

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE STAFF'S ENVIRONMENTAL ANALYSIS

The conclusions and recommendations presented in this section are those of FERC environmental staff. While our conclusions and recommendations were developed with input from the Coast Guard, COE, NMFS, EPA, and NYSDOS as cooperating agencies, each of these agencies may present its own conclusions and recommendations when it has completed its review of the proposed Project.

Based on the analysis included in this final EIS, we have determined that construction and operation of the proposed Project, with the adoption of FERC and Coast Guard recommendations, would result in limited adverse environmental impacts. Our assessment is the product of an interdisciplinary review by FERC staff and our cooperating federal and state agencies. Our assessment is based on the analysis and critical review of information compiled from field investigations; literature research; alternatives analysis; comments from federal, state, and local agencies; input from public groups and individual citizens; and information provided by Broadwater and its technical consultants. During construction, the primary impacts would be physical disturbance of the seafloor and related turbidity in the water column. During normal operation, the impacts of primary concern would consist of minor impacts to water quality, air quality, fisheries resources associated with impingement and entrainment, recreational boating and fishing, commercial fishing, and commercial vessel traffic, as well as minor to moderate impacts on visual resources. All impacts occurring during normal operation would continue through the life of the proposed Project.

We also assessed the potential impacts that would result from a release of LNG. The level of any such impacts would be dependent on many variables, such as the volume and location of the release, the time of year, and wind and wave conditions. However, in general the potential for impacts would be mitigated by the fact that Hazard Zone 1 and Hazard Zone 2 do not extend to shore anywhere along the Project Waterway. In addition, the possibility of a release from an LNG carrier is unlikely due to the safety and security measures that would be included in the Project design and operation, as well as the safety record of LNG shipping. There has never been a major release of LNG from an LNG carrier during more than 40 years of shipping.

As part of our analysis, we developed specific mitigation measures that we believe would appropriately and reasonably avoid, minimize, and/or mitigate environmental impacts resulting from construction and normal operation of the proposed Project. FERC and the Coast Guard also have identified mitigation measures that would minimize, to the extent possible, risks to the environment from non-normal operation of the FSRU and LNG carriers. We believe that these measures would further reduce the environmental impact that otherwise could result from implementation of the proposed Project, and we recommend that these measures be attached as conditions to any authorization issued by the Commission. In addition, the Coast Guard would include the required risk mitigation measures in its Letter of Recommendation if it finds the Project Waterway to be suitable for use by the LNG carriers with additional measures. We have concluded that if the proposed Project is implemented with the identified mitigation measures during design, construction, and operation, it would be an environmentally acceptable action.

5.1.1 Geology and Soils

Construction and operation of the proposed Project would have a minimal impact on geologic resources in the area, and the potential for geologic hazards or other natural events to significantly impact

the Project would be low. Because there is a remote possibility for seismic activity and subsequent soil liquefaction in the area of the YMS, we are recommending that Broadwater undertake appropriate geotechnical investigations and analyses to determine the potential for seismic soil liquefaction beneath the proposed YMS, and identify any appropriate mitigation measures to avoid or minimize potential impacts.

Construction and operation activities could result in direct physical disturbance of the seafloor, sedimentation, and sediment conversion. Pipeline installation, as proposed by Broadwater, would affect approximately 2,235.5 acres of the seafloor, with over 90 percent of this acreage attributed to anchor cable sweep from construction vessels. We recommend that Broadwater use mid-line buoys on all anchor cables of construction vessels to avoid and minimize potential impacts to the seafloor by reducing the seafloor disturbance associated with the anchor cable sweep from Broadwater's estimate of 2,020 acres to an expected 61.7 acres. Our recommendation also includes the potential use of a dynamically positioned vessel instead of an anchored lay barge, which would completely eliminate seafloor disturbance associated with anchoring and cable sweep. Broadwater proposes to use a subsea plow to excavate the pipeline trench, which would minimize the physical disturbance of sediment relative to other trenching methods. Broadwater proposes to actively backfill less than 10 percent of the trench length, and allow the remaining trench to naturally backfill. To minimize potential problems associated with the persistence of an open trench, we are recommending that Broadwater develop plans in coordination with appropriate federal and state resource agencies to actively backfill the entire length of the pipeline trench and to conduct post-construction monitoring.

Since Broadwater's proposal includes backfilling 2 miles of the trench (MP 0.0 to 2.0) with rock or engineered material, we are also including a recommendation for Broadwater to develop plans to backfill this portion of the pipeline in a manner that limits the permanent conversion of the surface substrate type. The long-term or permanent impact to sediment during construction would be reduced to a total of approximately 1.4 acres of softbottom sediment to hard substrate, including concrete (utility crossings), and metal (YMS footings). This conversion is considered permanent and would likely result in adverse impacts to some biological resources (such as benthic organisms) and benefit other organisms (such as some bivalves and crabs).

Installation of the pipeline would be accomplished by subsea plow for the majority of the pipeline route. Although subsea plowing would be efficient in the depositional, fine-grained sediment along most of the pipeline route, the larger substrate (sand, gravel, and bedrock) overlying the Stratford Shoal may prohibit the use of this method. In the event that the test plowing of Stratford Shoal is unsuccessful, Broadwater proposes contingency crossing methods for Stratford Shoal including either dredging or the use of concrete mats. Broadwater has provided general information on the potential contingency methods, impacts, and mitigation. However, we recommend that Broadwater provide a detailed contingency plan that identifies the specific alternative construction method, potential impacts, and mitigation measures that would be implemented to avoid and minimize potential impacts associated with pipeline installation across Stratford Shoal in the event that the proposed subsea plow is unable to excavate the trench. Further, if Broadwater pursues contingency dredging methods across Stratford Shoal, we recommend that Broadwater coordinate with EPA and COE to determine a suitable disposal site for dredge spoil.

5.1.2 Water Resources

Installation and operation of the YMS, FSRU, and subsea pipeline would occur offshore within the waters of Long Island Sound. The most substantial impacts to water resources associated with the proposed Project include increased turbidity during construction and water intake and discharge during operation. Staging for the proposed Project would be conducted from an onshore location at an existing

facility in either Greenport or Port Jefferson, New York. Other surface waterbodies, wetlands, and groundwater would not be affected by construction or operation of the proposed Project.

During construction, plowing the seafloor to create the pipeline trench would temporarily increase turbidity in the vicinity of active excavation activities. Turbidity modeling was conducted by Broadwater using standard modeling methods for this type of impact. The modeling results found that turbidity in the upper and middle depth strata of Long Island Sound would be less than 10 milligrams per liter (mg/L), and mostly less than 5 mg/L. Therefore, it is not expected that increases in turbidity in the surface layer would constitute a substantial visible contrast to natural conditions, which is in compliance with New York's water quality standards for SA-classified waters. Turbidity would be greatest in the bottom stratum with turbidity concentrations typically less than 14 mg/L, and rarely exceeding 20 mg/L more than 1,600 feet from active plowing. While plowing could last 3 to 4 weeks (the plow would move at a rate of about 1 to 2 miles per day, on average), suspended sediments would settle to the bottom or be assimilated into the ambient conditions of Long Island Sound within about 12 hours of seafloor disturbance. In addition, modeling indicated that minimal sedimentation would occur 300 feet or more from the trench (less than 0.1 inch).

Broadwater proposed the use of a copper-based anti-fouling paint on the FSRU. To minimize potential impacts to water quality, we are recommending that Broadwater use a silicon-based anti-fouling paint on the FSRU.

We are also recommending that Broadwater develop an offshore SPCC Plan to minimize the likelihood of a spill as well as to minimize environmental impacts in the event that a spill were to occur during construction or operation of the proposed Project.

During operation of the proposed FSRU and LNG carriers, seawater intake and subsequent discharge would be the primary impact to water resources. The large majority of the water intake for the daily operation of the FSRU would be used as ballast water, with minor volumes used for side-shell curtains (during LNG off-loading) and desalination. Averaged over the year, daily water intake for the FSRU would be 5.5 mgd, with a maximum intake of 8.2 mgd during periods when more ballast water is required due to peak rates of natural gas sendout. The temperature of the discharged water from the FSRU would be comparable to ambient conditions because most of the water volume taken in would be used as ballast. The frequency, rate, volume, and chlorine concentrations of the FSRU discharges would be monitored according to SPDES Permit requirements to minimize potential impacts to ambient water quality.

The greatest water use by LNG carriers would be by steam-powered LNG carriers. The majority of the water taken in by steam-powered LNG carriers would be used for ballast water and engine cooling. Annual daily water intake for steam-powered LNG carriers while at the proposed FSRU would average 22.7 mgd. The majority of this water would be treated with a biocide, sodium hypochlorite, and approximately 80 percent of it would be returned to Long Island Sound, with minimal residual sodium hypochlorite (the concentration would be between 0.01 and 0.05 ppm). The remaining 20 percent would be retained as ballast water for steam-powered LNG carriers when they leave Long Island Sound. As is standard for large steam-powered vessels that operate in Long Island Sound, the water used for engine cooling would have an elevated temperature upon discharge. The heated plume would generally rise vertically towards the surface mixing with cooler water and dispersing by currents. Modeling indicated that the average distance at which discharged water would be cooled to within 1.5°F of ambient temperature would be about 75 feet. These discharges would cause a minimal, localized impact on water quality conditions; however, impacts would last for the life of the proposed Project.

The next generation of LNG carriers is expected to consist of larger, diesel-powered carriers. It is estimated that these carriers would require less water (13.4 mgd), with approximately half of this volume used for ballast water and the other half used for engine cooling and returned to Long Island Sound. These diesel-powered LNG carriers would require considerably less water for cooling, and therefore the thermal discharges would be expected to be lower. Discharges from either steam-powered or diesel-powered LNG carriers would be conducted in accordance with federal and international regulations for the shipping industry.

As noted above, LNG carriers would take on ballast water to compensate for the weight being removed from the carrier while unloading LNG. Carriers would not be expected to discharge any ballast water along the Project Waterway.

Additional periodic water use for testing the fire-fighting system (monthly) and the cleaning the inert gas scrubber (every 5 years) would also be required. Periodic testing and maintenance would be conducted in accordance with SPDES permitting requirements.

In summary, water discharges from the proposed FSRU and the LNG carriers would result in minor impacts to the water resources of Long Island Sound.

5.1.3 Biological Resources

The primary biological impacts of the proposed Project during construction would be associated with direct disturbance of benthic habitat in the water column. During the operational phase, the primary impact would be the impingement/entrainment of eggs and larvae of fish and invertebrates.

Installation of the pipeline, as proposed by Broadwater, would directly disturb approximately 2,235.5 acres of benthic habitat. Nearly all of this impact (2,020 acres) would result from disturbance of the bottom due to anchor cable sweep. We determined that the use of mid-line buoys on all anchor lines would reduce the total seafloor impacts of the proposed Project from 2,235.5 to 263.6 acres, and we are including a recommendation that would require either the use of mid-line buoys or a dynamically positioned vessel (no anchoring). In addition, we are recommending that Broadwater actively backfill the excavated trench and develop plans to conduct post-construction monitoring in coordination with federal and state resource agencies. Physical disturbance of the benthic habitat during pipeline installation would likely result in mortality of relatively immobile benthic organism within the disturbed sediments, and displacement of more mobile organisms from the approximately 75-foot-wide pipeline construction corridor and the footprints of the YMS and anchors. Implementation of our recommendations to actively backfill the entire trench would accelerate recovery of the large majority of the benthic habitat disturbed during construction.

Localized increases in turbidity and sedimentation could result in temporary displacement of mobile organisms and potential stress to immobile organisms immediately adjacent to active plowing. However, it is anticipated that mobile organisms, biological activity in the water column, and ambient turbidity levels would return to normal soon after the completion of active construction. We have included a recommendation in Section 5.1.2 that would reduce the permanent conversion of soft bottom habitat to 1.4 acres. This conversion would adversely impact the benthic community that utilizes softbottom substrate, and likely benefit other biological communities that prefer hard substrate (such as some bivalves and crabs).

Operation of the proposed Project would require a daily average intake of approximately 28.2 mgd of seawater for the combined FSRU and LNG carrier intakes. Without any mitigation, it is anticipated that water intake would result in the impingement/entrainment of about 0.1 percent of the

ichthyoplankton in the central basin of Long Island Sound. To reduce impingement and entrainment, Broadwater has proposed to locate the intake structures of the FSRU at mid-depth (40 feet below the water surface), and limit intake flow velocities to 0.5 feet per second. Water discharges would be conducted in accordance with SPDES requirements and would incorporate measures determined by NYSDEC to minimize impacts to water quality and marine resources, although any impacts would continue throughout the life of the Project.

NMFS has designated the seafloor and the water column of Long Island Sound as EFH. In addition, NMFS has identified 19 fish species as EFH-designated species, including the early life stages of 9 fish species (Atlantic mackerel, cobia, king mackerel, ocean pout, red hake, scup, Spanish mackerel, windowpane flounder, and winter flounder), within the area of the proposed YMS, FSRU, and pipeline. Designated EFH also occurs within the LNG carrier transit route for various life stages of 30 additional species. Impacts to EFH and EFH-managed species would be comparable to those described above for the benthic and aquatic environment and for the marine biological resources of the Project Waterway. Our recommendations to reduce the extent, magnitude, and duration of impacts to the marine environment would also serve to avoid and minimize potential impacts to EFH. The primary impact to EFH-managed fish species would be associated with impingement and entrainment of organisms during operation of the FSRU and LNG carriers. As stated previously, water intake at the FSRU would affect about 0.1 percent of the ichthyoplankton in the central basin. Based on average ichthyoplankton densities, EFH-managed species would comprise less than 10 percent of the 0.1 percent of organisms affected. This small estimated impact may overestimate the actual impact because the eggs and larvae of the EFH-designated fish species that were reported in the ichthyoplankton surveys would not be expected to be found at those densities proximal to the mid-depth water intakes since they tend to be located near the water surface or near or on the bottom. Therefore, actual impingement/entrainment of EFH-designated species would likely be considerably less. An EFH assessment is included in Appendix J of this EIS.

Broadwater submitted a draft lighting plan that outlines general lighting conditions for the proposed FSRU. Broadwater has stated that the final lighting plan (which cannot be prepared prior to the final design phase for the FSRU) would be based on illumination lux levels that are consistent with offshore facilities and standard marine shipping practice. We also are including a recommendation for Broadwater to coordinate with NMFS and FWS to develop a detailed lighting plan that would be protective of avian species, fish species, and marine mammals.

Overall, impacts to marine biological resources from construction and operation of the proposed Project would not be expected to be significant. Construction impacts would be minor and generally temporary, although seafloor substrate conversion would be permanent. Operational impacts would be minor but would continue throughout the life of the proposed Project. Impacts to biological resources associated with the onshore facility would be negligible since the onshore facility would consist of the continued use of an existing dock, warehouse, and office space.

5.1.4 Threatened and Endangered Species

Our assessment of the potential impacts of the proposed Project to federally listed threatened and endangered species are based on information provided by FWS and NMFS. FWS stated that, except for occasional transient individuals, no threatened or endangered species within its purview occur in the proposed offshore Project area. FWS further stated its concurrence with FERC's determination that the proposed Project would not be likely to adversely affect federally listed avian species. NMFS identified seven federally listed threatened or endangered species, including four reptiles (loggerhead sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and green turtle) and three marine mammals (North Atlantic right whale, humpback whale, and fin whale) that could occur in the offshore area of Long Island

Sound. Additionally, a federally and state-listed threatened and endangered species (the shortnose sturgeon) may occur in the same area.

Impacts to federally listed threatened and endangered species associated with the proposed Project could include vessel strikes and underwater noise. In the open waters of Long Island Sound, the increase in vessel traffic associated with the proposed Project would represent a slight increase in large vessel traffic over current conditions (approximately 1 percent). Construction vessels, LNG carriers, and support vessels would use existing shipping routes to the maximum degree practical and travel at relatively slow speeds. During construction, Broadwater proposes to avoid the use of high-speed vessels, use biological monitors to identify listed species, and avoid observed or reported federally listed species and other marine mammals. Broadwater has developed a draft vessel strike avoidance plan in coordination with NMFS - Protected Resources Division. We are recommending that Broadwater continue coordination with NMFS - Protected Resources Division to finalize whale strike avoidance measures specific to the Broadwater Project.

Noise associated with construction of the proposed Project could temporarily limit the potential use of the proposed Project area in Long Island Sound by marine mammals and sea turtles during active construction; however, those species are expected to return to the area once construction has ceased. To reduce potential noise impacts to federally listed species and other resources, Broadwater proposes to initiate pile driving with low force, then gradually increase to full force to allow mobile organisms to leave active pile-driving areas. We recommend that Broadwater coordinate with NMFS to identify appropriate measures to minimize potential impacts of noise on biological resources during construction and operation. In addition, we are including a recommendation that Broadwater conduct pile-driving operations between the months of December and March to avoid impacts to sea turtles. We also recommend that Broadwater incorporate any additional conservation measures identified by NMFS into the Project. With implementation of these recommendations, the proposed Project would not be likely to adversely affect federally listed or state-listed species. In addition, we are recommending that Broadwater coordinate with NYSDEC to minimize potential impacts to state-listed species.

5.1.5 Land Use, Recreation, and Visual Resources

The primary concerns related to land use, recreation, and visual resources are associated with the offshore location of the proposed FSRU in Long Island Sound, recreational use of portions of the Sound, special use areas, and visual resources.

The seafloor below the proposed safety and security zone of the FSRU, and the submerged lands used for the permanent pipeline easement are currently held in public trust by the State of New York. Broadwater applied to NYSOGS to obtain an easement for Project components on or below the seafloor, with the actual spatial extent of the easement to be determined by NYSOGS and Broadwater. NYSOGS is required to complete a review to ensure that the granting of a lease would be consistent with State coastal policies. Part of this review would include input and recommendations from NYSDOS and NYSDEC. If the easement is granted, an easement fee or another type of payment would be negotiated between Broadwater and NYSOGS.

Pipeline installation would require two crossings of existing utilities; these crossings would be accomplished using specialized construction methods. To minimize potential impacts to these existing utilities, we have recommended that Broadwater consult with the utility companies, and develop site-specific construction plans to avoid impacts.

We considered four factors to assess the potential that the Project could spur industrialization of the Sound: secondary economic activity, economic clustering, entrepreneurial innovation, and

precedence. 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 offshore in Long Island Sound, and there is little indication that the existence of that facility increased development in the Sound or onshore. 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 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. In addition, it is not likely that approval and implementation of the Broadwater Project would stimulate new types of offshore industrial or commercial developments in Long Island Sound. Finally, if additional projects are proposed, each would be subject to federal, state, and local regulations, and the associated regulatory review processes prior to implementation. As a result, our analysis indicates that construction and operation of the proposed Project would not likely spur industrial development of Long Island Sound waters.

Recreational impacts during construction would be minimal based on the relatively low boating use near the proposed locations of the FSRU and pipeline. 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. Construction would be no closer than about 4 miles from the nearest shoreline, and generally farther from shore. In addition, Broadwater is proposing to construct the pipeline between October and April, months when recreational fishing and boating activities are generally reduced. As a result, construction of the pipeline would result in a minor, temporary impact to recreational boating and fishing.

The proposed 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, less than 0.1 percent of the total area of the Sound. As a result, the safety and security zone around the FSRU would not have a significant impact on general recreational use.

Recreational boating and fishing activities during operation could be affected by LNG carriers and their associated safety and security zones as they travel to and from the FSRU, with an estimated 2 to 3 carriers arriving per week. Boats could be temporarily displaced if they are fishing or recreating in areas that would intersect the safety and security zone around a carrier. This impact would be negligible along most portions of the carrier route due to the fact that most of the transit would occur through unconstricted, open waters that typically support low recreational usage. With the constriction and higher use of the Race, the potential for impacts is greater. 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. The width of the deeper main channel 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 main 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, there are also several other passages adjacent to the Race that recreational vessels could use as alternative routes to transit the area while a carrier is passing through the Race. Consequently, recreational vessels traveling through the Race could be affected, but would not be significantly affected since they could travel outside of the safety and security zone.

If the Coast Guard issues a Letter of Recommendation that finds the Project Waterway suitable for LNG marine traffic with conditions, one of those conditions would likely require that LNG carrier transits be scheduled to minimize the impact to other waterway users. As a result, the impacts to

recreational vessels transiting the Race would be minimized, but would occur periodically as long as the authorized activities continue.

Recreational vessels drifting or anchored in the path of an oncoming moving safety and security zone would be required to leave their location and remain outside the moving safety and security zone while the zone passes. These fishermen or boaters could relocate to the edge of the existing shipping channel or to nearby waters outside the main shipping channel. With the currently proposed moving safety and security zone passing by any one point in about 15 minutes, a recreational boater or fisherman might be displaced for about 40 to 60 minutes while weighing anchor, moving to the edge of the moving safety and security zone, waiting for the moving safety and security zone to pass, returning the boat to the original location, and resetting the anchor. The Coast Guard would conduct routine Broadcast Notice to Mariners, notifying the public of the implementation of the moving safety and security zone. Additionally, escort tugs and any Coast Guard escort vessels would serve as an additional layer of on scene notification with the LNG carrier. Because the Coast Guard would require that the LNG carriers transiting the Race avoid periods of peak usage to the extent possible, the impact of the Project on recreational vessels using the Race would be minor and of short duration when it did occur, but would occur periodically for the life of the Project.

Regattas could also be affected if their timing and location conflict with the approach of an LNG carrier. However, all regattas are subject to prior review and approval by the Coast Guard. It is anticipated that all practical attempts would be made to coordinate the transit of LNG carriers so that they would not conflict with a known regatta. The effect of LNG carrier transit on regattas would be minor and occasional but would occur for the life of the Project.

The onshore facilities proposed for use by Broadwater are existing waterfront use facilities situated in commercial/industrial areas. Activities associated with use of those facilities are not expected to impact recreation.

Although the entire Sound has been designated as an Estuary of National Significance, no wildlife management areas, marine sanctuaries, or state, federal, or local parks are within 9 miles of the proposed locations of the FSRU and YMS, or within approximately 4 miles of the proposed pipeline route. As required by the National Estuary Program, a Comprehensive Conservation and Management Plan was developed for Long Island Sound to meet the goals of Section 320 of the Clean Water Act. The Plan for the Sound was developed to protect and improve the health of the Sound while ensuring compatible human uses within the Sound's ecosystem. Areas of concern identified as top priorities include low dissolved oxygen levels, toxic contamination, pathogen contamination, floatable debris, and land use and development, along with their associated impacts to water quality, living resources, and habitat degradation. The proposed Project would not appreciably affect dissolved oxygen levels, increase pathogen contamination, generate floating debris, or result in a net degradation of habitat.

The nearest special use area, a trawling lane for commercial fishing, is located just north of the proposed YMS location. Up to 12 fishermen use the trawling lane. If the Coast Guard issues a Letter of Recommendation that finds the Project Waterway suitable for LNG marine traffic with conditions, it would likely incorporate one of the conditions identified in the Coast Guard's assessment (WSR) to establish a fixed safety and security zone for the FSRU. As currently proposed, the fixed safety and security zone for the FSRU would extend through much of the western portion of this trawling lane, and the Coast Guard would not allow trawling within the fixed safety and security zone without express permission. This would result in shorter trawl distances east and west of the safety and security zone. If those distances are considered unacceptable to the trawlers, trawling may be discontinued in that area or the lane may be moved to accommodate the current level of trawling. A second trawling lane is located farther north in Connecticut waters and would not be directly affected by the Project; however, increased

use of the northern lane could result from limiting use of the southern trawling lane. In addition, trawlers and fishermen located along the LNG carrier route could experience gear damage or use conflicts.

Project operation could result in a moderate, long-term impact to the fishing efforts of the commercial trawlers affected by the existence of the proposed fixed safety and security zone. However, Broadwater has proposed to offset the economic impact to the trawl fishermen who use the lane by providing compensation. We are recommending that Broadwater file the final compensation agreement that they develop with lobster and trawl fishermen. Broadwater has also agreed to compensate fishermen for damaged gear, and we are recommending that Broadwater file documentation of this process. Considering the limited number of affected parties and a mechanism for compensation, the impact to fishermen would be minor. No Special Use Areas would be affected by the onshore staging and support service areas.

The CTDEP conducts finfish and lobster sampling within survey transects established throughout the Sound, including within the trawling lane. The Coast Guard has stated that it likely would allow the agency to conduct sampling within the fixed safety and security zone, assuming that proper procedures are followed to receive approval from the Captain of the Port, and that conditions related to safety and security are acceptable at the time of sampling. If sampling is not permitted in the fixed safety and security zone, a small number of potential transect locations would be eliminated from the pool of potential transect sites. Under these circumstances, the agency would need to make minor statistical adjustments in its analyses before interpreting the longitudinal data set. This would result in a minor, long-term impact to the State of Connecticut's survey program.

There are no hazardous waste storage or disposal sites, or other offshore disposal sites, at or near (within about 3 miles) the proposed locations of the FSRU, YMS, or pipeline. Similarly, the moving safety and security zone along the proposed LNG carrier route would not intersect any of these sites. Plum Island, home to a U.S. Government laboratory for animal disease research, is approximately 1.3 miles south of the planned LNG carrier route and would not be affected by operation of the Project.

The primary impact to visual resources would be the presence of the 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. 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. From the closest shoreline vantage point, the FSRU and berthed LNG carrier would be similar in size to a paper clip held at arm's length. 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. In addition to our recommendation that Broadwater file a lighting plan to minimize potential impacts to visual resources (Section 5.1.3), we are also recommending that Broadwater file its final plan for the color scheme for the FSRU and YMS for review and approval prior to construction.

Based on our assessments and a visual resource analysis conducted by Broadwater in accordance with NYSDEC's procedures, the Project would have a minor, long-term impact on the visual resources of Long Island Sound. Given the number and sensitivity of current viewers in the central portion of the Sound, the impact in that area would be moderate and long term; there would be little or no effect on views from other portions of the Sound. This impact is not expected to change the public value of the viewshed or alter the value of shorefront property or recreation.

Broadwater has submitted a Coastal Zone Management Act consistency certification to NYSDOS and a supplement to the certification that includes the anticipated coastal zone effects associated with implementing the proposed safety and security measures included in the Coast Guard's WSR. NYSDOS is currently reviewing Broadwater's documents. We understand that, after the final EIS is issued, NYSDOS will determine whether the proposed Project would be consistent with the New York State Coastal Management Program, including the Long Island Coastal Management Plan; the Local Waterfront Revitalization Programs adopted by Smithtown, Southold, and Greenport; and the Harbor Management Plan of Port Jefferson. We are recommending that Broadwater file the NYSDOS consistency determination prior to installation activities in Long Island Sound.

We considered the issue of the Project potentially being in conflict with the Public Trust Doctrine. This doctrine is not a promulgated law but is essentially common law for the Sound. Many other commercial and industrial uses of the Sound have been approved by the responsible agencies, including power cables, fiber optic cables, natural gas pipelines, active disposal sites, oil transfer platforms, ferry services, extensive commercial shipping, and commercial vessel lightering. We believe that implementation of the Project with our recommended mitigation measures would help meet the energy needs of the region with minimal impacts and would therefore be in the public interest. However, legal issues related to the Public Trust Doctrine are not part of a NEPA environmental review and have therefore not been addressed in this final EIS. It is our understanding that NYSDOS and other New York agencies will consider those issues in their reviews.

5.1.6 Socioeconomics

Construction would require approximately 205 full-time equivalent positions for 1 year; local workers could fill approximately 82 of these full-time equivalent positions. About 60 full-time positions would be supported during operation; many of these positions would likely be filled from outside the local labor pool. These employment opportunities and worker migrations would have a minor impact on Suffolk County's population, employment, and housing.

Using the IMPLAN software program, Broadwater estimated that the Project-related increase in federal tax revenues would be \$864,000 during construction; the increase in local tax revenues would be about \$1,061,000. During operation, the Project-related increment to federal tax revenues would be \$1,763,000 and the increase in local tax revenues would be \$3,426,000 annually. These increased revenues are expected to exceed any increases in the demand for public services. Broadwater has also proposed a payment in lieu of taxes to local government authorities of approximately \$15 million per year. This would represent a minor increase in tax revenues that would continue for the life of the Project. As described below, additional funding would be provided to local emergency planners/responders, and to state and local law enforcement agencies that may assist the Coast Guard.

We evaluated the potential economic impacts of the Project on recreational and commercial fishing, the industries associated with those activities, and tourism. We also considered the potential effect of the proposed Project on property values. Our assessment indicated that the Project would not affect property values and that the potentially negative economic impacts to commercial fishermen, tourists, and the industries that support them would be negligible or fully mitigated. Impacts to commercial fishermen would be addressed as part of Broadwater's compensation package. However, Broadwater has not yet negotiated the compensation agreement with commercial fishermen. Therefore we recommend that, prior to initiation of operation, Broadwater file with the Secretary documentation of completion of its final compensation agreements with the affected commercial fishermen.

We also considered the potentially positive economic effects of potential increases to energy reliability and reductions in energy price levels and volatility. We noted that a report prepared for LIPA

(Levitan & Associates 2007) estimated the potential economic benefits associated with Broadwater that might accrue in New York State. Direct benefits to gas utility customers were estimated to be \$4.6 billion; direct benefits to electric utilities were estimated to be \$10.2 billion.

5.1.7 Marine Transportation and Onshore Traffic

Potential impacts to marine transportation during construction could result from an increase in vessel movements in Long Island Sound and from establishment of a construction zone that would limit use of the waters of the construction area to vessels associated with the Project. We are recommending that Broadwater file written documentation that it has coordinated delivery of the FSRU and YMS to the proposed installation site with the Coast Guard and ferry companies. We find that any impacts to transportation associated with FSRU and YMS installation and pipeline construction would be minor and temporary.

During operation, potential impacts to marine transportation could result from establishment of the proposed fixed safety and security zone around the FSRU, increased vessel traffic (LNG carriers and support vessels), periodic pipeline maintenance, and establishment of a proposed moving safety and security zone around each LNG carrier. In the WSR, the Coast Guard has proposed safety and security zones for the FSRU and the LNG carriers as part of its assessment of the suitability of the Project Waterway. For the FSRU, a fixed circular zone with a radius of 1,210 yards (0.7 mile) from the center of the YMS has been proposed for the duration of the Project. If the Coast Guard issues a Letter of Recommendation that finds the Project Waterway is suitable for LNG marine traffic with conditions, one of the conditions based on the Coast Guard's WSR would likely be to require that Broadwater include equipment and incorporate procedures into the Project that would minimize impacts to marine transportation. The Coast Guard would also implement procedures to minimize impacts and to manage the potential risks.

Some commercial shipping vessels would need to make adjustments to the traditional commercial vessel east-west route along Long Island Sound to avoid the fixed safety and security zone around the FSRU. We found that impacts to vessel traffic routing would be minor but would last for the life of the Project.

If the Coast Guard issues a Letter of Recommendation that finds the Project Waterway suitable for LNG carrier traffic, it would also initiate procedures to establish a moving safety and security zone around each inbound and outbound LNG carrier. This moving safety and security zone would extend about 2 nautical miles (2.3 miles) in front of the bow, about 1 nautical mile (1.2 miles) behind the stern, and 750 yards (about 0.4 mile) to each side of the vessel. Along the proposed LNG carrier route, marine vessel congestion is the greatest in the Race. As noted in Section 5.1.5, even within the most constricted portion of the Race, there would be room available for use by small vessels when LNG carriers are passing through. The total distance between the edges of the moving safety and security zone and the edges of the main 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.

The Race is a critical waterway connecting Block Island Sound and Long Island Sound; it is used for national defense, commerce, and recreation. In its WSR, the Coast Guard has made a preliminary determination that the risks associated with the moving safety and security zone around the LNG carriers on other waterway users could be effectively managed. The Coast Guard would determine which vessels could use the Race while a carrier is in transit through the Race, but there would be sufficient area for both a carrier and small vessels at the same time. In addition, several other passages near the Race can accommodate the drafts of many commercial and recreational vessels and could be used as alternative routes. Commercial shipping and fishing vessels would occasionally need to make minor adjustments in

their routes or travel speeds to avoid an LNG carrier and its associated safety and security zone, resulting in minor impacts that would occur periodically for the life of the Project. The time required for an LNG carrier and its associated safety and security zone to pass a single point would be approximately 15 minutes. This could result in a time loss for a ferry or other vessel crossing the path of a LNG carrier. Although most ferries would experience minor impacts at most, there is a potential for regular conflict between the moving safety and security zones of the carriers and the ferries operated by Cross Sound. However, the Coast Guard has determined that, if the Project is approved for operation and if the threat environment of the Project Waterway remains at its current level or lower, it would permit ferries to transit through the proposed moving safety and security zone around the LNG carriers. The Coast Guard would discuss the specifics of such transits with Cross Sound. Since the threat environment is dynamic, as it changes the Coast Guard would re-evaluate the specifics of the transits by the ferries and communicate any required operational revisions to Cross Sound. Therefore, the potential impacts of LNG carrier traffic to ferry operations would continue for the life of the Project, but would be minor.

Broadwater would lease existing facilities in either Port Jefferson or Greenport, New York to provide office support, warehousing, and waterfront access for tugs and vessels servicing the Project. Because the vast majority of offshore construction workers would be housed offshore, they would not be associated with onshore transportation, except for occasional trips to the onshore support facility for transport to and from the construction barges. Because of the incidental nature of the tug and other support vessel departures and returns during operation, and because the types of vessels involved would be consistent with existing vessel traffic, the impact to marine transportation at these ports is considered minor but would last for the duration of the Project.

Potential impacts to onshore traffic during construction would be associated with transport of workers, supplies, and materials to the onshore support facilities. However, since the FSRU and components of the YMS would be towed to the site, and pipe would be shipped via barge from the Port of New York/New Jersey to the lay barge, there would not be a major increase in onshore traffic in the vicinity of the onshore support facilities during construction. Onshore traffic during operation, at either the Greenport or the Port Jefferson waterfront sites, would be minor and would continue for the life of the Project.

5.1.8 Cultural Resources

Cultural resources surveys conducted by Broadwater included remote sensing surveys (magnetometry, side-scan sonar, and sub-bottom profiling) that identified nine targets as potential archeological deposits. All nine targets are within the temporary anchoring area of the construction vessels. Based on consultation with the SHPO, Broadwater has proposed avoiding the nine targets by maintaining a minimum 100-foot-wide buffer zone around the detectable limits of each target. We concur with this approach. In addition, as noted above, we are recommending that Broadwater use mid-line buoys on all anchor cables of construction vessels (or a dynamically positioned lay barge) to avoid and minimize potential impacts to the seafloor associated with the anchor cable sweep.

The Greenport onshore facility is adjacent to two NRHP-listed historic districts and the location of the temporary onshore storage and concrete coating yards have not been identified. We recommend that Broadwater defer construction and use of all proposed facilities until the Director of OEP reviews and approves all cultural resources reports and plans, and notifies Broadwater in writing that it may proceed with treatment or construction.

5.1.9 Air and Noise

Offshore construction activities would result in emissions from marine vessels used to install the proposed FSRU, the YMS, and the pipeline. There would be no emissions in the U.S. associated with fabrication of the FSRU. To ensure that construction emissions do not contribute to the typical ozone season in the Project area (May 15 through September 15), we are including a recommendation that Broadwater conduct all local activities associated with construction of the proposed pipeline and YMS outside of the ozone control period unless otherwise allowed by NYSDEC. Because most of the construction-related activities would take place at least 4 miles offshore, air pollutant emissions would not interfere with, or create a nuisance for, the general public.

All emission sources identified for operation of the FSRU are associated with combustion of natural gas and diesel fuel that would generate air emissions throughout the life of the project. The major source thresholds for a 1-hour ozone standard nonattainment area apply to the proposed Project in accordance with NYSDEC regulations 6 NYCRR 201-2.1(b)(21)(iii)(a). However, the D.C. Circuit Court recently clarified its position with respect to the 8-hour ozone implementation rule, essentially ruling that conformity only needs to be demonstrated to the 8-hour ozone standard. Because the proposed Project's potential to emit NO_x is greater than the major source threshold in the New York SIP, the Project is a proposed major source subject to nonattainment NSR. Additionally, FSRU operations would result in annual PM_{10} emissions that are greater than 15 tpy, triggering an analysis of the secondary formation of $\text{PM}_{2.5}$, according to NYSDEC. The FSRU operational air emission levels were determined to be less than the applicable PSD major source thresholds.

We have analyzed air modeling results that Broadwater submitted and determined that there would be exceedances of the NAAQS for 24-hour $\text{PM}_{2.5}$, 3-hour SO_2 , and 24-hour SO_2 from combined facility and FSRU emissions with the LNG carriers using 4.5 percent sulfur fuel. Based upon this analysis, we are recommending that Broadwater develop a plan to limit the sulfur content of the fuel to a 2.7 percent annual rolling average as well as a 3.2 percent maximum. This mitigation should minimize the SO_2 and $\text{PM}_{2.5}$ impacts from the facility.

EPA Region 2, in a letter dated August 9, 2007 determined that the Project is not subject to PSD requirements based on a preliminary assessment of PSD non-applicability. Broadwater must still demonstrate that emissions do not exceed PSD applicability thresholds. Broadwater will submit a plan to monitor and demonstrate compliance with its annual PSD limit as part of its Title V Operating Permit application. Although the FSRU does not require review under the PSD requirements, Broadwater has submitted an application for an Air State Facility Permit in accordance with NYSDEC regulations for pre-construction approval under New York's NSR program. Broadwater will submit an application for a Title V Operating Permit within 1 year after commencement of commercial operation under 6 NYCRR 201.6.3(a)(2). With implementation of the mitigation and offsets determined by NYSDEC, and adherence to the applicable permit requirements, impacts to air quality during FSRU operation would be insignificant but long term, continuing for the life of the Project.

Emissions would be produced by LNG carriers during transit to and from the FSRU, and by support vessel activity during routine operation of the FSRU. Vessels used for routine operation of the FSRU include the LNG carriers, tugs, and supply vessels. Direct emissions of PM_{10} would be less than the applicable threshold; therefore, $\text{PM}_{2.5}$ emissions would be less than the applicable threshold. NO_x emissions are expected to exceed the applicable threshold, and Broadwater may be required to develop measures to offset these emissions based on consultation with NYSDEC.

Section 176(c)(1) of the CAA requires Federal agencies to assure that their actions conform to applicable State implementation plans (SIPs) for achieving and maintaining the NAAQS for criteria

pollutants. For there to be conformity, a Federal action must not contribute to new violations of standards for ambient air quality, increase the frequency or severity of existing violations, or delay timely attainment of standards in the area of concern (e.g., a State or a smaller air quality region). As the New York SIP budget components that affect Broadwater are currently in development, Broadwater has initiated discussion with NYSDEC regarding General Conformity and the Project's emissions that are subject to General Conformity. Project emission data have been submitted to NYSDEC and are being evaluated by NYSDEC for incorporation into the SIP emission budget for the relevant ozone SIPs.

The General Conformity Analysis for the proposed Project indicates that the Project would be constructed and would operate in conformance with the New York SIP under the current 1-hour ozone standard, insofar as it applies in the future. Broadwater anticipates that measures undertaken in conformance with the 1-hour ozone SIP will similarly conform under the 8-hour SIP, currently being revised by the NYSDEC. Upon the determinations concerning the SIP budgets, Broadwater will continue to coordinate with FERC, NYSDEC, and USEPA to satisfy the applicable General Conformity requirements. Appendix K contains a preliminary General Conformity Analysis. FERC will evaluate the magnitude and potential impact of the emissions and determine whether mitigation is necessary.

Noise would be generated during construction of the pipeline, during installation of the YMS, and during installation and operation of the FSRU. Since construction would occur during two consecutive winter seasons, when recreational boating is relatively low, the construction impacts to human receptors would be minimized. Pile-driving the four legs of the YMS would be the primary contributor to increasing noise levels. Because only one leg would be installed at a time and each leg would take approximately 1 week to install, noise associated with this phase would last 3 to 4 weeks for no more than 12 hours per day (pile-driving would not be conducted at night).

Several operational components of the FSRU would generate noise, including generation equipment, pumps, compressors, and other rotating equipment. Much of the equipment on the FSRU would be located below deck, and enclosures would be used on certain equipment to further reduce noise emissions. Operational noise would not be audible from shore, and noise modeling predicted that, at the boundary of the safety and security zone (1,210 yards [0.7 mile] from the YMS), the operational noise level would be less than 53 dBA; that is less than the noise level that would interfere with normal conversation. The noise associated with LNG carriers under transit would be comparable to other large ships and the Project would increase commercial shipping vessels by approximately 1 percent of the existing commercial vessel traffic in Long Island Sound; therefore, the incremental contribution of LNG carriers to existing shipping noise would not be significant. Thus, there would not be any significant noise impacts to humans during construction or standard operations.

5.1.10 Reliability and Safety

The proposed facility would incorporate design and engineering components of an LNG import facility, and an offshore marine facility, as well as features similar to those of an LNG carrier. Consequently, FERC and Coast Guard staff jointly reviewed the proposed engineering design of the FSRU and the YMS based on each agency's respective expertise. 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 also are recommending 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 NVIC 03-05 "*Guidance for Oversight of Post-Licensing Activities Associated with Development of Deepwater Ports.*" The Coast Guard, the selected certifying entity, and FERC would review the facility during design, construction, and operation for compliance with applicable standards. Compliance or demonstrated equivalency with the standards of NFPA 59A, 49 CFR 193, Gas Ship Rules, and other standards would mitigate the risk of failure of facility

components and the associated LNG release and fire hazard. These measures, in addition to our recommendation that Broadwater maintain compliance with classification society rules 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.

The Coast Guard Captain of the Port of Long Island Sound prepared a WSR that assesses the suitability of the Project Waterway to support LNG carrier traffic with respect to navigation safety and maritime security. In that document, the Coast Guard reported its preliminary determination that, to make the waters of Rhode Island Sound, Block Island Sound, and Long Island Sound (the Project Waterway or the involved waterways) suitable for LNG vessel traffic and the operation of the FSRU, additional measures would be necessary to responsibly manage the potential safety and security risks to navigation safety and maritime security associated with Broadwater's proposal. As described in the WSR (Appendix C), Coast Guard Sector Long Island Sound currently does not have the resources required to implement the measures that have been identified as being necessary to effectively manage the potential risk to navigation safety and maritime security associated with the proposed Project in addition to current levels of mission activity. Obtaining the required resources would require either curtailing current activities within the Sector, reassigning resources from outside of the Sector, or for the Coast Guard to seek additional resources through the budgets process. The proposed Project would not be allowed to initiate operation unless adequate Coast Guard resources were available to maintain an acceptable level of safety and security following a review of the current maritime security requirements.

After completion of the EIS process, the Captain of the Port will issue a Letter of Recommendation to Broadwater. The Letter of Recommendation will be based on the WSR and will be the official determination regarding the suitability or unsuitability of the Project Waterway to support the proposed LNG facility and associated LNG carrier traffic. If the Coast Guard determines the Project Waterway to be suitable, it may stipulate the specific operating procedures that Broadwater would be required to follow based on the additional measures identified in the WSR that would be necessary to responsibly manage the potential risks to navigation safety and maritime security associated with the FSRU.

The FSRU would be approximately 9 miles from the nearest shoreline. If the Coast Guard issues a Letter of Recommendation that finds the Project Waterway suitable for LNG carrier traffic with conditions, one of those conditions identified in the WSR would likely be to establish a circular-shaped safety and security zone around the YMS with a radius of 1,210 yards (0.7 mile) from the center of the YMS. There would be no risk to onshore receptors from the thermal impact of a pool fire or from an ignitable vapor cloud from the FSRU based on Project-specific modeling. The fixed safety and security zone around the FSRU would mitigate security risks, and would reduce risks to recreational, commercial, and fishing vessels. In the unlikely event of a large LNG spill without ignition, vessels in the Project vicinity could be exposed to, and could provide an ignition source for, the ignitable vapor cloud.

In addition to the LNG inventory onboard the FSRU, other hazardous materials would be received, stored, and used onboard - including aqueous ammonia. These hazardous materials would be handled and stored in accordance with applicable federal and state regulations to minimize the potential for accidental release.

The FSRU would be moored in place by a YMS that would be secured to the seabed. The YMS would be designed to withstand the forces of the high wave and wind conditions that would occur with storms of greater severity than a 100-year storm. Using conversion factors to compare the YMS design criteria to the characteristics of the Saffir-Simpson Hurricane Scale, the YMS would be designed to withstand a Category 5 hurricane, and our analysis of storm frequency and severity indicated that there is little likelihood that a hurricane exceeding Category 3 would reach Long Island Sound.

Although there is a potential for an increased risk to public health and safety due to operation of the LNG carriers, we consider the potential risk to be very low. The LNG carriers would be subject to Coast Guard inspection and enforcement practices. If the Coast Guard issues a Letter of Recommendation that finds the Project Waterway suitable for LNG carrier traffic with conditions, one of the conditions identified in the WSR would be to establish a safety and security zone for each inbound and outbound carrier. This moving safety and security zone would extend about 2 nautical miles (2.3 miles) in front of the bow, about 1 nautical mile (1.2 miles) behind the stern, and 750 yards (about 0.4 mile) to each side of the vessel.

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 1.4 miles (Fishers Island) to 1.3 miles (Plum Island) from the routes. LNG carriers would be subject to Coast Guard requirements that will be presented in the Letter of Recommendation (and are summarized in the WSR), including establishment of a safety and security zone around both incoming and departing carriers as described above. Separately, LNG carriers are currently subject to existing international and domestic regulatory safety and security requirements.

The outer limits of Hazard Zone 1 and Hazard Zone 2, which were calculated for the LNG carrier transit routes and the FSRU, would not reach the shoreline. Therefore, a pool fire associated with a release of LNG at either the FSRU or an LNG carrier along the proposed transit route would not be expected to affect shoreline habitats. Portions of Hazard Zone 3, which only spreads in the absence of an ignition source, could intersect with the shoreline at a few locations in the vicinity of the Race, but the exposure period would be short and temporary. However, 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. In addition, as noted above, even if there were a major release of LNG from a carrier, it is unlikely that Hazard Zone 3 would reach its maximum estimated width since it is unlikely that a major spill would occur in the absence of an ignition source.

Our assessment of the proposed pipeline also considers the risk to human health and safety to be very low. The pipeline would be designed, constructed, and operated in accordance with federal standards, and the proposed system incorporates several types of safety equipment and procedures to limit the release of natural gas in the event of an accident. In addition, the pipeline would be located at least 4 miles from the nearest shoreline. If a pipeline rupture occurred, there would be no potential for fire or explosion until the gas reached the surface of the water. Once at the surface, the gas would dissipate into the atmosphere. If an ignition source were present and if the air/methane mixture were in the range of 5 to 15 percent methane in air, then a fire could occur. The gas flow in the pipeline would be shut off and the fire would likely burn until all of the gas released from the pipeline had surfaced. An explosion would likely not occur at the surface since it is unlikely that the gas would be released into a confined space. There would be little likelihood that either environmental impacts or risks to human health and safety would result.

5.1.11 Impacts of an LNG Release

The transit corridor for the LNG carriers would traverse open water and estuarine habitats within Rhode Island, Block Island, and Long Island Sounds. Shoreline habitats in the general vicinity of the routes support a wide variety of species, and human population densities vary from low to high (see

Figures 3.0-1 through 3.0-8). Under each of the applicable resource impact assessments in Section 3.0 we have included an analysis of the impacts to those resources based on a release of LNG.

In general, any accidental or intentional release of LNG along the transit route would likely have temporary but substantial impacts in the vicinity of the release due to potential impacts of extreme heat and/or extreme cold. Because LNG is a cryogenic liquid, the greatest threat to aquatic life would be thermal stress. Any aquatic life (including plankton, fish, birds, sea turtles, marine mammals, and any federally listed species) that came into contact with the LNG would probably experience a sudden cold shock and, depending on what context that contact occurred, the exposure could be lethal, especially for non-motile species. Wildlife occupying the water's surface near the release and within the developing vapor could suffer asphyxiation.

The direct impacts of an LNG fire along the LNG carrier transit route would be mostly limited to the open waters of Long Island Sound since the nearest occupied land (Plum Island) along the route would be farther than the extent of the hazard zones associated with an LNG pool fire. Specifically the LNG carrier transit route would be located about 1.3 miles from Plum Island, 1.4 miles from Fishers Island, 1.8 miles from Rocky Point, and about 3.9 miles from Great Gull Island. For the FSRU, none of the hazard zones would reach a shoreline.

During normal transits of an LNG carrier, Hazard Zones 1 and 2 would remain over open water. The maximum extent of Hazard Zone 3 would intersect the shoreline at the following locations: the northern tip of Block Island, Rhode Island; the southern tip of Weekapaug Point, Westerly, Rhode Island; the southern tip of Watch Hill, Rhode Island; all of Fishers Island, New York; all of Plum Island, New York; the northeastern most third of the North Fork of eastern Long Island, New York; a portion of Goshen Point straddling the City of New London, Connecticut; and the town of Waterford, Connecticut.

Hazard Zone 3 represents another level of improbability because it would exist only if a release occurs and there is no ignition source encountered within any resulting vapor cloud within at least 1.2 miles of the release (the outside edge of Hazard Zone 2). For Hazard Zone 3 to develop, there must be no potential ignition sources associated with the catastrophic incident causing the release and no ignition source associated with the LNG carrier, support tugs, escort ships, or any other marine vessels within 1.2 miles of the release. In this unlikely scenario, the vapor cloud would extend into Hazard Zone 3 where it would either disperse based on the prevailing conditions or encounter an ignition source. At the first encounter with an ignition source, the vapor cloud would burn back to the source.

Because of the extensive operational experience of LNG shipping, the structural LNG carrier design, and the navigational safety and security controls further described in Section 3.10 and the WSR (Appendix C), the likelihood of a substantial LNG release occurring would be remote.

5.1.12 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 (one of which is currently proposed for replacement), two offshore oil transfer platforms, and two proposed offshore dredged material disposal sites.

We determined that, while other 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 remaining impact of the Eastchester Expansion Pipeline Project and

the proposed Islander East Pipeline Project have the potential to contribute discernable cumulative impacts to the Project area. Therefore, we evaluated these two projects more closely. Incomplete backfilling along the Eastchester route has resulted in the persistence of a trench or depression along portions of the pipeline route. To minimize similar problems with the proposed Project, we have recommended that Broadwater coordinate with appropriate federal and state resource agencies to develop appropriate plans to actively backfill the entire trench immediately after pipeline installation and conduct post-construction monitoring to assess the success of backfilling.

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, construction of the two projects would not overlap unless construction of Islander East occurred in 2009 or 2010. Additionally, the type of project, construction methods, and impacts 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.

We believe that impacts associated with the proposed Broadwater Project would be relatively minor, and we have included recommendations in this EIS to further reduce the environmental impacts associated with the Broadwater Project. 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.

5.1.13 Alternatives

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

Coast Guard

The proposed action before the Coast Guard, which is also its preferred alternative, is to issue Broadwater a Letter of Recommendation finding the waterway suitable for LNG marine traffic with conditions. Alternatives considered by the Coast Guard consisted of the following:

- Issuing a Letter of Recommendation finding that the Project Waterway is suitable without the implementation of additional measures;
- Issuing a Letter of Recommendation finding that the Project Waterway is unsuitable (No-Action Alternative); and
- Issuing a Letter of Recommendation finding that to make the Project 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 Project Waterway to be suitable for LNG carrier traffic in response to Broadwater's Letter of Intent associated with the proposed FSRU would allow the FSRU to receive LNG by carriers. This would allow the Project to operate if Broadwater receives FERC authorization and certification as well as the other permits and approvals required for construction and operation of the Project. This would result in meeting the energy needs of the target market for the Project. A determination that the Project Waterway is suitable could be rendered with or without additional measures. As a part of the assessment reported in the WSR, the Coast Guard made the preliminary determination that additional measures would be necessary to make the Project Waterway suitable for LNG carrier traffic. The Coast Guard considers those measures necessary to responsibly

manage the safety and security risks associated with the proposed FSRU and LNG carriers. Therefore, the alternative of issuing a Letter of Recommendation finding the Project Waterway suitable for LNG marine traffic without additional measures is not considered reasonable and was not addressed further.

If the Coast Guard issues a Letter of Recommendation that finds the Project Waterway unsuitable for LNG marine traffic, the involved waterways would continue to be used as they are currently and the environmental impacts associated with issuance of a Letter of Recommendation with specific conditions would be avoided. With that alternative, the purpose and need of the Project would not be met, the region's increasing energy demands would not be met, and the potential impacts associated with the Project would not occur (as described below).

FERC

We determined that, with the No-Action and Postponed-Action Alternatives, the projected energy needs for the New York City, Long Island, and Connecticut markets would not be met and that none of the existing or proposed pipeline systems or LNG terminals could meet the energy needs for the target markets without substantial system upgrades that would result in greater environmental impacts than those of the proposed Project. In addition, these alternatives would generally not provide a diversification of natural gas sources or Broadwater's stated objective of providing an imported source. Further, the alternatives do not provide storage for natural gas.

Proposed renewable energy projects in New York State and Connecticut were evaluated including proposed wind and tidal energy projects. Existing renewable energy projects were also evaluated such as Connecticut's landfill gas generation and fuel cell programs. 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.

In considering potential LNG terminal-type alternatives and 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 Project objectives. Each of the alternative types of terminals considered in our evaluation would result in greater environmental impacts than the impacts associated with the proposed FSRU design.

We evaluated the proposed Safe Harbor Energy Project as an alternative. That project, if approved and constructed, would be located in the Atlantic Ocean about 13 miles south of Long Beach, Long Island. Construction and operation of the proposed Safe Harbor Energy Project would result in nearly twice the seafloor impacts as the proposed Broadwater Project. Further, the project, as currently proposed, would not be capable of directly supplying comparable volumes of natural gas to New York City or Connecticut.

We also evaluated the alternative of energy derived from renewable resources combined with natural gas derived from any of the proposed LNG terminals in the Northeast. The expected impacts would be greater than those of the proposed Project due to the infrastructure improvements required to (1) transport natural gas to the interstate pipeline systems in Connecticut and from there across Long Island Sound to New York City and Long Island, or (2) transport natural gas to the Transco pipeline and from there to the Long Island and New York City markets.

An onshore LNG facility 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 a GBS terminal would result in much greater seabottom impacts than an FSRU and would require that the facility be closer to shore in Long Island Sound than the proposed Project. An SRV LNG terminal also would result in greater seabottom impacts than those of the proposed Project, and would not provide the LNG storage benefits of an FSRU. Further, only two areas within Long Island Sound have water of sufficient depth to allow operation of an SRV; an SRV constructed at either of these locations would result in greater impacts to marine transportation, recreational boating and fishing, benthic resources, and visual resources. Recent SRV-type projects have added storage capabilities by permanently mooring an LNG carrier at one of the transfer buoys. Essentially, this configuration is similar to an FSRU and would be expected to exhibit the suite of impacts associated with both the SRV and FSRU configurations.

We determined that an FSRU sited in the central portion of Long Island Sound would maximize the distance of the LNG terminal from the shoreline and minimize the associated visual impacts and potential conflicts with marine commercial traffic. It also would avoid potential impacts to shellfish beds and other nearshore marine communities.

The sendout pipeline route for the proposed Project was selected based on the desire to balance the need to minimize impacts to the environment with the engineering constraints on potential interconnection locations with the IGTS pipeline. Construction of the proposed interconnection to the IGTS pipeline would allow delivery of natural gas to the target markets without the need for additional upgrades to the IGTS system and the associated environmental impacts that would be in addition to those of the proposed Project. The pipeline route identified for this Project would limit the length of pipeline (and associated marine bottom impacts), maintain the desired average throughput of 1 bcfd, and maintain the 9-mile offset between the FSRU and the closest shoreline. While shortening the pipeline length would reduce construction impacts for a year or two, it would result in the proposed Project being located closer to heavy ferry traffic, marine transportation routes, and coastal features throughout the life of the Project.

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 88 percent from what would occur using the conventionally anchored lay barge proposed by Broadwater. Consequently, 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 proposed Broadwater Project includes a vaporization system that would convert LNG into natural gas. In its initial design, Broadwater considered the use of an SCV system, which would have been less costly to construct and operate than the proposed system. After evaluating the air emissions from the SCV system and consultation with NYSDEC, Broadwater decided to switch to the currently proposed STV system to reduce air emissions. An alternative vaporization system that uses flow-through seawater could be incorporated 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 less expensive to operate, Broadwater rejected it to avoid the substantial increase in entrainment and impingement of marine organisms that would occur with a 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 are including recommendations that would modify the Broadwater proposal to further minimize and avoid impacts.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission approves the proposed Broadwater LNG Project, we recommend that the Commission's authorizations include the measures below. We believe these measures would further mitigate the environmental impacts associated with construction and operation of the proposed Project.

In general, the recommendations specified below include a timing component that dictates when these measures must be completed and submitted for FERC's review. The timing component designated for each recommendation is based on a practical approach for the overall Project review and oversight.

1. Broadwater shall follow the construction procedures and mitigation measures described in their applications, supplemental filings (including responses to staff data requests), and as identified in the EIS unless modified by the Commission's Order. Broadwater must:
 - a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
 - b. justify each modification relative to site-specific conditions;
 - c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
 - d. receive approval in writing from the Director of OEP before using that modification.
2. For pipeline facilities, the Director of OEP has delegation authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the Project. This authority shall allow:
 - a. modification of conditions of the Commission's Order; and
 - b. design and implementation of any additional measures deemed necessary (including stop work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from Project construction and operation.
3. For LNG facilities, the Director of OEP has delegated authority to take all steps necessary to ensure the protection of life, health, property, and the environment during construction and operation of the Project. This authority shall include:
 - a. stop-work authority and authority to cease operation; and
 - b. design and implementation of any additional measures deemed necessary to assure continued compliance with the intent of the conditions of the Order.
4. **Prior to any construction**, Broadwater shall file an affirmative statement with the Secretary, certified by senior company officials, that all company personnel, environmental inspectors (EIs), and contractor personnel will be informed of the EI's authority and have been or will be trained on implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.
5. The authorized facility locations shall be as shown in the EIS, as supplemented by filed alignment sheets, and shall include the staff's recommended facility locations. **As soon as they are available, and before the start of construction**, Broadwater shall file with the Secretary revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all

facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

6. Broadwater shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations and staging areas, pipe storage yards, and other areas that will be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species will be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction** in or near that area. This requirement does not apply to route variations recommended in this EIS or minor field realignments that do not affect sensitive environmental areas. Examples of alterations requiring approval include all route realignments and facility location changes resulting from:
 - a. implementation of cultural resources mitigation measures;
 - b. implementation of endangered, threatened, or special concern species mitigation measures; and
 - c. recommendations by state regulatory authorities;
7. **At least 60 days before the start of construction of all Project facilities**, Broadwater shall file initial Implementation Plans with the Secretary, for review and written approval by the Director of OEP, describing how the company will implement the mitigation measures required by the Order. Broadwater must file revisions to their respective plans as schedules change. The plans shall identify:
 - a. how Broadwater shall incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;
 - b. the number of EIs assigned, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;
 - c. company personnel, including EIs and contractors, who will receive copies of the appropriate material;
 - d. what training and instructions Broadwater will give to all personnel involved with construction and restoration (initial and refresher training as the Project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);
 - e. the company personnel (if known) and specific portion of Broadwater's organizations having responsibility for compliance;
 - f. the procedures (including use of contract penalties) Broadwater will follow if noncompliance occurs; and
 - g. for each discrete facility, a Gantt or PERT chart (or similar Project scheduling diagram), and dates for:
 - i. completion of all required surveys and reports;
 - ii. mitigation training of onsite personnel;
 - iii. start of construction; and
 - iv. start and completion of restoration.
8. Broadwater shall employ an EI. The EI shall be:

- a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;
 - b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;
 - c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;
 - d. a full-time position, separate from all other activity inspectors;
 - e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and
 - f. responsible for maintaining status reports.
9. Broadwater shall file updated status reports prepared by the EI with the Secretary on a weekly basis until all construction and restoration activities are complete. On request, these status reports shall also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:
- a. the current construction status of the Project, work planned for the following reporting period, and any schedule changes for work in environmentally sensitive areas;
 - b. a listing of all problems encountered and each instance of noncompliance observed by the EI(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
 - c. corrective actions implemented in response to all instances of noncompliance, and their cost;
 - d. the effectiveness of all corrective actions implemented;
 - e. a description of complaints that may relate to compliance with the requirements of the Order, and measures taken to satisfy its concerns; and
 - f. copies of any correspondence received by Broadwater from other federal, state, or local permitting agencies concerning instances of noncompliance, and Broadwater's response.
10. Broadwater must receive written authorization from the Director of OEP before commencing service of the Project. Such authorization will only be granted following a determination that restoration of the seafloor impacts is proceeding satisfactorily.
11. Within 30 days of placing the authorized and certificated facilities in service, Broadwater shall file an affirmative statement with the Secretary, certified by a senior company official:
- a. that the facilities have been constructed in compliance with all applicable conditions and that continuing activities will be consistent with all applicable conditions; or
 - b. identifying which of the authorization or certificate conditions Broadwater has complied with or will comply with. This statement shall also identify any areas where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.
12. Prior to installation activities in Long Island Sound, Broadwater shall conduct appropriate geotechnical investigations and analyses to determine the detailed foundation design requirements and the potential for seismic soil liquefaction beneath the proposed YMS. Broadwater shall file with the Secretary of the Commission (Secretary), for review and written approval by the Director of the Office of Energy Projects (OEP), the survey results quantifying the potential for liquefaction, and identify any mitigation measures/design features necessary to minimize or preclude the potential for damage to the proposed YMS. (*Section 3.1.1.3*)

13. **Prior to installation activities in Long Island Sound**, Broadwater shall file with the Secretary for review and written approval by the Director of OEP, revised construction plans that include the use of properly configured and maintained mid-line buoys on the anchor cables of all construction vessels that would use anchors during pipeline installation. The plans shall include either the use of mid-line buoys on all anchor cables, including the lay barge or alternatively the use of a dynamically positioned lay barge. *(Section 3.1.2.2)*
14. If Broadwater determines that subsea plowing cannot be used across Stratford Shoal, Broadwater shall file a contingency plan with the Secretary, for review and written approval by the Director of OEP, that outlines the specific alternative method, potential impacts, and mitigation measures that would be developed in coordination with federal and state agencies to avoid and minimize potential impacts associated with pipeline installation **prior to implementation of an alternative installation method across Stratford Shoal**. *(Section 3.1.2.2)*
15. If a dredging contingency installation method across Stratford Shoal is proposed, Broadwater shall coordinate with EPA and COE **prior to implementation** to determine a suitable disposal site for dredge spoil if one is warranted. *(Section 3.1.2.2)*
16. **Prior to installation activities in Long Island Sound**, Broadwater shall file plans with the Secretary, for review and written approval by the Director of OEP, describing methods to mechanically backfill the trench with the excavated spoil material in a manner that successfully results in the excavated material being returned to the trench following installation. The plan shall be developed in coordination with COE, EPA, and NMFS to identify the conditions under which backfilling would be required, the appropriate methods for backfilling, and detailed post-construction monitoring criteria to assess success including use of a multi-beam echosounder system or comparable technology. *(Section 3.1.2.2)*
17. **Prior to installation activities in Long Island Sound**, Broadwater shall develop and file with the Secretary, for review and written approval by the Director of OEP, a backfilling plan for the 2-mile-long pipeline section closest to the FSRU (MP 0.0 to MP 2.0). The plan shall include the use of native sediment from the spoil piles, as appropriate, to overlay the backfill to minimize the amount of sediment conversion that would occur. *(Section 3.1.2.2)*
18. **Prior to installation activities in Long Island Sound**, Broadwater shall file with the Secretary, for review and written approval by the Director of OEP, an offshore-specific SPCC Plan that includes the estimated volumes associated with a worst-case spill scenario; an appropriate evaluation of the associated potential impacts to water resources and marine life; and appropriate mitigation measures to minimize the likelihood of a spill, as well as measures to contain and clean up a spill if it were to occur during construction or operation. *(Section 3.2.2.1)*
19. Broadwater shall use a silicon-based anti-fouling paint on the hull of the proposed FSRU and any other structures requiring anti-fouling paint. **Prior to installation activities in Long Island Sound**, Broadwater shall file with the Secretary, a material safety and data sheet of the silicon-based anti-fouling paint to be used. *(Section 3.2.3.1)*
20. **Prior to installation activities in Long Island Sound**, Broadwater shall coordinate with NMFS to identify appropriate mitigation measures as they relate to Level A harassment and Level B harassment thresholds for construction (especially pile-driving) and operational noise. Broadwater shall file with the Secretary, for review and written approval by the Director of OEP, a written description of the agency-approved noise thresholds, including any appropriate mitigation to avoid and minimize potential impacts during construction and operation. *(Section 3.3.2.2)*
21. **Prior to final design**, Broadwater shall coordinate with FWS and NMFS to develop a detailed lighting plan that will be protective of avian species, fish species, and marine mammals, and file the plan with the Secretary, for review and written approval by the Director of OEP. *(Section 3.3.5.2)*

22. Broadwater shall continue consultations with NMFS to develop a final set of whale strike avoidance measures specific to the Broadwater Project. The final version of the plan shall be filed with the Secretary for review and written approval by the Director of OEP prior to operation. *(Section 3.4.1.1)*
23. Broadwater shall conduct pile-driving operations between the December 1 through March 31 period to avoid impacts to sea turtles. *(Section 3.4.1.2)*
24. **Prior to installation activities in Long Island Sound**, Broadwater shall coordinate with NYSDEC to identify any measures appropriate to avoid and minimize potential impacts to state-listed species. *(Section 3.4.2)*
25. Broadwater shall **not begin installation activities** in Long Island Sound until the Commission completes any necessary consultations with NMFS, and FWS if necessary, and Broadwater receives written notification from the Director of OEP that construction and/or implementation of conservation measures may begin. *(Section 3.4.3)*
26. **Prior to installation activities in Long Island Sound**, Broadwater shall develop, in consultation with AT&T and the Cross Sound Cable Company, site-specific construction plans that would avoid impacts to the utilities; and file the plans with the Secretary, for review and written approval by the Director of OEP. *(Section 3.5.2.2)*
27. **Prior to installation activities in Long Island Sound**, Broadwater shall file the final FSRU and YMS color scheme with the Secretary, for review and written approval by the Director of OEP. *(Section 3.5.6.4)*
28. **Prior to installation activities in Long Island Sound**, Broadwater shall file the NYSDOS determination of the Project's consistency with the New York CMP, under the applicable provisions of the CZMA. *(Section 3.5.7.1)*
29. **Prior to operation**, Broadwater shall file with the Secretary documentation of completion of the final compensation agreements between Broadwater and the commercial fishermen related to fishing grounds within the fixed safety and security zone. *(Section 3.6.8.1)*
30. **Prior to operation**, Broadwater shall file with the Secretary documentation describing the mechanism for fishermen to file damaged gear claims and receive compensation. *(Section 3.6.8.1)*
31. **Prior to towing the FSRU and mooring tower into U.S. territorial waters**, Broadwater shall file with the Secretary written documentation that it has coordinated the timing of delivery with the Coast Guard and each of the ferry companies that could be affected by the towing activities. *(Section 3.7.1.4)*
32. Broadwater shall **defer implementation** of any treatment plans/measures (including archaeological data recovery), construction of facilities, and use of all staging, storage, or temporary work areas and new or to-be-improved access roads **until**:
 - a. Broadwater files with the Secretary cultural resources survey and evaluation reports, any necessary treatment plans, and the New York State Historic Preservation Officer's comments on the reports and plans; and
 - b. the Director of OEP reviews and approves all cultural resources survey reports and plans, and notifies Broadwater in writing that treatment plans/mitigation measures may be implemented or that construction may proceed.

All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "CONTAINS PRIVILEGED INFORMATION-DO NOT RELEASE." *(Section 3.8.5)*

33. Broadwater shall conduct all activities associated with construction of the proposed Project outside of the ozone control period (May 15 through September 15), unless otherwise allowed by NYSDEC. *(Section 3.9.1.2)*
34. Broadwater should submit a plan for review and approval by the Director of the OEP, that indicates the specific procedures it would use to reduce sulfur dioxide emissions generated by the LNG carriers servicing the FSRU. *(Section 3.9.1.2)*
35. Broadwater shall engage and retain a qualified certifying entity for an independent review of the codes and standards development, detailed design, fabrication, installation, and operation of the proposed FSRU for the life of the facility. **Prior to approval of each phase of Project development** as described above, a detailed project management plan shall be filed with the Secretary, for review and written approval of the Director of OEP. At a minimum, this plan shall be in accordance with the Coast Guard Navigation and Inspection Circular 03-05, *Guidance for Oversight of Post-Licensing Activities Associated with Development of Deepwater Ports*. *(Section 3.10.2.1)*
36. Broadwater shall maintain classification for the life of the proposed facility, using a member of the International Association of Classification Societies. Use of an alternate classification society other than ABS must be reviewed and approved by the Director of OEP. *(Section 3.10.2.1)*

The following measures apply to Broadwater FSRU design and construction details. Information pertaining to these specific recommendations shall be filed with the Secretary, for review and approval by the Director of OEP either prior to keel laying or any other Project-related construction activity; prior to construction of final design; prior to commissioning; or prior to commencement of service, as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No. RM06-24-000), including security information, shall be submitted as critical energy infrastructure information (CEII) pursuant to 18 CFR 388.112. *See Critical Energy Infrastructure Information, Order No. 683, 71 Fed. Reg. 58,273 (October 3, 2006), FERC Stats. & Regs. ¶ 31,228 (2006)*. Information pertaining to items such as offsite emergency response, procedures for public notification and evacuation, and construction and operating reporting requirements would be subject to public disclosure. This information shall be submitted a minimum of 30 days before approval to proceed is required.

37. The piping and instrumentation diagrams (P&IDs) and design information for the FSRU process, utility, and safety systems as reviewed by the certifying entity shall be filed prior to keel laying or any other Project-related construction activity. *(Section 3.10.2.2)*
38. Complete plan drawings and a list of the hazard detection equipment shall be filed prior to keel laying or any other Project-related construction activity. The list shall include the instrument tag number, type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings shall clearly show the location of all detection equipment. *(Section 3.10.2.2)*
39. Broadwater shall provide a technical review of its proposed facility design that: *(Section 3.10.2.2)*
 - a. identifies all combustion/ventilation air intake equipment and the distances to any possible hydrocarbon release (LNG, flammable refrigerants, flammable liquids, and flammable gases); and
 - b. demonstrates that these areas are adequately covered by hazard detection devices and indicates how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency.

Broadwater shall file this review prior to keel laying or any other Project-related construction activity.

40. Complete plan drawings and a list of the fixed and wheeled dry-chemical, fire-extinguishing, and other hazard control equipment shall be filed prior to keel laying or any other Project-related construction activity. The list shall include the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings shall clearly show the planned location of all fixed and wheeled extinguishers. *(Section 3.10.2.2)*
41. Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as P&IDs, of the fire water system shall be filed prior to keel laying or any other Project-related construction activity. *(Section 3.10.2.2)*
42. A complete equipment list of the process and utility equipment, with process data sheets and design specifications shall be filed prior to keel laying or any other Project-related construction activity. *(Section 3.10.2.2)*
43. Manufacturer's data submitted in response to process equipment design specifications shall be filed prior to keel laying or any other Project-related construction activity. *(Section 3.10.2.2)*
44. A copy of the hazard design review and list of recommendations that are to be incorporated into the final facility design shall be filed prior to keel laying or any other Project-related construction activity. *(Section 3.10.2.2)*
45. Broadwater shall develop an Emergency Response Plan and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. This plan shall include at a minimum: *(Section 3.10.6)*
 - a. designated contacts with state and local emergency response agencies;
 - b. scalable procedures for the prompt notification of appropriate local officials and emergency response agencies based on the level and severity of potential incidents;
 - c. procedures for notifying residents and recreational users within areas of potential hazard;
 - d. evacuation routes/methods for residents and other public use areas that are within any transient hazard areas along the route of the LNG carrier transit;
 - e. procedures for evacuation and rescue of persons on board the FSRU and LNG carriers;
 - f. locations of permanent sirens and other warning devices;
 - g. an "emergency coordinator" on each LNG carrier to activate sirens and other warning devices;
 - h. provisions to address the recommendations contained in Section 6.2 of the WSR;
 - i. procedures for off-loading LNG from the FSRU to LNG carrier in the event that the FSRU must be removed from the mooring; and
 - j. procedures for pumping down the LNG onboard the FSRU in preparation for severe weather events such as a hurricane.

The Emergency Response Plan shall be filed with the Secretary, for review and written approval by the Director of OEP, prior to keel laying or any other Project-related construction activity. Broadwater shall notify FERC staff of all planning meetings in advance and shall report progress on the development of its Emergency Response Plan at 3-month intervals.

46. The Emergency Response Plan shall include a Cost-Sharing Plan identifying the mechanisms for funding all Project-specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan shall include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. The Cost-Sharing Plan shall be filed with the Secretary, for review and written approval by the Director of OEP, prior to keel laying or any other Project-related construction activity. *(Section 3.10.6)*

47. The **final design** of the fixed and wheeled dry-chemical, fire-extinguishing, and hazard control equipment shall identify manufacturer and model. *(Section 3.10.2.2)*
48. The **final design** shall specify that the LNG unloading arm isolation valves SDV-101/3/5 be equipped with bypass valves sized for draining the unloading arms into the unloading line. *(Section 3.10.2.2)*
49. The **final design** shall include thermal relief valves for the unloading arms and piping upstream of the isolation valves. *(Section 3.10.2.2)*
50. The **final design** shall include boil-off gas flow and temperature measurement from the LNG storage tanks. *(Section 3.10.2.2)*
51. The **final design** shall include an LNG flow control element upstream of the vaporizer LNG flow control valve, dedicated to vaporizer flow control. *(Section 3.10.2.2)*
52. The **final design** shall include details of the control system and interlocks that would prevent the LNG flow to the vaporizer from exceeding the heating capacity of the flowing heating medium and prevent the LNG flow control valve from opening without appropriate heating medium flow and temperature conditions being verified. *(Section 3.10.2.2)*
53. The **final design** shall specify that piping specification change shall occur downstream of the system isolation valve. *(Section 3.10.2.2)*
54. The **final design** shall specify that, for LNG and natural gas service, branch piping and piping nipples less than 50 millimeters (2 inches) are to be no less than Schedule 160. *(Section 3.10.2.2)*
55. The **final design** shall specify that spiral-wound gaskets for LNG and natural gas service are to be equipped with inner and outer stainless steel retaining rings. *(Section 3.10.2.2)*
56. The **final design** shall include a fire protection evaluation carried out in accordance with the requirements of NFPA 59A, Chapter 9.1.2. *(Section 3.10.2.2)*
57. The **final design** shall include details of the shutdown logic, including cause-and-effect matrices for alarms and shutdowns. *(Section 3.10.2.2)*
58. The **final design** shall include emergency shutdown of equipment and systems activated by hazard detection devices for flammable gas, fire, and cryogenic spills, when applicable. *(Section 3.10.2.2)*
59. The **final design** shall include details of the air gaps to be installed downstream of all seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or wiring system. Each air gap shall vent to a safe location and be equipped with a leak detection device that shall continuously monitor for the presence of a flammable fluid, shall alarm the hazardous condition, and shall shut down the appropriate systems. *(Section 3.10.2.2)*
60. The **final design** shall include a hazard and operability review of the completed design. A copy of the review and a list of the recommendations shall be filed. *(Section 3.10.2.2)*
61. The **final design** shall provide up-to-date P&IDs, including a description of the instrumentation and control philosophy, type of instrumentation (pneumatic, electronic), use of computer technology, and control room display and operation. Drawings and all information shall be clearly legible on 11- by 17-inch paper, and the piping legend and symbology shall be in accordance with accepted practice. All drawings shall be filed in black and white. The following information shall be included on the P&IDs: *(Section 3.10.2.2)*
 - a. equipment tag number, name, size, duty, capacity, and design conditions;
 - b. piping with line number, piping class specification, size, and insulation;
 - c. LNG tank pipe penetration size or nozzle schedule;
 - d. piping specification breaks and insulation limits;
 - e. vent, drain, cooldown, and recycle piping;

- f. isolation flanges, blinds, and insulating flanges;
 - g. valve type, in accordance with the piping legend symbol;
 - h. numbering of all control valves;
 - i. all valve operator types and valve fail position;
 - j. instrumentation numbered;
 - k. control loops, including software connections;
 - l. alarm and shutdown set points;
 - m. shutdown interlocks;
 - n. numbering of relief valves, with set point;
 - o. relief valve inlet and outlet piping size;
 - p. car sealed valves and blinds;
 - q. equipment insulation;
 - r. drawing revision number and date;
 - s. numbering of all manual valves including check, vent, drain, and car sealed valves; and
 - t. alarm and shutdown set points.
62. The final design shall specify that all hazard detection equipment include redundancy, fault detection, and fault alarm monitoring. *(Section 3.10.2.2)*
63. The final design of the FSRU, subject to verification by the Coast Guard, shall include provisions for: *(Section 3.10.2.2)*
- a. appropriate navigation equipment to assess the potential of a vessel alliding with the FSRU, as well as to monitor the FSRU's position and movement around the mooring tower;
 - b. appropriate lights, sound signals, and communications equipment;
 - c. a qualified navigation watch, as specified in the WSR, that would consist of three Vessel Traffic Supervisors; and
 - d. a pre-rigged emergency towing bridle.
64. The final design of the FSRU shall meet or exceed all applicable design and construction standards for LNG carriers trading in the U.S. *(Section 3.10.2.2)*
65. The final design of the FSRU shall include an adequate number of side shell bits as well as at least two sets of emergency towing equipment. *(Section 3.10.2.2)*
66. The final design shall provide detailed engineering specifications for the appropriate cryogenic material for the spill control system, the slope and sizing of the diversion channels, and the measures that would be used to avoid LNG splashing against the FSRU or LNG carrier hull side. *(Section 3.10.3.1)*
67. All valves, including drain, vent, main, and car sealed valves, shall be tagged in the field during construction and prior to commissioning. *(Section 3.10.2.2)*
68. The design details and procedures to record and to prevent the tank fill rate from exceeding the maximum fill rate specified by the tank designer shall be filed prior to commissioning. *(Section 3.10.2.2)*
69. Complete plan drawings and a list of the proposed hand-held fire extinguishers shall be filed prior to commissioning. The list shall include the equipment number, type, size, number, and location. Plan drawings shall include the type, size, and number of all hand-held fire extinguishers. *(Section 3.10.2.2)*
70. Operation and maintenance procedures and manuals, as well as safety procedure manuals, shall be filed prior to commissioning. *(Section 3.10.2.2)*

71. FERC staff shall be notified of any proposed revisions to the security plan and physical security of the facility prior to commencement of service. *(Section 3.10.2.2)*
72. Progress on the construction of the FSRU shall be reported in **monthly** reports filed with the Secretary. Details shall include a summary of activities, projected schedule for completion, problems encountered, and remedial actions taken. Problems of significant magnitude shall be reported to FERC **within 24 hours**. *(Section 3.10.2.2)*

The following seven measures shall apply throughout the life of the facility:

73. The facility shall be subject to regular FERC staff technical reviews and site inspections on at least an annual basis, or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, Broadwater shall respond to a specific data request, including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed P&IDs reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted annual report, shall be submitted. *(Section 3.10.2.2)*
74. The FSRU and YMS shall be subject to regular structural surveys for the life of the facility. These surveys shall include participation of Coast Guard marine inspectors, and shall be conducted in accordance with a plan to be developed by the certifying entity and approved by the Director of OEP. Survey intervals shall not be less than those specified in the API RP2A standard and applicable classification rules. *(Section 3.10.2.2)*
75. Semi-annual operational reports shall be filed with the Secretary to identify changes in facility design and operating conditions; abnormal operating experiences; activities (including ship arrivals, quantity and composition of imported LNG, vaporization quantities, boil-off/flash gas); and plant modifications, including future plans and progress thereof. Abnormalities shall include, but not be limited to, unloading/shipping problems, potential hazardous conditions from offsite vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, vapor or liquid releases, fires involving natural gas and/or from other sources, negative pressure (vacuum) within a storage tank, and higher than predicted boil-off rates. Adverse weather conditions and the effect on the facility also shall be reported. Reports shall be submitted within 45 days after each period ending June 30 and December 31. In addition to the above items, a section entitled "Significant Plant Modifications Proposed for the Next 12 Months (dates)" shall be included in the semi-annual operational reports. Such information would provide FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility. *(Section 3.10.2.2)*
76. In the event that the temperature of any region of any secondary containment becomes less than the minimum specified operating temperature for the material, the Commission shall be notified **within 24 hours**, and procedures for corrective action shall be specified. *(Section 3.10.2.2)*
77. Significant non-scheduled events, including safety-related incidents (such as, LNG or natural gas releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security-related incidents (such as, attempts to enter the site and suspicious activities) shall be reported to FERC staff. In the event that an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification shall be made **immediately**, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification shall be made to the Commission staff

within 24 hours. This notification practice shall be incorporated into the LNG facility's emergency plan. Examples of reportable LNG-related incidents include: (*Section 3.10.2.2*)

- a. fire;
- b. explosion;
- c. estimated property damage of \$50,000 or more;
- d. death or personal injury necessitating in-patient hospitalization;
- e. free flow of LNG that results in pooling;
- f. unintended movement or abnormal loading by environmental causes, such as an earthquake, hurricane, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes gas or LNG;
- g. any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;
- h. any malfunction or operating error that causes the pressure of a pipeline or LNG facility that contains or processes gas or LNG to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the buildup allowed for operation of pressure limiting or control devices;
- i. a leak in an LNG facility that contains or processes gas or LNG that constitutes an emergency;
- j. inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of the FSRU or YMS;
- k. any condition that could lead to a hazard and cause a 20-percent reduction in operating pressure or shutdown of operation of a pipeline or an LNG facility;
- l. safety-related incidents to LNG carriers occurring at or en route to and from the LNG facility; or
- m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property, or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, Commission staff would determine the need for an onsite inspection by Commission staff, and the timing of an initial incident report (normally within 10 days) and follow-up reports.

78. Broadwater shall provide the Commission and the Coast Guard with a report on any structural repairs, modifications, or failures of yoke mooring systems owned or operated by Broadwater, Shell, or TransCanada. This report shall be filed with the Secretary (or in the semi-annual operational report) and shall address the applicability of these repairs, modifications, or failures to the YMS provided for the FSRU. (*Section 3.10.2.3*)

79. Broadwater shall amend its Preliminary Project Security Assessment Overview (PPSAO) to incorporate the recommendations in Sections 5.5.1, 5.5.2, 5.5.3, 5.5.7, 5.5.8, 5.5.9, 5.5.11, 5.5.14, and 5.5.17 of the SSI Supplement to the WSR. In addition, Broadwater shall annually review and amend, as necessary, the PPSAO and submit it to the Coast Guard Captain of the Port Long Island Sound for review. (*Section 3.10.4.5*)

The following six measures shall apply to the YMS design and construction details. Information pertaining to these specific recommendations shall be filed with the Secretary, for review and approval by the Director of OEP either: prior to keel laying or any other Project-related construction activity, or prior to construction of final design. This information shall be submitted a minimum of 30 days before approval to proceed is required.

80. **Prior to keel laying or any other Project-related construction activity**, a failure modes and effect analysis shall be conducted by a third party to verify that there is not a single point of failure in the design of the YMS. *(Section 3.10.2.3)*
81. The **final design** of the YMS shall meet or exceed the design and construction requirements in the American Petroleum Institute RP2A standard for high consequence designs for offshore structures that are accepted by MMS upon completion of their review based on Hurricanes Katrina and Rita. *(Section 3.10.2.3)*
82. The **final design** of the YMS and FSRU shall be capable of withstanding a Category 5 hurricane. *(Section 3.10.2.3)*
83. The **final design** of the FSRU and YMS shall include measures to prevent the FSRU from being set adrift following a potential failure of the mooring, regardless of the cause of the failure. Proposed measures shall take into account, among other things, adverse wind and sea conditions, potential impacts of mishaps onboard the FSRU (such as fire and collision damage), time of day, proximity to shoal waters, and other vessel traffic in the vicinity. A layered approach for mitigation measures shall be used. *(Section 3.10.2.3)*
84. The **final design** shall specify, for different weather conditions, how long the mooring tower would be able to accommodate the anticipated range of forces associated with the attached FSRU and a berthed LNG carrier, following an allision with the mooring tower. *(Section 3.10.2.3)*
85. The **final design** of the yoke mooring tower shall verify that the results of the detailed geotechnical studies are consistent with the preliminary results upon which the load and survivability analysis was based. *(Section 3.10.2.3)*

In addition, we recommend that the following measures shall apply throughout the life of the facility:

86. Throughout the life of the facility, Broadwater shall ensure that the FSRU and any LNG vessel transiting to and from the FSRU comply with all requirements set forth by the Coast Guard Captain of the Port which includes all risk mitigation measures as set forth in the WSR. *(Section 3.10.4.5)*