APPENDIX A

MARINE INSTALLATION PLAN

Marine Pipeline Installation Methodology

Prepared for:

Islander East Pipeline Project, L.L.C.

Branford, Connecticut

March 2003

Islander East Pipeline Project

Marine Pipeline Installation Methodology

GENERAL

The type of pipeline installation process performed by a typical laybarge is described as S-Lay. (See Drawing No. SK-1.) This designation is derived from the S-shaped profile of the pipeline as it transitions from the stern of the barge to natural bottom. Engineering calculations are performed to determine the effective tension ranges for successful installation.

Typically, the pipeline is protected by lowering it beneath the seabed by either pre-lay or post-lay lowering methods. As described in more detail later in this document, pre-lay lowering methods include various forms of dredging, while Islander East's preferred form of post-lay lowering is plowing.

In cases where overall conditions may prevent industry standard methods of protecting and lowering the pipeline, one of various forms of barriers may be placed over the top of the completed pipeline, including concrete mats or a rock cap.

A unique method of crossing a shoreline, also described in more detail within this document, will be used for crossing the Connecticut and New York shorelines. (See Drawing No. SK-4.) Horizontal Directional Drilling (HDD) of the Islander East Pipeline will initiate at a point onshore in Connecticut and will result in the offshore end of the pipeline string occurring approximately 4,200 feet from the entry point, at milepost (MP) 10.9. The pipeline string for the HDD will be laid out and hydrostatically tested on the seabed prior to pulling into the HDD hole. In New York, the HDD will commence at onshore MP 33.0 and will extend approximately 1,400 feet, exiting at MP 32.7. The HDD pipe string on the New York side will be hydrostatically tested in identical fashion as the Connecticut side.

From approximately MP 10.9 through approximately MP 12.0, the Islander East pipeline utilizes two comparatively short-radius curves to thread its way through the shallow waters of the Thimble Islands and associated rock outcrop areas. Lowering of the pipeline out to the 20 feet water depth contour, between MP 10.9 and approximately MP 12.0 will be accomplished by pre-lay dredging. The dredging method will also be used in New York waters from approximately MP 32.0 to MP 32.7.

Pipeline installation at the Connecticut HDD exit point will require a great deal of control over the installation vessels. Specifically, a winch mounted on a construction vessel at the HDD exit hole will be used to pull two strings of pipe, each approximately one mile long, from the laybarge to near the exit hole. After the first of the two strings, the HDD pipe string, has been pulled into the drilled hole, its offshore end will be lifted off of the seabed to enable an above-water welded tie-in to be made onto the shoreward end of the second pipe string. The seaward end of the second string will likewise be lifted for tie-in and the remainder of pipeline, from approximately MP 12.0 through MP 32.0 will be installed by normal pipelay methods with anchor-moored positioning.

The preferred post-lay lowering method for the Islander East Pipeline project is plowing, supplemented by diver hand-excavation in certain selected areas such as near crossings of foreign utilities. Dredging is the preferred method for lowering the pipeline through the shallow water Connecticut and Long Island areas.

2. PIPELAY CONSTRUCTION

The pipeline will be installed with a typical, anchor-moored pipelay barge, length of which is expected to be between 260 feet and 400 feet. The laybarge is expected to draft as much as 16 feet water depth.

The vessels to be utilized to lay and bury the pipeline will utilize an anchoring system consisting of eight (8) to ten (10) anchors. The anchor cables, when conventionally deployed, lay along the bottom for some distance from the anchor toward the vessel.

To minimize the anchor cable sweep impacts, all vessels deploying anchor cables on this project will utilize buoys to support the anchor cables such that approximately 600 feet of the cable will be in contact with the seafloor. The buoy is attached to the anchor cable at a point determined by the length of the particular cable, the water depth in which it is placed, and the tension capabilities of the vessel.

The construction of the pipeline is accomplished in an assembly-line fashion on-board the pipelay barge described below.

2.1. "Ready" Rack

As each 40-foot joint of pipe is lifted onto the laybarge from a transportation vessel alongside the laybarge, the pipe section is placed onto a ready rack where it is internally inspected for cleanliness.

2.2. Line-up station and Bead Stall

This station is positioned near the bow of the barge and is the location where each 40-foot joint of pipe is initially staged for welding. A mechanical apparatus, called a line-up clamp, is used between two adjoining pieces of pipe to ensure the joints are properly aligned and ready for welding. Once the proper alignment is achieved, the first weld passes are applied and the internal line-up clamp is removed.

2.3. Welding stations

Aft of the bead stall, there are usually two or three welding stations positioned approximately 40 feet apart. Each station performs a number of successive weld passes until the weld is completed. This increases the efficiency of the operation and results in a timely installation process.

2.4. Non-Destructive Examination (NDE) Station

Once welding is completed, non-destructive examination (NDE) is performed on the weld, typically in the form of Radiographic or Ultrasonic Testing (UT), to ensure the integrity of the weld. Any unacceptable defects are removed. The field joint is then rewelded and re-examined to verify the integrity of that individual weld.

2.5. Corrosion Coating Station

At the subsequent station, the completed girth weld will be sand blasted and readied for the application of a fusion bonded epoxy corrosion coating at the welded joint.

2.6. Foam in-fill Station

Concrete weight coating will have been applied to the pipe joints at the onshore coating yard. This weight coating is necessary to provide adequate weight to the pipeline to assure negative buoyancy for its service life. During the application of the concrete weight coating, approximately 6-12 inches of the concrete is removed from the end or cut-back. To protect the corrosion coating applied to the girth weld during the installation process and during the lowering operations, the area without concrete is encapsulated and filled with a two-part epoxy foam which fills the void and then hardens to provide a uniform external surface that protects the corrosion coating from damage.

Once each station completes its required tasks, the barge is moved ahead approximately forty feet and the process begins again. This gives the appearance the pipeline is being laid, when in reality the barge is moving from beneath the pipeline.

2.7. Abandonment and Recovery Operations

The laybarge is equipped with an Abandonment and Recovery (A&R) winch. As the name implies, this winch is used to lower the free end of the pipeline to the seafloor upon completion of pipelay or whenever weather conditions prohibit the safe operation of the vessel. The A&R winch is also utilized to recover the temporarily lowered pipeline to recommence pipe lay.

In the event that the vessel must lower the pipeline, a pullhead is welded onto the end of the pipeline. The pullhead is capable of withstanding the force exerted on the pipeline during the temporary abandonment and recovery procedures. The pullhead design is also fabricated with several valves, thereby allowing the pipeline to be flooded for hydrostatic testing or to provide on-bottom stability in the event of severe weather.

3. PIPELINE LOWERING AND PROTECTION METHODS

The term pipeline lowering refers to a variety of processes used to insure that the pipeline has been installed below the natural bottom of the seabed. The methods for lowering and protection of the pipeline are broken into three distinct groups, specifically pre-lay trenching, post-lay trenching, which includes diver hand excavation near crossings of existing utilities, and post-lay protection of a pipeline which may not be lowered to the design depth below seabed.

3.1. Conventional Bucket Dredge Lowering Method

The excavation or preparation of a trench prior to installation of the pipeline, or pre-lay lowering, will be addressed in this section. The factors that must be reviewed when planning the pipeline lowering operation include:

- Review of geophysical, geotechnical, oceanographic and meteorological data.
- Review of environmental and regulatory requirements.
- Selection of the most suitable equipment to perform the work.

In addition, Horizontal Directional Drilling (HDD) will be used to supplement the installation methodology at both shoreline crossings. HDD will be addressed in a separate section of this methodology description.

For typical pipeline projects of this magnitude, a pipe trench will be dredged into the seabottom in water depths between approximately 8' and 20' to maintain protection for the pipeline during installation. In most cases, the minimum depth below natural bottom to which the pipeline will be lowered is 3 feet unless supplemental or engineered backfill is utilized. The primary advantage for this type of lowering is that the pipeline will be protected below natural bottom, thereby providing immediate safety for marine traffic in the vicinity.

As specifically applies to the Islander East Pipeline Project, pipe trench will be dredged on the Connecticut end of the marine pipeline route from near the HDD exit hole area to a water depth of 20 feet, which occurs approximately at MP 12.0. However, because the shallow waters near the Connecticut shoreline restrict marine traffic to smaller vessels, and to minimize sediment deposition through this area, the depth of lowering through this area will be reduced to 18 inches. The Long Island end of the route will require pipe trench from the 20' water depth contour at approximate MP 32.0 to the HDD exit hole at approximate MP 32.6. The conventional 3 feet of minimum cover will be maintained during dredging operations for the New York portion

The dredges anticipated for use on the Islander East project maintain their position with three spuds assisted by a pushboat. A conventional bucket or clamshell dredge will be employed to cut and remove seabottom material.

The bucket dredge uses a boom of sufficient length to remove the spoil from the trench, thereby providing less opportunity for inadvertent trench in-fill. The dredged material is normally sidecast alongside the ditch where the spoil may be retrieved and placed back into the trench (backfill) after pipeline installation. However, to reduce impacts from sediment deposition, Islander East has committed to place the spoil into hopper barges.

Work areas that may constitute a hazard to navigation will be marked with signs and lights on temporary timber piling. The piling will be maintained until the associated installation tasks have been completed.

3.2. Post-Pipeline Installation Lowering Method

Post-lay lowering of the Islander East pipeline will be accomplished between the dredged areas previously described, specifically between approximately MP 12.0 and MP 32.0. The trench into which the pipeline will be lowered is shown on Drawing No. SK-12. The excavation or preparation of a trench after the pipeline has been installed will be addressed in this section. As with pre-installation lowering methods, the factors to be reviewed include:

- Review of geophysical, geotechnical, oceanographic and meteorological data.
- Review of environmental and regulatory requirements.
- Selection of the most suitable equipment to perform the work.

3.2.1 Post-lay Plow

As previously stated, plowing is the primary means for lowering the pipeline below the seabed. To minimize anchoring impacts, the Islander East Pipeline will be lowered beneath the seabed with a single plowing pass. Furthermore, a backfill plow will return available spoil into the plowed trench.

A plow-towing vessel capable of lifting and positioning the plow and also equipped with an eight- or ten-point mooring system are typical requirements for a plow-towing vessel. Anchor positioning is controlled and monitored with navigation and positioning equipment located on both the plow-towing vessel and the anchor handling tugs.

The plowshares are hinged such that they can be lowered over the pipeline and hydraulically closed to encapsulate the pipe (rollers allow safe movement along the coated pipeline). An umbilical connecting the plow to the towing vessel control room allows monitoring and control of the plow functions. Adjustments can be made to the plowshare and moldboard positions from the control room. The moldboards are components of the plow that move spoil away from the trench; thereby allowing a level surface for the plow skids during subsequent lowering passes. Video monitors and instrument readouts furnish the plowing operators information on the status of the plowing functions, such as angle and position of shares, position of moldboards, pulling forces and pressure exerted on the pipeline.

A transitional trench approximately 200 feet long may be required to preclude pulling the plow forward while the plow shares dig into the seabed to the desired depth below natural bottom. This trench would be constructed by a shallow water dredge, allowing the plowshares to be positioned at the required first-pass depth below natural seabottom.

Once the plow is in place, the towing vessel moves along the pipeline (pulling in the bow anchor lines and releasing the stern anchor lines) to a pre-determined distance ahead of the plow. The plow tow cable is secured and the towing vessel commences the plowing operations. As the towing vessel moves itself forward by pulling and releasing anchor lines, the Anchor Handling Tugs (AHTs) begin the routine of moving the anchors ahead of the towing vessel. The spoil resulting from the plowing operation is spread to both sides of the trench by the moldboards.

The type of seabottom sediment will affect the depth of the trench and speed of the plow. The depth of cut is hydraulically controlled using the skid position on the natural bottom as a base line. If high-density sediments (soft rock, dense material, etc.) are encountered, the depth of the plowshares and/or speed of the plow may have to be reduced. To insure that no damage is inflicted on any foreign utility, plowing operations will be discontinued approximately 100 feet before any foreign utility, pipeline, cables or other protected obstacles. Plowing operations will commence approximately 100 feet past the obstruction.

3.2.2. BACKFILL PLOW

Backfill Plow (BFP) operations will follow the trenching operations by returning the displaced spoil to the pipe trench. The BFP is a pipeline guided tool designed with reversed mold boards that move the displaced spoil back into the trench; it is placed in the pipe ditch and pulled along the pipeline much in the same way as the Post-lay Plow. It will also be removed from the pipeline approximately 100 feet before any foreign crossing and reset on the pipeline approximately 100 feet past the foreign crossing.

The backfilling operation is capable of only one pass with the BFP and the towing vessel. The maximum tow force is anticipated to be approximately 150 tons. The main monitoring and control of the BFP will be through the Buoyed Control Umbilical connecting instrumentation on the BFP with the towing vessel's control room. The control room will contain the survey and navigation equipment and the monitors for the plow input data, including BFP television cameras and profilers.

3.3. Post-lay Protection

After the pipeline has been installed and all efforts have been made to lower it to the required depth of cover, it may be found that certain sections of the line have not attained the intended lowering depth. Once the pipeline has been laid, it would be extremely difficult and hazardous to remove any 'plug'. Although the geophysical data of the Islander East Project indicates this should not occur, the typical method of protecting the pipeline is the placement of articulated concrete mats or engineered backfill material on top of the pipeline.

4. HORIZONTAL DIRECTIONAL DRILLING

4.1. General

The two shoreline crossings, where the offshore portion of the pipeline transitions to the onshore portions, will be installed with the HDD technique. The entry point of the HDD crossing will be located onshore while the exit point of the HDD crossing will be located approximately 3,400 feet offshore on the Connecticut end and approximately 900 feet offshore on the New York end. (See Drawing No. SK-4.)

Installation of a pipeline by HDD is generally accomplished in three stages. First, a small diameter pilot hole is drilled along a designed directional path. Next, the pilot hole is enlarged to a diameter that will accommodate the pipeline. Finally, the pipeline is pulled into the enlarged hole.

The feasibility of an HDD pipeline installation is largely dependent upon subsurface conditions. Therefore, a site-specific geotechnical investigation will be conducted at the crossing location in order to define the geological characteristics and engineering properties of the subsurface material. This will include performing exploratory borings at multiple locations along the drilled alignment. Soil and rock samples obtained from these borings will be taken to a laboratory and tested for various properties such as strength and hardness. This information will then be utilized to optimize the design of the HDD crossing and to minimize exposure to subsurface conditions that are not conducive to HDD.

All stages of HDD involve circulating drilling fluid from equipment on the surface, through a drill pipe, and back to the surface through the drilled annulus. Drilling fluid returns collected at the entry and exit points will be processed through a solids control system which removes spoil from the drilling fluid allowing the fluid to be reused. Drilling fluid plays a critical role in the HDD process, with its primary functions being transportation of soil and rock cuttings to the surface and stabilization of the hole. Additional functions include reduction of friction, cooling and cleaning of cutters, transmission of hydraulic power, and hydraulic excavation.

The primary component of drilling fluid used in HDD pipeline installation is fresh water obtained at the crossing location. In order for water to perform the required functions, a viscosifier is typically added to modify its properties. The viscosifier used almost exclusively on HDD installations is naturally occurring bentonite clay. The properties of bentonite used in drilling fluids are often enhanced by the addition of polymers. This enhancement typically involves increasing the yield by reducing the amount of dry bentonite required to produce a given amount of drilling fluid. For use in drilling fluids, standard bentonite yields in excess of 85 barrels of fluid per ton of dry material. Addition of polymers to produce high yield bentonite can increase the yield to more than 200 barrels per ton of material. Further descriptions of common HDD drilling fluid components are provided in Appendix A of this document.

4.2 HDD Rigsite Equipment

A typical large horizontal drilling spread can be moved onto a site in seven to ten tractor trailer loads. Space requirements will vary due to minor differences between each contractor's equipment, however, the location of the rig, control cab, and drill pipe are fixed by the entry point. The rig must be aligned with the drilled segment and will generally be positioned no more than 25 feet back from the entry point. The control cab and drill pipe must be positioned adjacent to the rig.

Working areas must be cleared and graded as necessary to allow movement and erection of equipment. Equipment is typically supported on the ground surface although timber mats may be used where soft ground is encountered. Access for wheeled vehicles must be available throughout the course of construction to insure that supplies can be delivered to the rigsite. Specific components of an HDD spread are described below.

The "drill rig" consists of an inclined ramp equipped with a carriage that can be moved up and down the ramp to advance and retract the drill string. A turntable mounted on the carriage provides drill string rotation. The drill rig also contains a vise system for making up and breaking out joints of drill pipe.

The "control cab" houses the controls and personnel necessary to operate the drill rig. During pilot hole operations, guidance equipment and personnel will also be present in the control cab. The control cab may consist of a small trailer which can be pulled by a pick-up truck, or an enclosure positioned on a semi trailer which may also contain the hydraulic power unit, spare parts storage, etc.

The "hydraulic power unit" provides power to the directional drilling rig. It generally consists of at least one diesel engine, a hydraulic pump and reservoir, and a generator that provides electrical power to the control cab. The power unit is typically either mounted on a semi trailer along with the control cab or positioned next to the rig as a stand-alone piece of equipment.

Joints of "drill pipe", typically 5 inches in diameter and roughly 30 feet in length, are either racked on the ground surface or on a semi trailer positioned next to the rig. Throughout the HDD process, drill pipe is continually added or removed at the rig.

The "mud pump" typically consists of a diesel engine and a high-pressure, triplex pump that supplies drilling fluid to the rig at the required pressure and flow rate.

The "mud system" typically includes a drilling fluid storage tank, water and viscosifier intake systems, drilling fluid mixing equipment, and solids control equipment used to process surface drilling fluid returns and produce drilling fluid suitable for reuse. In some cases the mud system and the mud pump are combined in a single unit. Occasionally, the solids control equipment is mounted atop a separate tank that is used solely for processing drilling fluid returns.

"Water storage", which is typically required at locations lacking a sufficient source of fresh water, is generally accomplished using steel "frac tanks" which are positioned near the mud system.

A "bentonite storage" area is typically provided near the mud system. Pallets of dry bentonite products are delivered by truck and stored until needed.

"Auxiliary equipment" typically consists of flatbed or enclosed semi trailers loaded with reaming tools, motors, pumps, hoses, spare parts, etc.

"Tools/parts" are often stored in enclosed semi trailers or overseas shipping containers that may also serve as an onsite workshop.

With the exception of a drilling fluid collection pit located near the entry point, excavated fluid pits are not generally used at the rigsite. The drilling fluid collection pit is utilized to temporarily store fluid returning from the hole until the fluid can be pumped into above-ground tanks. Typical drilling fluid collection pit dimensions are on the order of 10 feet long by 10 feet wide by 5 feet deep.

4.3 Preparation of Offshore Exit Hole

Principally, the offshore exit point of the crossing will be dredged and/or excavated to accommodate a specific transition profile. (See Drawing No. SK-10.) A combination of the burial depth, transition length, and HDD exit angle combine to determine the configuration of the dredged exit hole. The transition profile allows the pipeline to return to a horizontal position, and be readied for tie-in. An additional length of pipe, referred to as the "pipeline tail", is added to the transition length and accounted for when determining the final tie-in position.

The tail will allow the marine pipeline installation contractor to manipulate or maneuver the pipeline to perform the tie-in to the adjoining section of pipeline. An HDD will minimize the potential for negative impacts at, and adjacent to, the shoreline by restricting those impacts to a localized area further offshore.

The HDD pipe string will be installed by the laybarge either by standard operations or by remaining stationary and a winch mounted on a separate vessel may be used to pull the pipeline off the laybarge to the HDD exit hole.

The predetermined pipe string length, including additional footage to accommodate the seaward end tie-in, will be assembled and prepared for hydrostatic testing prior to pullback. Upon completion of testing, the pipe string will be dewatered and will lay on the seabottom until the HDD contractor is ready to begin pullback operations. After completion of pullback, the HDD segment will be prepared for tie-in to the seaward segment.

4.4 Pilot Hole Drilling

Pilot hole directional control will be achieved by using a non-rotating drill string with an asymmetrical leading edge. Leading edge asymmetry is typically accomplished with a bent sub or bent motor housing located several feet behind the bit. The asymmetry of the leading edge creates a steering bias while the non-rotating aspect of the drill string allows the steering bias to be held in a specific position while drilling. If a change in direction is required, the drill string is rolled so that the direction of bias is the same as the desired change in direction. The direction of bias is referred to as the "tool face". Straight progress can be achieved by drilling with a series of offsetting tool face positions. Where directional control is not required, the drill string can be continually rotated.

In soft soils, drilling progress will be achieved by hydraulic cutting with a jet nozzle. Mechanical cutting action required for penetration of bedrock will be provided by a positive displacement mud motor that converts hydraulic energy from drilling fluid to mechanical energy at the drill bit. This allows for bit rotation without drill string rotation.

A magnetic steering tool, which provides readings of the inclination and azimuth at the leading edge of the drill string, will be used to monitor the actual path of the pilot hole as drilling progresses. The steering tool will be positioned as close as possible to the bit, and its readings will be transmitted to the surface over a wire running through the drill string. These readings, in conjunction with measurements of the distance drilled, will provide the horizontal and vertical coordinates of the steering tool relative to the initial entry point on the surface.

Azimuth readings are taken from the earth's magnetic field and are subject to interference from downhole tools, drill pipe, and magnetic fields created by adjacent structures. Therefore, the steering tool must be inserted into a non-magnetic collar and positioned in the string so that it is adequately isolated from downhole tools and drill pipe. The combination of bit, mud motor (if used), subs, steering tool, and non-magnetic collars is referred to as the Bottom Hole Assembly (BHA).

Upon punching out at the offshore exit point, air will be pumped from the HDD rig through the drill string, creating air bubbles which will allow divers to pinpoint the actual location of the bit.

4.5 Prereaming

After the pilot hole is completed, the drill string will be lifted above the water surface by support equipment working from a barge that will be positioned near the exit point. With assistance from HDD support personnel on the barge, a series of successively larger diameter reaming passes will be conducted to enlarge the hole to a diameter of approximately 36 inches. A typical "backreaming" pass will consist of attaching a reaming tool into the drill string on the support barge, after which the reamer will be rotated and drawn to the drilling rig, thus enlarging the hole. As the reaming tool progresses toward the rig, drill pipe will be continually added from the barge to insure that a string of pipe is always maintained in the drilled hole. It is also possible to ream away from the drill rig, in which case a reamer fitted into the drill string at the rig will be rotated and thrust toward the exit hole.

4.6 Pullback

After completion of the final reaming pass, pipe installation will be accomplished by attaching the prefabricated pull section behind a reaming assembly at the exit point, then pulling the reaming assembly and pull section back to the drilling rig. A swivel will be utilized to connect the pull section to the reaming assembly in order to minimize torsion transmitted to the pipe.

5. PIPELINE TIE-IN METHODS

The methods available for connecting adjoining sections of offshore marine pipelines (tie-in) involve one of several specialized procedures. The water depth, pipeline diameter, equipment required or available, and the materials necessary to complete the tie-in will influence the procedure chosen. The methods described below are best suited for this project.

5.1. Line Pipe Recovery and Lay

This tie-in method provides a welded connection between sections of the pipeline system and minimizes overall installation time. This method requires a sufficient length of pipeline to have been installed on the seafloor to permit recovery onto the pipelay vessel and is typically favored when transitioning from an HDD section to conventional offshore pipelay. The method requires installation of additional pipe footage, or "tail", onto the HDD pipe string. Once recovered and on board the lay barge, the A&R cable is disconnected, the pull head is removed and conventional offshore pipe lay commences.

5.2. Above-water Welded Tie-in Method

This method is accomplished by lifting the ends of adjoining pipeline segments above the water surface, then preparing and welding those sections together. Sufficient lifting points along the pipeline sections are required to fully support and align the sections. The pipeline sections are lifted to the surface, the weld is completed and NDE examined, the field joint is coated, and the pipeline is lowered to the seafloor. This method can only be performed on two segments that have been installed with sufficient length to allow the lifting and tie-in configuration to be achieved.

5.3. Subsea tie-in with Flanged Connection Method

This method involves welding flanges onto the ends of the pipeline section to be tied-in. Once the flanges have been installed and each segment is lying on natural bottom, the distance and angle between the adjacent sections is measured and a make-up spool is fabricated in accordance with the measurements taken. All welds are NDE examined and coated prior to the subsea installation. The spool piece is then lowered to the seabed and the two bolted connections at the ends of the spool piece are completed by divers.

6. FOREIGN UTILITY CROSSINGS

Foreign utility crossings refer to any sewer line, communications or power cable, pipeline or other similar object that currently exists within the route of the Islander East Pipeline. Characteristics of the foreign utility will be determined by exchanging installation information with the utility owner. Two 9"-thick layers of segmented concrete mats will be installed between the existing utility and the Islander East Pipeline to maintain permanent separation.

General pre-lay construction tasks include the following:

- 72-hour notification will be given to the owner of the foreign utility prior to arrival of any inspection or construction vessel at the site.
- Pre-lay crossing preparation, specifically placement of concrete mats and sand/cement bags, will be undertaken prior to installation of the pipeline.
- To further protect the existing utility, anchors will typically not be placed within 500 feet on the near side and 1000 feet on the far side of the existing foreign utility.
- Any segment of the Islander East Pipeline that cannot be lowered beneath the seabed may be further protected by covering it with concrete mats.

The plowing operation will cease approximately 100' on either side of the foreign utility crossing. This approximate 200-foot "gap" in the lowering operation will be completed by diver hand-jetting. A hand jet is a man-portable piece of pipe connected to the surface support vessel typically by a hose. The diver may then use the water stream to "wash" the bottom material from beneath the pipeline.

7. HYDROSTATIC TESTING

Testing of all newly constructed natural gas pipelines is required by 49CFR Part 192 - Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards. The testing medium for the Islander East project will be water.

Prior to hydrostatic testing of offshore pipe segments, a "pig" may be pushed through the pipeline. The pig is installed into the open end of the pipeline prior to completing the final weld on the pipeline. A pig may be considered as a swab, fitted with neoprene sealing disks that attain a sufficient seal inside the pipeline to permit pressure behind the pig to propel it through the pipeline. Filtered seawater will be used to propel the sizing plate pig and to fill the pipeline for the hydrostatic test.

A high-pressure pump will be used to pressurize the test section to design test pressure. The test pressure will be maintained for 8 hours (4 hours for testing fabricated units and for short, visible sections). After the testing is complete, the water in the pipeline will be discharged with a dewatering pig propelled through the pipeline with air pressure. The water will then be discharged to the location in Long Island Sound from which it was taken. (See "Hydrostatic Test Water Information Table")

Hydrostatic Test Water Information				
Section Description	**Length (Miles)**	**Volume (42-gal. bbls)**	**Test Water Source**	**Test Water Discharge Point**
CT HDD string prior to pull	1.0	2,600	CT waters, +/-MP 12.0	CT waters, +/-MP 12.0
CT HDD string after pull	1.0	2,600	CT waters, +/- MP 11.0	CT waters, +/- MP 11.0
NY HDD string prior to pull	0.5	1,300	NY Waters, shoreward of MP 32.0	NY Waters, shoreward of MP 32.0
NY HDD string after pull	0.5	1,300	NY Waters, shoreward of MP 32.0	NY Waters, shoreward of MP 32.0
CT HDD entry point to NY tie-in point.	22.8	62,000	NY Waters, shoreward of MP 32.0	NY Waters, shoreward of MP 32.0

Islander East received a permit to discharge hydrostatic test water associated with the offshore portion of the route from the New York State Department of Environmental Conservation (NYSDEC). In issuing the permit, the NYSDEC has also granted Islander East permission to treat the hydrostatic test water with a biocide. This biocide will inhibit growth of anaerobic bacteria within the pipe which promotes corrosion. The treatment and discharge will be completed in accordance with Islander East's permit. .

8. ENVIRONMENTAL AND REGULATORY COMPLIANCE

8.1. Marine Vessel Cleanliness Measures

Islander East will specify that the marine construction contractor take special precautions to reduce the discharge of potentially harmful substances from the construction vessels to be employed on the project. Tug, crew and supply boats will be addressed on a case-by-case basis. All Contractor personnel will receive environmental orientations and training prior to commencement of the work to insure they are fully aware of these requirements. Islander East has developed and Offshore Spill Prevention, Containment, and Countermeasure Plan which identifies actions to be taken should a spill occur.

Each vessel shall be inspected for proper functioning and cleanliness prior to arrival on site. The marine installation contractor shall thoroughly clean the vessel prior to arriving at the worksite.

To eliminate detrimental impacts to the environment during periods of extremely heavy rainfall, the contractor shall utilize appropriate measures to insure surfaces that may be exposed to weather, rain and seas are free of contaminants. In the event that the exposure to the weather, rain and seas becomes so excessive as to endanger the vessel, these clean surfaces will allow rainwater and seawater that may splash onto the deck of the vessel to proceed overboard without detriment to the environment. Cooling water systems that take seawater directly from the surrounding waterbody and subsequently discharge it overboard are permitted. All wastes will be collected and disposed of in an appropriate manner.

8.2. Project Work Plan in Fairways and State Waters

Islander East will minimize adverse impacts to shipping and navigation during installation activities by adhering to the following safety precautions while working in or near navigation channels:

In all cases prior to a vessel commencing operations within a fairway, notification will be provided to the United States Coast Guard (USCG) Captain of the Port in the appropriate office so that Notice to Mariners may be broadcast per standard USCG policy.

Personnel onboard the work vessel who are responsible for monitoring positioning of that vessel will monitor their vicinity using radar and visual methods for vessel traffic in their vicinity. UHF Channel 16 will also be monitored for voice communications. For anchored operations, the anchor handling tugs will likewise monitor Channel 16.

Access to and from the work sites is planned to occur primarily via existing boat channels. The table below presents the frequency of operation for the boat types to be used in the construction of Islander East.

Table: Frequency of operation of vessels during construction.

Type of equipment	Round trips / day from Port of entry
Laybarge and anchor tugs	Stay offshore
Jet or Plow Barges and tugs	Stay offshore
Dredges and pushboats	Stay offshore
Supply / crew boats	4 trips/day
Pipehaul vessels	2 trips/day

8.3. Transportation

The vessels used to transport personnel, equipment, and supplies to and from the worksite will be selected based primarily upon the water depth in which the working vessels are operating. In shallow water depths, personnel and supplies will be delivered to working vessels via small crew boats, perhaps 60 to 65 feet long and a draft of approximately 4 feet. In deeper waters (greater than 10-12 feet), a typical crew boat should be approximately 100 feet long with a draft of approximately 6 feet. Once the construction operations have attained water depths where draft restrictions are not a critical issue, 180-to 220-foot supply boats, drafting on the order of 12 feet will be used to transport supplies to the working vessels.

Similar to the above, the sizes of the barges required to transport pipe and heavier equipment to the working vessel will be restricted by the water depth. Small barges, approximately 140 feet x 40 feet with a draft as shallow as 4 feet, may be required in shallow water depths. In deeper waters, where vessel draft will not be restricted, a typical pipe transportation barge will be 250 feet x 72 feet and may draft roughly 12 feet. To help supply the pipelay vessel with pipe during peak periods of production, pipehaul boats may be used. Typical pipehaul boats are up to 220 feet x 56 feet and draft up to 14 feet.

The table below lists the types of vessels anticipated for use on the Islander East Pipeline Project:

Table: Vessels to be used by Islander East During Installation.

Location	Type of Vessel	Vessel Size	Vessel Draft
Throughout Route	Laybarge	~ 260' x 72' to 400' x 100'	~16 ft
	Jet or Plow barge	~ 260' x 72' to 400' x 100'	~16 ft
Shallow waters	Supply/crew boat	~ 60 ft	~4 ft
	Pipe barge	~140 ft x 40 ft	~4 ft
"Deeper" waters	Crew boat	~100 ft	~6 ft
	Supply boat	~180-220 ft	~12 - 14 ft
	Pipe barge	~180 x 54 ft	~8 ft
	Pipe barge or pipehaul boat	~250 x 72 ft	~12 - 14 ft

8.4. Coordination of Vessel Movements

The high traffic area in which Islander East will be installed demands that a Vessel Traffic Separation Scheme (VTSS) is implemented by the Vessel Traffic Services (VTS) unit of the USCG in order to avoid collisions. The systems regulated by the VTS are designed to improve the safety and efficiency of vessel traffic and to protect the environment. The VTS has the capability to interact with marine traffic and respond to traffic situations developing in the VTS area.

The method chosen by the USCG under 33 CFR 26 for communications between vessels in the VTS area or any other area within the 3 mile limit is by Radiotelephone capable of transmitting and receiving on the frequency or frequencies within the 156-160 Mega-Hertz band using the classes of emissions designated by the Federal Communications Commission (FCC) for the exchange of navigational information specifically VHF FM channel 22A (156.375 MHz). Areas out of the VTS area but within the navigable waters of the United States must monitor channel 13 (156.65 MHz). This equipment is required on every vessel as shown below:

- Every power-driven vessel of 20 meters or over in length while navigating;
- Every vessel of 100 tons gross tons and upward carrying one or more passengers for hire while navigating;
- Every towing vessel of 26 feet or over in length while navigating; and
- Every dredge and floating plant engaged in or near a channel or fairway in operations likely to restrict or affect navigation of other vessels.

The location of each vessel must be transmitted to the nearest USCG station in the VTS area describing the area of planned activity and expected duration, by the assigned person on watch designated by the master or person in charge as required. No person may use the designated frequency by the FCC to transmit any information other than information necessary for the safe navigation of vessels or necessary tests.

Additional safety measures for this project will include

- Notification to the harbormasters in the area informing them of vessel movements either verbally or with a daily fax of planned activities to ensure that the smaller vessels that do not fall within these VTS vessel requirements will also be aware of the construction activities on a daily basis.

  All pipeline construction vessels will have lights and shapes displayed, as required, at all times.

  The pipeline shall be installed below the seabed using pre-installation trenching methods in those shallow areas where the top of the pipeline may be exposed to passing vessels.

PAGE LEFT INTENTIONALLY BLANK

The figures in Appendix A involve pipeline location information and are not available at this Internet site due to homeland security-related considerations. This portion of the Islander East consistency appeal administrative record may be reviewed at NOAA's Office of General Counsel for Ocean Services, 1305 East-West Highway, Silver Spring, Maryland.