Considering Best Practices for Managing Pipeline Permitting

A Roadmap for States and Tribes Considering Ways to Incorporate Best Practices into Oil & Gas Permitting Processes

Association of State Wetland Managers

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An Introduction

Pipeline Projects Routinely Impact Waters, Including Wetlands

Review of oil and gas pipeline development project permits is a complex, time-consuming and challenging task for state and tribal regulators. Effectively participating in the permit planning and Clean Water Act §401 certification review process relies on regulatory staff understanding how the energy permitting process works, what best practices can reduce adverse effects, what controls they can assert, and when in the process to do so.

States and tribes must always emphasize first and foremost the importance of avoiding impacts to water resources and minimizing impacts whenever possible. However, despite these efforts, some impacts to water resources are deemed unavoidable and must be mitigated. Specifically, unavoidable temporary-impacts to resources should require restoration to pre-impact conditions and permanent impacts should be appropriately mitigated. Resource functions should be the same or similar pre- and post-construction. If these resources and their functions are not restored effectively, the impacts may be permanent, leading to the loss of waters, potential isolation of headwaters and even such related impacts as reduction in species diversity.

To assist states and tribes with this growing challenge, the Association of State Wetland Managers (ASWM) has been working in collaboration with states, tribes, energy permitting/licensing agencies and a variety of other stakeholders to explore a critical gap that exists for state and tribal permit reviewers around how to effectively engage in review, comment and conditioning processes which differ from one federal agency to another. This guide has been specifically developed to assist states and tribes as they consider how to implement Section 404 of the Clean Water Act and Section 401 Water Quality Certifications of federal permits.

Research and practice indicate that oil and gas pipeline construction can lead to some common problems, including waters not being returned to their original contours, poor management of erosion and sediment controls, soil compaction from extensive heavy vehicle and machinery use and redirecting hydrology in ways that result in a decrease or increase in hydrology. These impacts may lead to non-compliance violations, which can not only be damaging to important aquatic resources, but also cost energy companies through significant regulatory fines, delays or requirements to cease operations. If waters can be avoided in the first place, there may be fewer permits needed. Additionally, construction costs are usually higher when they include costs associated with working where waters will be impacted. This is especially true for sites where crossings or the use of Horizontal Directional Drilling (HDD) is planned, or there are additional site restoration needs.

To avoid or reduce these impacts, some states and tribes have adopted "best management practices" (BMPs). BMPs are methods, techniques, processes or procedures found to be most effective and practical in achieving an objective (e.g. permitting process efficiency, water quality protection, regulatory or legal language necessary to support regulatory decision-making), while taking into consideration technological, economic, and institutional considerations.

ASWM has developed this guide to assist states and tribes identify, review and adopt BMPs that are valuable to improving their regulatory processes. The guide provides information about how to identify and document best practices. The document includes links to existing BMP manuals that may provide insights into how a state/tribe would like to pursue the BMP development process. The document's appendices provide lists and links to examples of administrative, legal, regulatory, project planning and construction BMPs.

What are Best Management Practices (BMPs)?

In the context of this document, BMPs are defined as methods, techniques, processes, or procedures found to be most effective and practical in achieving an objective (e.g. permitting process efficiency, water quality protection, regulatory or legal language necessary to support regulatory decision-making), while taking into consideration technological, economic, and institutional considerations.

A BMP can be a structural "thing" that you physically install on-the-ground. Examples of structural BMPs include runoff diversions, silt fence, waterway buffers and groundcover vegetation over bare soil areas. A BMP can also be part of the "process" that you use to plan, conduct and monitor an activity. Examples of process BMPs include preconstruction planning, laying out roads in advance of construction, marking waterway buffers with paint or flagging, and locating wetlands on the site before work begins.

BMPs are most effective when organized into a comprehensive BMP plan. BMPs are designed to address the quality of practices and may ultimately affect the ability to meet environmental compliance requirements. Many different practices can be used to achieve similar results. This flexibility allows the permit applicants to select BMPs and tailor a BMP plan to meet their needs using the capabilities and resources available. BMPs may be divided into general practices that are applicable to a wide range of operations and site-specific (or process-specific) BMPs, which are tailored to the requirements of an individual site or project.

Developing a BMP Development Committee to Review and Assemble BMPs

When developing a set of BMPs for state or tribal adoption, it is best to work with a committee to discuss the parameters of the effort, review BMPs jointly, and determine which BMPs will be required versus those that are recommended but optional. To do this work, it is advisable to develop a BMP planning committee/workgroup. This group is comprised of interested staff within the state/tribe. The committee will represent the state's/tribe's interests in all phases of BMP development.

Generally, a lead committee member is selected. The group may also want to consider bringing in an outside, neutral facilitator to assist in the process, if the selection of BMPs may be contentious. Committee members must include persons knowledgeable about the range of practice areas being discussed. Committee members should include staff from agencies that have the authority to make decisions affecting BMP development and enforcement. The size of the committee should be appropriate to the state and the committee should represent staff from all appropriate offices/agencies involved in the permitting process. Where needed, committee members should call upon the expertise of others through the establishment of project-specific task forces.

Responsibilities of a BMP Committee commonly include:

- Develop the scope of state/tribal BMPs to be developed
- Set schedules with milestone dates for the development of BMPs to keep the committee on schedule
- Make recommendations to state/tribe in support of a formal set of state/tribal BMPs
- Review and evaluate any existing BMPs
- Compile and review common external BMPs for consideration
- Conduct assessment to prioritize BMP for adoption
- Determine and select appropriate BMPs
- Set forth standard operating procedures for implementation of BMPs
- Provide technical guidance on expected practices and procedures for recordkeeping and reporting
- Establish BMP training for regulatory and permitting staff on the state's/tribe's BMPs and enforcement
- Periodically review the BMPs to evaluate the need to update and/or modify

Start by Developing a State/Tribal BMP Document Policy Statement

The first section of a BMP guidance document should be a state/tribal policy statement. In this section, outline the reasons for developing state BMPs. Discuss the timeframe within which the BMP development process occurred and dates any decisions/requirements come into effect. Indicate the areas of focus (e.g. types of pipelines, geographic range, types of BMPs – for example administrative, pipeline construction, legal/regulatory). Next include a projection of the end result of the BMPs – the planned outcome from the state's/tribe's adoption of the new BMPs. Do not include details of the BMPs in the policy statement. The final policy statement and document should be issued by the state/tribal agency(ies) rather than the committee that developed the statement or the completed document.

Track BMPs Under Consideration through the Development Process

It is useful to track the BMPs under consideration. Starting a table with all the potential BMPs under consideration will allow a thorough and documented process to unfold. The table can be used to sort and prioritize BMPs over time. A recommended way to track BMPs under consideration by the committee during the development phase is to utilize a form of documentation similar to the Table below. This table allows the committee to document the name of the BMP, what process it targets, the targeted water quality benefits from adoption, and any benefits to other media, as well as pros and cons for inclusion gathered from existing literature/practice and the source(s) from which the BMP was identified. Over time, the format can be used to show which BMPs were selected and which were not included in different tables, if desired.

BMP Name	BMP Description	Targeted WQ Benefit	Benefits to Other Media	Pros for inclusion	Cons for inclusion	Sources (Citations; hyperlinks)

Select Potential BMPs to Include in Your Guidance Document(s)

After the BMP policy statement and committee have been established and the committee has determined the types of BMPs it seeks to develop, the committee can begin determining the most appropriate BMPs to include in their state BMP list. Rather than starting from scratch, it is useful to look at existing BMP manuals for inspiration. In Appendix G, ASWM provides examples of BMP documents from a variety of states, federal agencies, and other sources that can be used as convenient starting references. ASWM's listing does not represent the full universe of possible BMPs or versions of common BMPs. Thorough research into appropriate sources must be conducted. States/tribes should then identify which sources of BMPs are acceptable to the state/tribe and what selection criteria will be used.

Conduct In-depth Review of Relevant BMPs

After the process of researching existing BMPs from other sources, it is important to review the potential BMPs to determine if they apply. It can be useful to identify any associated practices, actual case studies, and/or demonstrations that clarifies how the BMP works and its likelihood of success in your state/tribal area. Evaluate whether the BMP would help to achieve the objectives of the state. For the sake of the Clean Water Act, Section 401 state water quality certification (aka §401; §401 certification; or state water quality certification) review, BMPs should focus on reducing impacts to water quality. Other pros and cons should also be discussed during this review, to ensure there are no other unintended consequences. Consult the references of the document from which the example was obtained. Make sure to include citations for the sources from which BMPs were developed.

Common types of BMPs for consideration for oil and gas pipeline planning and construction activities include: 1) pipeline route, construction, and maintenance planning; 2) waterway crossing construction methods; 3) scheduling pipeline waterway crossings and work on adjacent slopes; 4) minimizing soil disturbance; 5) minimizing and/or alleviating sediment discharges into waters; 6) preventing alterations in waterway hydrology and geomorphology; 7) alleviating changes to the aquatic biota abundance and composition in waters; 8) preserving water quality; and 9) restoring aquatic resources after development operations are completed.

Determine Whether a BMP Should be 'Required' or 'Suggested but Voluntary'

Once a BMP has been identified as beneficial and feasible to include in your state's BMPs, the next decision is whether the BMP should be required or recommended, but voluntary. While some BMPs may be beneficial, they may only be helpful for specific projects or may be cost-prohibitive. A discussion of costs and benefits should be included when making the decision whether to include a BMP as "required." Political influence may also play a role in whether to require a specific practice or process. Writers should be clear in their language. Differences between words chosen for each type are shown below:

1) **Example of a Required BMP** - A prescriptive BMP that must be used to achieve compliance: *The Arkansas BMP SC10 document states, "*where excavation involves native or established wetland/riparian vegetation, the top 6 –12 inches or more of vegetation and topsoil including the vegetation and root mass <u>will be</u> carefully removed and stockpiled separately into a dedicated deposition area. After completion of site disturbance this vegetated material and its associated soils <u>will be</u> replaced as the surface material." Words like "must", "will", "cannot", and others provide the appropriate tone for mandatory actions.

2) ***Example of a Conditional BMP*** - A BMP that should only be in effect under specific conditions: *The New Hampshire Stormwater BMP Manual* states, "<u>Where practicable</u>, use a geotextile construction fabric underlayment when constructing roads on poorly drained surface". *The Arkansas BMP SC10 document provides another example of conditional wording, "*staged movement of instream spoil <u>may be required</u> if quantities are excessive".

3) **Example of a Voluntary BMP** - A BMP that is not required, but rather encouraged on a voluntary basis: *The Arkansas BMP SC10 document states that it is* <u>recommended</u> that "the Environmental Compliance Coordinator communicate to appropriate personnel needed repairs and ensure that repairs are properly installed in a timely manner (within 48 hours, weather permitting)".

Important Considerations when Developing Written BMPs

The complexity and language used when writing BMPs should be based on your target audience. There are, however, some common organizational and writing conventions that make BMP manuals more accessible and organized for users.

- **Keep BMPs simple, concise, and present them in a highly readable format.** While many manuals provide an abundance of supporting information, citations, and detail, these BMPs can be hard to use in the field. Keeping a simple, consistent, easy-to-read format assists in the usability of the BMPs. Provide detail in an appendix, an accompanying document, or if it must be included in the document, via footnote or endnote.
- **Group BMPs into logical categories of practices/procedures,** either by sequence in a process or by type. This will allow the reader to work through the BMPs in logical order and be able to easily find the ones they are seeking. Include this structure in your table of contents for the BMP document.
- **Use a logical numbering sequence to order groups of BMPs and the specific BMPs** within each group. For example, BMP Category 1, Specific BMP A. If there are variations on BMP 1A, they can be listed as BMP1A.1, BMP1A.2, etc. This not only allows for easier reading, but also specific notation in regulatory documents, applications and discussions.
- **Include a list of all technical terms and their definitions, as well as a list of any acronyms used** in the document. Ideally, include a glossary of terms in the document with easily searchable definitions. These definitions should also be included in the description section of each BMP. Providing a list of acronyms is also helpful and can facilitate the use of acronyms to make individual BMP write-ups shorter.
- **Include a version number and date on the document** that the BMPs go into effect and maintain document revisions by numbered and dated versions, so that all parties using the document are able to reference the same (and most recent) version. Adding a list of versions and dates of revisions at the beginning of the document can be helpful.
- **Allow for multiple reviews** first by the members of the BMP Development Committee and then by a number of stakeholders from your target audience to gauge the appropriateness and usefulness of your language, organization, and content. This review should take place before the group is fully invested in a format or style, to allow for efficient changes if necessary. For example, circulate the first draft BMP for feedback before formatting the remaining BMPs.
- **Allow for updates to the document.** Include a process for how updates will be made to the document and how the updates will be identified and distributed. The updates could range from minor editorial revisions to major updates to BMPs or inclusion of new or alternative BMPs.

Common Elements for Inclusion in a BMP Manual

Any manual is well-served to include background information about the purpose of the manual, its target audience(s), its regulatory reach, and other background information about who developed the manual and the process that was used to select the included BMPs. The manual should include a table of contents, glossary and list of acronyms, as well as a list of tables and figures the reader will find in the document. The bulk of the document will then focus on information about specific BMPs. At the end of the manual, the reader should be able to find any appendices with more detailed information, any searchable indexes that the group has developed, and a list of contacts for more information, as well as a bibliography including all the references cited in the document.

Once this information is shared, the manual should move to write-ups of BMPs. While BMPs can be written up many ways, there are common elements to BMPs across standard guidance manuals. The most common elements of a BMP are listed below, providing contextual and design information, as well as considerations around maintenance, common problems or concerns that have been encountered during its use by others, and variations on the BMP. Many BMPs do not include cost/benefit information, but if this information is available it is useful to include it to help planners determine required expenditures and use common benefits to justify adoption of the BMP.

Remarkably, there are best practices for developing best practices. This guidance includes the type of information that is useful for users when reading the BMPs. While most manuals do not include this information, those developing manuals may want to consider inclusion of any or all of the following BMP elements.

BMP elements may include:

- Practice/Procedure Description with Definition
- Purpose of the Practice (what is the expected outcome)
- Condition/Context Where Practice Applies
- Planning Description
- Design Criteria (including diagrams and schematics)
- Maintenance
- Cost/Benefit Information
- Common Problems/Concerns
- Variations on BMP

For ASWM's pipeline project, ASWM reviewed more than twenty pipeline-related BMP documents and have found none that include all the above elements. Consequently, those developing BMP documents should select which elements make the most sense for inclusion and what resources for their development will allow. Some examples of well-structured existing pipeline-related BMP manuals are listed below:

- Arkansas Best Management Practices for Natural Gas Pipeline Construction and Maintenance Activities in the Fayetteville Shale Areas Upper Little Red River Watershed: https://www.fws.gov/arkansas-es/docs/AR_Natural_Gas_Pipeline_BMPs_ULRR_v1_July_2009.pdf

- Ohio Stormwater Best Management Practices (BMPs) for Pipeline Construction (Factsheet): http://epa.ohio.gov/Portals/0/general%20pdfs/StormWaterBMPsforPipelineConstruction.pdf

Appendix A: Examples of Administrative Best Management Practices to Improve §401 Certification Permitting of Pipeline Projects

States and tribes work hard to operate their 401 certification permitting processes for pipeline project applications with a high level of efficiency and effectiveness. This section can serve to validate what is already in place and think potential ways to strengthen the systems that support this certification work. Most of these could be labeled as "common sense" practices. Links to references and additional resources have been included for each example practice as available.

Example Practices:

1. Make use of federal pre-application meetings
2. Convene federal/state/tribal-organized pre-application planning meetings
3. Identify the key responsible, trustee and cooperating agencies in a specific FERC process.
4. Partner the Lead and Responsible Agency
5. Clearly Identify the "chain of command" both within own agency and with other agencies involved in the permitting process (federal, tribal, state, local).
6. Develop process maps for permitting processes with identified access points for state input
   - ASWM Pipeline Permitting Project Process Mapping
7. Establish, coordinate, and adhere to project timelines/milestones
   - MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
   - FERC Wetland and Waterbody Construction and Mitigation Procedures
8. Coordinate agency reviews among different state and federal agencies
9. Establish joint-agency working groups
10. Hire staff with energy project siting experience
11. Provide high quality, periodic training
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects
12. Review §404/§401/State program requirements as they relate to permit review processes
13. Improve coordination between state and non-state entities, including tribes
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects
14. Engage in Master Planning to Provide Oversight to the Project Planning and Review Process
15. Identify and Define Consistent Terminology and Quantitative Measures Among Multiple
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects
16. Provide Timely CEQA/NEPA Document Consultations and Comments
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects

17. Submit permits early enough to Achieve Timely Permitting Decisions
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects
18. Increase transparency in administrative processes
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects
19. Use GIS and other tools available to improve permit review
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects
    - MD Recommended BMPs for Marcellus Shale Gas Development
20. Incorporate cumulative impact/adverse effects review
    - ASWM White Paper: The Cumulative Adverse Effects of Gas Pipeline Development on Wetlands
21. Implement governmental relations and public outreach efforts
22. Provide opportunities for stakeholder engagement
    - Recommended Best Practices for Environmental Reviews and Authorizations for Infrastructure Projects
    - MD Recommended BMPs for Marcellus Shale Gas Development
23. Work towards creating systems that reduced administrative burdens
    - Pending Final Policy for State Water Quality Certification Issuance for Interstate Natural Gas Transmission Pipeline Projects Regulated by the Federal Energy Regulatory Commission

Appendix B: Examples of Regulatory and Legal Practices Designed to Support §401 Certification Permitting of Pipeline Projects

In addition to developing administrative systems that can improve permitting efficiency and effectiveness, states and tribes may want to consider adopting some common legal or regulatory supports that have been shown to increase legal standing, regulatory certainty, and environmental protections around the regulation and decision-making about pipeline permitting. Links to references and additional resources have been included for each example practice as available.

Examples Practices:

1. Implement a comprehensive planning process to address the cumulative impact of multiple projects, to channel development into areas with greater amounts of existing disturbance, and to avoid key resource areas
   - (PA) Comprehensive Environmental Assessment of Proposed Project Impacts for Chapter 105 Water Obstruction and Encroachment Permit Applications
   - (PA) Governor's Pipeline Infrastructure Task Force (PITF) Report

2. Require the co-location of linear infrastructure as practicable with current roads, pipelines, and power lines to avoid new disturbance.

3. Establish and enforce setbacks
   - FERC Wetland and Waterbody Construction and Mitigation Procedures
   - MD Recommended BMPs for Marcellus Shale Gas Development
   - PA Riparian Forest Buffer Guidance

4. Develop a no-disturbance setback within and 50-150 ft around any priority conservation area
   - FERC Wetland and Waterbody Construction and Mitigation Procedures

5. Include runoff and spill prevention, response, and remediation plans as part of the permitting process
   - MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
   - FERC Wetland and Waterbody Construction and Mitigation Procedures
   - (PA) Governor's Pipeline Infrastructure Task Force (PITF) Report

6. Require identification of clear objectives for final site restoration as part of the permitting process.
    - FERC Wetland and Waterbody Construction and Mitigation Procedures
    - MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

7. Require applicants to submit an invasive species plan as part of permit application for preventing the introduction of invasive species and controlling any invasive species that is introduced.
    - (PA) Governor's Pipeline Infrastructure Task Force (PITF) Report

8. Various pipeline workgroup recommendations regarding agriculture; conservation and natural resources; environmental protection; emergency preparedness; historical, cultural, tribal; state, local, federal government; siting routing; public participation; and public safety and integrity among others
    - (PA) Governor's Pipeline Infrastructure Task Force (PITF) Report

Appendix C: Pre-Application Planning Best Practices Designed to Improve §401 Certification Permitting of Oil and Gas Pipeline Projects

A major finding of ASWM's pipeline permitting project was the benefits of state and tribal agency participation in pre-application/pre-certifications planning meetings. This entails the state and tribe being part of advance planning processes prior to the initiation of the formal §401 certification process. By being part of these early conversations, states and tribes may be able to address questions about what information and data collection is needed to support §401 certification, concerns about the pipeline route, encourage the integration of specific considerations and best practices into the application. By developing early and frequent communication, at least some of the common delays that beset the §401 certification process may be avoided. Links to references and additional resources have been included for each example practice as available.

Example Practices:

Planning for Avoidance

Implement project design features which will assure that the authorized installation does not result in drainage of the associated wetlands.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Assess Range of Ecosystem Services Provided by Areas to be Impacted

- Ecosystem Service Valuation for Wetland Restoration (ASWM Document)
- MD Recommended BMPs for Marcellus Shale Gas Development

Track and Take into Consideration Construction Staging Areas and construction access

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Identify legacy pollutants that may be released during construction and their impacts

Consider likely changes to nutrient concentrations (nitrogen and phosphorus)

Develop Effective Monitoring Plans and Practices

Collect Baseline Water Quality Data (incl. quantitative measures of suspended sediment load or turbidity)

- MD Recommended BMPs for Marcellus Shale Gas Development

Conduct baseline assessment of concentrations of metals, hydrocarbons, or other contaminants in surface water at project development sites.

Collect baseline data on a seasonal basis to take into consideration variability between seasons and flow changes.

Develop Specific Methods and Thresholds for Turbidity Monitoring for each Crossing (at the crossing and downstream of the crossing)

- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects

Plan appropriate range of tools and techniques to collect and analyze water samples

Require use of qualified aquatic environmental specialists (QAES) to conduct water quality assessments.

Conduct Baseline Data to Characterize Wetland and Waterway Functions (including identifying hydrological connectedness, monitoring water levels and water quality data)

- MD Recommended BMPs for Marcellus Shale Gas Development

Assess Baseline Information on All Plant Communities (incl. Distribution and Abundance of Traditional Use Species, percent cover of all species (native, non-native and invasive), and density of all shrubs and tree species)

- MD Recommended BMPs for Marcellus Shale Gas Development

Added new BMP: The new NWP 12 permit includes a condition related to inadvertent returns, in which bentonite slurry is not considered to be fill. Therefore, a best practice is to include a special condition for inadvertent return—for example, to notify a state spill reporting hotline within 24 hours of an inadvertent return.

Planning at the Watershed Scale

Consider Wetlands as Watershed Components, not just Terrestrial Vegetation Features

Assess Predicted Impacts from Planned Permanent Roads at Watercourse Crossings or Near Surface Waters (incl. sediment and salt)

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Planning for Avoidance

Careful Selection of Pipeline Routes to Minimize Impacts to Vital Resources/Allow Setback from Key Features

- FERC Wetland and Waterbody Construction and Mitigation Procedures

No placement of shot holes within a specific distance of a protected waterbody

- LA Oil and Natural Gas BMPs

No mechanized clearing or staging (where storing, managing equipment) within a specific distance of a protected waterbody

- LA Oil and Natural Gas BMPs
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Planning to Address Cumulative Impacts/Cumulative Adverse Effects

Assess cumulative negative/adverse effects (direct and indirect) on wetlands and other water bodies from all related pipeline construction activities. This includes impacts as a result of changes to hydrology flow, direction, and quantity, as well as compaction, habitat fragmentation, disruption of vegetation, and other disturbances. Source: Mass DOT

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- MD Recommended BMPs for Marcellus Shale Gas Development

Assess Multiple Water Crossings on the Same Watercourse or in the Same Watershed to determine if they will Cumulatively Impact Water Quality.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Identify Zones of Influence Where Impacts from Crossings Overlap

- RI Wetland BMP Manual: Techniques for Avoidance and Minimization

Take into Consideration Co-occurrence of impacts to surface waters that will result from changes to wetlands Co-occurrence = adjacent to existing infrastructure (co-location in an existing right of way or adding to an existing right of way

- New Hampshire BMP Manual

Planning for Minimization

Minimize Crossings of Waters and Wetlands where Possible

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Disturb the Smallest Surface Area that Still Allows Safe Access and Safe Area for Use of Equipment for Pipeline Installation.

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- LA Oil and Natural Gas BMPs

Time construction to minimize impacts to species in the area (i.e. cutting trees and shrubs outside of bird nesting season, dewater and do in-water work to avoid amphibian breeding season and fish rearing, etc.) (Specific permit requirements are common)

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Preservation of tree and natural areas to insure important vegetated areas existing on-site prior to development will survive the construction process.

Site Geology Considerations

When planning for Horizontal Directional Drilling (HDD) or comparable directional drilling, boring, trenchless technologies

For each water that would be crossed using the HDD method, file a plan that includes:

1. Site-specific construction diagrams that show the location of mud pits, pipe assembly areas, all areas to be disturbed or cleared for construction;
2. Identification of any above ground disturbance or clearing between the HDD entry and exit workspaces during construction; and
3. A contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plans (HDD Plan Guidance) *FERC (October 2018)*

Planning for activities where there is Karst terrain

- Void Mitigation Plan for Karst Terrain and Underground Mining
- Recommendations for Proposed Activities in the Ozark Highlands (US F&WS)

Planning for activities where there are acid forming soils

- Minimize exposure; acid forming soils may be okay if they stay underground, but when exposed to air, they can cause acidic runoff
- Use of GIS and field mapping to avoid acid forming soils
- Use of number of pounds per acre of lime or drain runoff to settling pond

Take substrate into consideration when determining what type of drilling is most appropriate for each specific location.

Planning for HDD or other trenchless technologies

Planning for HDD should include analysis of bore pressures, fracture gradients, required drilling weights; a drilling plan; a hydraulics plan; a barrier design; and a contingency plan.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plans (HDD Plan Guidance) *FERC (October 2018)*

Make Decisions to Use Horizonal Directional Drilling *When Appropriate*

- Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plans (HDD Plan Guidance) *FERC (October 2018)*
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- LA Oil and Natural Gas BMPs
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects

Consider Other Trenchless Methods *when appropriate*

- Publication list from ASCE (Amer Soc. Of Civil Engineering)

Limit permitting of gas pipeline development within recommended number vertical feet of USDW and ground surface.

- Use caution when drilling through the subsurface zone to adequately protect USDW from contamination and minimize disturbance.
- Drill all intervals prior to reaching a USDW protective depth either on compressed air, freshwater, a freshwater-based drilling fluid, or a combination of the above.
- MD Recommended BMPs for Marcellus Shale Gas Development

Ensure that drill pipeline entry and exit are located outside the waterway floodplain or as far from waterbodies as possible

- LA Oil and Natural Gas BMPs

Prohibit clearing of right of way above directionally drilled segment of pipeline, with the exception of an access road that is no closer than X feet to the ordinary high-water mark of the waterbody.

- LA Oil and Natural Gas BMPs
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Planning Compensatory Mitigation

Ensure adequate mitigation for all direct and indirect impacts

Use quantitative turbidity baseline as a mitigation goal for water quality following project construction.

Develop Plans for Mitigation of Impacts (temporary and permanent), including details about whether pre-disturbance conditions will be restored, or other offsets will be required

Appendix D: Examples of Pipeline Construction Best Practices to Consider During §401 Certification Permitting of Pipeline Projects

Best practices are most common for specific construction activities. The inclusion of best practices in permit applications will assist in the ability of reviewers to understand and evaluate the planned construction activities involved with the pipeline development or maintenance project. This list is only a small representation of the vast number and variety of BMPs available for pipeline construction. The following list is provided to share some limited examples. Links to references and additional resources have been included for each example practice as available.

Example Practices:

Sediment and Erosion Control/Stormwater

Measure existing erosion risks and impacts at planned water crossings (utility entities refer to risks rather than impacts, because it is not assured that impacts will occur)

Minimize Disturbed Surface Area

- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects

Analyze Bed Scour Potential at Each Crossing to Determine Whether Planned Depth of Cover and type of cover is Sufficient to Prevent Exposure of the Pipeline

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Prior to the start of construction, all non-work wetland areas shall be bounded by properly trenched filter fabric fence and orange construction fencing to prevent sediment from entering the wetland and to prohibit construction personnel from entering or performing work in these areas. Fence shall be maintained daily throughout the construction process. Upon project completion, the accumulated materials shall be removed and disposed of at an upland site. The erosion barrier shall then be removed in its entirety and the area restored to its original configuration and cover.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Install and maintain adequate sediment and erosion control measures before and during project implementation to ensure no sediment or construction related debris are allowed to enter a protected waterbody.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- LA Oil and Natural Gas BMPs
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Avoid Construction on Steep Slopes

- Improving Steep-Slope Pipeline Construction to Reduce Impacts to Natural Resources, *A Collaborative of Eight energy companies facilitated by The Nature Conservancy*

Use slope drains along road fills or other long fills where surface flow down the embankment would cause significant damage.

- OH Standards for Storm Water Management
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects

All areas of earth disturbance, but especially those within 100 feet of a lake, waterway, or wetland that is not brought to final stabilization by the end of the active growing season should be temporarily stabilized with seeding mulching, mulch blankets, or other adequate erosion and sediment control measures.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Conduct dust control that prevents or reduces dust from exposed soils or other sources during land disturbing, demolition, and construction activities to reduce the presence of airborne substances which may present health hazards, traffic safety problems, or harm animal or plant life.

- OH Standards for Storm Water Management
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Stabilize Pipeline Right of Way, Access Road, and Other Support Area

- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use Liners for Reserve Pits and Other Pits

- Arkansas Best Management Practices for Natural Gas Pipeline Construction and Maintenance Activities in the Fayetteville Shale Areas Upper Little Red River Watershed

Use dewatering measures to provide a stable area for receiving and treating water pumped from an excavation or work area prior to being released offsite

- OH Standards for Storm Water Management
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Employ temporary seeding to provide erosion control between construction operations

- OH Standards for Storm Water Management
- MI DEQ 2018 Conditions for Utility Situations (*No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use Temporary Rolled Erosion Control Products (Erosion Control Matting) to reduce soil erosion and assist vegetative growth by providing temporary cover from the erosive action of rainfall and runoff while providing soil-seed contact.

- OH Standards for Storm Water Management
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use sediment traps (a temporary settling pond formed by construction of an embankment and/or excavated basin) with a simple outlet structure typically stabilized with geotextile and rip-rap.

- OH Standards for Storm Water Management
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use silt fences as a sediment-trapping practice, utilizing geotextile fence, topography and sometimes vegetation to cause sediment deposition in preferred and controlled locations.

- OH Standards for Storm Water Management
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Temporarily divert clean surface water runoff at construction areas to prevent offsite sedimentation, erosion or flooding of work areas (e.g. water bars, berms).

- OH Standards for Storm Water Management
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use water bars at construction site ingress/egress points, on long sloping access roads, on temporary construction roads, or at utility rights-of-ways which do not have a stable surface or where runoff would otherwise collect and cause erosion.

- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Create temporary waterway utility crossings to provide construction traffic access across a waterway while reducing the amount of disturbance and sediment pollution.

- OH Standards for Storm Water Management
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Wetlands adjacent to waters will be protected so that they are not adversely impacted by pipeline construction in the waters. These wetlands will not be used for staging, storage, waste, access, parking, borrow material, or any other construction support activity.

- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects

Use of silt fences - Use of super silt fences or Jersey barriers to catch and contain silt

- Examples can be found in New Jersey, West Virginia and elsewhere
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Bale filters are constructed of bales which are securely bound. The bales are embedded at least four inches into the soil and each bale firmly held in place by two stakes driven at least 1 ½ feet into the ground. Bales tightly abut adjacent bales. Straw bales are effective in areas where the support stakes can be driven adequately into the ground. The strings are not placed in contact with the ground.

- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Silt fences consist of fence posts spaced no more than ten feet apart and driven a minimum of two feet into the ground. The above-ground height of the fence posts are no less than two feet. A metal mesh fence with six-inch are smaller openings may be fastened to the fence posts to reinforce

- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use of sodding (rolls or mats of turf grass) to provide immediate stabilization to bare soils.

- OH Standards for Storm Water Management
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Minimizing the Impacts of Closure (backfilling of a trench, etc.)

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- API. 2009b. Environmental Protection for Onshore Oil and Gas Production Operations and Leases
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

When appropriate, use rock check dams to reduce the velocity of concentrated flows, thereby reducing erosion within the swale or ditch (Source: Michigan)

- OH Standards for Storm Water Management
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Require timber mats for all temporary access roads and pads for excavation and installation

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use of phased disturbance to limit the total amount of grading at any one time and sequences operations so that at least half the site is either left as undisturbed vegetation or re-stabilized prior to additional grading operations.

- OH Standards for Storm Water Management
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

If the utility is trenched through the waterway or lake, all spoil material shall be removed from the waterway or lake and disposed of on an upland (non-floodplain, non-waterway, non-wetland, or non-bottomland) site. The trench shall be backfilled with washed gravel.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Preserve groundwater hydrology - Pipelines projects often involve alignments along a waterway or wetland to avoid or minimize direct impacts to a waterway, wetland, or riparian zone. Maintaining the natural mechanisms for groundwater movement in these areas is often very important for sustaining baseflow to receiving waters and for preserving riparian vegetation. To avoid creating a preferential pathway for groundwater flow (i.e. "French Drain" effect within the pipeline trench backfill - usually permeable aggregate), the use of trench plugs at a maximum spacing of 1,000 feet is warranted. Properly installed trench plugs will block the flow of groundwater along the path of the utility pipe/trench and maintain the natural groundwater pathway.

- Chapter 13-Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

All slurry resulting from any dewatering operation shall be discharged through a filter bag or pumped to a sump located away from wetlands and waters and allowed to filter through natural upland vegetation, gravel filters, or other engineered devices for sufficient distance and/or period of time necessary to remove sediment or suspended particles. The discharge of slurry water resulting from the hydro demolition of concrete is not allowed to enter a lake, waterway, or wetland

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

If the project, or any portion of the project, is stopped and lies incomplete for any length of time, other than that encountered in a normal work week, every precaution shall be taken to protect the incomplete work from erosion, including the placement of temporary gravel bag riprap, temporary seed and mulch, or other acceptable temporary protection

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

If the project, or any portion of the project, is stopped and lies incomplete for any length of time, other than that encountered in a normal work week, every precaution shall be taken to protect the incomplete work from erosion, including the placement of temporary gravel bag riprap, temporary seed and mulch, or other acceptable temporary protection.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

For waterway backfilling, the top foot of backfill shall be clean washed gravel.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- Also mentioned in FERC Wetland and Waterbody Construction & Mitigation Procedures

The placement of riprap shall be limited to the minimum necessary to ensure proper stabilization of the side slopes and fill in the immediate vicinity of the structure.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Construction of Temporary Structures

If a temporary dam is constructed to dewater a waterway to allow for a dry waterway pipeline repair, the dam crest shall be placed at such an elevation that the dam will not cause upstream flooding in the event of high flow conditions. In no case shall the crest be set at an elevation greater than two feet above the ordinary highwater mark of the waterway. "Ordinary high-water mark" means the line between upland and bottomland that persists through successive changes in water levels, below which the presence and action of the water is so common or recurrent that the character of the land is marked distinctly from the upland and is apparent in the soil itself, the configuration of the surface of the soil, and the vegetation. The dam shall be removed within 14 days of placement.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

If a temporary bridge is constructed as part of this project, the structure shall be a clear span bridge, if possible, with the lowest bottom of beam elevation at or above the natural ground elevations on each bank. The approach fill shall slope to natural ground elevations within ten (10) feet of either end of the structure. The bridge shall be removed within 30 days of the completion of the activities covered by this permit

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

If a rock flume crossing is constructed within any waterway, the lowest elevation of the road shall be constructed no more than two feet above the ordinary high-water mark of the waterway. The rock flume structure shall be removed within 14 days of placement.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Temporary mat travel lanes shall be up to 25 feet wide and shall be removed within 30 days of the completion of the activities covered by this permit.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Open Cut/Trench Crossing Procedures

Assemble the pipeline in an upland area if possible. If not possible, try to assemble the pipeline when the wetland is dry enough to adequately support skids and pipe.

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Use "push-pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Vegetation, topsoil and subsoil in wetland areas should be segregated during excavation activities and replaced accordingly to replace the natural wetland condition as much as practicable.

Minimize the length of time that topsoil and subsoils are segregated, and the trench is open. Do not trench the wetland until the pipeline is assembled and ready for lowering in.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Limit construction equipment operating in wetland areas to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Cut vegetation just above ground level, leaving existing root systems in place, and remove it from the wetland for restoration activities.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

The project sponsor may be able to burn woody debris in wetlands, if approved by the COE and in accordance with state and local regulations, ensuring that all remaining woody debris is removed for disposal.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Limit pulling of tree stumps and grading activities to directly over the trench line. Do not grade or remove stumps or root systems from the rest of the construction right-of-way in wetlands unless approved by the appropriate regulating agencies.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Minor waters, those less than or equal to 10 feet wide at normal flow depth, swales, ditches, channels, and waters should be flumed, or pumped, past the open trench at the time the crossing is made.

Major waters may be flumed or pumped where feasible. However, it is often more practical to use a cofferdam, to affect the crossing, especially for pipelines with jointed assembly.

If there is an existing base flow or runoff at the time of the trenching, this flow should be flumed or otherwise diverted (e.g. pump around or coffer dam) around the work area to the existing channel below. Where waterway flow is flumed, the flume shall be installed prior to trench excavation at that location. The flume should be of sufficient size to convey normal waterway flow over the open trench. Sandbags may be used to direct flow into the flume. If no base flow or runoff exists, the flume may be installed immediately following backfilling of the trench.

In cases where the pipeline is completed within one day, from initial disturbance to final stabilization, no flume may be required for watercourses with no base flow at the time of the crossing. The disturbed watercourse should be re-established and stabilized as part of the crossing.

Horizontal Directional Drilling (HDD)

Implement appropriate precautions for HDD activities near significant/other water sources

a. Permit for water withdrawals – separate program (State example: New Jersey)
b. Recycle through drilling process and dispose after (Direct to ASCE standards instead of working through BMPs here)

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plans (HDD Plan Guidance) *FERC (October 2018)*
- Directional Drilling Best Practices (Walsh & D'Eletto)

Minimize Impacts of HDD

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plans (HDD Plan Guidance) *FERC (October 2018)*
- Directional Drilling Best Practices (Walsh & D'Eletto)

HDD may be used as an effective technique for the installation of pipelines in sensitive or congested areas, including waters. As the drainage area for a waterway increases, open-cut methods become less practical and HDD becomes more viable. However, HDD has its risks and there are certain potential issues that need to be properly addressed. The major issues with HDD are associated with the drilling mud (inadvertent returns) and the exposure of the workspace, which is often in close proximity to sensitive areas such as waters and wetlands.

If the volume of drilling mud is too great or the composition such that it cannot be treated by conventional means (i.e. filtering), which may include HDD operations utilizing bentonite, it should be captured and removed from site or otherwise directed to a suitable treatment facility. If chemicals other than water are added to the drilling mud, all fluids should be captured and removed from site to a suitable treatment facility.

Workspace for an HDD may require clearing and grading, depending on the entry and exit sites selected for the drill. Since the drill entry location must accommodate the drill rig and supporting equipment, the entry side location requires satisfactory access as well as stable ground conditions to support heavy equipment. The drill exit side is usually the location for the fabrication of the pipe string as well as the location where the pipe string is inserted into the bore hole. The workspace required is typically longer to accommodate the pipe string and may require extra temporary workspace. Depending upon the need for temporary staging, these areas can be larger than the permanent pipeline/utility line right-of-way which should be an overall consideration from an impact point of view.

Make sure to adequately cover management of subsequent discharge of HDD fluids (including spill protocols – again, direct to ASCE)

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plans (HDD Plan Guidance) *FERC (October 2018)*

Seismic Blasting

Minimize Impacts from Seismic Studies

Assess Whether Locations Subject to Blasting have Potential Acid-generating (PAG) rock and Determine Impacts

Hydrostatic Testing Note: May require a Discharge Permit – The discharge from the hydrostatic testing of pipelines may require the applicant to obtain and comply with a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of water from the hydrostatic testing of the pipeline.

Controls and Structures for Hydrostatic Testing

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Test Hydrostatic Test Water for Hydrocarbons and Metals, along with Other Quality Measures after Use and Before Discharge into the Environment (make sure to address surface/groundwater withdrawal and problematic discharge).

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Regulate discharge rate and use energy dissipation device(s)

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Secure assurances of Non-discharge of hydrostatic test waters that do not meet parameter requirement

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Management of Drilling Fluids During Trenchless Installations

Due diligence should be performed prior to initiating the directional drilling to determine whether geologic or hydro-geologic conditions at the proposed crossing could result in an inadvertent return (discharge) of drilling mud to the water body being crossed during HDD and other trenchless drilling operations. Where such conditions exist, proper precautions must be taken to prevent such discharges. HDD operations should include an inadvertent return response plan, preparedness, prevention and contingency (PPC) plan, etc. The pipeline construction site should also have the necessary materials and equipment readily available to quickly respond in the event of an inadvertent return, include isolating the area, capturing, collecting and pumping to bypass the waterbody. The methods used to accomplish this are beyond the scope of this guidance but are recognized and refenced by the HDD industry.

Appendix E: Best Practices to Include in §401 Certification Permit Planning for Post-Construction Phase of Oil and Gas Pipeline Projects

States and tribes are likely to benefit from participation in pre-application/pre-certifications planning meetings. This entails the state or tribe being part of advance planning processes prior to the initiation of the formal §401 certification process. By being part of these early conversations, states and tribes may be able to address questions about what information and data collection is needed to support §401 certification, concerns about the pipeline route, encourage the integration of specific considerations and best practices into the application. By developing early and frequent communication, at least some of the common delays that beset the §401 certification process may be avoided. Links to references and additional resources have been included for each example practice as available.

Example Practices:

Restoration Practices

ASWM provides a useful resource for those planning wetland restoration elements of projects, entitled "Wetland Restoration: Contemporary Issues and Lessons Learned"

Develop a site restoration plan, which may include a construction sequence and timeline, how any permitted wetland fill will be removed, and the site restored. See specific state for restoration requirements.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Complete Timely Restoration and Revegetation

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Where the pipeline trench may drain a wetland, construct trench breakers at the wetland boundaries, and/or seal the trench bottom as necessary to maintain the original wetland hydrology.

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Restore pre-construction wetland contours to maintain the original wetland hydrology.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

For each wetland crossed, install a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers as outlined in the Plan. In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Do not use fertilizer, lime, or mulch unless required in writing by the appropriate federal or state agency

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after revegetation and stabilization of adjacent upland areas are judged to be successful.

- FERC Wetland and Waterbody Construction and Mitigation Procedures
  Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

The restoration wetland is characterized by the presence of water at a frequency and duration, sufficient to support a predominance of wetland vegetation and the wetland types specified at the end of the monitoring period.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

The restored wetland shall be free of oil, grease, debris, and all other contaminants.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Require topsoil segregation to insure adequate soil for replanting.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects

Require a minimum amount of topsoil replacement or soil amendment to allow for adequate revegetation

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects
  Pennsylvania Erosion and Sediment Pollution Control Program Manual (2012)

Have a watering schedule or contingency plan to insure require survivorship for plantings

Require all imported soil (if needed because rock was removed from the trench) to be added below topsoil when backing the trench

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Use Native Plant Species in Seed Mixes During Restoration Activities (Often a requirement)

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Replace topsoil to help plant growth by improving the water holding capacity and nutrient content and consistency of the soils.

- OH Standards for Storm Water Management
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures
- USACE, Little Rock: Sediment and Erosion Control for Pipeline Projects

The seeded areas must meet the percent cover and percent bare ground parameters as outlined by permitting agencies at the end of the second growing season

There shall be a pre-determined minimum number of different native species per restoration area. The total number of native wetland plant species shall be determined by a sum of all species identified in meander searches of the same wetland type. Nomenclature shall follow in the Flora of North America, which can be found at www.fna.org.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Areas which do not meet the specified requirements shall be reseeded within acceptable planting dates, and the inspection period shall be extended a minimum of two additional growing seasons.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

A plan to control invasive species should be implemented prior to site restoration if the area was not dominated by invasive species prior to the start of the project. The mean percent cover of invasive species including, but not limited to, *Phragmites australis* (Common Reed), *Lythrum salicaria* (Purple Loosestrife), and *Phalaris arundinacea* (Reed Canary Grass), shall in combination be limited to no more than the percent cover allowed by appropriate agencies

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

If the mean percent cover of invasive species is more than the permitted amount, the permittee shall submit an evaluation of the problem to the permitting agency. If the permittee determines that it is infeasible to reduce the cover of invasive species to meet the above performance standard, the permittee must submit an assessment of the problem, a control plan, and the projected percent cover that can be achieved for review by the permitting agency. Based on this information, the permitting agency may approve an alternative invasive species standard or require additional mitigation for the loss of wetland functions in that area if the site was dominated by native wetland vegetation prior to the site work conducted as part

of this project. Any alternative invasive species standard must be approved in writing by the permitting agencies.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Monitor and evaluate restoration performance over time

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

At the end of the monitoring period, the restoration area shall support a permitted minimum of surviving, established, and free-to-grow trees per acre in the scrub-shrub or forested wetland that are classified as native wetland species and consisting of at least a permitted number of different species.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

In the event the permitted activity is begun but not completed, the permittee or owner of record shall remain responsible for completion of the restoration of the impacted wetland and associated conditions, as determined by the permitting agency. Such determinations shall be based upon the extent of the disturbance to the existing wetlands.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

If the wetlands do not successfully re-establish within one growing season, applicant shall take necessary corrective measures, with appropriate permits, to correct deficiencies until the wetland is successfully re-established. Any wetland that cannot be restored to original condition shall require compensatory in-kind mitigation.

- MI DEQ 2018 Conditions for Utility Situations (No Link Yet)

Examples of Monitoring Practices

Monitoring site rectification of temporary impact acres

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Monitor wetland and waterway mitigation areas

Examples of Reporting Practices

Require and review post-construction reports

Annual monitoring reports for rectification of temporary impacts and wetland and waterway mitigation areas.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Examples of Practices Focused on Tracking Compliance

Include contact information for all environmental monitors

Track permit conditions
Require reporting of errors

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Examples of Enforcement Practices for State/Tribal Regulatory Actions

Make sure to budget for enforcement costs

Budget for legal costs to support defense of legal actions taken

Perform work as permitted and comply with all permit conditions to avoid enforcement

- FERC Wetland and Waterbody Construction and Mitigation Procedures
- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Appendix F: Other Considerations that May (or May Not) be Involved in §401 Certification Permit Planning Depending on State/Tribe (Invasive Species, Habitat Quality, Habitat Fragmentation, T&E)

The above listed BMPs in Appendix A-E provide consideration of practices that are commonly considered in permit review across states and tribes. However, there are specific BMPs that may be considered by specific states and tribes which are tied directly to 401 certification that are not required for 401 certification review in other states and tribes. This list in Appendix F references some of these BMPs. Links to references and additional resources have been included for each example practice as available.

Example Practices:

To prevent the spread of invasive species, equipment shall be washed prior to arrival at a new location and when traveling from an area dominated by invasive species to an area not dominated by invasive species within the same route. Soils, organic matter, organisms, and all plant material shall be removed from the equipment, including the undercarriage.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*

Assess indirect habitat loss (change in habitat availability) resulting from changes in abiotic and habitat conditions.

Assess and minimize habitat/landscape fragmentation and its impacts

Offset Temporal and Spatial Impacts for T&E Species

Avoid Identified Nesting or Breeding Locations or Locations of Populations of T&E species.

- FERC Wetland and Waterbody Construction and Mitigation Procedures

Postpone pipeline construction activities to avoid certain times of the year, when threatened and endangered species are mating, nesting, or rearing young.

- MI DEQ 2018 Conditions for Utility Situations *(No Link Yet)*
- FERC Wetland and Waterbody Construction and Mitigation Procedures

Appendix G: Examples of BMP Guides Related to Oil and Gas Pipeline Permitting

This appendix offers examples of BMP Manuals identified in a review of BMP documents in support of oil and gas pipeline development and maintenance activities. The list does not represent the complete universe of available BMP documents, but a sampling of documents used to inform this document or provide information supplemental to the document. Additionally, documents listed may have been updated or taken out of use since the publication of this document. Before using any of the below-listed documents, check with the source to ensure that the document is the most current version.

FEDERAL

- Wetland & Waterbody Construction & Mitigation Procedures, *Federal Energy Regulatory Commission, May 2013*
- Recommended Best Practices for Environmental Reviews & Authorizations for Infrastructure Projects, *Federal Permitting Improvement Steering Council, January 2017*
- Sediment & Erosion Control for Pipeline Projects, *U.S. Army Corps of Engineers, Little Rock District (Regional)*
- Guidance for Horizontal Directional Drill Monitoring, Inadvertent Return Response and Contingency Plans (HDD Plan Guidance) *FERC (October 2018)*

ARKANSAS

- AR Best Management Practices for Natural Gas Pipeline Construction & Maintenance Activities, *July 2009*

LOUISIANA

- LA Oil & Natural Gas BMPs, *LA Dept. of Wildlife & Fisheries*

MARYLAND

- Recommended BMPs for Marcellus Shale Gas Development in MD, *Final Report Submitted to MD Dept. of the Environment, Appalachian Laboratory, University of MD Center for Environmental Science, February 2013*

MICHIGAN

- MI DEQ 2018 Conditions for Utility Situations, *2018 (No Link Yet)*

OHIO

- Stormwater BMPs for Pipeline Construction, *Division of Surface Water, Ohio EPA, June 2017* (*Fact Sheet*)
- OH Standards for Stormwater Management, Land Development & Urban Stream Protection 3rd Edition, *OH Dept. of Natural Resources, Division of Soil and Water Conservation, Updated November 2014* (*Full Manual)*

PENNSYLVANIA

- Pennsylvania Stormwater BMP Manual, *December 30, 2006*

WEST VIRGINIA

- WV Best Management Practices for Entrainment & Impingement Prevention
- WV Erosion & Sediment Control Field Manual, *May 2012*

OTHER:

- A Horizontal Drilling Best Management Practices Manual. Tammi et al. (2008).
- Horizontal Directional Drilling Best Management Practices Manual. ENSR Corporation & Skonberg. (2002)
- Improving Steep-Slope Pipeline Construction to Reduce Impacts to Natural Resources, *A Collaborative of Eight energy companies facilitated by The Nature Conservancy*
- Independent Review of Spectra Energy Transmission (Westcoast) Wyndwood Pipeline Expansion Project Impact Assessment & Proposed Mitigation Measures, *Prepared for Saulteau First Nations, MSES, April 2017 (Canada)*
- Planning Guidelines for Pipeline Construction During Frozen Conditions, *Prepared for The INGAA Foundation. Inc., Natural Resources Group, LLC, December 2013*
- Pipeline Associate Water Crossings 3rd Edition, *Fisheries & Oceans, Canada, October 2005*
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