Technical Review of Volume I FERC Draft Environmental Impact Statement Submitted For PennEast Pipeline Project

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1. Project Overview

The report that follows, prepared by Princeton Hydro, consists of a technical review of Volume 1 of the Draft Environmental Impact Statement for the proposed PennEast Pipeline prepared by the staff of the Federal Energy Regulatory Commission (FERC), FERC docket number CP15-558-000. Princeton Hydro's report focuses on the shortcomings of the submitted DEIS.

PennEast Pipeline, LLC is a joint venture effort of AGL Resources, NJR Pipeline Co, South Jersey Industries, PSEG Power LLC, Spectra Energy Partners and UGI Energy. If constructed the proposed pipeline would transfer natural gas extracted via a "fracking" process from shale fields located in northeast Pennsylvania to the Transcontinental Gas Pipe Line Co.'s Trenton-Woodbury Lateral located in Mercer County, NJ. From its point of origin in Luzerne County the proposed pipeline path transects the Lehigh Valley of Pennsylvania in an approximately southeasterly direction cutting through Northampton, Carbon and a portion of northern Bucks Counties. In New Jersey the pipeline path runs in a southeasterly direction. Beginning in Holland Township, northern Hunterdon County, the proposed pipeline path continues through Milford, Alexandria, Kingwood, West Amwell, East Amwell, Lambertville, Hopewell, Kingston, Pennington and Princeton, terminating at the Transco Trenton-Woodbury interconnection.

The pipeline's 118.8 mile long path directly impacts over 1600 acres of land, with approximately 85% of the affected lands located within the watershed boundaries of the Delaware River ecosystem. Of particular significance is that the pipeline's path runs through preserved public open-space lands, steeply sloped terrain, and crosses numerous Pennsylvania Department of Environmental Protection (PADEP) Exceptional Value and High Quality streams, New Jersey Department of Environmental Protection (NJDEP) Category-1, anti-degradation streams, and Delaware River Basin Commission (DRBC) Special Protection Waters.

The pipeline's work corridor right of way (the area disturbed during the survey, site-access and construction of pipeline) varies between 90 and 125 feet in width. Following construction, a 50 foot wide permanent right-of-way (ROW) will run the entire length of the pipeline. This ROW will remain in a significantly altered state relative to existing conditions. The temporary and permanent ROWs are part of the overall environmental damage caused by the pipeline. Supporting the "pipeline" are various appurtenant facilities used to transport the gas. These include access/maintenance roads, compressor units, metering stations, regulator stations, delivery stations, holders, valves, and the other infrastructure elements critical to the pipeline's operations. These components of the pipeline are all above ground and are neither benign nor passive operational elements of the system.

As per the DEIS, in total "1,613.5 acres of land, will be disturbed in order to construct the pipeline and supporting pipeline facilities (aboveground facilities, pipe and contractor ware yards and staging areas, and access roads). Once completed, the long-term operation and maintenance of the pipeline affects 784 acres of land, of which the majority (715 acres) consists of the pipeline ROW, 61 acres in the form of aboveground facilities, and 8 acres associated with new permanent access roads". The major elements of the PennEast pipeline are as follows:

- The primary line consisting of 115.1 miles of new 36-inch-diameter pipeline,
- The 2.1-mile, 24-inch-diameter Hellertown Lateral, Northampton County, PA
- The 0.1-mile, 12-inch-diameter Gilbert Lateral, located in Hunterdon County, NJ, and
- The 1.5-mile, 36-inch-diameter, Lambertville, Hunterdon County, NJ lateral.

Above ground elements of the PennEast Pipeline include:

- Well Head and Well Pad (where the gas is extracted),
- Water Lines (Fresh Water and Flowback; associated with the fracking process),
- Production Lines,
- Gathering Lines,
- Metering and regulating stations,
- Gas Processing Plants,
- Compressor Station (47,700 HP), Kidder Township, Carbon County, PA),
- Mainline Vales (11 in total),
- Smart PIG (pipe inspection gauge) Launchers/Receivers (elements required for the maintenance, inspection and cleaning of the pipeline), and
- The Citygate (the point where the pipeline connects to an interstate or distribution pipeline).

2. Review of DEIS

The FERC PennEast Pipeline DEIS was released for public review and comment in July 2016. The DEIS was prepared in accordance with the National Environmental Policy Act (NEPA), which mandates that all executive federal agencies prepare an environmental impact statement (EIS) for any proposed major federal project determined as having the potential to cause a significant environmental impact. The PennEast Pipeline DEIS reviews and assesses the potential environmental impacts caused by the construction and operation of the pipeline.

As per FERC, the purpose of the DEIS is to *"inform FERC decision makers, the public, and the permitting agencies about the potential adverse and beneficial environmental impacts of the Project and its alternatives, and recommend mitigation measures that would reduce adverse impacts, to the extent practicable".*

The FERC DEIS concludes that although the pipeline's construction will cause some adverse environmental impacts, the majority of those impacts will "be reduced to less-than-significant levels with the implementation of PennEast's proposed mitigation" and the additional recommendations suggested by FERC within the DEIS.

Princeton Hydro's report focuses on the failure of the DEIS and inconsistencies in FERC's findings regarding the significance and irreversible nature of the impacts caused by the PennEast Pipeline (the Project). FERC's failure to properly ascertain the Project's impacts

caused by the pipeline's construction and subsequent maintenance and operation are based on the following:

1. **The failure to recognize that the majority of the wetland, riparian and water resources directly impacted by the Project are highly unique, extremely sensitive, of significant public value, and are protected by State and/or DRBC anti-degradation regulations.**
2. **The lack of any site-specific field data supporting FERC's findings and PennEast's assumptions regarding the Project's level of impact,**
3. **The assumption that all impacts, regardless of their magnitude can be fully mitigated,**
4. **PennEast's reliance on standard mitigative measures to address the Project's impacts to highly unique and extremely sensitive wetland, riparian and water resources, as well as upland areas characterized by steep terrain and shallow soils,**
5. **Failure to properly account for varying seasonal uses, resource requirements, and differing life-history needs of the resident wetland, riparian and aquatic biota,**
6. **Failure to sufficiently account for habitat alterations resulting from the fragmentation of core forest habitat, permanent loss of canopy cover at each stream crossing, and the introduction of invasive species attributable to such disturbances,**
7. **Failure to sufficiently assess and account for the long-term and cumulative impacts that will arise following the initial disturbance of the pipeline corridor,**
8. **Inadequate assessment of the long-term impact of the above ground and permanent access road elements of the project, including, but not limited to a failure to provide appropriate post-construction stormwater best management practices for these elements, and**
9. **Failure to recognize the sustained impacts to the initially impacted resources due to ongoing inspection, operation and maintenance activities associated with the pipeline and pipeline ROW.**

Of particular concern is the inability of the proposed mitigation measures, which FERC has deemed acceptable, to prevent irreversible damages to the region's natural resources. These damages contravene the protective regulations that have been put into effect by NJDEP, PADEP and DRBC which are intended to prevent <u>any impact, not simply attempt to mitigate them to the degree FERC deems appropriate.</u>

2.1 Environmental Impact Analysis

The National Environmental Policy Act (NEPA) of 1969 defines the procedural requirements used by all federal government agencies to comprehensively evaluate the environmental impacts and risks of a project. The NEPA process is designed to ensure a project's positive and negative environmental attributes are equally weighted and appropriately appraised as part of the official decision-making process. The evaluation process must include an assessment of alternatives to the preferred project approach, including a No Action alternative. The evaluation process must also provide an opportunity for public comment and input.

The Natural Gas Act of 1938 (NGA) governs all aspects of interstate transportation and sale of natural gas, and gives the Federal Energy Regulatory Commission (FERC) authority over all pipeline projects. FERC is an independent federal agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC is charged by Congress "with evaluating whether interstate natural gas pipeline projects proposed by private companies should be approved". The Energy Policy Act of 2005 gave FERC additional responsibilities, including the siting and abandonment of interstate natural gas pipelines and storage facilities. Overall, FERC is mandated by law to conduct a thorough, in-depth and impartial analysis of a project's environmental impacts, with that analysis conducted in a manner consistent with NEPA requirements.

The Federal Clean Water Act and the State issued Water Quality Certificate directly tie the NEPA process to State regulations. Both trigger the need for FERC's environmental impact review and documentation to satisfy State environmental requirements. New Jersey's and Pennsylvania's wetland and surface water regulations are linked to Sections 401 and 404 of the Clean Water Act. As such, the FERC EIS findings inherently must be consistent with the mandates of the Clean Water Act.

Although the siting of the pipeline occurs under FERC's oversight, FERC does not issue any environmental permits nor does FERC issue the State Water Quality Certificates. Rather, the environmental review of the pipeline's construction and the eventual issuance of the majority of the required permits (including all Water Quality Certificates) occur through the Pennsylvania Department of Environmental Protection (PADEP) and the New Jersey Department of Environmental Protection (NJDEP). Additionally the regulatory requirements of the US Army Corps of Engineers, Delaware River Basin Commission and US Fish and Wildlife Service need to be satisfied. It is therefore PennEast's responsibility to fully satisfy PADEP, NJDEP, and DRBC regulations and not rely solely on FERC's findings. In order to satisfy PADEP, NJDEP, and DRBC regulations PennEast must conduct their own rigorous site evaluations, data collection and ecological assessments as would any other applicant seeking to conduct a project in Pennsylvania or New Jersey. Table 1.3-1 of the DEIS provides a summary of all of the regulations that the Project is subject to and the status of the permits that need to be issued through the Commonwealth of Pennsylvania, the State of New Jersey, the DRBC and various Federal agencies.

In Pennsylvania the water courses affected by PennEast include:

- *Class A wild trout water*—A surface water classified by the Fish and Boat Commission, based on species-specific biomass standards, which supports a population of naturally produced trout of sufficient size and abundance to support a long-term and rewarding sport fishery.
- *Exceptional Value Waters*—Surface waters of high quality which are protected by PADEP's anti-degradation standards,
- *High Quality Waters*—Surface waters having quality which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying § 93.4b(a),

- *Surface water of exceptional ecological significance*—A surface water which is important, unique or sensitive ecologically, but whose water quality as measured by traditional parameters (for example, chemical, physical or biological) may not be particularly high, or whose character cannot be adequately described by these parameters.
- *Surface water of exceptional recreational significance*—A surface water which provides a water-based, water quality-dependent recreational opportunity (such as fishing for species with limited distribution) because there are only a limited number of naturally occurring areas and waterbodies across the State where the activity is available or feasible.

In New Jersey the water courses affected by PennEast include:

- *Category 1 Waters* – Surface waters that are protected by the State's antidegradation policies set forth at NJAC 7:9B-1.5(d), for protection from measurable changes in water quality based on exceptional ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resource(s) to protect their aesthetic value (color, clarity, scenic setting) and ecological integrity (habitat, water quality and biological functions). Furthermore, as per NJAC 7:9B-1.5(d)iii, Category One Waters shall be protected from any measurable changes (<u>including calculable or predicted changes</u>) to the existing water quality.

With respect to the DRBC, the water courses affected by PennEast are special protection waters that have, among other things, exceptionally high scenic, recreational, ecological, and/or water supply uses that require special protection pursuant to DRBC's Special Protection Waters regulations.

Common to each of the above special designations is that each mandates the subject water be protected from degradation or any impact that alters its ability to meet its designated use. Of particular significance with respect to PennEast is the status of the Section 401 Water Quality Certificates issued through NJDEP and PADEP. For either PADEP or NJDEP to issue a 401 Water Quality Certificate, PennEast will have to definitively demonstrate that the Project fully complies with their respective state water quality standards (Chapter 93 and NJAC 7:9B). Additionally, the DEIS does not address how the Project will satisfy all of the requirements associated with NJDEP's Individual Wetland Permits (NJAC 7:7A) and the Individual Flood Hazard Permits and Area-Specific Requirements for Individual Permits (NJAC 7:13). Without the State issued 401 Water Quality Certificates as well as other required permits or authorizations required via NJDEP, PADEP or the DRBC, PennEast cannot be constructed.

2.2 FERC Summary of PennEast Impacts

Beginning on Page 12 of the DEIS Executive Summary, FERC presents and reviews the Project's potential impact's to the region's natural and cultural resources. This report focuses on the Project's impacts to water and wetland resources, but also identifies the Project's impacts to

upland resources that will trigger the degradation of water and wetland resources. Support of FERC's Executive Summary findings are provided in Sections 4.1 through 4.12 of the DEIS and FERC's conclusions regarding the Project's impacts and a compilation of FERC's recommended mitigation measures are presented in Sections 5.1 and 5.2 of the DEIS.

Repeatedly throughout the DEIS, FERC contends that the environmental, ecological, scenic and recreational impacts of this Project will be adequately minimized as a result of PennEast's implementation of an Erosion and Sediment Control Plan (E&SCP) and a Spill Prevention, Control and Countermeasures (SPCC) Plan, both of which are provided in Appendix D of the DEIS. The E&SCP is based on FERC's Upland Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures. FERC's conclusions are also based on FERC's inference that PennEast will be able to fully comply with all of NJDEP's PADEP's and DRBC's permit requirements, the limitations set forth in any issued permit, and the recommendations of all Federal review agencies, including but not limited to USACE, USFWS, NRCS and USEPA.

The following sections of this report provide an overview of the resources at risk, FERC's findings, and the short-comings of FERC's conclusions that the project will not have a significant environmental impact.

2.2.1 - Geology

The DEIS notes that in Pennsylvania, portions of the pipeline's route traverses areas that are susceptible to landslides. This analysis is limited to areas prone to seismic events that could trigger a landslide. However, landslides often occur in the absence of any seismic event, especially in steeply sloped areas. Such landslides are more commonly associated with intense rain storms or major snows melts, and increase in likelihood when lands are denuded of vegetation and native soils are disturbed and exposed. The DEIS does not discuss how such events could result in the catastrophic transport of large quantities of soil, rock and debris into sensitive upland, wetland, riparian and water resources.

Within Appendix D of the DEIS (E&SCP), PennEast notes that:

"The primary cause of landslides is when colluvial (loose) soil and old landslide debris on steep slopes give way. The geologic instabilities that cause landslides are often exacerbated by highway projects in which the earth is cut and soil is loosened. Other primary causes of landslides are rainfall or rain-on-snow events that can weaken debris on steep mountain slopes (McCormick Taylor, 2009)".

The PennEast project will create exactly these types of conditions (cut earth and loosened soils) as part of the land clearing and pipeline trenching elements of the Project. The construction phase of the project, when soils are exposed, soils are stock piled and the vegetation has been stripped from the site, offers the greatest potential for the occurrence of a landslide. Neither Sub-Section 5 (Description of Erosion and Sediment Control BMPs) nor Sub-Section 6 (Project

Site Runoff Prior to Site Restoration) of the E&SCP (Appendix D of the DEIS) identifies any special actions or measures that will be implemented when conducting work in steep slopes to prevent a landslide.

Additionally, the post-construction alterations of the ROW's vegetative cover and the inevitable compaction of site soils will increase the rate and volume of runoff generated from the Project ROW. **These changes to prevailing soil conditions and alteration in the type of vegetated cover (trees and shrubs to grasses) increase the likelihood for post-construction landslides, especially in steeply sloped areas.**

Thus, FERCs finding of minimal impact needs to be revisited due their incomplete analysis of the potential for landslides (not just those triggered by seismic events), in particular those resulting from site preparation, construction activities, and post-construction changes to soil properties and vegetative cover. Both FERC and PennEast conclude that the implementation of the E&SCP will prevent landslides and provide adequate mitigation to minimize the impacts caused by a landslide. However our review of the E&SCP finds it to be lacking with respect to any actual special measures proposed for steep sloped areas to prevent landslides from occurring.

2.2.2 – Soils

The trench depth for the 36" diameter PennEast Pipeline must conform to the Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA). For safety reasons it must be buried deep enough to avoid accidental punctures and to deal with seasonal frost issues. The PHMSA requires pipelines transporting conventional and unconventional gas to typically be covered by 30 to 36 inches of soil overburden. The thickness of soil cover may be greater when the pipeline runs under a roadway or when it runs under a stream, river or lake. PHMSA may require additional cover (48 inches to 60 inches) when the pipeline runs under agricultural lands. Less cover however may be allowed (as little as 18 inches) when the pipeline cuts through a consolidated area of bedrock. Nonetheless the amount of excavation required to properly trench the pipe is significant.

Because the placement of the pipe in the trench takes time there is the need to stockpile the excavated soil in areas adjacent to the trench. Each stockpile represents another opportunity for offsite soil migration. This happened during the construction of the Tennessee Gas pipeline in Northern New Jersey leading to the impact of streams, wetlands and large recreational lakes located adjacent to the pipeline ROW.

In rockier areas, in order to protect the pipe from damage caused by sharp stones it may be necessary to sort the soil, with the non-conforming material transported off site. The sorting, stockpiling and off-site transport of the rejected material again increases the opportunity for the soil related impacts, especially when work is being conducted adjacent to streams, wetlands and other waterbodies.

In Sub-Section 4 of the DEIS, PennEast reviewed available digital soil data (USDA NRCS Web Soil Surveys), and identified approximately 38% of the soils along the proposed pipeline are defined by the NRCS as highly erodible. In total about 406 acres of traversed soils are classified as such. Much of this acreage appears to be associated with the steeper portions of the ROW.

PennEast also evaluated the compaction potential of soils occurring along the pipeline's route. The compaction potential of soils was largely based on the drainage class of the soils, with soils designated by the NRCS as very poorly and poorly drained being those identified by PennEast as having the greatest potential for compaction (but fail to provide any supporting data). The hydrologic classification of soil, specifically how well or how poorly it is drained, is only one factor affecting soil compaction. Soil moisture content is another, as well as how close a soil at its time of disturbance is to its optimal soil moisture content. Sands, which are well drained, due to the angular nature of the soil particles and lack of high clay or silt content, can actually be more effectively compressed and compacted than clays and silts. As such, PennEast's evaluation of soil compaction impacts based primarily on a soil's drainage classification is incorrect.

PennEast also states that "many soils along the proposed pipeline segments have likely already been compacted due to past development and some areas being covered by paved surfaces". This is both misleading and non-relevant as the greatest environmental impact that is expected to occur as a result of soil compaction is along sections of the ROW passing through undeveloped core forest reaches, wetlands, protected riparian areas and steeply slopes lands, all of which are for the most part protected from development. Alteration of the properties of these soils has far reaching consequences pertaining to increased erosion potential, increased stormwater runoff (rate and volume), revegetation potential and long-term stability.

FERC recognizes that the Project has the potential to permanently alter the physical properties of native soil disturbed by clearing, construction, and maintenance activities, specifically as a result of soil compaction, rutting, and erosion. However, FERC concludes that these impacts can be adequately mitigated through the implementation of the Erosion Control, Revegetation, and Maintenance Plan (Plan) and Wetland and Waterbody Construction and Mitigation Procedures (Procedures). The Cornell Soil Health Test (CSHT) provides a standard for assessing the important physical, chemical and biological processes and functions of disturbed soil. The CSHT was used to evaluate the impacts of a recently constructed pipeline that transected University-owned land. The CSHT analysis definitively showed that soils within the ROW had significantly lower soil quality levels than the soils sampled in the adjacent areas unaffected by the pipeline's construction. This suggests that reliance on standard erosion control and soil handling techniques inadequately compensates for soil compaction issues within the ROW. Compacted soils inhibit the recharge of precipitation leading to a greater amount of stormwater runoff. The added runoff can lead to an increase in the mobilization and transport of pollutants and an increased opportunity for overall soil erosion.

Recent investigation of another pipeline ROW (Tennessee Gas pipeline as it passes through the Highlands region of New Jersey) conducted by the New Jersey Conservation Foundation[1] found multiple examples of "restored" sites that were significantly altered from pre-pipeline conditions, even though each had been mitigated in accordance with FERC accepted erosion control and revegetation measures. Some of the consistently observed impacts were:

- Compacted soils,
- Evidence of erosion,
- Failure of the mitigation plantings,
- Lack of adequate vegetative cover,
- Vegetation dominated by invasive species, and
- Spread of invasive species into adjacent undisturbed area

FERC's analysis and the resulting reliance on mitigation measures to address soil compaction impacts are short-sighted and inaccurate. With respect to soil related impacts, the DEIS greatly underestimates the potential for the alteration of soils traversed by the pipeline and the subsequent short- and long-term consequences of soil compaction. Additionally, FERC's finding that the proposed mitigation measures will prevent any significant alteration of site soils or can successfully limit impacts attributable to such alterations is inaccurate as based on actual field assessments of "restored" pipeline ROWs.

2.2.3 – Groundwater

There always exists the possibility that during construction a spill will occur; for example fuel spill or that directional drilling, trenching or related construction operations will result in the improper management of drilling fluids or dewatering effluent. These actions, in particular construction related accidents can pose a threat to local groundwater resources. FERC concludes that any groundwater impacts attributable to construction related operations will be minimized by PennEast's adherence to and implementation of a Spill Prevention, Control, and Countermeasures Plan.

The Spill Prevention, Control, and Countermeasures Plan is contained in Appendix D of the DEIS (Erosion and Sediment Control Plan). It is part of an earlier document prepared by PennEast (Draft Erosion and Sediment Control Plan) dated September 2015. The subsection of the plan dealing with spill prevention and control is contained in Sub-Section 13 of the E&SCP, is a single paragraph consisting of **five (5) simple bullet points**, none of which provide any direction of the actions that must be taken in the event of a spill. The Spill Prevention, Control, and Countermeasures Plan upon which FERC has based their findings is unreasonably simplistic, lacks any detail, and does not account for the highly sensitive and unique environments the

[1] Emile DeVito, PhD. August 2016. Letter with supporting report and photographs from New Jersey Conservation Foundation to Norman Bay, Chairman, FERC.

pipeline will disturb. Concluding that the Spill Prevention, Control, and Countermeasures Plan is sufficiently adequate and minimizes impacts to the region's groundwater resources is misleading. Additionally, it does not address potential groundwater contamination events associated with the operation and maintenance of the pipeline, including the long-term application of herbicides to control the growth of vegetation or the management of invasive plants within and adjacent to the pipeline ROW.

With respect to the potential impact to groundwater attributable to drilling wastes, FERC sites that PennEast's Horizontal Directional Drilling (HDD) Inadvertent Returns and Contingency Plan provide sufficient protection. The HDD mitigation measures contained in Appendix D, again are part of the aforementioned September 2015 Draft E&SCP. The Inadvertent Returns and Contingency Plan is referenced within Sub-Section, 11.2.5.4 (Horizontal Directional Drill). This reference consists of a single bullet point that states, a site specific plan will be implemented that includes "a description of how an inadvertent release of drilling mud would be contained and cleaned up". This statement provides no assurance or guidance (even in general) regarding the measures that PennEast takes to prevent such events or their response to such events.

We therefore conclude that FERC's findings are inaccurate and that PennEast must provide a more detailed Spill Prevention, Control, and Countermeasures Plan that encompasses construction, operation and maintenance activities.

2.3.4 – Surface Waters

PennEast's acute (immediate) impacts to surface waters can be divided into two categories. The first is associated with the above noted in-stream construction activities and the other is associated with the hydrostatic testing of the pipe(see 2.3.5 below).

The Project crosses 255 waterbodies (159 perennial, 45 intermittent, 40 ephemeral, and 11 open water), with eleven (11) of these water courses classified by FERC as major waterbodies that are over 100 feet in width. HDD techniques will be used to bore under a few of these waterbodies (Beltzville Lake, the Lehigh River/Lehigh Canal the Delaware River/Delaware Canal, two locations along Lockatong Creek, and an unnamed tributary to Woolsey Brook). The other crossings will involve the actual excavation of the watercourse, which entails the temporary diversion and damming of flow; the so called "dry-crossing" method. The typical plan for these types of crossing are presented in Appendix C, Figures 1F, 1G and1H.

As such, the vast majority of the stream crossings require the diversion of stream flow around the construction zone or actively pumping water out of the construction zone. Even when the work area is segregated from the stream by some type of diversion measure, the shallow depth to groundwater relative to the required depth of the pipe trench will require the constant dewatering of the trench. Similar types of acute impacts will also occur in the wetland and riparian areas traversed by the pipeline again due to shallow depth to seasonal high water (groundwater), standing water or saturated soil conditions.

PennEast concludes that the dry crossing method can be conducted in a manner that minimizes potential in-stream turbidity impacts. FERC's review of the conventional channel cut, flume crossing, and dam-pump crossing techniques reach a similar conclusion. It is FERC's positon that after the pipe is installed and the trench backfilled, the stream channel and stream banks will be adequately restored and the ecological properties of the stream returned to pre-construction conditions.

None of the conclusions reached by either PennEast or FERC are supported by any data. Again the finding of no significant impact is largely based on the assumption that the proposed mitigation measures can be successfully implemented and will lessen the Project's impact to surface waters. What FERC has failed to take into consideration is that the PADEP and NJDEP anti-degradation regulations protect many of the traversed streams from any measurable or calculable impact. PennEast's position that impacts can be minimized is inconsequential as the quality, ecological functions, aesthetics and recreational potential of Exceptional Value and Category-1 streams cannot be decreased in any manner.

2.3.5 - Surface Water Withdrawals and Discharges Associated with Hydrostatic Testing

PennEast proposes the use of surface water and municipal water sources for the hydrostatic testing of completed sections of the pipeline operations. In total, 18 million gallons of water is needed for the hydrostatic testing of the pipeline. Table 4.3.2-7 of the DEIS presents the preliminary estimates for the amount of water that will be required to conduct the hydrostatic testing of the pipeline. The amount of water needed at each of the 28 planned testing sites ranges from 18,000 gallons to over 5,000,000 gallons with 12 of the sites (43%) requiring over a 1,000,000 gallons of water. The DEIS does not identify or discuss how these withdrawals could affect nearby private wells. PennEast also proposes not to withdraw water from any EV or C-1 stream, unless the appropriate federal, state, and/or local permitting agencies have granted written permission to do so. As such, even these streams could be used as a source water for hydrostatic testing. And although it is stated within the DEIS that during low flow conditions the volume of water withdrawn from a stream or river may be assessed relative to use of alternative water sources, but does not preclude the withdrawal of water even during periods of low flow.

The DEIS states that "Adequate flow rates downstream from the withdrawal would be maintained to protect aquatic life, provide for waterbody designated uses, and provide for downstream withdrawals of water by existing users" but provides no details of how flow rates will be measured and any standard to which the measured flow rates will be compared.

Concerns regarding the hydrostatic testing of the pipes extend beyond the amount of water withdrawn to conduct the testing. The hydrostatic testing of the pipes occurs after a pipe segment is in place and construction is completed, but prior to the backfilling the pipeline trench. Basically the testing involves filling the pipeline with water and then pressurizing the pipeline to a "level higher than the maximum pressure at which the pipe will ever be operated". The hydrostatic pressure test is conducted for a minimum of eight continuous hours. Beside

the catastrophic failure of the pipe during testing, a potential exists for impacts to occur during the return of the test water to a stream, lake or pond. These impacts can be in the form scour and erosion of the receiving system or due to the introduction of contaminants.

The DEIS attempts to minimize the relevance of such impacts by stating that "the post-testing discharge of hydrostatic test water will be regulated by State Discharge Elimination Permit. Such permits do not prevent the introduction of contaminants, even contaminants that may not have been present in the stream before testing. They only regulate the maximum allowable concentration of a contaminant or the duration over which a contaminant can be introduced. Thus, the fact that the discharge would occur in accordance with a State issued discharge permit does not mean contaminants will not be introduced into a waterbody as a result of hydrostatic testing. Additionally, while focus is often placed on contaminants that are responsible for acute toxic impacts, the release of nutrient rich water, especially phosphorus is a significant concern. Data generated on hydrostatic test water reports phosphorus levels (total phosphorus) ranging from 0.03 mg/l to 0.07 mg/L; which is enough to stimulate an algae bloom. More importantly test results show that the return water is typically very low in dissolved oxygen. This could cause a temporary but significant impact to the organisms residing in a stream especially during low flow conditions or during the summer when DO saturation is low.

The DEIS and FERC's assessment of hydrostatic testing impacts do not address these types of impacts. Thus, any conclusions that FERC has reached concerning water withdrawals or water releases associated with the hydrostatic testing of the pipeline are premature and are not based on a comprehensive analysis of the potential impacts or the ability to suitably mitigate or avoid those impacts.

2.3.6 - Wetlands

FERC concludes that the Project will temporarily impact 56 acres of wetlands (26 acres in Pennsylvania and 30 acres in New Jersey) and **permanently impact 35 acres of wetlands (17 acres in Pennsylvania and 18 acres in New Jersey).**

FERC goes on to summarize that the impacts to emergent wetlands resulting from the construction of the pipeline (including permanent ROW access roads and above ground facilities) "would be relatively brief because the emergent vegetation would regenerate quickly, typically within one to three years".

For scrub-shrub and forested wetlands, FERC recognizes that the a 10-foot-wide corridor centered over the pipeline would be maintained in an herbaceous state following the pipeline's construction and that selective tree cutting would occur over time within a 30-foot-wide corridor centered over the pipeline. The remainder of forested and scrub-shrub vegetation would be allowed to return to preconstruction conditions and would not be affected during operation.

FERC concludes that the pipeline's construction will **not result in the permanent fill or loss of wetland area due either to the pipeline's construction or its operation/maintenance and that construction and operational impacts can be mitigated by PennEast's through:**

- Compliance with the conditions of permits issued by New Jersey and Pennsylvania under Sections 401 and 404 of the Clean Water Act,
- Implementation of the wetland protection and restoration measures contained in its E&SCP,
- Implementation of additional measures received by Federal and State review/permitting entities, and
- For highly saturated wetlands, the implementation of "special construction methods".

As previously mentioned, FERC cannot rely on basic E&SCP measures and the post-construction mitigation of disturbed wetlands to conclude that this project will not adversely impact wetland and riparian ecosystems. Clearly irreversible damages will occur, with at least 35 acres of wetlands (17 acres in Pennsylvania and 18 acres in New Jersey) permanently impacted. The DEIS also assumes that PennEast will be able to satisfy all of NJDEP's and PADEP's requirements for the State issued Water Quality Certificates.

2.3.7 – Vernal Pools

In both Pennsylvania and New Jersey, vernal pools are regulated as communities of special concern. The Project's path traverses and impacts a number of **known** (that is mapped) vernal pools. PennEast has tried to minimize the significance of these impacts by stating that only 0.13 acres of vernal pool habitats is directly impacted as a result of construction activities and an additional 0.11 acres will be permanently impacted as a result of pipeline operations.

FERC acknowledges within the DEIS that there may be a number of additional vernal pools at risk and that that it is obligatory that PennEast conduct a thorough survey along the route of the pipeline to identify vernal pool habitat occurring within and adjacent to the ROW or areas slated for the construction of any of the permanent above-ground elements of the Project. Schmid (July 2016)[2], in his review of PennEast's mapping of wetlands and associated riparian areas in Pennsylvania, identified multiple errors, inconsistencies and under estimation of the total affected area impacted by the pipeline. These findings support our positon that there may be a much greater than currently reported amount of vernal pool habitat and that the irreversible impacts to these habitat resulting from the construction, maintenance and operation of the pipeline.

As such, any conclusions reached by FERC within the DEIS pertaining to impacts to vernal pool habitat need to be revisited as the magnitude of these impacts may greatly exceed that presented in the DEIS. Thus it is inaccurate for FERC to conclude that the Project is not

[2] Schmid and Company. July 2016. The Effects of the Proposed PennEast Pipeline on Exceptional Value Wetlands in Pennsylvania

expected to significantly impact vernal pool habitat or that the "implementation of PennEast's proposed mitigation measures along with FERC's mitigation recommendations are sufficient enough to protect these unique resources.

2.3.8 – Aquatic Resources

The DEIS acknowledges that as a result of the numerous pipeline crossings of wetlands, streams and rivers that the Project poses a threat to various aquatic organisms. Although these threats are deemed by FERC to be greatest during the construction phase, they also acknowledge that the maintenance and operation of the pipeline could extend these threats into subsequent years following the completion of the pipeline. FERC also acknowledges that the impacts to aquatic organisms are both "direct and indirect", and include loss of habitat (spawning, foraging and refuge), stream channel erosion, sedimentation alteration of flow, and chemical/fuel spills. Other impacts that are not identified by FERC include thermal impacts (due to the removal of or reduction in the amount of canopy cover), eutrophication, and alteration of the food web.

However, FERC concludes that the threat and impacts to aquatic organisms will be "adequately minimized". This conclusion is solely based on the assumption that PennEast's construction activities will be conducted in accordance with their E&SCP and FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and Wetland and Waterbody Construction and Mitigation Procedures. FERC also assumes that any construction limitations affecting the timing or magnitude of the operation as set forth in the permits issued by NJDEP, PADEP, DRBC or any other regulatory body will adequately protect aquatic organisms. This includes adherence to seasonal construction "windows" to protect cold water and warm water fisheries (essentially all in-stream work occurring between 1 June and 30 November). Additionally, FERC assumes that PennEast will install culverts and/or bridges at proposed permanent access road crossings, and that these crossing will reduce (rather than add) to the overall long-term impacts of the Project.

FERC's conclusion of adequate mitigation and no impact are unrealistically based on the implementation of construction mitigation techniques and fail to recognize the sensitivity of the organisms present in the multiple high quality streams that will be crossed by the pipeline. Their findings are also inconsistent with the ante-degradation regulations that protect these waters, and the organism residing in these waters, from any measurable or calculable impact. Furthermore, PennEast has not provided any actual data to support their positon that the proposed stream crossings do not negatively affect the resident biota (fish, shellfish, invertebrates, diatoms/periphyton, reptiles and amphibians).

2.3.9 - Vegetation and Wildlife

FERC's assessment of the Project's impact to vegetation and wildlife focuses on construction related impacts, which FERC minimizes in their assessment to mortality and displacement. Longer term impacts resulting from the establishment of invasive species are also noted in the DEIS. However, the DEIS does not comment on the longer term and cumulative impacts that are known to occur when interior habitats are transected and fragmented.

Some of the unique or exemplary wildlife habitats crossed by the pipeline include Bear Creek Preserve, Sourland Mountain Region, State Game Lands, Deer Management Areas, and Important Bird Areas (including Hickory Run State Park, Kittatinny Ridge, Musconetcong Gorge, Everittstown Grassland, Baldpate Mountain, and Pole Farm). Much of the value of these areas is linked to the consistency of the core forest areas and preservation of intact interior habitats. Once again within the DEIS FERC minimalizes the severity of the impacts attributable to habitat fragmentation or the creation of edge habitat adjacent to interior core habitat by concluding that the "proposed pipeline route was sited to avoid areas containing large, interior forested stands where possible", and where the pipeline traverses through forests, such impacts will be minimized by constructing the pipeline adjacent to existing ROWs and by "locating the pipeline as far from the interior portion of the forest as practicable". Overall, the DEIS treats the unique or exemplary wildlife habitat areas noted no differently than other forested areas.

FERC's conclusion that the Project presents no significant impact to wildlife or vegetation is focused on PennEast's implementation of various types of mitigative strategies, construction procedures, and an invasive species control program (which in itself represents a repetitive long-term impact caused by various maintenance activities ranging from cutting, clearing and the application of herbicides). Additionally there is a robust body of data that demonstrates FERC's standard pipeline mitigation measures pipelines are actually often quite ineffective. These measures do not uniformly prevent environmental degradation and equally important are not capable of restoring project sites to their original environmental state thus preventing the project site from providing its original ecological services and functions conditions. The failure of such mitigation measures is especially significant when dealing with the unique or exemplary wildlife habitat areas traversed by the PennEast Pipeline. FERC's conclusion that the overall impacts of the project on vegetation and wildlife will be "adequately minimized" is inaccurate and not supported by any actual data.

2.3.10 – Threated and Endangered Species

The Project runs through areas known to harbor both State and Federal listed threatened and endangered (T&E) species. The DEIS focuses on vertebrate T&E species, making little mention of invertebrate and plant T&E species. The DEIS although acknowledging impacts to Pennsylvania and New Jersey listed species and Species of Special Concern (New Jersey), FERC only recommends that PennEast consult with State biologists to minimize impacts to these species. FERC largely relied on available information regarding T&E species; which could result in an under-estimation of the both the affected T&E species as well as the amount of T&E species habitat disturbed or lost as a result of either construction activities or longer term maintenance and operational activities.

The DEIS actually concludes that the Project will have a detrimental impact on Indiana Bat. It also does not conclude that other T&E species or Species of Special Concern will not be impacted. Rather FERC recommends that PennEast work with State biologists to develop "measures that would minimize impacts on state listed species and state species of concern".

As such, FERC does not definitely state that the project will not cause a detrimental, irreversible impact to Federal and State listed T&E species and State species of special concern. Without PennEast being required to conduct the same types of surveys and assessments of T&E species mandated of other developers, the DEIS is at a minimum incomplete with respect to the assessment of the Project's impact on T&E species. Presently, it must be concluded that the Project will negatively impact T&E species and species of concern both directly and indirectly (as a result of alteration or loss of habitat necessary for the success of these species).

2.3.11 - Land Use, Recreation, and Visual Resources

As previously noted many of the affected water courses crossed by the PennEast Pipeline are protected by anti-degradation regulations. This includes PADEP *Surface Water of Exceptional Recreational Significance,* DRBC *Significant Resource Waters*, and NJDEP *Category-1 Waters.* Common to the definition of all three of these categories of waters is the protection of the recreational, scenic and aesthetic properties of these waters. For example, NJDEP extends protections from any measurable changes (including calculable or predicted changes) to the aesthetic and recreational attributes (NJAC 7:9B-1.5(d)iii) of Category-1 waters.

FERC concludes that the direct impacts to these resources will be short-term and limited largely to the construction activities and to some extent by inspection and maintenance activities. FERC also concludes that by implementing various impact avoidance, minimization, and mitigation plans, PennEast's overall impacts to the recreational, scenic and aesthetic elements of the disturbed forest lands, vistas and special category waters will be "adequately minimized".

As noted above, FERC's standard pipeline mitigation measures are often quite ineffective and do not fully prevent environmental degradation. The ROW clearly results in a permanent scar through currently forested areas; this diminishes the scenic and aesthetic value of these resources. The Project, due to increases in sedimentation, alteration of stream habitat and irreversible loss of wetland and riparian areas threaten the recreational potential of streams, vernal pools and wetlands. Overall, PennEast has not definitively documented that the Project will not contravene the provisions established for PADEP *Surface Water of Exceptional Recreational Significance,* DRBC *Significant Resource Waters*, and NJDEP *Category-1 Waters.*

2.3.12 – Long-Term and Cumulative Impacts

The DEIS largely focuses on the construction related impacts of the Project; impacts that can be considered acute and rapidly evident. FERC relies heavily on PennEast's implementation of various types of mitigative measures to reduce the Project's impacts or to compensate in some capacity for irreversible damages. **It is assumed that the successful implementation of these mitigative strategies and procedures will lessen any long-term or cumulative impacts. As will be discussed below this is not a realistic assessment.**

2.3.12.i Long-Term Impacts –

Projects of this nature also lead to a multitude of long-term environmental perturbations including:

- Destabilization of the traversed ecosystem,
- Diminishment and alteration of the ecological services and functions provided by these ecosystems,
- Negative changes to the assemblage of the biotic community,
- Increased predation/loss of native forest core species due to the introduction of predators and "edge" species,
- Increased opportunity for the introduction and colonization of invasive species,
- Fragmentation of habitat and the loss of key resources, access to key resources or the quality of key resources required for the success of forest core and wetland core species,
- Reduction in the long-term water quality of the bisected streams,
- Increased thermal impacts to streams resulting from a decrease in stream side tree canopy cover,
- Changes in the watershed's hydrologic and hydraulic properties,
- Increased amounts of stormwater runoff, the rate of runoff and the frequency and longevity of erosive flows,
- Increased opportunity for upland and in-stream erosion,
- Increased pollutant loading to wetlands and streams, and
- Decreased infiltration and recharge of the surficial aquifer (critical to the maintenance of stream baseflow and the hydrodynamic properties of wetlands).

To date there has been no acknowledgement of such long-term impacts by PennEast. More importantly though is that these types of long-term impacts cannot be successfully mitigated. This is especially true, as is the case with the PennEast Pipeline, when the project area includes a high percentage of high quality, currently undisturbed forest, wetland and stream environments and ecosystems.

One of the major long-term impacts associated with PennEast (as well as other linear developments of similar magnitude) is habitat fragmentation. As per Franklin, et. al., (2002), habitat fragmentation can be defined as:

> "The discontinuity, resulting from a given set of mechanisms in the spatial distribution of resources and conditions present in an area at a given scale that affects occupancy, reproduction, or survival of a particular species."

The impacts and problems of habitat fragmentation have long been analyzed and discussed by ecologists especially with respect to the clearing or alteration of core forest areas. The obvious

impact of linear development is that it results in the irreversible alteration of the vegetative cover within the pipeline pathway and pipeline ROW. Initially this is the result of the required clearing of trees, shrubs and understory lands, the grading of land and the back-filling of the pipeline trench. Over the long-term, the maintenance of the ROW requires prevention of any tree growth, which is accomplished by periodic mowing and the use of herbicides. ROW in order to prevent the migration of such vegetation into the actual ROW, prescribed maintenance activities may also involve the periodic trimming, pruning, cutting back and removal of trees and woody vegetation growing along the perimeter of the ROW. The inspection and maintenance of the ROW means the repetitive access and traverse of the ROW by inspection vehicles and maintenance equipment. This increases overall site compaction and because there are no stabilized access-ways, it also creates repeated opportunity for soil erosion.

The removal of trees, herbaceous vegetation and groundcover can negatively impact the basic habitat requirements of a given species thereby effecting its survival. Fragmentation not only eliminates vital habitat but can separate species from necessary resources and degrade the forage, refuge and reproductive value of the habitat thereby limiting the long-term success of a species. Habitat fragmentation also greatly increases the opportunity for invasive species colonization (both native and non-native), increased predation, increased nest parasitism and other direct and indirect negative impacts to the species that relied on the complexity of the undisturbed core habitat area, whether a mature forest, wetland or riparian floodplain corridor.

Linear development projects (including roads, transmission lines, pipelines and pipeline ROWs) have been directly linked to a loss of sensitive species (Forman, 2004; Gucinski et al. 2001; Trombulak and Frissell, 2000). Some of these losses reflect the separation of species from needed resources as well as the physical and ecological alteration/degradation of the traversed habitat. The linear fragmentation caused by the pipeline ROW is especially significant when the ROW and pipeline approach and cross streams, especially high-gradient streams. Increased fine sediment loading will occur due to the compromised nature of the wetlands and riparian areas abutting these streams, with those impacts exacerbated by the steeper terrain. These fine sediments are especially impactful to benthic organism, fish eggs, fish larvae and fish fry (Newcombe and MacDonald 1991, Newcombe and Jensen 1996, Gucinski et al. 2001, Angermier et al. 2004).

The above long-term habit fragmentation impacts cannot be mitigated owing to the ecological complexity that they trigger. The resulting ecological losses surpass the compensatory capabilities of the standard mitigation measures proposed as a means of lessening acute project impacts. For example, re-establishing ground cover does not compensate for the changes in the composition of the soil mantle, the complexity of the pre-existing groundcover or the loss of species complexity. Planting trees along the perimeter of the ROW does not compensate for the loss of the ecological services and functions provided by the original core forest. The PennEast Pipeline pathway clearly bisects miles of sensitive and unique habitats. **The damage to the overall ecological properties of the affected lands and water resources are irreversible**. Once the pipeline and its ROW are in place it is impossible to return to or recreate pre-pipeline environmental conditions.

Another set of long-term impacts attributable to any pipeline project, including the PennEast Pipeline, relate to post-construction hydrologic properties of the site. These impacts can be divided into three related categories; increased volume of runoff from the altered ROW, changes in the hydraulic response of runoff from the altered ROW, and increased pollutant loading. Changes in the amount and rate of runoff stem from the alteration of the vegetated cover and the compaction of soil that occurs during the clearing of the ROW, the construction/installation of the pipeline, and the long-term maintenance of the ROW. These impacts will be greater on steeper sloped lands and where the soils have a higher clay/silt content and lower soil saturation coefficient (soils that are easily saturated). Obviously on steeper land there will be a greater tendency for precipitation to runoff as compared to land of minimal grade. But the long-term changes in the ROW's hydrologic properties occur regardless of slope gradient or soil type simply due to the inherent amount of soil disturbance, soil compaction and altered vegetative cover resulting from the pipeline's construction (USDA, 1986).

An increase in runoff volume will occur when forested lands, and their complex understory, are cleared and replaced with grass. Although the surface of the ROW may be stable following the establishment of the replacement vegetative cover, its runoff characteristics will be different. Referring to the TR-55 table of runoff coefficients (USDA, 1986), even for the best drained soils (hydrologic soil group A) the increase in the runoff coefficient value when converting woods to lawns, ranges from 30%-50%. This translates to a substantial increase in the volume of runoff generated by each storm event. Also because the runoff coefficients have increased, this also translates to a shorter time for runoff to be generated, which in turn leads to greater peak runoff flows (the rate at which runoff leaves the ROW). This combination of increased runoff volume and increased rate of runoff has been repeatedly demonstrated as the root cause of stream erosion. On average, a typical deciduous tree intercepts 700 to 1,000 gallons of precipitation annually, and an evergreen (the majority of the trees that will be removed over the course of the PennEast pipeline) intercepts over 4,000 gallons of precipitation annually (PennState, 2014). Removing acres and acres of trees and replacing them with a grass cover will result in major changes in the ROW's runoff characteristics. Although PennEast will implement post-construction site restoration measures, they themselves acknowledge that post-construction restoration cannot fully return a disturbed site back to its original state.

With respect to any soils disturbed as part of the project, PennEast's is only required to ensure that the soils are stable and is under no regulatory obligation to restore soil to pre-construction conditions. The fact of the matter is that these changes in the properties of the soils along the pipeline and within the pipeline ROW will contribute to the predicted increases in the volume and rate of runoff. Along the entire length of the 108-mile long pipeline, these changes in the post-construction hydrology of the affected lands (especially the steeper sloped areas) will invariably alter runoff properties. The end result will be impacts to the streams, wetlands and riparian areas traversed by the pipeline and pipeline ROW and increased opportunity for erosion along the steeper segments of the pipeline and pipeline ROW. Because PennEast is not required to implement any of the conventionally utilized best management measures to collect,

treat and control ROW runoff, there is no way to mitigate for these changes other than to revegetate. However, once again the cover type will be different pre to post-construction (e.g. trees to grass) and PennEast is only obligated to achieve 80% post-revegetation coverage with the vegetation type it is using.

Another often overlooked long-term impact caused by pipelines (whether wastewater, stormwater or gas/oil) is that they can actually alter the movement of groundwater. Essentially when the pipe and pipe trench intercept the shallow aquifer, groundwater flow paths can be altered with the pipeline and pipeline trench functioning as a subsurface diversion forcing groundwater away from vital stream and wetland resources.

When all of these factors are taken into consideration it is obvious that the pipeline's construction will lead to substantial long-term hydrologic changes. These changes may be manifested in the form of increased stormwater volume, increases in the rate of stormwater runoff, and/or diminished recharge. Such hydrologic changes impact streams, wetlands and riparian areas, and can lead to significant ecological changes including the loss of sensitive species, increased eutrophication and habitat degradation.

In summary, the DEIS does not thoroughly assess the Project's long-term impacts. FERC's conclusions regarding the Project's long-term impacts is not comprehensive and is based largely on FERC's assumptions that the E&SCP, Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and Wetland and Waterbody Construction and Mitigation Procedures and Horizontal Directional Drilling (HDD) Inadvertent Returns and Contingency Plan will collectively mitigate any short-term project impacts thus minimizing the likelihood of any long-term impacts.

2.3.12.ii Cumulative Impacts

The PennEast Project is but one of a number of pipeline or utility projects occurring within the eastern Pennsylvania and western New Jersey region. Other regional power transmission projects are the Transco pipeline and the proposed Texas Eastern TEAM 2014 Project and the Columbia East Side Expansion Project. As noted earlier, the cumulative impacts arising from the PennEast Pipeline are a function of the additive negative environmental effects caused by other past and future pipeline and electric transmission line projects (linear development). In short, the impacts caused by other regional linear development projects worsen the long-term, ecological, project specific impacts attributable to the PennEast Pipeline.

The "most favorable route" for the majority of linear development projects tends to be through undeveloped lands. This is reflected in the proposed PennEast Pipeline pathway. Such routes avoid populated areas and the human health and safety issues that must be addressed when running conventional and unconventional gas pipelines or power lines through or near established neighborhoods, schools or public facilities. As in the case with the PennEast Pipeline, the "most favorable route" involves the disturbance of environmentally sensitive and protected lands, dedicated public open space and preserved farmland. Each of these projects

has a permanent access/inspection/maintenance ROW that can vary from 50' to 150' in width. Again, the permanent ROWs associated with these projects further exacerbate the amount of long-term destruction and ecological losses caused along the entire length of the transmission corridor.

Thus, with each of these projects comes some combination of stream impact, core forests destruction, wetland and riparian corridor disturbance, and clearing of steeply sloped lands. As such, each project has caused or will cause its own unique set of impacts and add another layer of acute and long-term assaults to the environment. Additionally, each new project magnifies the project specific impacts of each prior project. When dealing with environmental impact assessment, each project is evaluated independently; the cumulative impacts of multiple linear development projects are not assessed and the additive long-term impacts of past and future linear projects fail to be recognized.

Some of the major gas transmission lines already located in eastern Pennsylvania include the Blakeslee, Transco, Humbolt, Shickshinny, Wyoming, Appalachian Basin and UGI gas lines. Similarly, in western New Jersey there are already a number of pipelines and transmission lines transecting the State's sensitive forests, wetland, and streams as well as preserved farmland. These include the proposed Pilgrim Pipeline and the existing Algonquin, TGP, Transcontinental, Elizabethtown, and Texas Eastern gas lines. Add to this all of the large electrical transmission lines such as the Susquehanna-Roseland line, and it becomes clearly evident that the cumulative impacts of these linear development projects cannot be overlooked or underestimated. It is also obvious that the cumulative impacts of these projects will accelerate the long-term negative effects that come about due to the fragmentation of critical forest, wetland and riparian habitats.

In terms of cumulative impact analysis, the DEIS focused mostly on the short-term impacts of PennEast relative to other projects such as residential developments, utility lines, and transportation projects. FERC concluded that these impacts would be temporary and relatively minor overall. FERC rationalizes that although cumulative impacts will occur as a result of PennEast, there will be cumulative benefits to the community due to "increased tax revenues…jobs, wages, and purchases of goods and materials". Overall FERC concludes that PennEast's cumulative impacts will "be effectively limited". However, FERC's analysis of the Project's cumulative impacts was very limited in its scope. Thus a true, comprehensive analysis of the Project's cumulative impacts is lacking in the DEIS. Additionally, FERC's conclusions regarding the Project's cumulative local and regional impacts is not based on the evaluation of PennEast relative to other large-scale development projects or other existing and proposed linear development projects.

3. Reliance on Mitigation

As of the date of the DEIS's publication, FERC had received 11,565 specific comments contained in 3,960 comment letters (Page 1-14). FERC indexed these comments relative to specific sub-

sections of the DEIS (refer to Table 1.4). Among the more commonly received public comments reviewed by FERC (as per Table 1.4) within the DEIS are those dealing with:

- Impacts on state-classified designated waters and rivers,
- Long-term operational impacts
- Impacts to ecologically important areas (e.g. the Sourlands),
- Forest fragmentation,
- Destruction of habitat important to a number of threatened and endangered species
- Cumulative impacts, and
- Adequacy of mitigative measures.

As noted throughout Section 2 of this report, FERC's uniform answer to these concerns is that the mitigative measures proposed by PennEast will adequately address any potential impacts, resulting in what FERC defines as an "adequate minimization" of damages to natural resources, recreational resources and scenic resources.

However, for the most part mitigation plans represent the minimum actions that need to be taken and such plans do not guarantee that a project will not cause irreversible environmental damage. This is best exemplified by erosion and sediment control plans; a commonly referenced mitigation strategy identified by FERC throughout the DEIS. The Project's E&SCP emphasizes the containment of soil and sediment during the construction phase and then the stabilization of the soils after construction is completed. While preventative by design, these measures do not fully preclude the off-site transport of soil or sediment. The limitations of soil erosion and sediment control plans are clearly recognized in PADEP's Erosion and Sediment Pollution Control Manual (Technical Guidance Number 363-2134-008, 2012), which states that measures and BMPs contained in the manual are "expected to achieve the regulatory standard of minimizing the potential for accelerated erosion and sedimentation". The Manual also notes that "human activities…typically increase the rate of erosion to many times that which occurs naturally". At best E&SCPs work at sites that are not challenged by steep slopes, thin soils, sensitive vegetation and flowing water; conditions common to the route of the PennEast Pipeline.

In the upland areas through which the pipeline traverses there will be the need to clear cut and remove numerous, densely growing, large, established trees. Some of this clear cutting will occur in core forest areas. The clear cutting of the trees at the scale needed for this project will create a major acute ecological problem. From the perspective of erosion, the logging activity associated with felling the trees and then removing them from the pipeline ROW creates an erosion problem that is much different than that caused by conventional development activity. First, unlike a typical development site no intrinsic infrastructure is created to facilitate the removal of trees. This means additional clearing is needed to create access roads and staging areas. Second, much of the upland work along the PennEast ROW occurs in areas characterized by steep terrain. This increases the severity of the erosion problems caused by clear cutting. Third, the native soils in these steeper areas are shallow and fragile, and once exposed are

more likely to erode and unlikely to be easily stabilized. Thus, although erosion and sediment control measures could be implemented, the topography of sections of the pipeline's route will limit the effectiveness of soil and sediment control measures. Therefore, even with the best developed soil erosion and sediment control plan in place there will be sediment and soil erosion impacts given the scale of the project and the sensitivity of the environments traversed by the pipeline.

The acute erosion problems caused by the PennEast Pipeline are not limited to upland areas. Some of the more potentially severe acute and long-term impacts occur where the pipeline crosses through wetlands and streams. These areas are characterized by persistent standing water, actively flowing water or saturated soils. Such conditions present especially difficult conditions for the proper installation of erosion and sediment control measures. Such conditions also decrease the functionality of most erosion and sediment control measures, which by design are meant to work in dry environments. Those control measures intended to be used in wet environments often require the dewatering of the site to allow the measure to be installed or constructed. This in itself creates an impact to the stream or wetland ecosystem and resident organisms by significantly altering the hydrologic regime. Those measures intended to be used in wet conditions will not be able to fully prevent eroded or disturbed soil from being mobilized and transported downstream, especially during storm events. As such the impacts will extend beyond the actual construction site.

There is also an increased need to inspect, re-install and maintain erosion control measures installed in wetland and stream environments. The repeated need to access an area to re-install or maintain erosion control measures is problematic. By repeatedly accessing and working in wetlands, stream corridor or riparian areas further increases the likelihood of erosion, sedimentation and acute environmental damage. Thus, although the pipeline plan may involve the implementation of an E&SPC, those measures insufficiently protect the transected streams and wetlands from sedimentation damages. In fact, due to the need for repetitive maintenance the installed erosion and sediment control measures may actually exacerbate environmental damages and prolong sedimentation and siltation problems. Clearly there is the need to implement proper erosion and sediment control measures, however when working within stream, wetland and riparian corridors the implementation of these measures and their maintenance need to be conducted in a manner consistent with the sensitively of these environments. Appendix C of the DEIS reviews the measures that will be implemented to control impacts associated with:

- Typical ROWs (Section 9)
- Clearing of Vegetation (Section 9)
- Hydrostatic Testing (Section 9)
- Waterbodies (Section 10), and
- Wetlands (Section 11)

In total only 19 pages of Appendix C are dedicated to the procedures and measures that will be taken to control soil and sediment impacts to upland, wetland and water resources. These

measures do not guarantee that upland, wetland or water resources will not be compromised or altered. For example the section pertaining to wetland crossings concludes with the statement: *"The original wetland contours and flow regimes will be restored to the extent practical"*.

A major problem with sedimentation, increased turbidity and siltation in aquatic and wetland environments is the impact this has on the resident biota. Excessive suspended sediments in the water column or prolonged periods of elevated turbidity will directly affect the spawning success of many organisms and impact the foraging success of a wide variety of filter feeding species. While these impacts can be damaging at any time of year, the severity is magnified significantly during ecologically critical times of year. Because different species rely on these streams at different times of year for spawning, nursery or feeding habitat, "working around" certain times of year is not an option. In fact the limits placed by NJDEP and PADEP on work within a stream are intended to minimize impacts to cold water fish.

The inadequacies of mitigation also relate to the restoration of each stream crossed by PennEast. HDD is limited to a few crossings with the majority of the crossing accomplished by a simple "dig and drop" approach involving flow diversion (Refer to Section 11 of Appendix C). At each of these crossing, some means will need to be implemented to divert flow around the project area and/or keep the pipe trench dewatered. Again, the trench depth will be at least 5-6 feet below existing stream grade, and could be even deeper to avoid thermal impacts to the stream or to protect the pipe from high-energy event scour and exposure. Overall, this type of construction is very disruptive to the stream and will negatively affect its ecological functionality. The current mitigative measures planned by PennEast, while perhaps addressing short-term erosion and sedimentation impacts, do nothing to restore the streams to their pre-disturbance ecological complexity and functionality. In order to justifiably state that the pipeline will cause "no impact" at each stream crossing, the subject stream must have its stream channel restored to the pre-construction width, depth, slope and substrate. This entails the collection of detailed stream data and seasonal sampling of the stream's biota, neither of which is proposed by PennEast or recommended by FERC. The restored substrate would also have to mirror the pre-construction composition of the streambed and bank materials and condition, including restoration of the kind, quantity and quality of rock, sediment, woody debris and vegetation. Additionally, the stream's restoration must allow for natural channel migrations, flows, sediment transport, and stream channel evolutions typical of natural stream flows. **None of the mitigation measures discussed by FERC within the DEIS satisfy these requirements or demonstrate the ability to fully restore the streams to pre-construction conditions.**

The fact is that the proposed mitigation does not require a return to a pre-construction state. It only requires that the minimum, basic requirements stated in the regulations are satisfied. The fallacy with this is that the lack of impact predicted in the DEIS is based on the assumption any implemented mitigation measure will result in the affected resource being fully restored to its pre-construction state. That is never the case. Additionally, pipeline projects have had a very bad history of failed mitigation. These failures only reinforce that

the proposed level of mitigation for stream and wetland crossings is difficult to achieve and commonly fail to return the stream or wetland to pre-construction conditions.

In summary, the DEIS does conclude that the Project will "result in some adverse environmental impacts". However, FERC concludes that most of these impacts would be "temporary or short-term" and largely associated with pipeline construction. The DEIS also concludes that "long-term and potentially permanent environmental impacts on vegetation, wetlands, and individual fish and wildlife species would also occur". However, FERC concludes that if PennEast constructs and operates the pipeline in accordance with applicable laws and regulations, and implements the mitigation measures discussed in the DEIS and follows FERC's recommendations, most of the adverse impacts will be reduced to less than significant levels.

FERC's repeated conclusion that PennEast's impacts can be minimized or adequately mitigated is inaccurate, and is not supported by any data. It is strongly recommended that FERC review the DEIS relative to the issues and comments raised in this report. It is also strongly recommended that FERC require PennEast to conduct the same types of thorough pre-construction studies and analyses required by NJDEP, PADEP and the DRBC for any major project. Overall, our findings conflict with those of FERC and point to a project with the high likelihood of causing significant short-term and long-term impacts to critically sensitive, regionally important, environmental resources.

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