3.1 Standard Construction Methods

The proposed Project will be constructed in compliance with applicable specifications, Federal regulations and guidelines, and the Project-specific permit conditions.

Generally, in upland areas, construction of the Project will follow standard construction practices and will typically involve numerous divisions of the pipeline (spreads) with crews progressing work along the ROW within each spread in an ordered, choreographed fashion. The Project anticipates division of the pipeline portion of the Project into four construction spreads. Spread 4 is located in New Jersey.

Typically, survey crews will begin the operations by demarcating the pipeline centerline and construction workspace (CWS) along the ROW. Winter tree clearing may be employed in areas with sensitive habitat and species-driven timing restrictions. At this time other than tree clearing, PennEast does not anticipate construction during the winter season. Clearing, grading, trenching, and other crews would follow until a final cleanup crew initiates the restoration process. Crews most frequently progress in close sequence to facilitate orderly progress, minimize the active construction spread size, and expedite restoration efforts.

Pipeline construction generally involves the following sequential operations:

Surveying and Staking

Access to the CWS will normally be obtained via public roads that intersect the ROW. Prior to construction, survey crews will stake the centerline of the proposed pipeline, foreign line crossings, the limits of the CWS, and the location of approved work access roads. Wetland boundaries and other environmentally sensitive areas will also be staked at this time in such a manner as to not attract the attention of non-Project personnel.

Clearing

The upland CWS will be cleared to remove brush, trees, roots, and other obstructions such as stumps. Non-woody vegetation may be mowed to ground level. No cleared material will be placed within wetland areas. Clearing includes the removal of trees and brush from the CWS. Tree stumps will be removed within a 30-foot operational ROW in upland areas and will be limited to a 10-foot operational easement in wetlands and waterbodies. Stump grinding may be used outside the operational easement as an alternative to removal in order to leave below grade root systems intact to aid in soil stabilization. PennEast anticipates disposal of trees cleared from the CWS using several different methods. Trees, if suitable, will be taken off-site by the clearing contractor and used for timber unless the landowner has made alternative arrangements for the salvageable timber. The stumps and brush may be disposed of by chipping and spreading, hauling to approved disposal areas, storing along the ROW with landowner approval, or other approved methods. Trees and stumps may be chipped on-site and removed. Chipped material not removed from the site may be spread across the upland areas of the CWS in a manner that will not inhibit revegetation or broadcast into off-ROW and stable areas. Wood chips will not be left within agricultural lands, wetlands, or within 50 feet of wetlands. Wood chips will not be stockpiled in a manner that they may be transported into a wetland.

Grading and Installation of Erosion and Sediment Controls

Prior to grading activities, soil erosion and sediment control measures will be installed to prevent sediment from migrating outside the CWS and/or into environmentally sensitive areas. Soil erosion and sediment control measures are shown on the drawings provided as Attachment E-4 of the Multi-Permit Application. Grading of the CWS will allow for the movement of heavy equipment and the safe passage of work crews. Grading will include removing rock outcrops, tree stumps, ridges, and topographic irregularities. Generally, machinery will operate on one side of the trench (working side) with excavated materials stockpiled on the other (non-working side). Special construction procedures to minimize the amount of vegetation removed from stream banks and slopes, prevent undue disturbance of the soil profile, restore the original contours of the natural ground, and prevent topsoil erosion will be implemented as necessary.

Temporary bridges will be constructed across certain waterbodies to permit construction equipment to cross. Locations of temporary bridges are shown on the Project plans. Construction equipment will be required to use the bridges, except the clearing crew who will be allowed one pass through the waterbodies before the bridges are installed. Bridges and supports will be removed after restoration is complete. Where temporary bridges are not installed, equipment will be required to move around the waterbodies to gain access to the other side.

If Project construction activity extends beyond one construction season it will be necessary to stabilize the site for the over-winter period. Maintenance measures will continue as needed throughout the over-winter period. After each significant rainfall (> ½ inch), snowstorm (> 6 inches), or extended period of thawing and runoff (temperatures over 32 degrees for over seven consecutive days), the construction contractor will conduct an inspection of all installed erosion control measures and perform repairs as needed to insure their continuing function. Areas stabilized by temporary or permanent seeding prior to the onset of the winter season will be inspected in the spring to ascertain the condition of vegetation cover, to repair any damaged areas or bare spots and reseed as necessary to establish vegetative cover.

To minimize impact to the soil profile on agricultural lands, topsoil will be segregated from subsoil during trenching and will remain segregated during construction to avoid loss due to mixing with subsoil material. PennEast will utilize either full CWS topsoil segregation or ditch plus spoil side topsoil segregation, as requested by the landowner or as appropriate based upon site-specific conditions. Upon completion of backfilling operations, the topsoil will be pulled back over the graded area. Grading activities will be scheduled to minimize the time between initial clearing operations and the actual installation of pipe and in accordance with the FERC Plan and Procedures.

Trenching

In most areas characterized by normal soils, the trench for the pipeline is excavated by crawler-mounted, rotary wheel-type trenching machines, or track–mounted excavators. The trench generally will be approximately 12 inches wider than the diameter of the pipe and of sufficient depth to allow for the minimum cover requirements to the top of the pipe in accordance with USDOT regulations pursuant to the Natural Gas Pipeline Safety Act of 1968, as amended. Landowner requests or permitting requirements may dictate greater depth.

Rock encountered during trenching will be removed using one of the available rock removal techniques:

- Conventional excavation with a backhoe;
- Ripping with a bulldozer followed by backhoe excavation;
- Pneumatic hammering followed by backhoe excavation;
- Blasting followed by backhoe excavation; and
- Blasting surface rock prior to excavation.

The technique selected is dependent on relative hardness, fracture susceptibility, expected volume, and location.

All blasting activity will be performed according to Federal and State safety standards and in accordance with all necessary permit authorizations, as well as PennEast's comprehensive Blasting Plan to be implemented by a certified blasting contractor.

Excess rock generated during the construction of the Project will be hauled to approved quarries near the pipeline route and properly disposed.

Except as depicted on the Supplemental Stream Crossing Detail plans (see Attachment E-5 of the Multi-Permit Application), the depth of cover for the proposed pipeline facilities, as well as the depth of cover for other, non-typical construction techniques (such as HDD), will be in accordance with PennEast's minimum specifications. Scour analysis and the potential for external damage may warrant an increase in depth. In actively cultivated agricultural lands, PennEast plans to install the pipeline with a minimum of 48 inches of cover, except where rock prevents this depth. In all other areas it will be installed with a minimum of 36-inches depth of cover.

Crossing of foreign pipelines will generally require the pipeline to be buried at greater depths depending upon the depth of the foreign pipeline. A minimum of 12 inches of clearance will be maintained when crossing foreign pipelines, utilities, or other structures as required by USDOT. Trenching in the vicinity of any foreign utilities will begin only after completing the appropriate notification procedures.

Measures will be employed to minimize erosion during trenching operations and construction activities. Measures also will be taken to minimize the free flow of water into the trench and through the trench into waterbodies. Compacted earth for temporary trench breakers and sandbags for permanent trench breakers may be installed within the trench to reduce erosion.

Stringing

The stringing operation involves moving the pipe into position along the prepared ROW. Pipe will be delivered to the Project area's pipeline wareyards and will then be moved by truck from the pipeline storage areas to the construction zone. It will be placed along the ROW in a continuous line in preparation for subsequent lineup and welding operations. Individual joints of pipe will be strung along the ROW parallel to the centerline and arranged so they are easily accessible to construction personnel. The amount of pipe necessary for stream or road crossings will be stockpiled in pipeline storage areas in the vicinity of each crossing. Stringing activities will be coordinated with the advance of the trenching and pipe laying crews to minimize potential impact to sensitive resources.

Bending

The pipe will be delivered to the Project site in straight sections. Field bending of the pipe will be required to allow the pipeline to follow natural grade changes and direction changes of the ROW. For this purpose, prior to line-up and welding, selected joints will be field-bent by track-mounted hydraulic bending machines. For larger horizontal changes of direction, manufactured induction bends may be used.

Pipe bending in the field will be utilized for turns involving slight deflections and/or large radii. For turns involving larger deflections and/or small radii, often related to spatial limitations due to easement and topographic constraints, prefabricated elbow fittings will be utilized.

Welding and Pipe Integrity

Following stringing and bending, the joints of pipe will be placed on temporary supports adjacent to the trench. The ends will be carefully aligned and welded together using multiple passes for a full penetration weld. Only welders qualified according to applicable American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME), and American Petroleum Institute (API) Standards will be permitted to perform the welding.

To ensure that the assembled pipe meets or exceeds the design strength requirements and to ensure weld quality and integrity, the welds will be inspected visually and tested non-destructively using radiographic (x-ray) or another approved test method, in accordance with API Standards. Welds displaying inclusions (void spaces) or other defects will be repaired if out of code, or they will be cut out (removed) and new welds installed and retested.

Coating

Following welding, the previously uncoated ends of the pipe at the joints will be field-coated per applicable coating specifications. Prior to lowering the pipe into the trench, the coating on the entire pipe section will be visually inspected and evaluated using a holiday detector (inspection of pipe coating using electronic equipment). Damaged areas will be repaired per applicable coating repair specifications.

Lowering-In and Backfill

The pipe lengths are lowered into the trench by specialty "side boom" tractors acting in unison and spaced so as not to buckle or otherwise damage the pipe. Extreme care is taken to protect the coating during the lowering-in process. The pipeline will be lifted from the supports, swung out over the trench, and lowered directly into the trench. Lowered pipe is positioned within the trench on sandbag benches (or approved equivalent structures) or screened subsoil (topsoil will not be used for padding). Connecting ends of the pipe are welded together in the ditch followed by the above inspection and coating process. Following lowering-in, the trench and pipeline are backfilled. A bedding layer of rock-free pad dirt is placed first to protect the pipe and coatings. Final backfill makes use of material excavated from the trench; topsoil will not be used for backfill.

Hydrostatic Testing

Completed sections of pipeline are further tested using water pressure. The pipes are first cleaned using a cleaning pig. Pipes are then filled with water from municipal supplies with no added chemicals and pressurized to levels higher than the maximum operating pressure designated for the

pipeline. The pressure test is held for a minimum of eight hours to be in compliance with USDOT 49 CFR 192 regulations. Any leaks would be repaired and the pipe section would be re-tested until no leaks are detected. The water used for the hydrostatic testing will be discharged in accordance with all applicable federal and state water requirements. PennEast will obtain all required permits, including Division of Water Quality, Bureau of Surface Water Permitting, for discharges associated with hydrostatic testing.

Grade, Cleanup, Restoration, and Seeding

Cleanup and restoration commence as soon as practicable following completion of backfilling and testing. These activities include reestablishing the line and grade of original contours, seeding, fertilizing, and mulching to restore ground cover and minimize erosion. Temporary workspaces and areas beyond the operational easement will be allowed to revert to their preconstruction land condition.

Seeding of disturbed stream approaches will be completed in accordance with the FERC Plan and Procedures after final grading, weather and soil conditions permitting. Where necessary, slope breakers and erosion control blankets will be installed adjacent to stream banks to minimize the potential for erosion. Sediment barriers, such as silt fence and/or straw bales will be maintained across the ROW until permanent vegetation is established. Temporary equipment bridges will be removed following construction.

Grading, cleanup, restoration and seeding in regulated areas will be done in accordance with the Wetland and Riparian Restoration Plans in Attachment E-3.

3.2 Specialized Construction Methods

The Project will encounter conditions where specialized construction methods will be deployed to address certain needs or to assure that particular resources are adequately protected. The following addresses specialized construction methods that will be used as described below, in the associated FHACA rule compliance statements, and as detailed on the Project plans.

Wetlands and waterbodies will be crossed using either standard construction methods (i.e., open cut) or trenchless construction methods (i.e., conventional bores or horizontal directional drilling). Each of these approaches is discussed below.

Open-Cut Crossings

An open-cut construction method involves the excavation of the pipeline trench across the wetland or waterbody, installation of a prefabricated pipeline segment, and backfilling of the trench with excavated material. Depending upon the width of the crossing and the reach of the excavating equipment, excavation and backfilling of the trench will generally be accomplished using backhoes or other excavation equipment operating from one or both sides of the wetland or waterbody. Excavated material from the trench will be placed outside of the wetland or above the ordinary high-watermark (as applicable) for use as backfill. The pipe segment can be weighted, as necessary to provide negative buoyancy and placed below the scour depth of waterways. Typical backfill cover requirements will be met, contours will be restored within the waterbody, and the banks will be stabilized via seeding and/or the installation of erosion control matting or riprap, per applicable agency approvals. One of the goals of open-cut crossings is to complete all in-stream construction (trenching, pipe installation, backfill, and streambed restoration) within 24 hours of commencement.

Crossings where open-cut methods are proposed are identified in the Alternatives Analysis (Attachment K), the Freshwater Wetland Permit Plans (Attachment E-1), the Flood Hazard Area Permit Plans (Attachments E-2), and the Supplemental Stream Crossing Detail Plans (Attachment E-5).

treambeds and wetlands that contain solid rock may be drilled and blasted. PennEast will submit a blasting plan to NJDEP for review and approval prior to the commencement of blasting activities. Any blasting activities will be completed in accordance with the Soil Erosion and Sediment Control (SESC) Plans provided in Attachment E-4. The ditch crew will test bore the wetland areas and stream banks with a rock drill to determine if rock will be encountered. Should the test holes determine the area will need to be shot or blasted, the crew will continue to prepare the ditch line area for blasting. Upon completion of blasting, the crew will ensure that the stream bottom is restored to prevent interference with the flow. Once the mainline tie-in crews move to the area, the crossing will be excavated and pipeline installed. Pre-blasting activities will reduce the duration of wetland and stream disturbance and enable the contractor to meet the timing restrictions.

Completed open cut crossings will be stabilized before returning flow to the channel. Original streambed and bank contours will be re-established, and mulch, jute thatching, or bonded fiber blankets will be installed on the stream banks, where necessary, as shown in the SESC Plans (Attachment E-4). Where the flume technique is used, stream banks will be stabilized before removing the flume pipes and returning flow to the waterbody channel.

One of two open cut crossing methods will be used: Flume Crossing, or Dam and Pump. Details of these construction methods are provided below.

Flume Crossing Method

PennEast is proposing to cross specific wetlands and waterbodies by using the flume crossing method. Wetlands and waterbodies proposed to be crossed using the flume crossing method are identified in Attachments G-2 and G-3. The flume crossing method involves diverting the flow of the stream across the construction site through one or more flume pipes placed in the stream. A typical detail of the flume crossing method is provided in the Project SESC Plans (Attachment E-4). The first step in the flume crossing method involves placing a sufficient number of adequately sized flume pipes in the stream to accommodate the highest anticipated flow during construction. After placing the pipes in the stream, sand or pea gravel bags will be placed in the stream upstream and downstream of the proposed trench. The bags serve to dam the stream and divert the stream flow through the flume pipes, thereby isolating the stream flow from the construction area.

Backhoes located on both banks of the wetlands and waterbodies will excavate a trench under the flume pipe in the isolated streambed. Spoil excavated from the stream trench will be placed or stored a minimum of 10 feet from the edge of the waterbody or in ATWS as necessary. Once the trench is excavated, a pre-fabricated segment of pipe will be installed beneath the flume pipes. The trench will then be backfilled with native spoil from the wetland or streambed. Clean gravel or native cobbles will be used to backfill the top 12 inches of the trench in coldwater fisheries.

If trench dewatering is necessary near waterbodies, the trench water will be discharged into an energy dissipation/sediment filtration device, such as geotextile filter bag or straw bale structure, away from the water's edge and away from other regulated areas, preferably in a well-vegetated upland area to prevent heavily silt-laden water from flowing into the waterbody.

Dam and Pump Crossing Method

PennEast is proposing to cross specific wetlands and waterbodies using the dam and pump crossing method. Wetlands and waterbodies proposed to be crossed using the dam and pump crossing method are listed in Attachments G-2 and G-3. A typical detail of the dam and pump crossing method is provided in the Project SESC Plans (Attachment E-4). The dam and pump crossing method involves constructing temporary sand or pea gravel bag dams upstream and downstream of the proposed crossing site while using a high capacity pump to divert water from the upstream side around the construction area to the downstream side. Energy dissipation devices, such as steel plates will be placed on the downstream side at the discharge point to prevent streambed scour.

After installing the dams and commencing pumping, a portable pump (separate from that pumping the stream flow around the construction area) may be used to pump standing water from between the dams into a dewatering structure consisting of straw bales/silt fence or into a filter bag located away from the stream banks, thereby creating a dry construction area.

Once the area between the dams is stable, backhoes located on both banks will excavate a trench across the stream. Spoil excavated from the trench may be stored in the dry streambed adjacent to the trench if the stream crossing is major or in a straw bale/silt fence containment area located a minimum of 10 feet from the edge of the wetlands or stream banks. Leakage from the dam, or subsurface flow from below the streambed, may cause water to accumulate in the trench. As water accumulates in the trench, it may be periodically pumped out and discharged into a dewatering structure located away from the stream banks.

After trenching across the wetland or streambed is completed, a prefabricated segment of pipe will be installed in the trench. The wetland or streambed portion of the trench is immediately backfilled with wetland or streambed spoil. Once restoration of the wetland or streambed is complete, the dams are removed and normal flow is re-established in the stream.

Conventional Bore Crossing

PennEast is proposing conventional bore crossings at certain roads, freshwater wetland complexes, streams and combinations thereof. The depth of the bore pit will depend upon topography to ensure that a minimum cover is placed over the bored pipeline segment. Crossings where a conventional bore is proposed are identified in the Alternatives Analysis (Attachment K), FWPA and FHACA rule compliance statements (Attachments G-2 and G-3), and the Supplemental Stream Crossing Plans (Attachment E-5).

Horizontal Directional Drilling (HDD)

Horizontal directional drilling is an advanced boring method that requires the drilling of a small diameter hole, or pilot hole, along a predetermined design path. The pilot hole is then gradually enlarged until it is sufficient to accommodate the pipeline being installed. The pipeline may or may not be installed concurrently with the hole enlargement depending upon the final diameter of the enlarged hole and the soil conditions encountered.

Excavation of the drill entry and exit locations will be necessary to contain drilling fluids during all phases of the installation. These fluids and cuttings must be disposed of in an approved manner periodically or at the completion of the crossing installation. The crossing length and cross-sectional geometry are dependent upon the pipeline design parameters, the obstacle to be crossed, and the subsurface conditions. ATWS, including pipe staging areas and storage areas for drilling

mud and borehole cuttings, has been located and is depicted on the Project plans. ATWS is located in upland areas outside of wetlands and riparian zones wherever practicable.

Geotechnical investigations were conducted at all proposed HDD locations to support the design and proposed crossing method. The Geotechnical Data Reports are provided in Attachment R-3 of this Multi-Permit Application.

Although PennEast is confident in the current HDD methods and technologies available, it is recognized that such methods contain unanticipated risks. PennEast has developed a HDD Inadvertent Returns and Contingency Plan (IRCP) (Attachment R-1 of this Application) to mitigate these risks. The HDD IRCP describes how an inadvertent release of drilling mud would be contained and cleaned up and provides a contingency plan for crossing waterbodies or wetlands in the event an HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary. Under the IRCP, if there is an inadvertent return, the contractor will immediately take measures to eliminate, reduce, or control the inadvertent return based on the location of the inadvertent return, site specific geologic conditions, and the volume of the inadvertent return. Crossings where a HDD is proposed are identified in the Alternatives Analysis (Attachment K), FWPA and FHACA rule compliance statements (Attachments G-2 and G-3), and the Project plans (Attachments E-1 and E-2).

4.0 MEASURES TAKEN TO REDUCE POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

This portion of the FWPA and FHACA IP Application presents information regarding measures taken to reduce adverse impacts to the following features: special aquatic sites, public lands, critical habitat, channels, riparian zones, fishery resources, threatened or endangered species and their habitat, and other relevant environmental features observed along the proposed Project route.

In accordance with N.J.A.C. 7:7A-1.3, BMPs are any "methods, measures, designs, performance standards, maintenance procedures, and other management practices which prevent or reduce adverse impacts upon or pollution of freshwater wetlands, State open waters, and adjacent aquatic habitats." With any construction activity, groundwater and environmental resources have the potential to be impacted during various stages of construction, including clearing and grading, excavation (including open cut trenching and excavation of bore pits for trenchless construction), dewatering, hydrostatic testing, and blasting. For the PennEast Pipeline Project, several BMPs are proposed to reduce or eliminate these potential impacts on environmentally sensitive areas such as freshwater wetlands, transition areas, State open waters, adjacent habitats and groundwater.

A summary of these BMPs is provided below, along with discussion of the standard and specialized construction techniques PennEast plans to implement to minimize or avoid these adverse effects.

While field conditions may dictate the incorporation of additional BMPs, where these measures are known to be required, they are depicted on the Project SESC Plans provided in Attachment E-4.

PennEast and its contractors will adhere to the following with respect to groundwater and the protection of environmentally sensitive areas:

- Prior to commencing work, field workers will be trained to assure the proper implementation of BMPs, compliance with permit conditions, safety standards and proper emergency notifications.
- Signage and color-coded flagging will be used, along with training, to ensure Contractors know the limits of the CWS and boundaries of environmentally sensitive areas.
- Installing stone at unimproved construction access/egress locations to control sediment tracking from the construction site.
- Installing/maintaining temporary and/or permanent erosion-control structures to stabilize soil, such as temporary sediment barriers, silt fences and erosion-control blankets/fabrics, installed at the limits of construction to minimize erosion and prevent transportation of sediment outside the construction workspace and into environmentally sensitive areas such as wetlands and waterbodies.
- Rock filter outlets installed at low points of silt fence where overtopping damage is apparent.
- Erosion control blankets/fabrics will be placed on disturbed areas within 50 feet of streams and wetlands and on slopes steeper than 3:1.
- Use of earthen waterbars (slope breakers) on steep slopes to divert runoff to vegetated areas to slow flows and help minimize erosion and sedimentation. Except in cultivated areas, waterbars will be maintained in place.
- Excavated topsoil and sub-soils will be segregated, where appropriate, and returned as nearly as possible to their original soil horizon.
- Monitoring dewatering operations and discharging trench water to appropriate receiving areas or containers.
- Using secondary containment for pumps when working in/near sensitive resource areas.
- Enforcing restrictions on refueling areas and areas designated for storage of hazardous substances. Construction equipment lubricants and fueling shall only occur in locations that are at least 100 feet from all waterbodies and wetlands. No pollutants will be stored in Wellhead Protection Areas.
- Revegetating disturbed workspace locations to permanently stabilize such areas following the installation of Project pipelines and facilities.

- Installing permanent trench plugs, when necessary, to inhibit channelized groundwater flow along the trench line. Trench plugs will also be installed to prevent the trench from draining wetlands or changing hydrology.
- Protecting water supply wells and springs located within and in the immediate vicinity of Project workspaces.

For disturbance within wetlands, wetland transition areas and waterbodies, PennEast will adhere to the following additional BMPs in conjunction with the FERC Procedures:

- The width of construction workspace will be limited to 60 feet in forested wetlands and 75 feet in non-forested wetlands.
- Wetland boundaries and wetland transition areas will be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.
- Avoid rutting of wetland soil by installing appropriate stabilization in the equipment travel lane (e.g., timber mats, etc.).
- Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.
- Use "push-pull" or "float" techniques to place the pipe in the trench where standing water and other site conditions allow.
- Minimize the length of time that topsoil is segregated and the trench is open. Wetland areas will not be trenched until the pipeline is assembled and ready for lowering in.
- Limit construction equipment operating in wetland areas to equipment that is needed to clear the construction workspace, excavate the trench, fabricate and install the pipeline, backfill the trench, and restore the construction workspace.
- Cut vegetation just above ground level, leaving existing root systems in place, and remove cuttings from the wetland for disposal.
- Limit pulling of tree stumps and grading activities to a width of 10 feet in wetlands and waterbodies. Do not grade or remove stumps or root systems from the balance of the construction workspace in wetlands unless Chief Inspector and Environmental Inspector determine that such removal is required to address a safety-related condition.
- Pre-construction wetland contours will be restored to the greatest extent practicable to maintain the original wetland hydrology.

During construction, the open trench could accumulate water, either from the seepage of groundwater or from surface runoff generated by precipitation. This water must be removed from within the trench to allow construction to proceed. Trench dewatering will be conducted in a manner designed to prevent the flow or deposition of sand-, silt-, or sediment-laden water into waterbodies and wetlands, using sediment- and erosion-control devices. PennEast will discharge water from dewatering activities in accordance with applicable permits and BMPs such as sediment-control measures, including filter bags and/or silt fences, and hay bales whenever water is pumped from the pipeline trench. The sediment-control structure will capture solids during discharge and decrease the erosive forces of the water and the likelihood of associated effects. Implementing these procedures and using dewatering structures at stream crossings will minimize turbidity and erosion while also reducing the risk of groundwater impacts during dewatering operation. Nevertheless, trench dewatering may result in a temporary fluctuation in local groundwater levels, depending on soil characteristics at the trench and the volume and duration of dewatering necessary. To allow the water table to return to original conditions, PennEast will minimize to the extent practicable the amount of time that the trench will remain open, thereby minimizing the duration of dewatering. Where possible in suitable, upland non-regulated areas, groundwater from dewatering will be processed through BMPs and returned to the ground to re-infiltrate to locally reduce the effects of dewatering. Through the implementation of appropriate BMPs, PennEast expects that trench excavation and dewatering activities will have a negligible impact on groundwater resources.

At dry stream crossings, fish habitat could be directly altered at the crossing site. The temporary effects of stream crossing methods could include increased sedimentation and water turbidity downstream from the construction workspace as well as from downstream scour if pumps are used. Erosion and increased sedimentation could affect individuals of aquatic species not only at Project stream crossings, but also at downstream locations. PennEast will observe in-water species construction timing restrictions and continue to consult with NJDEP on these and other fishery impact minimization and mitigation measures to ensure that the Project's impacts on fish are temporary and/or negligible. Observance of timing restrictions and implementation of the aforementioned minimization and mitigation measures, including SESC measures provided in Attachment E-4, will reduce such impacts to the maximum extent practicable. The following measures specific to waterbody crossings will be implemented, as appropriate:

- Sediment barriers will be installed across the entire construction workspace at all waterbody crossings, where necessary, to prevent the flow of sediments into the waterbody. In the travel lane, these may consist of removable sediment barriers or drivable berms. (Removable sediment barriers may be removed during the construction day but are re-installed after construction has stopped for the day or when heavy precipitation is imminent.)
- Where waterbodies are adjacent to the construction workspace, sediment barriers will be installed along the edge of the construction workspace as necessary to contain soil and sediment within the construction workspace.
- Trench plugs will be used at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody, unless otherwise approved by the on-site environmental inspector.
- Applicable waterbody setbacks will be maintained until construction-related ground-disturbing activities are complete. The setback distances will vary based on the type of activity being performed, but all will be clearly marked in the field with signs and/or highly visible flagging prior to pipeline construction.
- Crossings will be constructed to maintain adequate waterbody flow rates to protect aquatic life and prevent the interruption of existing downstream uses.
- Any spoil from waterbody crossings will be placed in the construction workspace at least ten (10) feet from the water's edge.
- All waterbody banks will be restored to preconstruction contours or to a stable angle of repose, to the greatest extent practicable as approved by Environmental Inspector.

PennEast is employing trenchless construction methods for more than half of all New Jersey wetland and stream crossings. Inadvertent releases of water-based drilling fluid could affect groundwater resources. However, water-based drilling fluids would primarily consist of naturally occurring materials, such as bentonite, the release of which, in small quantities, is not detrimental to groundwater. In general, PennEast will use drilling fluid additives that are National Sanitation Foundation/ANSI 60-approved drilling fluid products and will review material safety data sheets/safety data sheets for all anticipated drilling fluid products after selecting the HDD contractor and before HDD construction. Local water sources will be used in combination with bentonite to prepare the HDD water-based drilling fluid mixture. Through the implementation of appropriate BMPs, such as using water-based drilling fluid, minimizing the quantity of drilling fluids used, and managing and optimizing the rheological properties of the HDD water-based drilling fluid, PennEast expects that any adverse impacts on groundwater resources associated with HDD activities will be temporary. PennEast has developed an IRCP provided as Attachment R-1 to this IP application. PennEast obtained publicly available well data through the NJDEP Data Miner website for each block and lot within 0.25 mile of the Project workspace in New Jersey. Landowners within 150 feet of Project workspace (500 feet in karst areas and near proposed HDDs) have been contacted to determine the location of wells near the Project. PennEast continues to collect well location data for newly constructed wells that are added to the public data set and continues to coordinate with landowners to collect the best-available information about water supply wells near the Project.

The use of heavy machinery and construction equipment could result in soil compaction during construction. Excessive soil compaction can reduce the ability of water to percolate into the soil where it is accessible to trees and herbaceous plants. Soil compaction also has the potential to adversely impact root systems. Impacts on vegetation through soil compaction will be reduced through minimizing the footprint of the proposed work activities to approved work areas and by minimizing the duration of disturbances to the extent practicable. Topsoil will be segregated in agricultural areas, as well as non-saturated wetlands. Where construction activities occur in those areas with soils that are more susceptible to soil compaction (i.e., areas with wet soils), protective matting may be used.

Impacts on wildlife during pipeline operation would generally result from the presence of operational Project ROWs and structures, vegetation reclamation and maintenance, and the periodic presence of maintenance personnel and equipment. Staff will adhere to the same BMPs during operations used during construction to minimize or avoid wildlife mortalities/injuries, sensory disturbances, and unnecessary habitat modification. Likewise, staff will practice good housekeeping and safety measures to avoid trash on the ROWs and prevent spills and fires. The rates of water withdrawal and discharge will be regulated by methods such as the use of splash pads to further minimize impacts on fish and to minimize or avoid sedimentation and impacts to stream flows. No chemicals will be added to the testing water. PennEast will identify, control, and minimize the spread of non-native invasive species and noxious weeds in areas disturbed by the Project in accordance with the Project Invasive Species Management Plan. Lastly, PennEast will consult with state and interstate agencies such as the Delaware River Basin Commission (DRBC) and NJDEP regarding the locations of hydrostatic testing locations and obtain all required hydrostatic testing permits.

5.0 ENVIRONMENTAL REPORT ASSESSMENT SUMMARY

The following section of this report assesses and summarizes environmental features at each NJDEP-regulated crossing in accordance with the rules and regulations associated with the NJDEP Multi-Permit necessary for Project construction. This assessment not only details regulated environmental features at each crossing, but also provides cross references to detailed plans and studies located within this Multi-Permit Application document. This assessment includes avoidance, minimization and mitigation information for Project impacts to environmental resources at the regulated crossings, including construction methods and other special considerations.

This Regulated Crossing Environmental Assessment should be viewed in concert with the entire Multi-Permit Application, which provides detailed technical analysis and scientific research and assessment performed relative to the following:

- Wetland and State Open Waters (Wetlands Delineation Report, Attachment F);
- Threatened and Endangered Species (Habitat Protection Plan, Attachment J);
- Alternatives Analysis (Attachment K);
- Mitigation Proposal (Attachment N);
- Historic Architectural and Archaeological Surveys (Attachment O); and
- HDD Supplemental Engineering Information (Attachment R).

As previously noted, this Environmental Report and assessment summary addresses in a comprehensive manner the requirements of the FWPA (N.J.S.A 13:9B) and its Rules (N.J.S.A 7:7A) as well as the FHACA (N.J.S.A. 58:16A-50) and its Rules (N.J.A.C. 7:13).