ITEM 5: ANTIDEGRADATION ANALYSIS

5.1 Introduction

In order for the Ohio Environmental Protection Agency ("OEPA") to issue a Section 401 Water Quality Certification, applicants must demonstrate compliance with Ohio Water Quality Standards pursuant to Ohio Administrative Code ("OAC") 3745-1. Included in Ohio's Water Quality Standards is the Antidegradation Rule, set forth in OAC 3745-1-05. These antidegradation rules require that project proponents demonstrate that project siting was performed in compliance with Ohio's antidegradation standards in terms of potential impacts to water resources. This includes the evaluation of alternatives that avoid potential impacts to water resources, and the consideration of alternatives that minimize unavoidable impacts (through project modifications), only when avoidance is deemed impracticable and when mitigation is proposed to compensate for lost water resource functions and values.

The OEPA's *Section 401 Water Quality Certification Application Completion and Submittal Instructions* ("OEPA Application Instructions") specify requirements for the antidegradation analyses including the evaluation of three specific project alternatives 1) Preferred Design Alternative; 2) Minimal Degradation Alternative; and 3) the Non-Degradation Alternative. The OEPA also requires in the application a description of Avoidance Considerations, Impact Minimization, and an assessment of the Magnitude of the Proposed Lowering of Water Quality, Technical Feasibility, Economic Considerations, Cumulative Impacts, Indirect Impacts, and a description of construction and post-construction Stormwater Management Plans. The following sections present the antidegradation analysis for the TEAL Project.

5.2 Project Description

The construction of the TEAL Project aboveground facilities, including a new compressor station, additional compression at an existing compressor station, piping modifications, and auxiliary facilities, will not have impacts to wetland or waterbody resources and are therefore the focus of the antidegradation analysis and is specific to the 4.4-mile pipeline loop and 0.3 miles of a 30-inch diameter connecting pipeline components of the Project.

5.3 Alternatives Overview

The 4.4-mile long Project loop is co-located with the existing Texas Eastern pipeline right-of-way ("ROW") for its entire length. By co-locating the pipeline with the existing Texas Eastern maintained pipeline easement, the area of disturbance and length of new pipeline loop is minimized, and creation of a new utility corridor is avoided. The co-location with the existing Texas Eastern pipeline ROW provides a least environmentally damaging alternative. Therefore, the alternatives being considered in this analysis are based on the current siting with different construction methodologies.

5.3.1 Preferred Design Alternative

Based on OEPA Application Instructions, the Preferred Design Alternative should include the project design and siting that maximizes the applicant's project objectives, but would result in the least avoidance and greatest amount of impacts to the quantity and the quality of pre-construction water resources.

The Preferred Design Alternative includes the construction of 4.4 miles of new 36-inch diameter pipeline loop in Monroe County, Ohio, and 0.3 miles of a 30-inch diameter connecting pipeline in Columbiana County, Ohio. The pipeline facilities for the Project will be installed using standard cross-country mainline pipeline installation techniques. These techniques utilize a minimum 100-foot wide construction ROW and do not employ impact avoidance and minimization measures (as detailed is Section 5.2.2 under the Minimal Degradation Alternative), to protect Ohio water resources.

Table 5.1 in the Tables Section provides a summary of potential impacts to Ohio water resources associated with the TEAL Preferred Design Alternative.

5.3.2 Minimal Degradation Alternative

In accordance with OEPA Instructions, the Minimal Degradation Alternative should reflect a project design with an implementable project location and layout that would maximize the applicant's minimum acceptable project objectives while simultaneously resulting in greater avoidance and least impacts to the quantity and quality of pre-construction water resources.

The TEAL Minimal Degradation Alternative would include the construction of 4.4 miles of new 36-inch diameter pipeline loop in Monroe County, Ohio, and 0.3 miles of a 30-inch diameter connecting pipeline in Columbiana County, Ohio, and Texas Eastern will implement the measures described in the TEAL Project Erosion and Sedimentation Control Plan ("E&SCP"), which is included in Appendix A. The TEAL Project E&SCP was developed using the Federal Energy Regulatory Commission ("FERC") *Upland Erosion Control, Revegetation, and Maintenance Plan* ("FERC Plan"), and the FERC's *Wetland and Waterbody Construction and Mitigation Procedures* ("FERC Procedures") and Texas Eastern's significant experience and practical knowledge of pipeline construction and effective environmental protection measures. The measures identified in the E&SCP will minimize erosion of disturbed soils and transportation of sediments off the ROW and into sensitive resources such as wetlands and streams during construction. The E&SCP provides specifications for the installation and implementation of soil erosion and sediment control measures while permitting adequate flexibility to use the most appropriate measures based on site-specific conditions while preserving the integrity of environmentally sensitive areas and maintaining existing water quality by implementing the following objectives:

- Minimize the extent and duration of disturbance;
- Protect exposed soil by diverting runoff to stabilized areas;
- Install temporary and permanent erosion control measures; and
- Establish an effective inspection and maintenance program.

Also reflected in the TEAL Project E&SCP is Texas Eastern's significant experience and practical knowledge of pipeline construction and effective environmental protection measures. Construction methodology that will be implemented includes:

- The work area will be limited to the minimum size necessary to safely construct the wetland or waterbody crossing;
- Prior to initiating clearing activities, all wetland boundaries and streams will be clearly marked in the field;
- Winter clearing will also avoid potential clearing impacts to the Indiana bat and northern long-eared bat;
- Vegetation will be cut just above ground level, and stumps will be ground and not removed (except over the trenchline or where determined to be a potential safety hazard);
- Cleared debris (brush, slash, wood chips) will be disposed of off-site;
- After clearing is completed and prior to grading, erosion and sediment controls will be installed along the ROW to minimize the potential for upland soils to enter resource areas;
- A 50-foot setback for additional temporary work space ("ATWS") for wetlands not located in active agricultural land or other disturbed land, topographic and other site specific conditions permitting;
- A narrowed 75-foot wide construction workspace in wetlands, topographic and other site specific conditions permitting;
- Minimization of riparian clearing to the extent practicable while ensuring safe construction conditions;
- Expedited construction in and around wetlands;
- Confinement of stump removal to the trench-line to minimize soil disturbance (unless safety or access considerations require stump removal elsewhere);

- Return of wetland bottoms and drainage patterns to their original configurations and contours to the extent practicable;
- Permanent stabilization of upland areas near wetlands as soon as practicable after trench backfilling to reduce sediment run off;
- Segregation of topsoil in unsaturated wetlands to preserve the native seed source (which will facilitate re-growth of herbaceous vegetation once pipeline installation is complete);
- Utilization of recommended seed mixes as specified by the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, or other relevant land management agencies;
- Periodic inspection of the construction corridor during and after construction;
- Post construction wetland monitoring to evaluate the progress of wetland revegetation; and
- Documentation of invasive species prior to construction and post construction monitoring to compare pre- and post-construction occurrences.

Construction and mitigation activities in wetlands and waterbodies will be conducted in accordance with the procedures and best management practices ("BMPs") in the TEAL Project E&SCP and the conditions of related permits. Compared to the preferred alternative, the minimal degradation alternative will reduce wetland and waterbody impacts that lower water quality, biological and physical impacts. The minimal degradation alternative will achieve lesser wetland and waterbody impacts by reducing the construction workspace in wetlands, prioritizing wetland and waterbody construction activities, and utilizing the dry crossing method for the larger stream crossings.

The construction methods that will be used for wetland crossings will minimize the extent and time that construction equipment operates in these areas. The top 12 inches of wetland soil over the trenchline will be segregated and stockpiled separate from subsoil. Trench spoils will be temporarily piled in a ridge along the pipeline trench. Gaps in the spoil pile(s) will be left at appropriate intervals to provide for natural circulation or drainage of water. The construction equipment required in wetlands will be limited as much as practicable to install the pipeline, and will reduce soil compaction from equipment travel by utilizing matting to avoid excess rutting in wetland areas. The reduction of construction duration and workspace area will increase the recolonization potential of adjacent naturally occurring wetland plants, in-turn increasing restoration of wetland function and ecological functions such as: sediment/toxicant retention; nutrient removal/transformation; flood attenuation; groundwater recharge/discharge; and wildlife habitat.

Temporary trench plugs will be installed in the trench at the edges of the wetland if the possibility exists for sediment-laden water to flow from uplands down the trench and into the resource. Silt fence and/or straw bales will be installed if the possibility exists for spoil to flow into undisturbed areas of wetlands. Original topographic conditions and contours will be restored as close to pre-construction as possible after completion of construction.

As part of the minimal degradation alternative, Texas Eastern will use specialized waterbody crossing techniques to minimize potential impacts to water quality. The open-cut crossing method (or wet-ditch method) proposed for the minimal degradation alternative will require that specific procedures be followed that will reduce potential impacts to water quality. Except for blasting and other rock breaking measures, instream construction activities when using the open cut method for minor waterbodies (including trenching, pipe installation, backfill, and restoration of the streambed contours) must be completed within 24 hours and within 48 hours at intermediate open cut crossings. A minor waterbody is defined as a waterbody that is 10 feet or less in width at the water's edge at the time of the crossing. Stream banks and unconsolidated streambeds may require additional restoration after this period. Limiting the installation process to the 24 hour window will minimize the duration of disturbance and potential degradation to water quality.

Texas Eastern may choose to use mainline construction procedures across minor waterbodies where the open cut crossing method is proposed. However, different from the preferred alternative, in these instances a flume pipe will be installed immediately after trenching is completed. The flume pipe will remain in

place until the lowering-in process. The flume pipe will be removed just prior to lowering in the pipeline. The 24-hour restoration timeframe starts as soon as the flume is removed. These procedures, although more labor intensive, reduce the potential for water quality impacts and downstream sedimentation.

The minimal degradation alternative will also reduce impacts to waterbodies by utilizing the dry crossing method for streams crossed which have average widths greater than 10 feet. This crossing method requires the installation of a dam and pump and/or a flume pipe(s) prior to trenching to divert the stream flow over the construction area and allow trenching of the stream crossing in drier conditions isolated from the stream flow. Consistent with the FERC Procedures, Texas Eastern plans to complete construction activities within 48 hours at intermediate dry cut crossings. By using the dry crossing method for streams with more significant flow, it will reduce sediment transport downstream and therefore reduce temporary and potential impacts to water quality and aquatic life.

If trench dewatering is necessary in or near a waterbody, the removed trench water will be discharged into an energy dissipation/sediment filtration device, such as a geotextile filter bag or straw bale structure located away from the water's edge to prevent heavily silt-laden water from flowing into the waterbody in accordance with the TEAL E&SCP and all applicable permits.

Following construction, stabilization, and establishment of vegetative cover, temporarily disturbed areas will be left to revegetate via natural succession. Texas Eastern will monitor the ROW to ensure revegetation is successful and address any areas where it is determined not to be successful. Permanent loss of trees will occur within the ROW that will be maintained in an early successional stage by mowing and periodic tree removal. The temporary workspaces will be allowed to naturally revegetate via natural succession. This natural revegetation process will gradually develop a stratified vegetative cover between the ROW and adjacent habitats. Construction and operation of the pipeline facilities is not expected to adversely affect the distribution or regional abundance of wildlife species given the amount and distribution of similar habitat types available in the immediate Project area.

As part of the minimal degradation alternative, in wetlands, vegetation maintenance over the full width of the permanent ROW is prohibited. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline up to 10 feet wide may be maintained annually in an herbaceous state. In addition, trees that are located within 15 feet on either side of the pipeline that are greater than 15 feet in height may be selectively cut and removed from the ROW. Trees and shrubs that become reestablished beyond 15 feet on either side of the pipeline will not be disturbed. Vegetation maintenance practices on the construction ROW adjacent to waterbodies will consist of maintaining a riparian strip within 25 feet of the stream as measured from the mean high water mark. This riparian area will be allowed to permanently revegetate with native woody plant species across the entire ROW. However, similar to wetland areas, a corridor centered on the pipeline up to 10 feet wide may be maintained in an herbaceous state and trees and shrubs greater than 15 feet in height may be selectively cut within 15 feet on either side of the pipeline.

See Table 5.2 in the Tables Section which provides a summary of potential impacts to Ohio water resources associated with the TEAL Minimal Degradation Design Alternative.

5.3.3 Non-Degradation Alternative

In accordance with OEPA rules, the Non-Degradation Alternative must represent a project location and layout that accommodates the Project purpose and need while completely avoiding impacts to water resources and therefore results in no impacts. The OEPA Application Instructions specify that the Non-Degradation Alternative cannot be a "no-build" alternative.

The TEAL Non-Degradation Alternative would include a transportation systems alternative that would use an existing pipeline system or other proposed project to meet the Project Purpose and Need, or the construction of the pipeline loop and the connecting pipeline using construction methods i.e., the horizontal directional drill ("HDD") or horizontal bore crossing methods that avoid direct impacts to wetlands and waterbody resources.

5.3.3.1 Existing Natural Gas Transportation System Alternatives

Transportation system alternatives ("system alternatives") are alternatives to the proposed action that would make use of other existing, modified, or proposed pipeline systems to meet the stated objectives of the proposed Project. System alternatives would involve the transportation of the equivalent amount of incremental natural gas that would make it unnecessary to construct all or most of the proposed Project, although modifications or additions to other existing pipeline system(s) may be required to increase capacity, or another entirely new system may be required. Although these modifications or additions could result in environmental impacts, the impacts may be less, similar to, or greater than those associated with construction of the TEAL Project.

The TEAL Project is utilizing existing natural gas transportation systems to the extent practicable. Use of existing systems reduces the need for additional greenfield pipeline construction. Capacity on Texas Eastern's system will be utilized from certain receipt points located between Berne, Ohio and Uniontown, Pennsylvania to a delivery point at a new connection between Texas Eastern and the NEXUS Project in Hanover Township, Ohio.

System alternatives that would result in significantly less environmental impact might be preferable to the Project. However, only those alternatives that are reasonable and consistent with the underlying Project Purpose and Need are required to be considered for the National Environmental Policy Act. Consequently, a viable system alternative that is technically and economically feasible and practicable must also satisfy the Project's Purpose and Need including the necessary contractual commitments supporting the development of the Project.

5.3.3.2 Modification of Existing Pipeline Systems

The purpose of and need for the Project is to provide the necessary infrastructure to transport a specific incremental volume of natural gas from the Appalachian Basin from points in Texas Eastern's Market Zone 2 between Berne, Ohio and Uniontown, Pennsylvania, to a new connection with the NEXUS Project near Hanover Township, Columbiana County, Ohio. Construction of the TEAL Project avoids new greenfield construction by the NEXUS Project to create the same pipeline capacity. Any viable system alternative composed of modifications to existing pipeline systems would need to provide the same transportation service while creating less environmental impact.

The proximity of the existing Texas Eastern system to the NEXUS Project results in: limited greenfield construction; a single new compressor station; limited co-located new facilities (a 4.4 mile loop and a 1,790 foot long connecting pipeline); and additional compression and pipe modifications at existing facilities. Once reaching the NEXUS Project, the gas will be transported to existing delivery points. Other existing pipeline systems operating in the Ohio area would require substantially greater expansions well in excess of the facilities proposed for the Project in order to fulfill the need to utilize a single transportation system. Furthermore, regardless of the new infrastructure required by these other pipeline systems, the gas supply must reach the requested delivery points by November 2017, which, due to the extensive process and time required to obtain FERC authorization, is not likely possible for any of the transportation system alternatives discussed above.

It is not clear that intrastate pipelines could provide the required service, as some of the production accessed by the Project is produced in western Pennsylvania and West Virginia and utilizes interstate pipelines. In light of the growing production in the Appalachian Basin and producers' demands for interstate pipeline capacity, it is reasonable to assume that interstate pipelines in the area are fully subscribed, and therefore, some amount of pipeline looping or new pipeline facilities would be required to render the same service sought by NEXUS and provided by TEAL. Additionally, other pipelines would need to connect to Texas Eastern in order to utilize existing facilities to access the NEXUS Project. In that case, the installation of third party interconnect facilities, plus all the described modifications and horsepower additions, absent the 4.4-mile loop, would still be required. Therefore, a 4.4-mile co-located loop is more cost effective and

causes fewer short-term environmental impacts than an unknown amount of expansion on another interstate pipeline, which would also require the addition of a permanent interconnect with Texas Eastern.

If another pipeline would connect directly with the NEXUS Project, without utilizing the existing Texas Eastern pipelines, duplicate facilities would be required, similar to those stated by Texas Eastern in this alternative analysis in order to provide similar service to that requested by NEXUS.

5.4 Impact Avoidance

Texas Eastern has taken avoidance of impacts to waters of the U.S. into account when designing layout of project facilities, to the extent practicable. These siting impact avoidance and minimization measures are summarized in Table 5-3 (*see* Tables Section). The pipeline facilities are necessarily co-located with existing pipelines and other existing infrastructure given the nature of a pipeline loop and connecting pipeline, both of which unavoidably need to connect to existing facilities. The proposed Project above ground facilities, while also connecting to existing facilities, in this case have more flexibility with siting and have been designed to avoid all wetland and waterbody impacts.

5.4.1 Preferred Design Alternative

The Preferred Design Alternative for the pipeline facilities utilizes a minimum 100-foot wide construction ROW and do not employ any impact avoidance measures to protect Ohio water resources.

5.4.2 Minimal Degradation Alternative

The Minimal Degradation Alternative will implement the measures described in the TEAL Project E&SCP, which is included in Appendix A. The TEAL Project E&SCP was developed using the FERC Plan and the FERC Procedures and Texas Eastern's significant experience and practical knowledge of pipeline construction and effective environmental protection measures. Among the procedures utilized to avoid impacts include defining project work space to avoid wetland and stream impacts

5.4.3 Non-Degradation Alternative

Utilizing the Non-Degradation Alternative would avoid all direct impacts to wetlands and waterbody resources from the TEAL Project.

5.5 Impact Minimization

Texas Eastern has taken minimization of impacts to waters of the U.S. into account when designing layout of project facilities, to the extent practicable. The pipeline facilities are necessarily co-located with existing pipelines and other existing infrastructure given the nature of a pipeline loop and connecting pipeline, both of which unavoidably need to connect to existing facilities. Minimization measures are related to construction methodologies.

5.5.1 Preferred Design Alternative

The Preferred Design Alternative for the pipeline facilities utilizes a minimum 100-foot wide construction ROW and do not employ any impact avoidance measures to protect Ohio water resources.

5.5.2 Minimal Degradation Alternative

Impact minimization efforts were performed once the pipeline centerline was sited including modifications to the design and layout of the proposed construction workspace to minimize potential impacts to water resources and directly adjacent uplands. These siting impact avoidance and minimization measures are summarized in Table 5-3 (*see* Tables Section).

Also, because the TEAL Project is an interstate natural gas transportation facility, it is regulated by the FERC and therefore, is required to demonstrate that proposed facilities will be constructed and operated in compliance with FERC requirements including the FERC Plan and FERC Procedures. These FERC documents specify BMPs for pipeline construction and operation based on the FERC's extensive experience

overseeing the construction of pipelines throughout the U.S. Proposed activities that are not in compliance with the FERC Plan and FERC Procedures require a written variance request with justifications be submitted to the FERC, and FERC approval prior to authorization.

In addition, TEAL has developed an E&SCP and a Spill Prevention Control and Countermeasure Plan ("SPCCP") for the TEAL Project that detail construction BMPs to be employed during the construction phase of the Project to avoid and minimize impacts to protected resources. The following sections summarize the impact minimization measures proposed during construction and operations of the TEAL Project.

In wetlands and on stream banks, vegetation will be cut just above ground level, leaving existing root systems intact. Stumps or root systems will be removed only over the trench line (minimum 10 feet) and where the Chief Inspector or Environmental Inspector determines that existing conditions present a safety hazard for construction. Treating stumps and root systems in this manner will help stabilize the soil and promote re-sprouting by some species.

The minimal degradation alternative will utilize a narrowed 75-foot wide construction workspace in wetlands, therefore reducing temporary impacts to wetlands vegetation and soil compaction. ATWS necessary to install the pipeline across wetlands and waterbodies will be located in upland areas, and at least 50 feet away from the wetland edge, except where adjacent upland consists of cultivated or rotated agricultural lands and other disturbed areas, topographic and other site specific conditions permitting. If construction limitations, such as topographic conditions (steep slopes) and road crossing requirements do not permit a 50-foot setback, these areas will be located at least 10 feet away from the wetland. The work area will be limited to the minimum size necessary to safely construct the wetland or waterbody crossing. Restricting the work area in this manner will minimize resource impacts associated with pipeline construction and the potential disturbance to wetland dependent wildlife.

The clearing operation in wetlands and on stream banks will be conducted to minimize impacts to existing woody vegetation root stock in order to promote revegetation after construction is completed. This process will reduce the potential negative impacts to water quality or wildlife habitat. Clearing will be conducted in the winter season, which will avoid impacts to neotropical migrant bird and other breeding bird species. Winter clearing will also avoid potential clearing impacts to the federally protected Indiana bat and northern long-eared bat.

Prior to initiating clearing activities, all wetland boundaries and streams will be clearly marked in the field. Vegetation will be cut just above ground level, and stumps will be ground and not removed (except over the trenchline or where determined to be a potential safety hazard). Treating stumps and root systems in this manner will help stabilize the soil and promote re-sprouting by some species. Cleared debris (brush, slash, wood chips) will be disposed of in upland areas, hauled off or burned (in accordance with applicable permit conditions).

After clearing is completed and prior to grading, erosion and sediment controls will be installed along the ROW minimize the potential for upland soils to enter resource areas. These erosion and sediment control measures will be installed in accordance with the TEAL E&SCP and maintained throughout construction and until restoration is determined to be successful. The TEAL SPCC Plan will be utilized during both the clearing and construction phases of the project.

Further discussion of the proposed construction methods that provide for minimizing impacts are described in the preceding Section 5.3.2

To offset temporary impacts to wetland and waterbody resources, TEAL is proposing a Mitigation Plan presented in Item 7 of this Application.

5.5.3 Non-Degradation Alternative

Utilizing Non-Degradation Alternative would avoid all direct impacts to wetlands and waterbody resources from the TEAL Project and minimization would not be necessary.

5.6 Magnitude of Proposed Lowering of Water Quality

5.6.1 Preferred Design

The TEAL Project is proposing the installation of approximately 4.4 miles of new 36-inch diameter natural gas pipeline loop and 1,790 feet of 30-inch diameter natural gas connecting pipeline in Ohio that will be operated below ground following construction. Texas Eastern has sited proposed aboveground facilities to avoid temporary and permanent impacts (discharge of fill material) to wetlands and waterbodies. Therefore, the potential lowering of water quality would be limited to the construction phase of the proposed project.

Pipeline construction across streams or adjacent to surface waters can result in temporary and long-term adverse effects on water quality if not performed properly. However, proper construction techniques and timing can ensure that potential impacts are both temporary and minor. The primary impact associated with in-stream trenching is a temporary increase in turbidity and the resulting sedimentation that may occur downstream. Surface runoff and erosion from the cleared ROW can also increase in-stream sedimentation during construction. Other potentially deleterious impacts include accidental hazardous material spills resulting from refueling/maintaining construction equipment, fuel storage, or equipment failure in or near a waterbody, and could have immediate effects on aquatic resources and contaminate the waterbody downstream of the release point.

Long-term impacts on water quality could result from alteration of stream banks and removal of riparian vegetation. If not stabilized and revegetated properly, soil erosion associated with surface runoff and stream bank sloughing could result in the deposition of large quantities of sediment into the waterbody. Prolonged periods of exposure to high levels of suspended solids have been linked to fish egg and fry mortality and degradation of spawning habitat from the infiltration of sediments within the interstitial spaces of streambed gravel. Also, the removal of woody vegetation from riparian buffers can increase light penetration into water resources, which has the potential to increase water temperature and decrease habitat quality for species that favor cool and cold water.

5.6.2 Minimal Degradation Alternative

Impacts to water quality from the Minimal Degradation Alternative will be similar to those described for the Preferred Design, however will be lesser in extent due to a reduced disturbed area. The reduction in disturbed area is achieved by narrowing width of the construction ROW for wetland crossings when feasible and reducing the size of ATWS adjacent to wetlands. Additionally, following measures outlined in the Project E&SCP, FERC Plan, and FERC Procedures that are more protective of resources than standard cross-country mainline pipeline installation techniques as proposed for the Preferred Design will reduce the potential for impacts to water quality.

5.6.3 Non-Degradation Alternative

Utilizing Non-Degradation Alternative would avoid all direct impacts to wetlands and waterbody resources from the TEAL Project and there would be no effects to water quality.

5.7 Technical Feasibility and Cost Effectiveness

5.7.1 Preferred Alternative

The preferred alternative would utilize standard cross country mainline installation techniques and a minimum 100-foot wide ROW across all wetland and waterbody crossings to minimize the amount of tie-ins required along the route and to allow sufficient workspace to assemble, lower-in, and backfill the pipeline. Standard cross-country mainline construction is the most cost-effective way to install pipeline in

most circumstances. In certain situations where there are slope constraints, road crossings, or other potential obstructions, this method of construction may not be technically feasible. However, in most instances it is the most cost effective and a technically feasible approach used routinely by the industry.

There are potential issues that may arise by not implementing many of the construction and restoration procedures provided in the minimal degradation alternative. This includes possible erosion problems that can result in a lack of sufficient ground cover over the pipeline and sediment deposition in wetlands and waterbodies. The removal of root stock and stumps in wetland areas and stream banks, and lack of permanent erosion and sediment controls on adjacent upland slopes as part of the restoration effort could result in additional maintenance requirement to restore shallow cover over the pipeline and stabilizing potential land slips. This may require additional crossings of wetlands and waterbodies by heavy equipment needed to conduct the work. It could also result in sediment deposits in wetland and waterbodies, which can negatively impact water quality.

During operation of the pipeline, the most cost effective method of maintaining the vegetation along the corridor is through conventional mowing. As part of the preferred alternative, the mowing would be conducted of the full 50-foot width of the permanent ROW in both uplands and wetlands. This process is easier to comply with and more cost effective to complete than the wetland specific vegetation maintenance procedures incorporated into the minimal degradation alternative.

5.7.2 Minimal Degradation Alternative

The minimal degradation alternative will utilize specialized construction procedures for wetlands and waterbodies crossed by the pipeline. The pipeline will be installed across waterbodies using the open cut or the dry crossing method. The open cut crossing method would be used for 11 minor streams and the dry crossings method (dam and pump and/or flume) would be used for the 3 larger streams. Both crossing procedures are considered relatively rapid and technically feasible. The open cut method is more cost effective and the duration of the temporary disturbance is short. Separate installations at stream crossings do require separate tie-ins, which does increase cost over the standard mainline construction process.

The dry crossing technique isolates the trenchline, which will reduce potential turbidity and sediment transport downstream from construction activities. This process is more costly as it requires the installation of temporary dams upstream and downstream, pump set-up, and separate installation crew and associated tie-in.

There are no additional operational difficulties through the use of the minimal degradation alternative. The pipeline will be installed at the minimum depth of 3 feet that are required by U.S. Department of Transportation regulations. At this depth the pipeline will easily be accessed for any future maintenance that may be required for the pipeline.

Texas Eastern will conduct full ROW post-construction monitoring to determine the success of revegetation, which ensures that any potential circumstances that could lead to erosion are address quickly before problems occur.

As part of the routine vegetation maintenance along the ROW, in wetlands as well as waterbody riparian areas (25 feet in width from mean high water mark), a corridor centered on the pipeline up to 10 feet wide may be maintained annually in an herbaceous state. Trees and shrubs that are located within 15 feet on either side of the pipeline that are greater than 15 feet in height may be selectively cut and removed from the ROW. This method of vegetation maintenance is more costly, as crews need to identify the boundaries of resource areas during each maintenance cycle and restrict mechanical mowing across the entire ROW width. In wetlands and riparian areas, hand cutting of trees 15 feet or taller is required, which is more labor intensive with associated additional cost.

5.7.3 Non-Degradation Alternative

Project System alternatives would involve the transportation of the equivalent amount of incremental natural gas that would make it unnecessary to construct all or most of the proposed Project, although modifications or additions to other existing pipeline system(s) may be required to increase capacity, or another entirely new system may be required. Furthermore, regardless of the new infrastructure required by these other pipeline systems, the gas supply must reach the requested delivery points by November 2017, which, due to the extensive process and time required to obtain FERC authorization, is not likely possible for any of the transportation system alternatives discussed above. As described in Section 5.2.3.2, it is not clear that intrastate pipelines could provide the required service, as some of the production accessed by the Project is produced in western Pennsylvania and West Virginia and utilizes interstate pipelines.

The HDD crossing of all wetland and streams that would be proposed for non-degradation alternative is not technically feasible. Due to the geologic and topographic conditions identified along the Project route, the loss of drilling fluid through fractured rock and elevation differences would cause drill failure.

If the HDD process was technically feasible for crossing all wetland and waterbodies along the Project route, it would be significantly more time consuming and Texas Eastern could not complete the Project by the in-service date and therefore, would not meet the Project's purpose and need. Also, the pipeline would be installed at depths not accessible by conventional equipment. Therefore, the pipeline cannot be maintained or repaired if necessary. Needed repairs would require installing another pipeline replacement segment using an HDD. This is not cost effective or practical as part of the operation of the facility.

Lastly, the magnitude of the expense of using the HDD method for all wetland and waterbody crossings along the pipeline route is cost prohibitive to the Project. On average, the rough estimated cost for the HDD process needed for the 30-inch diameter pipeline to be installed on the TEAL Project is $1,200 per linear foot. The non-degradation alternative would require over 4.7 miles of HDD to avoid wetlands and waterbodies, which puts the HDD installation cost alone at over $29 million, which is cost prohibitive to construct the Project.

5.8 Economic Considerations

It is anticipated that the three alternatives would be relatively similar in terms of social and economic benefits and losses.

The TEAL Project will require temporary and permanent jobs that would have beneficial impacts to both The State of Ohio and local communities. The TEAL Project would not result in any important social or economic benefits loss as a result of constructing the preferred alternative. Due to the temporary nature of the anticipated Project, potential short term impacts to water quality impacts during construction are not anticipated to effect recreation, tourism, aesthetics or other use and enjoyment by humans. During construction there will be a short-term impediment to use of the area within the construction workspace limits, but because of the linear nature of the Project, that area is limited to a relatively narrow crossing of waterbodies and wetlands.

Socioeconomic effects during construction are generally related to the size and composition of the labor force and its potential need for public services, including transportation and temporary housing. Other effects are directly related to the construction and operation activities themselves, including the need to transport materials to and from the TEAL Project area, commerce generated by local materials purchased, and tax revenues generated by Project activities.

The socioeconomic analysis area includes the three Ohio counties where Project facilities are proposed (Columbiana, Belmont, and Monroe Counties), as well as all communities that are within 10 miles of the Project's proposed pipeline and major aboveground facilities. A 10-mile radius from the Project's proposed pipeline and major aboveground facilities was selected for the analysis area because of the rural nature of the surrounding communities. Because the surrounding area is rural, construction workers are likely to

obtain food and other services in communities neighboring, but not directly crossed by the Project. Therefore, extending the analysis area beyond the immediate vicinity of the Project's facilities was necessary. Communities were identified based on U.S. Census Bureau data TIGER/Line® files (U.S. Census Bureau, 2015a). Counties and communities within close proximity to proposed piping modifications that are exclusively part of flow reversal work are not included in the socioeconomics analysis due to the limited scope of the modifications.

The Project socioeconomic impact area includes an analysis of the following communities located in counties crossed by the Project:

- Belmont County: Colerain, Goshen, Mead, Pease, Pultney, Richland, Smith, Somerset, Washington, Wayne, Wheeling, and York;
- Columbiana County: Butler, Center, Elkrun, Franklin, Hanover, Knox, Madison, Perry, Salem, Washington, Wayne, West, and Yellow Creek; and
- Monroe County: Adams, Center, Green, Lee, Malaga, Ohio, Perry, Salem, Sunsbury, Switzerland, and Wayne.

In addition, the following communities located within 10 miles of the Project, within counties which do not contain Project facilities, are included in the socioeconomic effect area:

- Carroll County: Augusta, Brown, East, Fox, Lee, and Washington;
- Jefferson County: Brush Creek, Ross, Saline, and Springfield;
- Harrison County: Athens, Green, Short Creek, Mount Pleasant, Smithfield, Warren, and Wells; and
- Stark County: Paris.

Tables 5-4, 5-5, and 5-6 (*see* Tables Section) provide summary data for selected demographic and socioeconomic conditions of the Project socioeconomic impact area, as well as the State of Ohio. Data provided in these tables includes population data, unemployment rates, percentage of persons living below the poverty line, per capita income, and major employment sectors/employers (top three industries).

Texas Eastern anticipates that its contractors will hire a substantial number of specialized construction workers with the requisite experience for the installation of natural gas facilities. These hires will include surveyors, welders, equipment operators, and general laborers. It is estimated that the Project will directly employ approximately 320 - 470 construction workers. It is anticipated that some of the construction workers will be hired locally. The local supply of construction workers needed for the Project is expected to be derived from workers employed in the construction industry in the affected counties. Based on contractor responses and industry history averages, Texas Eastern estimates on average a 40-60 percent local workforce usage (approximately 128 - 282 workers). It is estimated that over $45 million will be spent towards direct construction labor. Construction personnel that may be hired from outside the Project area include supervisory personnel and inspectors. These individuals will temporarily relocate to the Project vicinity, if necessary.

Approximately five operation and maintenance workers will be employed and will receive a total annual income of approximately $400,000. Of these workers, 100 percent are expected to be local workers. The total cost of materials for construction of the Project is estimated at $47.5 million. Money will be spent locally on the purchase/rental of equipment and purchase of materials/supplies such as stone, sand, concrete, fencing material, bulk fuel, and hay bales and seeds for restoration. These items and others required for construction will be purchased, as available, from vendors within analysis area counties. Approximately $4.7 million of the total construction cost would be spent on locally purchased goods.

Most socioeconomic effects will be short-term and localized, due primarily to the relatively short construction period when substantial numbers of workers will be active, the limited geographic scope of

the Project, and the relatively short duration of time that workers will be within each county, as they will move from location to location as the construction progresses in accordance with the construction schedule. Potential effects associated with construction may include minor, short term traffic disruption and congestion and short term noise effects in the general vicinity of the Project. Pipeline construction will also result in minor short-term disturbance of agricultural activities. Some long-term disturbance to site-specific agricultural areas will occur with the construction of the Salineville Compressor Station. The Project will not involve the displacement of any residences or businesses, and any disruptions of local residential use will be of short duration and fully mitigated.

Revenues from construction employment, operation and maintenance employment, local expenditures by the construction companies for construction materials, use of local construction and other project related companies, and non-local construction workers for temporary housing, food, and entertainment will benefit the local economy. Significant increases in the property tax base and (minimally) enhanced employment opportunities during Project operation will be beneficial in the long-term. It is estimated that the Project will generate approximately $184 million in property taxes over the first 60 years of service.

5.9 Cumulative Impacts

Cumulative impacts may result when the environmental effects associated with a proposed project are added to temporary (construction-related) or permanent (operation-related) impacts associated with other past, present, or reasonably foreseeable future projects. Although the individual impact of each separate project may not be significant, the additive or synergistic effects of multiple projects could be significant when considered cumulatively.

Construction of the TEAL Project facilities will result in temporary impacts to water resources and wetlands. Each proponent for the projects potentially occurring simultaneously with TEAL will be required by the terms and conditions of their respective Clean Water Act Section 404 dredge/fill permits and Section 401 Water Quality Certification requirements to avoid and minimize potential wetland and waterbody impacts to the extent practicable and to provide compensatory mitigation for unavoidable impacts to waters of the U.S. The construction and operation of the TEAL Project, along with the other potential projects, could result in a cumulative reduction in the extent of forested wetlands within the respective municipalities and watersheds due to the required conversion from forested wetlands habitats to emergent or shrub-scrub wetland habitat associated with maintenance of the permanent easement. Texas Eastern will work with regulatory agencies to identify the extent of appropriate mitigation should compensation for unavoidable impacts be deemed appropriate.

Both the Preferred Design and the Minimal Degradation Alternatives would require temporary impacts to wetland and waterbodies and would involve permanent conversion of forested wetlands habitat for the purpose of complying with U.S. Department of Transportation requirements for surveillance and monitoring of the pipeline ROW during operations. Texas Eastern is working with applicable regulatory agencies to develop acceptable mitigation to compensate for these unavoidable wetlands impacts. Proponents of other past, present, or reasonably foreseeable future projects in the vicinity of the Project will also be required to comply with the same impact avoidance and minimization criteria of Ohio and U.S. Army Corps of Engineers regulations and will be subject to the same requirements for compensation for unavoidable impacts. Therefore, Texas Eastern does not anticipate cumulative adverse impacts to Ohio water resources as the result of the TEAL Project.

The Non-Degradation Alternative would completely avoid impacts to water resources and therefore, would result in no impacts to water resources and have no cumulative effects.

5.10 Indirect Impacts

Both the Preferred Design and the Minimal Degradation Alternatives would cause temporary direct impacts to Ohio wetlands and waterbodies during the construction phase of the Project. Indirect impacts to

waterbodies could include downstream changes to streambed composition or configuration, alteration to riparian vegetation, or changes in flow characteristics. Indirect impacts to wetlands could include temporary alteration of wetland buffers, changes in wetland hydrology, or alteration of wetland functions and values in off ROW portions of wetlands crossed by the Project.

To avoid potential indirect impacts to off ROW water resources, Texas Eastern will employ full-time Environmental Inspectors during the construction phase of the Project to ensure that no construction related activities occur off the approved construction ROW. Texas Eastern will also perform construction through wetlands and waterbodies and restoration of these resources in accordance with the FERC Procedures, the FERC Plan, and the TEAL E&SCP and SPCC Plans. No indirect impacts to Ohio water resources are anticipated as the result of the proposed NEXUS Project.

The Non-Degradation Alternative will completely avoiding impacts to water resources and therefore, results in no indirect impacts.

5.11 Construction Stormwater Management Plans

Construction Stormwater Management is provided for in the TEAL Project E&SCP, which is included as Appendix A.

5.12 Post-Construction Stormwater Management Plans

Following construction, stabilization, and establishment of vegetative cover, temporarily disturbed areas will be left to revegetate via natural succession. Texas Eastern will monitor the ROW to ensure revegetation is successful and address any areas where it is determined not to be successful. Permanent loss of trees will occur within the ROW that will be maintained in an early successional stage by mowing and periodic tree removal. The temporary workspaces will be allowed to naturally revegetate via natural succession. This natural revegetation process will gradually develop a stratified vegetative cover between the ROW and adjacent habitats. As a result, no further post-construction stormwater management will be necessary.

TABLES

TABLE 5.1

Summary of Resources Affected by TEAL Preferred Design Alternative

Facility, County	Total Crossing Length (feet)	Total Wetland Area Affected (acres)	Total Forested Wetland Area Affected (acres)	Wetland Area Affected by Periodic O&M (acres)	Forested Wetland Area Affected by Periodic O&M (acres)	OEPA Category 3 Wetlands Crossed/Impacted
Pipeline Facilities						
Proposed Pipeline Loop	1,033.27	1.15	0.07	0.63	0.02	n/a
Proposed Interconnecting Pipeline to NEXUS	109.91	0.22	0	0.12	0	n/a
Preferred Design Alternative Totals	***1,143.18***	***1.37***	***0.07***	***0.75***	***0.02***	n/a

TABLE 5.2

Summary of Resources Affected by TEAL Minimal Degradation Design Alternative

Facility, County	Total Crossing Length (feet)	Total Wetland Area Affected (acres)	Total Forested Wetland Area Affected (acres)	Wetland Area Affected by Periodic O&M (acres)	Forested Wetland Area Affected by Periodic O&M (acres)	OEPA Category 3 Wetlands Crossed/Impacted
Pipeline Facilities						
Proposed Pipeline Loop	1,033.27	1.00	0.05	0.63	0.02	n/a
Interconnecting Pipeline to NEXUS	109.91	0.17	0	0.12	0	n/a
Preferred Design Alternative Totals	***1,143.18***	**1.17**	**0.05**	**0.75**	**0.02**	**n/a**

TABLE 5-3

Avoidance and Minimization of Resources for TEAL Project

Facility/County/Resource ID	Wetland Type/Waterbody Name	Approximate Mile Post	Wetland and Waterbody Impacts Avoidance and minimization Routing Activities
Proposed Pipeline Loop			
Monroe			
A15-02, A15-02-S1	PFO/ Tributary to Paine Run	0.0	Impacts avoided by shifting pipeline and associated workspace to the north
A15-03, A15-03-S1	PEM/ Paine Run	0.75	Impacts avoided and minimized by narrowing workspace.
A15-24-S1	Paine Run	0.75	Impacts to waterbody minimized by employing dry crossing method.
A12-04-S1	Tributary to Paine Run	0.78	Impacts minimized by siting the pipeline adjacent to an existing utility corridor.
TAR 2	n/a	0.78	Impacts avoided by shifting access road and associated workspace to existing road.
A15-05	PEM	0.87	Impacts avoided by shifting pipeline alignment to the south
A15-06	PEM	1.07	Impacts avoided by shifting pipeline alignment to the south
A15-22-S1	Tributary to Paine Run	1.13	Impacts avoided by shifting pipeline alignment to the north
A15-07, A15-07-S1	Tributary to Paine Run	1.22	Impacts minimized by siting the pipeline adjacent to an existing utility corridor and by narrowing construction workspace.
A15-08, A15-08-S1	PEM/ Tributary to Paine Run	1.60	Impacts minimized by siting the pipeline adjacent to an existing utility corridor.
A15-09	PEM	1.65	Impacts to resource area minimized by narrowing construction workspace.
A15-10, A15-10-S1	PEM/ Tributary to Paine Run	1.89	Impacts minimized by siting the pipeline adjacent to an existing utility corridor.
A15-21	PEM	2.03	Impacts avoided by narrowing workspace and locating access road east of wetland.
A15-11, A15-11-S1, A15-11-S2	PEM/ Tributary to Paine Run	2.17	Impacts minimized by narrowing construction workspace. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.
A15-12	PEM	2.42	Impacts minimized by narrowing construction workspace. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.

TABLE 5-3

Avoidance and Minimization of Resources for TEAL Project

Facility/County/Resource ID	Wetland Type/Waterbody Name	Approximate Mile Post	Wetland and Waterbody Impacts Avoidance and minimization Routing Activities
Proposed Pipeline Loop			
Monroe			
A15-13-S1	Tributary to Paine Run	2.53	Impacts avoided by shifting pipeline alignment to the south.
A15-14, A15-14-S1	PEM/ Tributary to Salem Run	2.90	Wetland impacts avoided by shifting pipeline alignment to the southeast. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.
A15-15	PEM	3.02	Impacts minimized by narrowing construction workspace. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.
A15-16	PEM	3.9	Impacts avoided by shifting pipeline alignment to the south.
A15-17	PSS	4.05	Impacts avoided by shifting pipeline alignment to the south.
B15-21	PEM	4.08	Impacts to resource area minimized by narrowing construction workspace.
A15-18-S2	Tributary to Stillhouse Run	4.19	Impacts minimized by narrowing construction workspace. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.
A15-18/A15-19	PSS/PEM	4.22	Impacts minimized by narrowing construction workspace. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.
A15-18-s1	Tributary to Stillhouse Run	4.25	Impacts minimized by shifting pipeline south and narrowing construction workspace to avoid wider crossing. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.
A15-19-s1	Tributary to Stillhouse Run	4.28	Impacts minimized by narrowing construction workspace. Impacts further reduced by siting the pipeline adjacent to an existing utility corridor.
A15-20	PEM	4.40	Impacts avoided by narrowing workspace.

TABLE 5-3

Avoidance and Minimization of Resources for TEAL Project

Facility/County/Resource ID	Wetland Type/Waterbody Name	Approximate Mile Post	Wetland and Waterbody Impacts Avoidance and minimization Routing Activities
Proposed Pipeline Loop			
Monroe			
Connecting Pipeline to NEXUS			
Columbiana			
B15-17, B15-17-S1	PEM/ Tributary to Brush Creek	0.19	Workspace reduced to minimize impacts
Salineville Compressor Station			
Columbiana			
A15-01	PEM	N/A	Impacts avoided by adjusting compressor station site workspace

TABLE 5-4

Existing Population Levels and Trends for the TEAL Project Socioeconomic Analysis Area

Location	2000 Population a/	2010 Population b/	2013 Population Estimate c/	Population Density (persons/sq. mi.) (2010) b/	Change in Population 2000-2013 (%)	Change in Population 2010-2013 (%)
FEDERAL						
U.S.	281,421,906	308,746,065	311,536,594	87.4	10.7	0.9
STATE						
Ohio	11,353,140	11,536,504	11,549,590	282.3	1.7	0.1
COUNTY						
Belmont	70,226	70,400	69,990	132.3	-0.3	-0.6
Columbiana	112,075	107,841	107,078	202.7	-4.5	-0.7
Monroe	15,180	14,642	14,646	32.1	-3.5	0.0
LOCAL						
Adams Township	672	625	318	27.8	-52.7	-49.1

TABLE 5-4

Existing Population Levels and Trends for the TEAL Project Socioeconomic Analysis Area

Location	2000 Population a/	2010 Population b/	2013 Population Estimate c/	Population Density (persons/sq. mi.) (2010) b/	Change in Population 2000-2013 (%)	Change in Population 2010-2013 (%)
Athens Township*	-	-	624	-	-	-
Augusta Township*	1,599	1,619	1,796	58.2	12.3	10.9
Brown Township*	8,300	7,935	7,912	188.9	-4.7	-0.3
Brush Creek Township*	467	438	492	18.5	5.4	12.3
Butler Township	3,444	3,614	3,579	109.9	3.9	-1.0
Center Township, Columbiana County	6,473	6,313	6,262	178.7	-3.3	-0.8
Center Township, Monroe County	3,797	3,647	3,647	88.1	-4.0	0.0
Colerain Township	4,438	4,276	4,247	172.4	-4.3	-0.7
East Township*	859	843	918	36.6	6.9	8.9
Elkrun Township	4,781	4,687	4,658	131.0	-2.6	-0.6
Fox Township*	1,075	1,041	833	28.8	-22.5	-20.0
Franklin Township	766	835	1,103	36.3	44.0	32.1
Goshen Township	3,252	3,147	3,135	87.2	-3.6	-0.4
Green Township, Monroe County	422	447	278	16.1	-34.1	-37.8
Green Township*, Harrison County	-	-	1,972	-	-	-
Hanover Township	3,749	3,704	3,669	103.4	-2.1	-0.9
Knox Township	4,828	4,434	4,400	125.5	-8.9	-0.8
Lee Township, Monroe County	1,122	1,023	915	58.7	-18.4	-10.6
Lee Township*, Carroll County	1,128	1,087	916	34.4	-18.8	-15.7
Madison Township	3,406	3,196	3,174	89.7	-6.8	-0.7
Malaga Township	979	1,062	1,557	36.3	59.0	46.6
Mead Township	6,023	5,967	5,922	187.0	-1.7	-0.8
Mount Pleasant Township*	2,588	2,368	2,502	124.1	-3.3	5.7
Ohio Township	1,032	1,004	943	43.4	-8.6	-6.1
Paris Township*	5,969	5,728	5,717	169.8	-4.2	-0.2

TABLE 5-4

Existing Population Levels and Trends for the TEAL Project Socioeconomic Analysis Area

Location	2000 Population a/	2010 Population b/	2013 Population Estimate c/	Population Density (persons/sq. mi.) (2010) b/	Change in Population 2000-2013 (%)	Change in Population 2010-2013 (%)
Pease Township	14,961	14,309	14,240	501.5	-4.8	-0.5
Perry Township, Columbiana County	17,049	16,850	16,773	1065.2	-1.6	-0.5
Perry Township, Monroe County	455	451	581	18.5	27.7	28.8
Pultney Township	9,700	8,795	8,756	339.1	-9.7	-0.4
Richland Township	13,571	14,973	14,885	256.8	9.7	-0.6
Ross Township*	655	721	637	23.3	-2.7	-11.7
Salem Township, Columbiana County	5,703	5,484	5,446	176.1	-4.5	-0.7
Salem Township, Monroe County	1,046	1,001	1,011	38.8	-3.3	1.0
Saline Township*	1,454	1,353	1,195	64.2	-17.8	-11.7
Short Creek Township*	-	-	1,381	-	-	-
Smith Township	1,445	1,543	1,795	42.8	24.2	16.3
Smithfield Township*	3,578	3,473	3,432	92.5	-4.1	-1.2
Somerset Township	1,186	1,245	934	36.0	-21.2	-25.0
Springfield Township*	2,568	2,367	2,686	77.1	4.6	13.5
Sunsbury Township	1,424	1,325	1,104	46.6	-22.5	-16.7
Switzerland Township	509	462	537	17.0	5.5	16.2
Warren Township*	4,499	4,232	4,170	183.2	-7.3	-1.5
Washington Township, Belmont County	537	517	587	14.6	9.3	13.5
Washington Township, Columbiana County	2,380	2,264	2,123	102.7	-10.8	-6.2
Washington Township*, Carroll County	1,061	1,239	1,225	47.7	15.5	-1.1
Wayne Township, Belmont County	624	709	595	20.1	-4.6	-16.1
Wayne Township, Columbiana County	785	814	510	32.6	-35.0	-37.3
Wayne Township, Monroe County	348	362	353	16.2	1.4	-2.5
Wells Township*	3,130	2,835	2,800	105.8	-10.5	-1.2

TABLE 5-4

Existing Population Levels and Trends for the TEAL Project Socioeconomic Analysis Area

Location	2000 Population a/	2010 Population b/	2013 Population Estimate c/	Population Density (persons/sq. mi.) (2010) b/	Change in Population 2000-2013 (%)	Change in Population 2010-2013 (%)
West Township	3,351	3,307	3,282	94.7	-2.1	-0.8
Wheeling Township	1,477	1,691	1,847	62.9	25.1	9.2
Yellow Creek Township	2,185	2,140	2,258	108.4	3.3	5.5
York Township	2,648	2,538	2,522	99.4	-4.8	-0.6

Sources:

a/ U.S. Census Bureau. 2000. Census 2000 Summary File 1 (SF 1) 100-Percent Data. Population, Housing Units, Area, and Density: 2000 – County – County Subdivision and Place (GCT-PH1). Accessed on April 10, 2015 at http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

U.S. Census Bureau. 2000. Census 2000 Summary File (SF1) 100-Percent Data. Profile of General Demographic Characteristics: 2000 (DP-1). Accessed on April 12, 2015 at http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

b/ U.S. Census Bureau. 2010. Census 2010 Summary File 1. Population, Housing Units, Area, and Density: 2010 – County – County Subdivision and Place (GCT-PH1). Accessed on April 10, 2015 at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

U.S. Census Bureau. 2010. Census 2010 Summary File 1. Population, Housing Units, Area, and Density: 2010 – State – Congressional Districts. Accessed on April 12, 2015 at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

U.S. Census Bureau. 2010. Census 2010 Summary File 1. Population, Housing Units, Area, and Density: 2010 – United States – States; and Puerto Rico (GCT-PH1). Accessed on April 12, 2015 at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

c/ U.S. Census Bureau. 2013. 2009-2013 American Community Survey 5-Year Estimates. Demographic and Housing Estimates (DP05). Accessed on April 12, 2015 at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

- Data unavailable.
- *Located within 10 miles of the Project, within a county which does not contain Project facilities.

TABLE 5-5

Existing Economic Conditions for the TEAL Project Socioeconomic Analysis Area

Location	Per Capita Income ($)	Civilian Workforce	Unemployment Rate (%)	Top Three Industries
FEDERAL				
U.S.	28,155	157,113,886	6.2	E, R, P
STATE				
Ohio	26,046	5,849,339	6.4	E, M, R
COUNTY				
Belmont	22,380	32,528	5.0	E, R, A
Columbiana	21,575	51,118	6.3	E, M, R
Monroe	21,487	6,074	3.4	E, R, C
LOCAL				
Adams Township	25,778	166	2.8	E, T, M
Athens Township*	16,081	222	3.5	E, T, M
Augusta Township*	18,657	770	10.1	R, C, M
Brown Township*	23,475	3,741	5.0	M, E, R
Brush Creek Township*	41,202	214	1.3	Ag, T, E
Butler Township	20,993	1,845	3.2	E, M, T
Center Township, Columbiana County	21,051	2,957	10.3	E, M, R
Center Township, Monroe County	21,113	1,326	3.9	E, R, F
Colerain Township	22,611	1,982	5.4	E, R, M
East Township*	19,217	357	3.3	M, E, W
Elkrun Township	17,713	1,078	2.3	E, M, T
Fox Township*	15,410	383	9.2	M, E, Ag
Franklin Township	19,557	577	12.0	R, E, T
Goshen Township	19,157	1,605	5.4	E, R, A
Green Township, Monroe County	21,420	82	0.0	R, A, M

TABLE 5-5

Existing Economic Conditions for the TEAL Project Socioeconomic Analysis Area

Location	Per Capita Income ($)	Civilian Workforce	Unemployment Rate (%)	Top Three Industries
Green Township*, Harrison County	22,627	981	2.6	E, M, Ag
Hanover Township	21,594	1,871	6.5	E, M, R
Knox Township	23,868	2,569	5.9	E, M, R
Lee Township, Monroe County	22,460	464	5.8	T, C, E
Lee Township*, Carroll County	21,808	429	1.9	M, C, E
Madison Township	20,131	1,453	7.0	E, M, A
Malaga Township	18,356	610	2.8	E, Ag, R
Mead Township	23,426	2,812	3.9	E, R, C
Mount Pleasant Township*	22,327	1,256	2.2	E, A, C
Ohio Township	22,730	425	4.0	C, M, E
Paris Township*	23,378	2,843	6.6	M, E, R
Pease Township	20,648	6,893	7.2	E, R, A
Perry Township, Columbiana County	21,461	8,251	6.6	E, M, R
Perry Township, Monroe County	21,385	223	3.0	E, Pu, Ag
Pultney Township	19,216	4,040	9.3	E, A, R
Richland Township	25,629	6,033	2.8	E, R, Ag
Ross Township*	19,326	312	7.9	P, O, C
Salem Township, Columbiana County	22,653	2,811	5.3	M, E, R
Salem Township, Monroe County	21,784	418	1.5	R, E, Ag
Saline Township*	17,994	480	9.6	M, E, T
Short Creek Township*	20,785	633	2.0	E, R, T
Smith Township	18,526	847	2.4	E, R, C
Smithfield Township*	19,572	1,356	4.8	E, R, A
Somerset Township	33,295	356	3.4	E, T, Pu

TABLE 5-5

Existing Economic Conditions for the TEAL Project Socioeconomic Analysis Area

Location	Per Capita Income ($)	Civilian Workforce	Unemployment Rate (%)	Top Three Industries
Springfield Township*	19,267	1,246	6.0	E, M, R
Sunsbury Township	23,147	432	4.8	E, Ag, C
Switzerland Township	33,046	272	8.8	C, E, M
Warren Township*	22,336	2,028	5.9	E, R, M
Washington Township, Belmont County	25,698	347	0.0	E, W, A
Washington Township, Columbiana County	19,340	1,042	10.2	P, M, E
Washington Township*, Carroll County	18,803	650	12.6	E, M, R
Wayne Township, Belmont County	27,487	314	0.2	E, Ag, R
Wayne Township, Columbiana County	25,097	238	0.0	M, T, E
Wayne Township, Monroe County	19,549	113	0.0	Ag, O, P
Wells Township*	20,562	1,329	3.7	E, C, A
West Township	19,893	1,619	7.4	E, M, R
Wheeling Township	26,807	1,051	6.4	O, E, P
Yellow Creek Township	28,134	1,054	5.6	E, T, M
York Township	21,140	1,169	6.4	E, Ag, T

Source: U.S. Census Bureau. 2013. 2009-2013 American Community Survey 5-Year Estimates. Selected Economic Characteristics (P03). Accessed on April 12, 2015 and August 18, 2015 at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

Industries:
A = Arts, entertainment, and recreation, and accommodation and food services.
Ag = Agriculture, forestry, fishing and hunting, and mining.
C = Construction.
E = Educational, health and social services.
F = Finance and insurance, and real estate and rental and leasing.
M = Manufacturing.

O = Other services, except public administration.

TABLE 5-5

Existing Economic Conditions for the TEAL Project Socioeconomic Analysis Area

Location	Per Capita Income ($)	Civilian Workforce	Unemployment Rate (%)	Top Three Industries

P = Professional, scientific, management, administrative and waste management services.
Pu = Public administration.
R = Retail trade.
T = Transportation and warehousing, and utilities.

*Located within 10 miles of the Project, within a county which does not contain Project facilities.

TABLE 5-6

Unemployment and Poverty Rates in the TEAL Project Socioeconomic Analysis Area

Location	Unemployment Rate (annual average 2013) a/	Persons Living Below the Poverty Line (%) b/	Household Receiving Income Based on Public Assistance (%)	
			SNAP Benefits a/	Cash Public Assistance Income a/
FEDERAL				
U.S.	6.2	14.2	12.4	2.8
STATE				
Ohio	6.4	14.9	14.5	3.4
COUNTY				
Belmont	5.0	14.5	13.3	3.1
Columbiana	6.3	15.8	16.4	2.9
Monroe	3.4	16.0	11.9	2.6
LOCAL				
Adams Township	2.8	0.0	9.3	0.0
Athens Township*	3.5	10.8	4.0	0.8
Augusta Township*	10.1	10.9	8.5	3.6

TABLE 5-6

Unemployment and Poverty Rates in the TEAL Project Socioeconomic Analysis Area

Location	Unemployment Rate (annual average 2013) a/	Persons Living Below the Poverty Line (%) b/	Household Receiving Income Based on Public Assistance (%)	
			SNAP Benefits a/	Cash Public Assistance Income a/
Brown Township*	5.0	12.6	12.5	2.5
Brush Creek Township*	1.3	3.1	2.4	0.0
Butler Township	3.2	6.6	6.1	0.0
Center Township, Columbiana County	10.3	16.3	22.0	2.2
Center Township, Monroe County	3.9	16.4	20.9	6.3
Colerain Township	5.4	9.5	11.4	0.9
East Township*	3.3	0.0	0.0	0.0
Elkrun Township	2.3	0.0	4.4	0.0
Fox Township*	9.2	20.3	20.8	3.1
Franklin Township	12.0	0.7	1.7	1.7
Goshen Township	5.4	10.5	12.5	2.5
Green Township, Monroe County	0.0	0.0	0.0	0.0
Green Township*, Harrison County	2.6	9.5	10.8	5.0
Hanover Township	6.5	17.4	15.6	3.0
Knox Township	5.9	5.2	8.5	3.3
Lee Township, Monroe County	5.8	6.1	4.8	3.6
Lee Township*, Carroll County	1.9	6.0	12.5	7.3
Madison Township	7.0	2.0	15.1	6.1
Malaga Township	2.8	12.3	6.6	0.6
Mead Township	3.9	6.6	6.1	2.2
Mount Pleasant Township*	2.2	7.3	11.8	1.8
Ohio Township	4.0	24.2	2.7	0.0
Paris Township*	6.6	8.6	10.5	1.0
Pease Township	7.2	16.6	23.5	4.8
Perry Township, Columbiana County	6.6	15.0	16.5	2.4

TABLE 5-6

Unemployment and Poverty Rates in the TEAL Project Socioeconomic Analysis Area

Location	Unemployment Rate (annual average 2013) a/	Persons Living Below the Poverty Line (%) b/	Household Receiving Income Based on Public Assistance (%)	
			SNAP Benefits a/	Cash Public Assistance Income a/
Perry Township, Monroe County	3.0	0.5	1.6	0.4
Pultney Township	9.3	18.2	18.2	5.7
Richland Township	2.8	3.9	5.3	0.6
Ross Township*	7.9	3.5	0.0	6.6
Salem Township, Columbiana County	5.3	13.0	14.6	2.0
Salem Township, Monroe County	1.5	5.5	6.2	0.7
Saline Township*	9.6	23.3	25.9	0.7
Short Creek Township*	2.0	11.2	13.8	6.4
Smith Township	2.4	13.7	11.2	7.0
Smithfield Township*	4.8	10.3	13.1	1.8
Somerset Township	3.4	0.0	3.1	0.0
Springfield Township*	6.0	8.3	17.3	2.8
Sunsbury Township	4.8	15.2	12.4	0.8
Switzerland Township	8.8	8.9	13.7	0.0
Warren Township*	5.9	9.8	15.1	3.0
Washington Township, Belmont County	0.0	0.0	0.0	0.0
Washington Township, Columbiana County	10.2	16.8	18.3	4.2
Washington Township*, Carroll County	12.6	12.2	12.0	1.8
Wayne Township, Belmont County	0.2	0.0	0.4	14.6
Wayne Township, Columbiana County	0.0	7.6	13.0	9.8
Wayne Township, Monroe County	0.0	13.1	10.3	0.0
Wells Township*	3.7	8.6	12.4	1.5
West Township	7.4	18.2	23.0	4.8
Wheeling Township	6.4	9.8	16.5	1.1

TABLE 5-6

Unemployment and Poverty Rates in the TEAL Project Socioeconomic Analysis Area

Location	Unemployment Rate (annual average 2013) a/	Persons Living Below the Poverty Line (%) b/	Household Receiving Income Based on Public Assistance (%)	
			SNAP Benefits a/	Cash Public Assistance Income a/
Yellow Creek Township	5.6	0.9	10.4	0.0
York Township	6.4	14.0	8.7	1.5

Sources:
a/ U.S. Census Bureau. 2013. 2009-2013 American Community Survey 5-Year Estimates. Selected Economic Characteristics (DP03). Accessed on April 12, 2015 and August 18, 2015 at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.
b/ U.S. Census Bureau. 2013. 2009-2013 American Community Survey 5-Year Estimates. Poverty Status in the Past 12 Months by Household Type By Age of Householder (B17017). Accessed on April 12, 2015 and August 18, 2015 at: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

*Located within 10 miles of the Project, within a county which does not contain Project facilities.

APPENDIX A

Erosion and Sediment Control Plan