

V

ALTERNATIVES ANALYSIS

- A. *Stream 4*
- B. *Stream 8*
- C. *Stream 12*

ALTERNATIVES ANALYSIS

The attached Alternatives Analyses discuss preferred, minimal-degradation, and non-degradation alternatives for Stream 4, Stream 8, and Stream 12. Per phone conversation with Maggie Corder from the OEPA on July 3, 2014, the minimal-degradation alternative was selected based on achieving minimal stream impact while maintaining project constructability.

The preferred alternative (PA) for all three streams represents the standard operating procedure for installing natural gas pipelines. Seventy (70) feet of pipeline right-of-way (ROW) width could be disturbed at each stream crossing. Stream length within the ROW varies by stream, with cumulative stream impact totaling 226 linear feet; 2,571 square feet; 0.060 acre (calculated using ArcMAP).

The minimal-degradation alternative (MDA) is the selected course of action for this 401 Water Quality Certification package. The pipeline ROW width will be reduced to 20 feet at each stream crossing. Cumulative stream impact will be 60 linear feet; 701 square feet; 0.016 acre (calculated using ArcMAP).

The non-degradation alternative (NDA) discusses constructing a horizontal directional drill (HDD) bore beneath each stream. This would not require any ROW impacts at the stream crossings, although there is a risk of an inadvertent return whereby drilling liquids could infiltrate stream substrate from below. The feasibility of the NDA is extremely limited due to topography in the area.

Project mapping for each alternative can be found in **Appendix VI**.

A
Stream 4

ALTERNATIVES ANALYSIS

This Alternatives Analysis discusses preferred, minimal-degradation, and non-degradation alternatives. Per phone conversation with Maggie Corder from the OEPA on July 3, 2014, the minimal-degradation alternative was selected based on achieving minimal stream impact while maintaining project constructability. Project mapping for each alternative can be found in **Appendix VI**.

Preferred Alternative

Project Description

Standard operating procedure for the installation of natural gas pipeline includes the potential disturbance of 70 feet of right-of-way (ROW). The permanent ROW extends 25 feet in width on either side of the center line of the pipeline for a total width of 50 feet. The temporary ROW extends 10 feet beyond the permanent ROW on either side, for a total width of 20 feet.

The proposed alignment would cross almost perpendicular to Stream 4, resulting in potential temporary impact to 80 linear feet (686 square feet; 0.016 ac) of stream within the ROW. Stream impact was calculated using ArcMAP and may differ from dimensions measured in the field. All impacts are temporary due to immediate post-construction restoration, described below.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

Best management practices include placing a timber mat bridge (16' x 20') with side guards to span the stream above its ordinary high water mark and permit the passage of equipment and vehicles during pipeline installation. Sediment-filtering material will be installed beneath the timber mat bridge to prevent sediment from entering the water from travel across the bridge. Erosion and sediment controls will be

installed along both sides of 80 linear feet (686 square feet; 0.016 ac) of stream to prevent the flow of sediment into the stream. Minor grading may occur to permit safe passage during pipeline installation. Any removed soil will be stored nearby and protected from erosion with additional erosion controls.

Sand bags will be placed within the stream, immediately upstream of the proposed pipeline location, to act as a temporary dam redirecting stream water into a flume pipe (15' to 20' long) within the center of the stream. Sand bags will be similarly placed at the downstream end of the flume pipe to maintain its position in the streambed. The stream will be open-cut for pipeline installation after surface water has been temporarily redirected. An excavator stationed on the timber mat bridge will dig the 5-foot-wide, 8-foot-deep trench through the streambed without disturbing the flume pipe.

Up to 12 cubic yards of streambed materials from within Stream 4 will be stockpiled during trench excavation. The dredged material will be stored nearby, protected by erosion controls.

Upon completion of the pipeline installation, the excavated area within the stream will be backfilled with the materials removed from the streambed. The flume pipe and sand bags will be removed and stream flow will be restored. Altered bed and banks will be fully restored to their original form and the site will be restored to original grade. Restored topsoil will be stabilized against erosion with the installation of additional erosion controls. The timber mat bridge will be removed after work in the area is completed; there will be no further stream impact.

Once the work area is stabilized and vegetative growth has reached 70%, all erosion controls will be removed. All best management practices will be included in the Erosion and Sediment Control Plan being designed in compliance with ODNR-DSWR standards dated November 26, 2013.

Magnitude of the Proposed Lowering of Water Quality

Temporary impacts to perennial Stream 4 include installing erosion and sediment controls along both sides of 80 linear feet (686 square feet; 0.016 ac) of stream, redirecting water through the work area, excavating up to 12 cubic yards of streambed materials, and backfilling the excavated materials back into the streambed.

The temporary nature of this work as well as the continuous, unimpeded flow of water around the work area should result in negligible impacts to stream biota as described in **Appendix III, Attachment A**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 4.

Technical Feasibility and Cost Effectiveness

The above-described standard operating procedures and best management practices are feasible according to current technology and available resources. Specific cost for this stream crossing is not known.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

The minor and temporary nature of the impacts to this stream should not adversely impact water quality within this watershed.

Indirect Impacts

By maintaining the flow of water during pipeline installation, neither the physical habitat nor aquatic species upstream or downstream of the work will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable post-construction. Post-construction grade will be the same as pre-construction grade.

Construction Storm Water Management Plans

This stream crossing work will be initiated and completed within one day and work will not take place during a storm event, eliminating the possibility of peak storm water flow exceeding the banks of the stream or the volume of the flume pipe. Normal stream flow will be maintained by following best management practices.

Post-Construction Storm Water Management Plans

Post-construction erosion controls will be left in place until the work area has stabilized. These controls should prevent any post-construction storm events from adversely impacting the stream.

Minimal-Degradation Alternative (the alternative selected for the proposed work)

Project Description

The standard ROW can be reduced to 20 feet. The permanent ROW will extend 10 feet in width on either side of the center line of the pipeline.

The proposed alignment will cross almost perpendicular to Stream 4, resulting in potential temporary impact to 20 linear feet (231 square feet; 0.005 ac) of stream within the ROW. Stream impact was calculated using ArcMAP and may differ from dimensions measured in the field. All impacts are temporary due to immediate post-construction restoration, described below.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

Best management practices include installing erosion and sediment controls along both sides of 20 linear feet (231 square feet; 0.005 ac) of stream to prevent the flow of sediment into the stream. Minor grading may occur to permit safe passage during pipeline installation. Any removed soil will be stored nearby and protected from erosion with additional erosion controls.

Sand bags will be placed within the stream, immediately upstream of the proposed pipeline location, to act as a temporary dam redirecting stream water into a flume pipe (15' long) within the center of the stream. Sand bags will be similarly placed at the downstream end of the flume pipe to maintain its position in the streambed. The stream will be open-cut for pipeline installation after surface water has been temporarily redirected. An excavator stationed above the ordinary high water mark of the stream will dig the 5-foot-wide, 8-foot-deep trench through the streambed without disturbing the flume pipe.

Up to 12 cubic yards of streambed materials from within Stream 4 will be stockpiled during trench excavation. The dredged material will be stored nearby, protected by erosion controls.

Upon completion of the pipeline installation, the excavated area within the stream will be backfilled with the materials removed from the streambed. Altered bed and banks will be fully restored to their original form and the site will be restored to original grade. The flume pipe and sand bags will be removed and stream flow will be restored. Restored topsoil will be stabilized against erosion with the installation of additional erosion controls.

A timber mat bridge (12' x 20') with side guards will be placed to span the stream above its ordinary high water mark and permit the passage of equipment and vehicles after pipeline installation. Sediment-filtering material will be installed beneath the timber mat bridge to prevent sediment from entering the water from travel across the bridge. The timber mat bridge will be removed after work in the area is completed; there will be no further stream impact.

Once the work area is stabilized and vegetative growth has reached 70%, all erosion controls will be removed. All best management practices will be included in the Erosion and Sediment Control Plan being designed in compliance with ODNR-DSWR standards dated November 26, 2013.

Magnitude of the Proposed Lowering of Water Quality

Temporary impacts to perennial Stream 4 include installing erosion and sediment controls along both sides of 20 linear feet (231 square feet; 0.005 ac) of stream, redirecting water through the work area, excavating up to 12 cubic yards of streambed materials, and backfilling the excavated materials back into the streambed.

]The temporary nature of this work as well as the continuous, unimpeded flow of water around the work area should result in negligible impacts to stream biota as described in **Appendix III, Attachment A**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 4.

Technical Feasibility and Cost Effectiveness

The above-described standard operating procedures and best management practices are feasible according to current technology and available resources. Specific cost for this stream crossing is not known.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

The minor and temporary nature of the impacts to this stream should not adversely impact water quality within this watershed.

Indirect Impacts

By maintaining the flow of water during pipeline installation, neither the physical habitat nor aquatic species upstream or downstream of the work will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable post-construction. Post-construction grade will be the same as pre-construction grade.

Construction Storm Water Management Plans

This stream crossing work will be initiated and completed within one day and work will not take place during a storm event, eliminating the possibility of peak storm water flow exceeding the banks of the stream or the volume of the flume pipe. Normal stream flow will be maintained by following best management practices.

Post-Construction Storm Water Management Plans

Post-construction erosion controls will be left in place until the work area has stabilized. These controls should prevent any post-construction storm events from adversely impacting the stream.

Non-Degradation Alternative

Project Description

No ROW maintenance would be associated with this project.

A horizontal directional drill (HDD) bore would be constructed beneath Stream 4, potentially avoiding any stream impacts. The HDD would be installed at least 10 feet below the surface. Upon installing the pipeline through the HDD, flowable fill compound would be installed around the pipeline.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

There would be a reduced risk of impact to the flow of water or water quality. The remaining risk of impacts to water quality would be related to an inadvertent return (IR), whereby drilling liquids could infiltrate stream substrate from below. A plan would be required to address, in detail, how the contractor directing the work would handle an IR.

Magnitude of the Proposed Lowering of Water Quality

The avoidance of impact to the stream would result in negligible impacts to stream biota or water quality as described in **Appendix III, Attachment A**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 4.

Technical Feasibility and Cost Effectiveness

Using HDD technology beneath streams is feasible according to current technology, but it requires a lot of equipment and resources, is dependent on the composition of below-grade materials, and is very expensive. The bore would need to be a substantial length to achieve the depth required for a 20-inch-diameter pipeline. The cost for a bore in this area would start at \$525 per linear foot, increasing if the pipeline gets stuck during installation or bedrock is encountered. The steep topography along the proposed alignment will also increase the cost of the HDD bore.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

This work will not adversely impact water quality within this watershed.

Indirect Impacts

By avoiding impacts to the stream, neither the physical habitat nor aquatic species upstream or downstream of the ROW will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable.

Construction Storm Water Management Plans

There is no risk of this project affecting storm water flow because stream water flow is not being impacted.

Post-Construction Storm Water Management Plans

There is no risk of this project affecting storm water flow because stream water flow is not being impacted.

B
Stream 8

ALTERNATIVES ANALYSIS

This Alternatives Analysis discusses preferred, minimal-degradation, and non-degradation alternatives. Per phone conversation with Maggie Corder from the OEPA on July 3, 2014, the minimal-degradation alternative was selected based on achieving minimal stream impact while maintaining project constructability. Project mapping for each alternative can be found in **Appendix VI**.

Preferred Alternative

Project Description

Standard operating procedure for the installation of natural gas pipeline includes the potential disturbance of 70 feet of right-of-way (ROW). The permanent ROW extends 25 feet in width on either side of the center line of the pipeline for a total width of 50 feet. The temporary ROW extends 10 feet beyond the permanent ROW on either side, for a total width of 20 feet.

The proposed alignment would cross perpendicular to Stream 8, resulting in potential temporary impact to 71 linear feet (1,028 square feet; 0.024 ac) of stream within the ROW. Stream impact was calculated using ArcMAP and may differ from dimensions measured in the field. All impacts are temporary due to immediate post-construction restoration, described below.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

Best management practices include placing a timber mat bridge (16' x 20') with side guards to span the stream above its ordinary high water mark and permit the passage of equipment and vehicles during pipeline installation. Sediment-filtering material will be installed beneath the timber mat bridge to prevent sediment from entering the water from travel across the bridge. Erosion and sediment controls will be

installed along both sides of 71 linear feet (1,028 square feet; 0.024 ac) of stream to prevent the flow of sediment into the stream. Minor grading may occur to permit safe crossing during pipeline installation. Any removed soil will be stored nearby and protected from erosion with additional erosion controls.

Sand bags will be placed within the stream, immediately upstream of the proposed pipeline location, to act as a temporary dam redirecting stream water into a flume pipe (15' to 20' long) within the center of the stream. Sand bags will be similarly placed at the downstream end of the flume pipe to maintain its position in the streambed. The stream will be open-cut for pipeline installation after surface water has been temporarily redirected. An excavator stationed on the timber mat bridge will dig the 5-foot-wide, 8-foot-deep trench through the streambed without disturbing the flume pipe.

Up to 12 cubic yards of streambed materials from within Stream 8 will be stockpiled during trench excavation. The dredged material will be stored nearby, protected by erosion controls.

Upon completion of the pipeline installation, the excavated area within the stream will be backfilled with the materials removed from the streambed. The flume pipe and sand bags will be removed and stream flow will be restored. Altered bed and banks will be fully restored to their original form and the site will be restored to original grade. Restored topsoil will be stabilized against erosion with the installation of additional erosion controls. The timber mat bridge will be removed after work in the area is completed; there will be no further stream impact.

Once the work area is stabilized and vegetative growth has reached 70%, all erosion controls will be removed. All best management practices will be included in the Erosion and Sediment Control Plan being designed in compliance with ODNR-DSWR standards dated November 26, 2013.

Magnitude of the Proposed Lowering of Water Quality

Temporary impacts to perennial Stream 8 include installing erosion and sediment controls along both sides of 71 linear feet (1,028 square feet; 0.024 ac) of stream, redirecting water through the work area, excavating up to 12 cubic yards of streambed materials, and backfilling the excavated materials back into the streambed.

The temporary nature of this work as well as the continuous, unimpeded flow of water around the work area should result in negligible impacts to stream biota as described in **Appendix III, Attachment B**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 8.

Technical Feasibility and Cost Effectiveness

The above-described standard operating procedures and best management practices are feasible according to current technology and available resources. Specific cost for this stream crossing is not known.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

The minor and temporary nature of the impacts to this stream should not adversely impact water quality within this watershed.

Indirect Impacts

By maintaining the flow of water during pipeline installation, neither the physical habitat nor aquatic species upstream or downstream of the work will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable post-construction. Post-construction grade will be the same as pre-construction grade.

Construction Storm Water Management Plans

This stream crossing work will be initiated and completed within one day and work will not take place during a storm event, eliminating the possibility of peak storm water flow exceeding the banks of the stream or the volume of the flume pipe. Normal stream flow will be maintained by following best management practices.

Post-Construction Storm Water Management Plans

Post-construction erosion controls will be left in place until the work area has stabilized. These controls should prevent any post-construction storm events from adversely impacting the stream.

Minimal-Degradation Alternative (the alternative selected for the proposed work)

Project Description

The standard ROW can be reduced to 20 feet. The permanent ROW will extend 10 feet in width on either side of the center line of the pipeline.

The proposed alignment will cross perpendicular to Stream 8, resulting in potential temporary impact to 20 linear feet (307 square feet; 0.007 ac) of stream within the ROW. Stream impact was calculated using ArcMAP and may differ from dimensions measured in the field. All impacts are temporary due to immediate post-construction restoration, described below.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

Best management practices include installing erosion and sediment controls along both sides of 20 linear feet (307 square feet; 0.007 ac) of stream to prevent the flow of sediment into the stream. Minor grading may occur to permit safe crossing during pipeline installation. Any removed soil will be stored nearby and protected from erosion with additional erosion controls.

Sand bags will be placed within the stream, immediately upstream of the proposed pipeline location, to act as a temporary dam redirecting stream water into a flume pipe (15' long) within the center of the stream. Sand bags will be similarly placed at the downstream end of the flume pipe to maintain its position in the streambed. The stream will be open-cut for pipeline installation after surface water has been temporarily redirected. An excavator stationed above the ordinary high water mark of the stream will dig the 5-foot-wide, 8-foot-deep trench through the streambed without disturbing the flume pipe.

Up to 12 cubic yards of streambed materials from within Stream 8 will be stockpiled during trench excavation. The dredged material will be stored nearby, protected by erosion controls.

Upon completion of the pipeline installation, the excavated area within the stream will be backfilled with the materials removed from the streambed. Altered bed and banks will be fully restored to their original form and the site will be restored to original grade. The flume pipe and sand bags will be removed and stream flow will be restored. Restored topsoil will be stabilized against erosion with the installation of additional erosion controls.

A timber mat bridge (12' x 20') with side guards will be placed to span the stream above its ordinary high water mark and permit the passage of equipment and vehicles after pipeline installation. Sediment-filtering material will be installed beneath the timber mat bridge to prevent sediment from entering the water from travel across the bridge. The timber mat bridge will be removed after work in the area is completed; there will be no further stream impact.

Once the work area is stabilized and vegetative growth has reached 70%, all erosion controls will be removed. All best management practices will be included in the Erosion and Sediment Control Plan being designed in compliance with ODNR-DSWR standards dated November 26, 2013.

Magnitude of the Proposed Lowering of Water Quality

Temporary impacts to perennial Stream 8 include installing erosion and sediment controls along both sides of 20 linear feet (307 square feet; 0.007 ac) of stream, redirecting water through the work area, excavating up to 12 cubic yards of streambed materials, and backfilling the excavated materials back into the streambed.

The temporary nature of this work as well as the continuous, unimpeded flow of water around the work area should result in negligible impacts to stream biota as described in **Appendix III, Attachment B**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 8.

Technical Feasibility and Cost Effectiveness

The above-described standard operating procedures and best management practices are feasible according to current technology and available resources. Specific cost for this stream crossing is not known.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

The minor and temporary nature of the impacts to this stream should not adversely impact water quality within this watershed.

Indirect Impacts

By maintaining the flow of water during pipeline installation, neither the physical habitat nor aquatic species upstream or downstream of the work will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable post-construction. Post-construction grade will be the same as pre-construction grade.

Construction Storm Water Management Plans

This stream crossing work will be initiated and completed within one day and work will not take place during a storm event, eliminating the possibility of peak storm water flow exceeding the banks of the stream or the volume of the flume pipe. Normal stream flow will be maintained by following best management practices.

Post-Construction Storm Water Management Plans

Post-construction erosion controls will be left in place until the work area has stabilized. These controls should prevent any post-construction storm events from adversely impacting the stream.

Non-Degradation Alternative

Project Description

No ROW maintenance would be associated with this project.

A horizontal directional drill (HDD) bore would be constructed beneath Stream 8, potentially avoiding any stream impacts. The HDD would be installed at least 10 feet below the surface. Upon installing the pipeline through the HDD, flowable fill compound will be installed around the pipeline.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

There would be a reduced risk of impact to the flow of water or water quality. The remaining risk of impacts to water quality would be related to an inadvertent return (IR), whereby drilling liquids could infiltrate stream substrate from below. A plan would be required to address, in detail, how the contractor directing the work would handle an IR.

Magnitude of the Proposed Lowering of Water Quality

The avoidance of impact to the stream would result in negligible impacts to stream biota or water quality as described in **Appendix III, Attachment B**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 8.

Technical Feasibility and Cost Effectiveness

Using HDD technology beneath streams is feasible according to current technology, but it requires a lot of equipment and resources, is dependent on the composition of below-grade materials, and is very expensive. The bore would need to be a substantial length to achieve the depth required for a 20-inch-diameter pipeline. The cost for a bore in this area would start at \$525 per linear foot, increasing if the pipeline gets stuck during installation or bedrock is encountered. The steep topography along the proposed alignment will also increase the cost of the HDD bore.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

This work will not adversely impact water quality within this watershed.

Indirect Impacts

By avoiding impacts to the stream, neither the physical habitat nor aquatic species upstream or downstream of the ROW will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable.

Construction Storm Water Management Plans

There is no risk of this project affecting storm water flow because stream water flow is not being impacted.

Post-Construction Storm Water Management Plans

There is no risk of this project affecting storm water flow because stream water flow is not being impacted.

C
Stream 12

ALTERNATIVES ANALYSIS

This Alternatives Analysis discusses preferred, minimal-degradation, and non-degradation alternatives. Per phone conversation with Maggie Corder from the OEPA on July 3, 2014, the minimal-degradation alternative was selected based on achieving minimal stream impact while maintaining project constructability. Project mapping for each alternative can be found in **Appendix VI**.

Preferred Alternative

Project Description

Standard operating procedure for the installation of natural gas pipeline includes the potential disturbance of 70 feet of right-of-way (ROW). The permanent ROW extends 25 feet in width on either side of the center line of the pipeline for a total width of 50 feet. The temporary ROW extends 10 feet beyond the permanent ROW on either side, for a total width of 20 feet.

The proposed alignment would cross almost perpendicular to Stream 12, resulting in potential temporary impact to 75 linear feet (857 square feet; 0.020 ac) of stream within the ROW. Stream impact was calculated using ArcMAP and may differ from dimensions measured in the field. All impacts are temporary due to immediate post-construction restoration, described below.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

Best management practices include placing a timber mat bridge (16' x 20') with side guards to span the stream above its ordinary high water mark and permit the passage of equipment and vehicles during pipeline installation. Sediment-filtering material will be installed beneath the timber mat bridge to prevent sediment from entering the water from travel across the bridge. Erosion and sediment controls will be

installed along both sides of 75 linear feet (857 square feet; 0.020 ac) of stream to prevent the flow of sediment into the stream. Minor grading may occur to permit safe crossing during pipeline installation. Any removed soil will be stored nearby and protected from erosion with additional erosion controls.

Sand bags will be placed within the stream, immediately upstream of the proposed pipeline location, to act as a temporary dam redirecting stream water into a flume pipe (15' to 20' long) within the center of the stream. Sand bags will be similarly placed at the downstream end of the flume pipe to maintain its position in the streambed. The stream will be open-cut for pipeline installation after surface water has been temporarily redirected. An excavator stationed on the timber mat bridge will dig the 5-foot-wide, 8-foot-deep trench through the streambed without disturbing the flume pipe.

Up to 9 cubic yards of streambed materials from within Stream 12 will be stockpiled during trench excavation. The dredged material will be stored nearby, protected by erosion controls.

Upon completion of the pipeline installation, the excavated area within the stream will be backfilled with the materials removed from the streambed. The flume pipe and sand bags will be removed and stream flow will be restored. Altered bed and banks will be fully restored to their original form and the site will be restored to original grade. Restored topsoil will be stabilized against erosion with the installation of additional erosion controls. The timber mat bridge will be removed after work in the area is completed; there will be no further stream impact.

Once the work area is stabilized and vegetative growth has reached 70%, all erosion controls will be removed. All best management practices will be included in the Erosion and Sediment Control Plan being designed in compliance with ODNR-DSWR standards dated November 26, 2013.

Magnitude of the Proposed Lowering of Water Quality

Temporary impacts to perennial Stream 12 include installing erosion and sediment controls along both sides of 75 linear feet (857 square feet; 0.020 ac) of stream, redirecting water through the work area, excavating up to 9 cubic yards of streambed materials, and backfilling the excavated materials back into the streambed.

The temporary nature of this work as well as the continuous, unimpeded flow of water around the work area should result in negligible impacts to stream biota as described in **Appendix III, Attachment C**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 12.

Technical Feasibility and Cost Effectiveness

The above-described standard operating procedures and best management practices are feasible according to current technology and available resources. Specific cost for this stream crossing is not known.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

The minor and temporary nature of the impacts to this stream should not adversely impact water quality within this watershed.

Indirect Impacts

By maintaining the flow of water during pipeline installation, neither the physical habitat nor aquatic species upstream or downstream of the work will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable post-construction. Post-construction grade will be the same as pre-construction grade.

Construction Storm Water Management Plans

This stream crossing work will be initiated and completed within one day and work will not take place during a storm event, eliminating the possibility of peak storm water flow exceeding the banks of the stream or the volume of the flume pipe. Normal stream flow will be maintained by following best management practices.

Post-Construction Storm Water Management Plans

Post-construction erosion controls will be left in place until the work area has stabilized. These controls should prevent any post-construction storm events from adversely impacting the stream.

Minimal-Degradation Alternative (the alternative selected for the proposed work)

Project Description

The standard ROW can be reduced to 20 feet. The permanent ROW will extend 10 feet in width on either side of the center line of the pipeline.

The proposed alignment will cross perpendicular to Stream 12, resulting in potential temporary impact to 20 linear feet (163 square feet; 0.004 ac) of stream within the ROW. Stream impact was calculated using ArcMAP and may differ from dimensions measured in the field. All impacts are temporary due to immediate post-construction restoration, described below.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

Best management practices include installing erosion and sediment controls along both sides of 20 linear feet (163 square feet; 0.004 ac) of stream to prevent the flow of sediment into the stream. Minor grading may occur to permit safe passage during pipeline installation. Any removed soil will be stored nearby and protected from erosion with additional erosion controls.

Sand bags will be placed within the stream, immediately upstream of the proposed pipeline location, to act as a temporary dam redirecting stream water into a flume pipe (15' long) within the center of the stream. Sand bags will be similarly placed at the downstream end of the flume pipe to maintain its position in the streambed. The stream will be open-cut for pipeline installation after surface water has been temporarily redirected. An excavator stationed above the ordinary high water mark of the stream will dig the 5-foot-wide, 8-foot-deep trench through the streambed without disturbing the flume pipe.

Up to 9 cubic yards of streambed materials from within Stream 12 will be stockpiled during trench excavation. The dredged material will be stored nearby, protected by erosion controls.

Upon completion of the pipeline installation, the excavated area within the stream will be backfilled with the materials removed from the streambed. Altered bed and banks will be fully restored to their original form and the site will be restored to original grade. The flume pipe and sand bags will be removed and stream flow will be restored. Restored topsoil will be stabilized against erosion with the installation of additional erosion controls.

A timber mat bridge (12' x 20') with side guards will be placed to span the stream above its ordinary high water mark and permit the passage of equipment and vehicles during pipeline installation. Sediment-filtering material will be installed beneath the timber mat bridge to prevent sediment from entering the water from travel across the bridge. The timber mat bridge will be removed after work in the area is completed; there will be no further stream impact.

Once the work area is stabilized and vegetative growth has reached 70%, all erosion controls will be removed. All best management practices will be included in the Erosion and Sediment Control Plan being designed in compliance with ODNR-DSWR standards dated November 26, 2013.

Magnitude of the Proposed Lowering of Water Quality

Temporary impacts to perennial Stream 12 include installing erosion and sediment controls along both sides of 20 linear feet (163 square feet; 0.004 ac) of stream, redirecting water through the work area, excavating up to 9 cubic yards of streambed materials, and backfilling the excavated materials back into the streambed.

The temporary nature of this work as well as the continuous, unimpeded flow of water around the work area should result in negligible impacts to stream biota as described in **Appendix III, Attachment C**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 12.

Technical Feasibility and Cost Effectiveness

The above-described standard operating procedures and best management practices are feasible according to current technology and available resources. Specific cost for this stream crossing is not known.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

The minor and temporary nature of the impacts to this stream should not adversely impact water quality within this watershed.

Indirect Impacts

By maintaining the flow of water during pipeline installation, neither the physical habitat nor aquatic species upstream or downstream of the work will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable post-construction. Post-construction grade will be the same as pre-construction grade.

Construction Storm Water Management Plans

This stream crossing work will be initiated and completed within one day and work will not take place during a storm event, eliminating the possibility of peak storm water flow exceeding the banks of the stream or the volume of the flume pipe. Normal stream flow will be maintained by following best management practices.

Post-Construction Storm Water Management Plans

Post-construction erosion controls will be left in place until the work area has stabilized. These controls should prevent any post-construction storm events from adversely impacting the stream.

Non-Degradation Alternative

Project Description

No ROW maintenance would be associated with this project.

A horizontal directional drill (HDD) bore would be constructed beneath Stream 12, potentially avoiding any stream impacts. The HDD would be installed at least 10 feet below the surface. Upon installing the pipeline through the HDD, flowable fill compound will be installed around the pipeline.

Construction is scheduled for fall 2014, but will not proceed until all permit approvals have been received. Installation will be completed within one year of the start date. Mitigation information can be found in the Mitigation Plan found in **Appendix VII**.

This project will convey natural gas from the Buckeye Compressor Station, which will collect natural gas from several well pads upon the completion of construction in late 2014, in Belmont County to market at the Monroe North Meter Site in Monroe County.

Avoidance

Mountain Gathering, LLC, considered several possible routes between the Buckeye Compressor Station and the Monroe North Meter Site for this project. Route choice is limited by the topography in the area, property access constraints, and surface water impacts. The nature of linear construction projects limits the ability to avoid crossing streams that occur in an area.

If this project is not constructed, natural gas cannot be conveyed from the Buckeye Compressor Station. The proposed pipeline is critical to conveying the natural gas to market.

Minimization

There would be a reduced risk of impact to the flow of water or water quality. The remaining risk of impacts to water quality would be related to an inadvertent return (IR), whereby drilling liquids could infiltrate stream substrate from below. A plan would be required to address, in detail, how the contractor directing the work would handle an IR.

Magnitude of the Proposed Lowering of Water Quality

The avoidance of impact to this stream will result in negligible impacts to stream biota or water quality as described in **Appendix III, Attachment C**. The proposed project will not impact the Existing Use Designation of this stream as Cold Water Habitat. There will be no impacts to the economic value of Stream 12.

Technical Feasibility and Cost Effectiveness

Using HDD technology beneath streams is feasible according to current technology, but it requires a lot of equipment and resources, is dependent on the composition of below-grade materials, and is very expensive. The bore would need to be a substantial length to achieve the depth required for a 20-inch-diameter pipeline. The cost for a bore in this area would start at \$525 per linear foot, increasing if the pipeline gets stuck during installation or bedrock is encountered. The steep topography along the proposed alignment will also increase the cost of the HDD bore.

Economic Considerations

The proposed project will have no effect on the local economy, jobs, or tax revenue. Unemployment rates, poverty rates, household income information, major employment sectors, and employers in the area will also not be affected by this work.

Cumulative Impact

This work will not adversely impact water quality within this watershed.

Indirect Impacts

By avoiding impacts to the stream, neither the physical habitat nor aquatic species upstream or downstream of the ROW will be adversely affected. Erosion and sediment controls will be implemented to prevent sediment from entering the water and ensure the area is stable.

Construction Storm Water Management Plans

There is no risk of this project affecting storm water flow because stream water flow is not being impacted.

Post-Construction Storm Water Management Plans

There is no risk of this project affecting storm water flow because stream water flow is not being impacted.