MOTT MACDONALD

Via FedEx

Pennsylvania Department of Environmental Protection
Regional Permit Coordination Office
c/o: Rebecca Albert, PG
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National Fuel Gas Supply Corporation
FM100 Project
FERC Docket No. CP19-491-000
Section 102 – Erosion & Sediment Control General Permit ESCGP-3 (Technical Deficiency Response)
Cameron, Clearfield, Clinton, Elk, McKean and Potter Counties, Pennsylvania

September 14, 2020

Dear Ms. Albert,

Mott MacDonald, on behalf of National Fuel Gas Supply Corporation (National Fuel), submitted a Section 102 Erosion and Sediment Control General Permit 3 for the FM100 Project (Project) November 20, 2019. PADEP provided technical deficiency comments on July 10, 2020. This update to the ESCGP-3 Application responds to PADEP's comments.

Concurrently, hard copies of these materials have been submitted to the respective County Conservation Districts crossed by the Project.

Under a separate and concurrent submittal, the complete Chapter 105 Water Obstruction and Encroachment Joint Permit Application (JPA) was delivered to Kevin White, RPCO and to the USACE Pittsburgh and Baltimore Districts.

The complete ESCGP-3 permit application is provided on the attached CD. Fees have been previously submitted, however total project impacts have been reduced by 8.2 acres; therefore, no additional Disturbed Acre Fee applies.

If you have any questions or request additional information regarding this project, please contact me or Jake Lybrook with National Fuel at (814) 871-8521, or LybrookJ@natfuel.com.

Sincerely,

Mott MacDonald

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Attachment: Revised Section 102 - ESCGP-3

MOTT MACDONALD

cc: Jake Lybrook – NFG

Lori Reed – Cameron Co. Conservation District

Jodi Foster – Elk Co. Conservation District

Will Hunt – Potter Co. Conservation District

Jeremy Morey – McKean Co. Conservation District

Jodi Brennan – Clearfield Co. Conservation District

Katherine de Silva – Clinton Co. Conservation District

FM100 Project

ESCGP-3 Permit Application

November 18, 2019

CP19-491-000: Public

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FM100 Project

ESCGP-3 Permit Application

November 18, 2019

CP19-491-000: Public

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This document outlines National Fuel Gas Supply Corporation's response to the Pennsylvania Department of Environmental Protection Incompleteness Review letter issued for the FM100 Project on December 24, 2019. Each comment has been reproduced and a corresponding answer provided. Where applicable National Fuel has updated plans and/or drawings and have noted the updates to those documents herein. Revised versions of these documents are being provided in digital format as part of this response.

All Counties

Question 1. §102.5 Permit Requirements

a. Please make the following adjustments to the Notice of Intent (NOI):

Q1.a.i. Section F.e is checked that there will be no off-site discharges to locations other than surface waters. It appears there may be off-site discharges to sites other than surface waters (i.e. pond discharge at Tamarack Compressor Station). Please review the project and provide justification or adjust as needed. Likewise, Section H.d will also need to be modified, if necessary.

Response: Section F, item e has been updated to check yes. As demonstrated for the pipeline construction, clean water diversion systems were designed inside slope areas and the calculations and associated nomographs demonstrate no offsite erosion will occur.

Section H, item d has been updated to check yes.

The PCSM reports for Carpenter Hollow OPP and all valve sites include an offsite discharge analysis. The PCSM drawing set for each of these sites includes an Offsite Discharge Stormwater Plan showing the path to a waterway. In addition, as also detailed in the PCSM reports, post construction peak flows have been reduced to be below pre-construction rates. Therefore, no additional offsite erosion or nuisance to offsite properties would occur. Reference to Section 5 (Offsite Discharge Analysis) of each PCSM Report and each Offsite Stormwater Discharge Plan for Carpenter Hollow OPP and all valve sites has been added to Section H, item d of the NOI.

For Tamarack Compressor Station, an offsite discharge analysis has been prepared and included as Appendix D of the E&S Plan. Reference to Appendix D of the E&S Plan for Tamarack Compressor Station has been added to Section H, item d of the NOI.

No off-site discharges to sites other than surface waters are proposed at the Marvindale Compressor Station.

Q1.a.ii. Section H.f - Summary Description of PCSM/SR BMPs has both rate control (RC, which requires 100-year/24-hour storm) and volume control/water quality (VC/WQ, which requires 2-year/24-hour storm) checked. However, only one (1) number is given for volume treated. Please clarify that the appropriate boxes are checked and that the BMPs listed are consistent with the submitted plan.

Response: Section H.f of the NOI has been revised and the 100-year storm volumes have been added where appropriate.

Q1.a.iii. Section E.11 has “Yes” checked for potentially hazardous naturally occurring soil/geologic conditions and refers to Section 2-1 for an explanation. Section 02-01-00 is ESCGP-3 Narrative, with Section 2.4 referencing SOILS Drawings. An explanation does not appear to be given for specific hazardous conditions within the project area and how they will not cause pollution. Please clarify.

Response: Section E.11 of the NOI has been revised to more clearly reference Section 2.5.5 of the ESCGP-3 Narrative (Potential Geologic Hazards and Mitigation). As indicated in this section, it does not appear that the potentially hazardous geologic or soil conditions have the potential to cause or contribute to pollution as a result of the proposed earth disturbance activities.

Q1.a.iv. Section I Antidegradation Analysis does not appear to be filled out correctly. In Part 1, “Yes” should be checked for the PCSM/SR Plan since Part 2 is filled out. In Part 2, some BMPs identified in the application were not checked (Sediment Basin with skimmer). Also, please clarify how street sweeping will be utilized. Please revise.

Response: In Part 1, "Yes" is incorrectly checked for the PCSM/SR Plan, since Part 2 is filled out. This has been revised to check "no," per the ESCGP-3 instructions.

Part 2 of Section I has been reviewed for completeness. Sediment Basin with skimmer has been checked.

Rock construction entrances are proposed at all access points. Street sweeping will be used as a secondary measure if sediment is tracked onto roadways.

Q1.a.v. Section G Riparian Buffer references ESCGP-3 Application Section 2-1 for Riparian Buffer Request. Within this request, it mentions a buffer management

and maintenance plan will be developed. Please include this plan with the application.

Response: Riparian Buffer Management and Maintenance Plans have been developed for both the Abandonment and Modernization portions of the project and are provided as Attachment A to this response. These plans address PAFBC comments to the JPA-105 Application dated 8/10/2020.

Question 2. §102.6(a)(2) Pennsylvania National Diversity Inventory (PNDI) Correspondence

Q2.a. The PNDI Search Results lists a Potential Impact for the U.S. Fish and Wildlife Service (USFW) with further review required. No correspondence was provided from the USFW. Please provide that correspondence.

Response: All Correspondence with the USFWS has been included in Section 1-06A-00_PNDI and USFWS Concurrence letters of the revised ESCGP-3 Application materials.

Q2.b. The October 08, 2019 letter from Pennsylvania Fish &Boat references specific conservation measures and best management practices from the report prepared by Herpetological Associates (i.e. for Timber Rattlesnake). It is not clear what these measures are and how they have been incorporated into the plan. Please clarify.

Response: The "Recommendations" section of the Timber Rattlesnake Report, has been included below and are also found within the JPA EA Narrative in Section XX. National Fuel has committed to implementing these recommendations during construction. These measures will be incorporated into National Fuel's Implementation Plan submitted to FERC. For convenience, the following list summarizes these commitments (please note that we have not defined the specific location of Habitats 1 & 2 in this response as this is a publically available document; however, the exact locations are identified in the Timber Rattlesnake Report):

1) Workers should be informed about the presence of rattlesnakes, their protected status in Pennsylvania, and how to avoid/minimize risk. Additionally, a qualified timber rattlesnake monitor may be utilized to provide education on rattlesnake movement, life cycle, and worker safety, and to move rattlesnakes from active work zones (bio-monitoring).
2) Bio-monitoring by a qualified biologist with experience with timber rattlesnakes should be performed during all pipeline construction activities

in the vicinity of Habitat 1 and Habitat 2 (note that no work is currently proposed near Habitat 2).

3) Bio-monitoring should be performed during the active season of the timber rattlesnake, from April 15-October 15. Bio-monitoring in additional portions of the Project may be recommended by PFBC based on PFBC records, and bio monitoring may be implemented proactively by National Fuel if rattlesnake encounters become a safety concern.

If avoidance of rock features within the existing ROW is not possible (i.e., Habitat 1 and 2), there is the potential to temporarily dismantle this habitat, especially the portion of rock features that are non-natural (i.e., created by past pipeline construction). Disturbance/dismantling of the rock should only be conducted during the inactive season of the timber rattlesnake. Upon completion of the Project, any disturbed rock features should be restored under the supervision of a qualified rattlesnake monitor."

Q2.c. Tree cutting restrictions were listed by the Pennsylvania Game Commission (PGC) in the April 29, 2019 letter for the Silver-haired Bat in Clearfield and Elk counties, but these don't appear to be listed or addressed in plans. Please revise.

Response: National Fuel has agreed to adopt the PGC-recommended tree clearing window during construction in Clearfield and Elk Counties for the FM100 Abandonment (see page B-60 of the FERC EA). However, it is noted that very limited clearing activities will be required beyond minor limbing to allow for equipment passage. In addition, National Fuel has committed to abide by clearing windows established for the state of Pennsylvania for migratory birds (April 1 – August 1).

Q2.d. The PGC letter dated April 29, 2019, listed potential impacts to State Game Lands, Numbers 34, 59, and 61. They requested the Land Management Supervisor, Mr. William Dingman, to be contacted to discuss and coordinate the project on these lands. There is no documentation that this was done.

Response: National Fuel has had and is currently having ongoing and extensive discussions with PGC regarding impacts to State Game Lands. Mr. Dingman is not National Fuel's primary point of contact; rather Denise Mitcheltree is representing the State Game Lands. Ongoing consultation will occur with this agency until agreement can be reached on the terms and conditions of abandoning the existing FM100 pipeline and securing access road agreements for both the YM58 and FM100 pipelines. A record of agency communications

for the project is found in Attachment 1-06B-00 PNDI and USFWS Concurrence Letters, to the ESCGP-3 Application.

Question 3. §102.6(a)(1) Municipal Notifications

Q3.a. Please submit the copy and proof of receipt of Acts 14/67/68/127 notification for Keating Township and Sylvania Township.

Response: Keating Township was notified on February 27, 2020, the letter and proof of receipt is attached in Section 01-05-00 Township Act 14 Municipal Notifications. The workspace at the Costello Compressor station that was within Sylvania Township has been eliminated from the Project and no project impacts will occur within Sylvania Township. Therefore, Sylvania Township has not been notified of the Project.

Q3.b. Regarding the Pennsylvania Historical and Museum Commission (PHMC) correspondence for the project, two letters from PHMC were provided with the application: ER 2017-2279-042-E dated June 27, 2019, and ER 2017-2279-042-G dated October 8, 2019. Please provide all PHMC correspondence and associated responses relating to this project, including ER 2017-2279-042-A, B, C, D, and F.

Response: The requested correspondence has been provided. It is located in Attachment 1-06A-00 PHMC Letters, to the ESCGP-3 Application.

Question 4. §102.6(a)(1) Municipal Notifications

Q4.a. In Section 8.1.4 Riparian Buffers and Riparian Forest Buffers, a table with streams and waterbodies with watersheds of Rattlesnake Creek (HQ-CWF) and Beaver Meadow Run Creek (EV) is referenced, but the table is not included. This section also states that these are the only EV and HQ waters crossed by the project. These waters do not appear to be part of this project. Please clarify.

Response: This statement has been removed from the ESCGP-3 Narrative. Section 8.1.4 correctly references Table 2.2-1A in Appendix A, which provides a list of waterbodies crossed by the Project and their associated watershed classification.

Question 5. §102.4(b)(5) Erosion and Sedimentation Control Requirements

Q5.a. Please ensure consistency between all construction notes. For example, Abandonment General Note No. 18 says that sediment tracked onto the roadway or sidewalk will be removed, returned to the construction site by the end of each day, while the Summary Maintenance Schedule has the sediment removed from paved roads immediately, as needed. It is preferable to have the sediment removed immediately. Please clarify.

Response: National Fuel will remove soil or gravel spilled or tracked onto roadways daily or more frequently as necessary to maintain safe road conditions. Abandonment General Note No. 18 and the Summary Maintenance Schedule have been revised accordingly. For consistency, this has been updated in the Modernization Notes sheets.

Q5.b. Please include information on abandonment and flowable fill used for grouting. Will concrete washout areas need to be included where the grouting is done?

Response: A table has been added to the Abandonment construction sequence which provides work to be done by station (i.e. removal, abandon in place, grout, foam). In general, plug material has been determined based on the objective of the grout location. For road and waterbody crossings where plugs need to bear load and/or support negative buoyancy of the pipe flowable cementitious grout has been used, whereas locations identified near wetland boundaries may utilize foam as the primary purpose of the plug is to prevent the pipeline from acting as a conduit for water in the future. In locations where a cut and cap is identified but no grout or foam is proposed, there is no need to address any of the concerns identified above; therefore, no plugging is proposed.

When deciding whether cement grout or expandable foam is used for a certain location involves a variety of factors such as diameter, length and the purpose for the plug (e.g., supporting a road v. a plug to prevent a water conduit). Expandable foam is the material of choice when large section of pipe must be filled because it is highly flowable and can be pumped over long distances. Alternatively cement slurry or grout is used in applications where shorter runs are involved that must support significant loads over time.

In locations where grouting is proposed, concrete washout areas will be utilized as necessary. Such locations have been specified on the alignment sheets. Additionally, the E&S details have been revised to include Figure 5, “Typical Compost Sock Washout Installation.”

Q5.c. Please provide a table that lists the beginning and ending station of all pipes to be abandoned in place. The table should indicate if grouting, foam, or nothing is to be used and demonstrate that the chosen method is site appropriate.

Response: For the Abandonment portion of the Project, a table listing the begin and end station of pipe to be abandoned in place, removed, grouted, or foamed has been added to the E&S Notes (i.e., drawing "NOTES 004").

Q5.d. Table 2.2-1A: Waterbodies Crossed by the Project appears to only include waterbodies crossed by the modernization portion. Please add the waterbodies crossed by the abandonment or rename the table and provide the waterbodies crossed by the abandonment in a separate table.

Response: Table 2.2-1A: Waterbodies Crossed by the Project has been revised to account for waterbodies crossed by the modernization and abandonment portions of the Project. Table 2.2-1A (Rev 1): Waterbodies Crossed by the Modernization Portion of the Project and Table 2.2-1B: Waterbodies Crossed by the Abandonment Portion of the Project are provided in Appendix A of the ESCGP-3 Application Narrative.

Q5.e. Table 2.2-1A has the following note for all access roads, "Existing Road, No Improvements Proposed." Narrative Section 9.2 allows for maintenance activities including gravel placement, lengthening, and/or widening of the road. The Erosion and Sediment Control & Agricultural Mitigation Plan (ESCAMP) section 10.4 notes BMPs will be installed when there is an expansion of existing access roads. It appears the designation in Table 2.2-1A may not be accurate, as the application indicates improvements may occur at access roads. Please clarify.

Response: National Fuel's intent is to limit the use of existing access roads to the drivable surface. All roads will be maintained during construction and restored to pre-construction conditions after construction activities have ceased. However, it is not uncommon for the construction contractor to request additional workspaces along access roads at critical locations to accommodate wide turns for construction equipment, pull outs for safe passing, etc.

Per a phone call with PADEP RPCO staff on 8/21/2020, it was discussed that specific areas for additional workspaces along access roads is not known at this time; however, it was agreed that NFG would provide a typical workspace

drawing that would apply requests for additional workspace beyond the drivable surface. This typical drawing addresses all necessary E&S controls and is found in the E&S details as Figure 3B. These additional work areas would be free of wetlands, waterbodies, floodways or other environmentally sensitive features as determined by the environmental inspector.

Should an area beyond the drivable surface be utilized it will be restored to its pre-construction condition. This would include regrading to achieve original contours and seeding as necessary to fully restore and revegetate areas outside of the drivable surface.

Q5.f. Please clarify how oil and gas wells within the project area will be addressed. Certain wells appear to interfere with the proposed pipeline. Specifically, Appendix E Table 6.4-1: Oil and Gas Wells within 0.5-mile of Project Construction Work Area lists an active gas well that is 7 feet from the centerline in McKean County (41.726535, -78.45189).

Response: Wells within 25 feet of the construction area will be staked and flagged for visibility. For wells that may be inside or adjacent to a work area, National Fuel will narrow the ROW/work area, where possible, to avoid the well; or, for wells within the workspace itself, National Fuel will surround each well site with a safety fence and use appropriate BMPs regarding protection of the well. The operator of the well will be contacted through the 811 One-call system to monitor construction activities in the vicinity of these wells. Construction crews will coordinate with the operators of third-party production wells to ensure safe construction of the Project facilities when in the vicinity of these wells.

Q5.g. Please clarify if any soil testing was done to determine representative samples for seeding and mulching. The Department recommends this be done to ensure proper soil amendments and application rates for proposed seed mixtures. (E&SPC Manual Chapter 11- Seeding).

Response: National Fuel did not complete soil testing; however, prior to construction commencement, National Fuel will either hire a qualified soil scientist to complete soil sampling along project areas to calculate appropriate soil amendments or follow the prescribed soil amendment and application rates as defined in the E&SPC Manual to ensure proper restoration of the right-of-way. It should be recognized that landowners will also have discretion regarding soil amendments on private property and National Fuel will abide by landowner requests for their property.

Q5.h. Were seed mixtures discussed with the Department of Conservation and Natural Resources (DCNR) and public landowners? They often have specific requirements and preferences for native species.

Response: National Fuel has coordinated with all landowners along the right of way to determine preferred seed mixes for private property. Likewise, National Fuel has proposed seed mixes with David Mong of the DCNR and the individual Forests are providing specific feedback regarding seed mixes on their respective forests as part of their approval process. Final seed mixes will be adjusted as requested by the applicable landowners and agencies.

Question 6. §102.4(b)(5)(ix) Plan Drawings

Q6.a. Please place a profile BMP Ribbon on the Plan Drawings.

Response: The drawings for the Modernization and Abandonment sections of the Project have been revised to include a profile band. The profile band includes trench plugs, temporary waterbars, and permanent waterbars. Other key design features and BMPs are identified in the plan view.

Q6.b. Please show on the E&S Plans the installation method for streams and wetlands.

Response: The E&S Plans for the Modernization section of the Project have been revised to include a "Waterbody Crossing Band". For each stream crossed by the pipeline, the band displays the stream name as well as the primary and secondary crossing methods in such cases where the primary method is found to be untenable during construction. For clarity, the waterbody crossing method legend has been added to the bottom of each alignment sheet.

For all wetlands outside of horizontally directionally drilled or bored crossing locations, the crossing method will be open cut. The typical wetland crossing procedure can be found on Figures 25A and 25B in the E&S Plan detail drawings.

For the Abandonment section of the Project, the E&S Plans have been revised to more clearly identify locations to be abandoned in place, grouted, or foamed. In such locations, no pipe will be installed and therefore no installation method will be required. There is one location where pipe will be removed through a

stream. For this location, a note has been added to the E&S Plan indicating primary and secondary proposed crossing methods.

Additionally, there are a couple of locations where the existing pipe will be cut and capped within a wetland. Similar to the Modernization portion of the Project, all of these instances will be open cut in accordance with Figures 25A and 25B.

Q6.c. Please show the restoration methods at each stream and wetland crossing.

Response: For the Modernization section of the Project, each stream will be restored in accordance with Figure 18 in the E&S Plan details. In summary, this includes restoring the natural grade, using native material for streambed restoration, and NAG SC150/C125 erosion control blanket from top of bank outward (100 feet in special protection watersheds and 50 feet in non-special protection watersheds). Similarly, all wetlands crossed will be restored in accordance with Figures 25A and 25B.

For the Abandonment section of the Project, the E&S Plans have been revised to more clearly identify locations to be abandoned in place, grouted, or foamed. In such locations, the pipe will be left in place, and therefore no restoration method will be required. There is one location where pipe will be removed through a stream, and a couple of locations where the pipe will be cut and capped in a wetland. Similar to the Modernization portion of the Project, these locations will be restored in accordance with Figure 18 (streams) and Figure 25A/25B (wetlands).

Q6.d. Please revise the plan drawings and supporting tables for consistency with station/milepost labeling. Table 2.2-1A: Waterbodies Crossed by Project and Table 6.2-1 Project Area Geologic Units both utilize milepost markers; however, milepost markers are not included in the modernization E&S Drawings.

Response: The plan drawings for the Modernization section of the Project have been revised to include milepost markers.

Q6.e. For the abandonment, please clarify how the areas will be handled that are designated as Parcels Requesting Removal. Not all sections with this designation will have the pipeline removed. For example, the land owned by Michael Buhler & Sandra M is shaded as Parcel Requesting Removal, but the

pipeline is proposed to be grouted in place. Please evaluate and revise it as necessary.

Response: For clarity, the "Parcels Requesting Removal" layer has been removed from the drawings. After further consultation with landowners, only locations where the pipe will be removed have been depicted on the drawings. Additionally, begin/end stations for pipe removal can be found in the table of work shown on E&S Notes drawing "NOTES 004".

Q6.f. Please clarify what details will be utilized during construction – those provided with the Modernization/Abandonment Drawings or those in the ESCAMP? There are differences and inclusions/exclusions between the two sets. Specifically, regarding Streambank Stabilization, the ESCAMP BMP Drawing No. 7 shows rock riprap while the Modernization Detail Figure 18 shows natural streambed material. Additionally, the compost filter sock table in the ESCAMP Drawing No. 45C and Modernization Details Figure 4C do not match. Please ensure all details are consistent and accurate.

Response: The ESCAMP incorporates the protocol and procedures contained within the Federal Energy Regulatory Commission's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan); and FERC's Wetland and Waterbody Construction and Mitigation Procedures (Procedures), collectively "FERC Plan and Procedures". The ESCAMP is also consistent with PADEP's published Erosion, Sediment and Pollution Control Manual. It is noted that the ESCAMP also contains decades worth of practical construction knowledge developed by National Fuel from previous pipeline construction projects in Pennsylvania. The ESCAMP is not intended to replace any of these published materials; only provide a singular location where all the information can be conveniently accessed. Care has been taken to prevent conflicting information between these documents and the ESCAMP; however, if there are any inadvertent conflicting standards the agency-published documents take precedence. In all cases NFG will implement the standard that provides the most stringent protection to property and the environment.

For clarity, the ESCAMP has been modified to remove conflicting information. BMP Drawing No. 7 has been redacted. The proposed method of stream restoration can be found in the E&S details, as Figure 18. BMP Drawing No. 45C has also been redacted. Compost filter sock was sized in accordance with the E&S details (Figure 4C), which was created using Figure 4.2 from the ESPC Manual.

Q6.g. Please review to ensure ESCAMP and notes in Plan Details align. For example, Modernization General E&S Note #14 mentions sites will be stabilized within 4 days of activity cessation. The ESCAMP section 4.6 allows activity to cease for 20 days before stabilization. Please clarify.

Response: Modernization General E&S Note #14 is correct. The site will be stabilized within 4 days of activity cessation. This statement has been redacted from the ESCAMP section 4.6. Additionally, the following statement has been added to ESCAMP section 4.6: "Where activity ceases for 4 days or more, or as soon as any graded area reaches final grade, temporary stabilization is required."

Please review response to Q6.f regarding the ESCAMP and its relationship to published agency manuals should conflicting direction occur.

Q6.h. Please ensure all details conform with standards in the PA E&S Manual. In the Details, Figure 4C shows pyramidal compost filter sock (CFS) stacking without decreasing sock diameter. The E&SPC Manual requires a decreasing diameter for each successive layer.

Response: Figure 4C in the E&S Details has been revised to show pyramidal compost filter sock (CFS) stacking with decreasing sock diameter. The equivalent stack for a 32-inch CFS has been revised from a pyramid of three 18-inch CFS, to a pyramid of two 24-inch CFS on the bottom and one 18-inch CFS on the top.

Q6.i. In the Details, the text for Figure 5 is not readable. Straw bales are not an Antidegradation Best Available Combination of Technologies (ABACT) and should be installed according to Standard Construction Detail #4-13. The compost filter sock J-hook is an acceptable alternative ABACT BMP, however, the straight portion is to be sized/designed as a diversion berm and the j-hook as a sediment trap. Please revise.

Response: Straw bales are not being proposed as an E&S BMP, therefore the detail has been removed and the narrative has been updated. All compost filter sock has been laid out not to cross 2-ft contours and therefore J-hook is not required.

Q6.j. On the E&S Soils Plan, the resolution to Low Fertility directs the contractor to 'Table 11-3 Plant Tolerances of Soil Limitation Factors.' This table was not included with the E&S Seeding and Vegetative Tables. Please provide a copy of this table.

Response: The E&S General Notes for both the Modernization and Abandonment portions of the Project were revised to include Table 11.3 from the ESPC Manual (i.e., drawing "NOTES 003"). The same revision was made to the Site Restoration General Notes for both the Modernization and Abandonment portions of the Project (i.e., drawing "SR NOTES 002").

Q6.k. On the Abandonment/Modernization Details E&S Seeding and Vegetative Tables, a temporary mixture of winter rye is designated to be used during October 15-March 31. Please clarify how temporary stabilization will be seeded throughout the rest of the year. Additionally, permanent stabilization often requires a temporary seed for a nurse crop (See E&SPC Manual Table 11.5 Recommended Seed Mixtures for Stabilizing Disturbed Areas).

Response: The temporary seed mixes may be used for temporary stabilization all year round. "OCTOBER 15 - MARCH 31" has been removed from the "TEMPORARY MIXTURES" section of the seeding table for clarity. A note has been added beneath permanent mixtures, "FOR DISTURBED AREAS THAT ACHIEVE FINISHED GRADE DURING NON-GERMINATING SEASONS, USE TEMPORARY MIXTURES UNTIL GERMINATING SEASON BEGINS".

Q6.l. Please review resource impacts to ensure they have been minimized. For example, it appears that temporary direct impacts to EV PEM Wetland 125 could have been minimized by installing the temporary wetland mats on the south side of the right of way (ROW). This would result in crossing Wetland 125 at the narrowest point. Please evaluate the possibility of moving the temporary wetland mats to the south side of the ROW at this location. If this is not possible to achieve, please justify the positioning. Other wetlands to evaluate include, but is not limited to, Wetlands 004B, 007A, 007B, 009A, 009B, 010A, 010A, 010B, 031, 026, 055, 056, Stream 043, Wetlands 091, Stream 077, Wetland 094, Coleman Creek-1 crossing, Wetlands 141, 125, 148.

Response: In all instances where wetlands or stream crossings are impacted by the Project National Fuel has attempted to minimize these impacts through the design of the project. General minimization measures include utilizing a nominal 75-ft ROW and co-location of the pipeline with the existing 24- and 30-inch-diameter Tennessee Gas pipelines to the degree possible. National Fuel has also eliminated all additional temporary workspace within wetlands and is proposing minimally invasive construction techniques in and around impacted wetlands and waterbodies as described in detail in our JPA-105 application. However, by co-locating the proposed pipeline adjacent to two live pipelines certain

compromises have been made to ensure the safety of construction crews and the general public. National Fuel is unable to accommodate this request because shifting the working side of the ROW nearer to the active pipelines would create an unreasonable risk to the integrity of the live TGP pipelines and the safety of the construction crews and general public.

Q6.m. Please review stream delineations. On modernization at MP 26.6, within Wetland 125, eMapPA, StreamStats, and the Pennsylvania Fish and Boat Commission (PAFBC) Stream Mapping indicates the presence of an Unnamed Tributary (UNT) East Branch Fishing Creek (HQ-CWF). Additionally, on abandonment at MP 26.2, the limits of disturbance and pipeline appear to cross a UNT Driftwood Branch Sinnemahoning Creek (HQ-CWF). These were not provided on the plans. Please evaluate these, along with the entire plan, and include all stream delineations on plans with appropriate crossings.

Response: Wetland 125 was revisited on July 31, 2020 during the additional field surveys completed in August 2020. The surveys conducted on July 31, 2020 confirmed that no stream channel is located within Wetland 125. The channelized flow from Ditch 56 dissipates into overland flow and no stream channel exists within the PEM wetland. Additional site photographs have been incorporated into the Representative Wetland site photos Appendix E of the Wetland Delineation Report. Additionally, the site photographs taken on July 31, 2020 are provided as Attachment B to this response document.

The site on the abandonment near MP 26.2 was visited during additional surveys conducted on August 4, 2020 and the UNT to Driftwood Branch Sinnemahoning Creek was delineated. This stream has been added to the revised application materials as Stream 363. The ARIT, Wetland Delineation Report, Riverine Rapid Assessment form, site photographs, and maps have been updated to identify this stream crossing proposed to be abandoned-in-place.

Q6.n. Please ensure adequate trench plugs are installed along the proposed alignment through the project, particularly through wetlands. The E&S Notes indicate that trench plugs will be installed every 100 feet as applicable through wetlands, however, this is not shown/depicted on the drawings. Wetlands 005A, 007, and 009 are some examples. Please review the project and revise it as applicable.

Response: The E&S design has been revised to include trench plugs every 100-ft through wetlands, as indicated in the E&S Notes.

Question 7. §102.8(f)(3) Limitations of Soils and Geologic Formations

Q7.a. In the SOILS attachment, the Limiting Soils Characteristics Legend table includes a No Data entry for a few soils. Please clarify if data will be obtained for these soils, or how they will be evaluated.

Response: The NRCS website was reviewed for all remaining soil data, and the table was revised accordingly (see drawing "SOILS").

McKean County

Question 8. §102.4(b)(5) E&S Plan Requirements

Q8.a. Please confirm that no additional workspace will be needed within the permit boundary/Limit of Disturbance (LOD). In past projects, the LOD and permit boundary were the same and there was not enough workspace provided to stockpile excavated materials, construct the pipeline, and run the equipment. If more workspace is needed, it may require a major amendment. This restarts the entire review process and will hold up construction. Specifically, a proposed utility line is right on the LOD between Marvindale Interconnect and the Compressor Station.

Response: National Fuel confirms that no additional workspace is needed beyond what is represented as the LOD in submitted drawings and plans. National Fuel is aware of the minor and major modification approval processes and will follow these processes as necessary should future project workspaces be required.

Q8.b. The overall plan drawings state that all disturbed areas will be restored to existing conditions. There should be an exception stating that compressor areas and mainline valve areas restoration details are provided in a separate area of the permit package.

Response: A note to this effect can be found in the "Thermal Impact Analysis" section on sheet "Notes 002" for both the Modernization and Abandonment sections of the Project. The note has been revised to read: "ALL DISTURBED AREAS WILL BE RESTORED TO AN EXISTING, VEGETATIVE CONDITION FOLLOWING CONSTRUCTION AND IN ACCORDANCE WITH CHAPTER 102 AND ESCGP PERMIT REQUIREMENTS FOR LINEAR OIL AND GAS PROJECTS, WITH EXCEPTION TO THE COMPRESSOR STATIONS AND OTHER ABOVEGROUND FACILITY SITES. FOR THESE SITES, POST CONSTRUCTION STORMWATER MANAGEMENT

PLANS HAVE BEEN PREPARED AND CAN BE FOUND UNDER SEPARATE COVER".

Q8.c. Page 15 of the E&S narrative lists 0.5-in as a rainfall event, this was recently clarified as 0.25-in by the Department. Please update the narrative to reflect this.

Response: The E&S narrative has been revised to list a 0.25-in rainfall event.

Q8.d. Overall, construction sequences are showing the BMP installation after earth disturbance activity begins taking place. BMPs should be installed before any earth disturbance begins. Please clarify the construction order.

Response: As part of site preparation, rock construction entrances will be installed prior to clearing and grubbing (see Note 10 under "Construction Preparation Activities" on drawing "Notes 004".

Perimeter controls and clean water diversions will be installed directly after clearing operations and prior to grubbing (see Note 1A under "Site Clearing (Tree Cutting) & Grubbing"). The purpose of installing perimeter controls and clean water diversions during clearing operations is to have access to the construction work area in areas that are forested. In certain situations, minor grubbing may need to occur in order install erosion control devices; in these situations grubbing and E&S controls will be installed concurrently.

The "Site Clearing (Tree Cutting) & Grubbing" section of the construction sequence (drawing "Notes 004") has been revised to provide clarity.

Question 9. §102.4(b)(5)(9) Plan Drawings

Q9.a. Drawing Notes 001 General E&S notes #26 states that spoil must be placed at least 10 (ten) feet from the edge of the watercourse. Ten feet is not an adequate distance. Only trench spoil, with proper E&S BMPs, is permitted at a distance of 10 feet from the edge of a watercourse. Please clarify.

Response: It is NFG's intention to only place spoil with proper E&S BMPs (sediment barriers) at least 10-ft from the edge of the watercourse.

Note #26 on drawing "Notes 001" was reviewed and is consistent with this methodology. "PLACE SPOIL AT LEAST 10 FEET FROM THE EDGE OF

WATERCOURSE. SPOIL WILL BE CONTAINED WITH EROSION AND SEDIMENT CONTROL BARRIERS (BMPs) TO PREVENT SPOIL MATERIALS OR HEAVILY SILT-LADEN WATER FROM TRANSFERRING INTO WATERCOURSES AND WETLANDS OR OFF CWA".

Additionally, stream crossing details are shown in the E&S details as Figures 16-17. Figures 16 and 17 show a stream crossing with spoil set a minimum of 10-ft back with sediment barriers.

Q9.b. Drawing Notes 002 - Waterbars- Maintenance is proposed weekly and after rainfall events. In the active work areas, waterbars should be inspected at the end of each workday and repaired each evening to ensure they are in place and functional in the event of heavy rainfall overnight or on a weekend. Waterbars in inactive construction areas may be inspected on a weekly and after rainfall event basis.

Response: Drawing "Notes 002" has been revised to specify inspection/maintenance at the end of each workday and after each rainfall event in active construction areas.

Q9.c. Drawing Notes 004 - Clearing and grubbing is proposed before the installation of BMPS. BMPs should be in place before any clearing and grubbing activity occurs.

Response: Please refer to response to Comment 8.d.

Q9.d. Site grading #2 - Rock Construction Entrances (RCEs) should be installed on access roads immediately, not following the remainder of the clearing and grubbing. It is difficult to determine the order, as RCEs are installed both during site grading and also during construction preparation activities.

Response: It is NFG's intention to install rock construction entrances (RCEs) on access roads immediately. For clarity, this duplicate note has been removed from the "Site Grading" section of the construction sequence. It is more accurately listed in the "Site Preparation Activities" section of the construction sequence.

Q9.e. Site grading #5 – BMPs should be in place before grading activity occurs.

Response: It is National Fuel's intention to install cleanwater diversions and perimeter controls before site grading occurs. The "Site Clearing (Tree Cutting) &

Grubbing" section of the construction sequence was revised to clarify this. Mention of the perimeter controls in "Site Grading" note #5 has been removed since these controls will already be installed.

Q9.f. Drawing Notes 005 - Post Construction Sequence establishes permanent stabilization before the removal of temporary wetland and stream crossings. Permanent stabilization would be disturbed upon moving contractors back in to remove the temporary crossings.

Response: For the Modernization portion of the Project, temporary equipment crossings for wetlands and waterbodies may remain in order to remove clean water diversion systems following perennial 70% vegetative cover. In such locations, the EI shall be present when equipment is sent back to the site to assess any earth disturbance requiring additional site restoration. The "POST-CONSTRUCTION" section of the construction sequence has been revised to more clearly state this (drawing "NOTES 005").

The "POST-CONSTRUCTION" section of the construction sequence for the Abandonment portion of the Project has been revised to remove temporary equipment crossings prior to establishing perennial 70% vegetative cover (drawing ("NOTES 005").

Q9.g. Upon review of aerial imagery, National Wetland Inventory (NWI) mapping, LiDAR contours, and modeled wetland mapping, six (6) areas of concern (AOC) regarding potential wetlands were identified where no data forms or photographs were provided in the Wetland Investigation Report. The approximate central coordinates along the modernization line for each of these areas are as follows: AOC 01 (41.723042, -78.459772), AOC 02 (41.742817, -78.431558), AOC 03 (along access road corridor; 41.74585, -78.323492), AOC 04 (along access road corridor; 41.777092, -78.309633), AOC 05 (along access road corridor; 41.782831, -78.306722), AOC 06 (along access road corridor; 41.775828, -78.291967). Please review these areas to determine the presence/absence of wetlands and update the plans accordingly.

Response: National Fuel completed field surveys at these six AOC locations and an additional 15 sites identified by PADEP (see Q11.e, Q14.e, Q16.d, and Q18.i), In addition to these sites, National Fuel identified 15 additional locations for field survey based on a review of aerial imagery, NWI mapping, National Hydrography Dataset, PADEP's Modelled Wetland shapefile, and PADEP's Chapter 93 Streams database. The wetland report has been updated to reflect the results of this field survey.

Question 10. §102.4(b)(5)(xii) Geologic Formations

Q10.a. The narrative states that impacts are minimal to non-existent throughout the project area and gives no guidance in the narrative or plans what to do should they encounter any acid mine drainage (AMD) type discharges or if they encounter any abandoned oil wells that potentially create contaminated soil. Please provide details that the contractor should follow if they encounter any unexpected geologic conditions that need to be addressed before construction continues.

Response: National Fuel has developed an Unanticipated Discovery of Contaminated Materials Plan to provide work, investigation and reporting procedures for responding to the unanticipated discovery of contaminated soils, groundwater or sediment during work activities associated with the Project (see Attachment C of this response).

Cameron County

Question 11. §102.5(b)(5) E&S Plan Requirements

Q11.a. In the E&S Drawings, Sheets 8/86 and 9/86 show that the pipe will be dug up and removed on the Wambaugh and Stager properties within the Boyer Run Drainage near MP 25. Please include plan drawing details for the associated earth disturbance. These drawings should show the E&S BMP's and details involved in the excavation of the Boyer Run stream channel to remove the pipe.

Response: For clarity, the "Parcels Requesting Removal" layer has been removed from the drawings. After further consultation with landowners, only locations where the pipe will be removed have been depicted on the drawings. Additionally, begin/end stations for pipe removal can be found in the table of work shown on E&S Notes drawing "NOTES 004".

The pipe through the Wambaugh and Stager properties near MP 25 will no longer be removed. As indicated on the E&S drawings, the pipe is to be abandoned in place.

Q11.b. Earth disturbance is being proposed within 150 feet of the drinking water source at 5309 Bucktail Trail Hwy, Driftwood, PA 15832. Grouting activity is being planned within 150 feet of the drinking water source at the Cable Property near MP 23.1. Please identify these drinking water sources in the E&S Plans.

Response: National Fuel contacted PADEP to discuss the physical location of these two wells as identified by Cameron County Conservation District staff. Unfortunately, a physical location was not reported and therefore not available to be added to the mapping. However, NFG will notify all landowners within 150 of the Project to complete pre- and post-construction testing of drinking water wells to ensure construction activities do not have a negative impact on water quality or yield. A note to this effect has been added to the plans. This should allow National Fuel to directly coordinate with landowners regarding their water wells and avoid any adverse impacts to these resources.

Q11.c. No E&S BMPs are being shown on the plans for the removal of the 872 & 873 rectifier facilities near MP 29.7. Please include.

Response: At this location, the work involves removal of a pole-mounted rectifier. Removal of this equipment will involve minimal earth disturbance beyond accessing the site and backfilling the hole left after the pole is removed. The E&S Plan has been revised to include proper E&S BMPs at the location identified near MP 29.7 (i.e., drawing "15/20").

Q11.d. The E&S Plans show 1,000 feet of new access road construction to access Rectifiers 872 & 873 for their removal. This access road will involve grubbing and clearing of trees along 1,000 feet before the road joins the existing Grove Run Trail state lease camp access road. It creates 30,000 square feet of additional earth disturbance. Please show appropriate E&S BMP's on the plans for this earth disturbance.

Response: For the Abandonment portion of the Project, National Fuel proposes to use only existing roads for access. Access road 'Rectifier 873, 872 Access' is an existing dirt/gravel road. National Fuel's intent is to limit the use of existing access roads to the drivable surface. All roads will be maintained during construction and restored to pre-construction conditions after construction activities have ceased.

Q11.e. Upon review of aerial imagery, NWI mapping, LiDAR contours, and modeled wetland mapping, six (6) areas of concern (AOC) regarding potential wetlands were identified where no data forms or photographs were provided in the Wetland Investigation Report. The approximate central coordinates along the abandonment line for each of these areas are as follows: AOC 10 (41.407086, -78.114003), AOC 11 (41.380836, -78.112781), AOC 12 (along an access road; 41.360103, -78.126967), AOC 13 (along an access road; 41.346656, -

78.137972), AOC 14 (41.3321, -78.186611), AOC 15 (along an access road; 41.331814, -78.198517). Regarding AOC 10, EV Wetlands have been identified in the headwaters of Lick Island Run 200 to 300 feet south of MP 30.8. These wetlands are located on the pipeline and immediately to the east of the pipeline. Please review these areas to determine the presence/absence of wetlands and include on the plans, with any appropriate BMPs.

Response: Please see response to Q9.g.

Q11.f. Several of the Rock Construction Entrances (RCEs) are proposed on severe grades. At the SR 120 South Access, the first 20 feet of the RCE is on a 70% grade and the overall RCE grade is 45%. The initial 20 feet of grade on the Rectifier 174 Access Road RCE also has a 70% grade, with an overall grade of 30%. Furthermore, the RCEs to access the start grout location near MP 23 and to remove the valve facilities at MP 33.4 are being proposed with 34% grades. The maximum percent grade is not specified in the E&SCP Manual. However, these slopes appear too severe for construction vehicle access and for the RCE to function effectively. Please clarify.

Response: National Fuel has evaluated the access roads along with the locations of the proposed RCEs.

As a result, the previously proposed SR 120 South Access point and access road 'Rectifier 174 Access' have been removed from the Project. National Fuel now proposes to use an existing driveway to access the workspace south of SR 120. The RCE has been placed at the end of the existing driveway, where the driveway meets the workspace in a flat area. To access the workspace to the north of SR 120, NFG proposes to use the existing road to the west of Johnson Run and then traverse the existing ROW to access the work location. The RCE located off SR 120 is now located in a flat area.

The workspace has been trimmed near MP 23 and Access Road "UNK AC 3" has been added. Access Road "UNK AC 3" is an existing road that will be utilized, and the RCE has been placed adjacent to the workspace parallel to the contours. This existing access road has been utilized to gain access to the corridor since construction and operation of the pipeline in the 1950's.

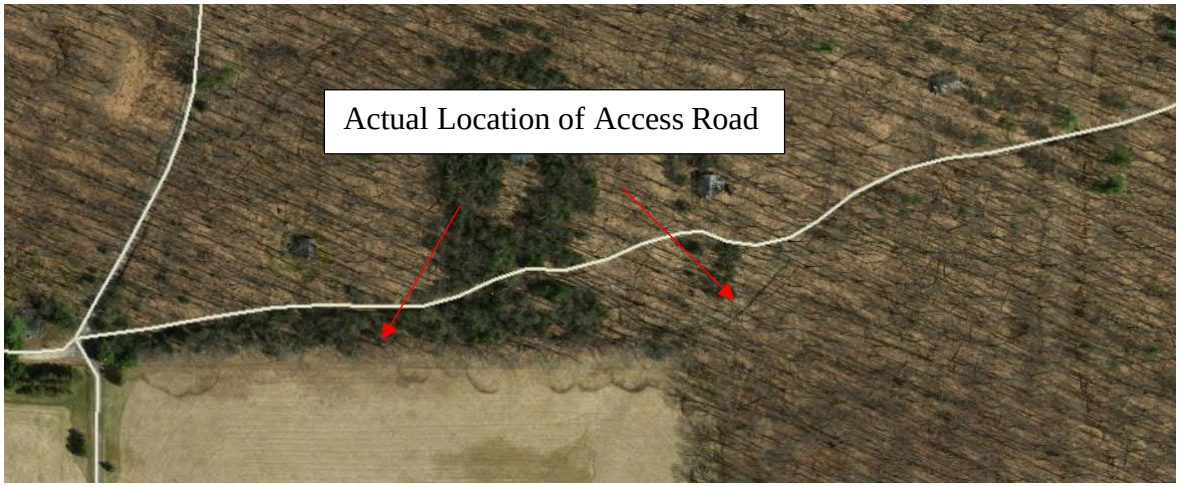
The proposed access point to the valve setting at MP 33.4 is an already existing access road used for operation. National Fuel does not anticipate an issue with utilizing this access point.

Question 12. §102.6(b)(1) Fees

Q12.a. Please adjust the total earth disturbance for Cameron County to incorporate the additional 0.7-acre earth disturbance involved in the Rectifier 872 & 873 Access Road and send appropriate remittance ($100) to the DEP Clean Water Fund for the earth disturbance fee.

Response: There may be a misunderstanding regarding National Fuel's documentation of this access road. National Fuel included the impacts and fees associated with this temporary access road in our 2019 submission. This is an existing access road composed of gravel/dirt and National Fuel is not proposing any improvements to the road other than ongoing maintenance during construction and restoration to existing condition following completion of construction activities. The proposed road is approximately 0.3 miles in length. The project footprint has been reduced from a typical 30-ft wide access road to a 15-ft wide access road (e.g., 0.5 acres total impacts). It is noted that the publically available GIS data layer shows the existing road north of the actual location as demonstrated by the figures below. As such, the $100 fee increase appears to not be warranted; however, National Fuel will submit the requested fee in case there is another reason for it.

Proposed Rectifier 873 and 872 Access Road



Question 13. §102.14(a)(1) Riparian Buffers

Q13.a. There are multiple concerns with the proposed SR120 North Access Road. Currently, the construction parallels Johnson Run (EV) and would impact 1.3 acres of riparian forest buffer. A waiver was originally requested; however, an existing access road is located west of Johnson Run on private land that can serve this location. Please confirm the alternative access road will be used and include updated plans.

Response: As discussed with the DCNR this was an error in the original map set submitted for review. National Fuel intends to use the existing access road located west of Johnson Run on Private land. Plans have been updated to reflect this change.

Clearfield County

Question 14. §102.4(b)(5) E&S Plan Requirements

Q14.a. Access to the "grout insertion location" and "end grout location" sites shown on alignment sheets 18/86 near the railroad will be problematic because of the ongoing mining operation straddling the pipeline ROW and proposed access roads. Additional timber mats may provide access to the site, otherwise, the current plan of access should be adjusted. Please evaluated and revise as necessary.

Response: National Fuel has worked directly with landowner, Michael Buhler, to secure use of existing access roads to access grout insert location. National Fuel does

not anticipate crossing railroad tracks with equipment in order to access the grout receipt point and grout the railroad crossing.

Q14.b. Concerning the same grout insertion location just west of the railroad, two 18" compost filter socks are shown upslope. Please clarify if these are meant to be placed on the downslope, or if they are meant to act as berms to divert water away from the area of construction.

Response: The need for the compost filter socks were reviewed at this location and it has been determined they are not necessary; they have been removed from the E&S Plan.

Q14.c. Please provide more information on the grouting process. If a washout is needed, please include on the plan. Otherwise please clarify how grouting will be performed without a washout.

Response: Please refer to the response to Comment 5.b.

Q14.d. Please provide additional information on seeding, particularly for steep slopes. Will a nurse crop be utilized? Will all steep slopes be handled the same? Table 11.5 in the E&SPC Manual provides slope stabilization guidance.

Response: Per the E&SPC Manual, erosion control blankets will be utilized on all slopes with 3H:1V slopes or steeper. This has been depicted on the E&S Plans. Seed and soil amendments are to be selected from drawing "Notes 003" and shall be applied according to the rates in the table prior to installing the blanket. National Fuel Mixture No. 9 is listed for slopes >20%.

Q14.e. Upon review of aerial imagery, NWI mapping, LiDAR contours, and modeled wetland mapping, two (2) areas of concern (AOC) regarding potential wetlands were identified where no data forms or photographs were provided in the Wetland Investigation Report. The approximate central coordinates along the abandonment line for each of these areas are as follows: AOC 20 (41.240067, -78.432572), AOC 21 (41.231414, -78.464011). Please review these areas to determine the presence/absence of wetlands and update the plans as appropriate.

Response: Please see response to Q9.g.

Q14.f. Please note – there is an active surface mine near abandonment milepost 0.3, permitted as an Industrial Mineral Mining Operation with an NPDES discharge. If not done already, there should be communication to ensure no overlapping permit, or other, implications.

Response: National Fuel has had extensive conversations with this landowner and has agree to remove the pipeline from the majority of this property. The access and workspaces required to complete the removal and nearby grouting have been agreed upon between the landowner/operator of the mine and National Fuel.

Question 15. §102.4(b)(5)(xii) Geologic Conditions

Q15.a. Could not identify review for potential geologic conditions that may cause adverse environmental impact, nor disposal directions of such potential material. There is a specific concern with the pyritic rock in this area.

Response: The Project crosses the following primary mapped geological units: Pottsville Formation, Shenango Formation, Catskill Formation, Huntley Mountain Formation and the Lock Haven Formation. Of these units only the Pottsville formation is considered to have the potential to contain iron disulfide (pyrite) associated with the lower depositional energy beds and organic beds.

There is minimal potential for exposure of pyritic rock along the pipeline due to the relatively shallow trench depth (e.g., generally less than 7-8 feet deep), and typically the upper 25 to 35 feet of bedrock does not contain pyrite because pyrite is not stable under atmospheric conditions and will weather away. However, National Fuel recognizes under certain conditions pyritic rock may be present and exposed during construction. As such, National Fuel has adopted applicable mitigative measures outlined in PADEP's publication, *How to Avoid and Handle Acid-Producing Rock Formations Encountered During Well Site Development.* Although this publication is applicable to well pads, many of the recommendations are applicable to pipeline construction.

In general, the right-of-way grading and trenching has been designed to minimize bedrock disturbance. Should shallow bedrock containing pyrite be encountered during trenching, National Fuel will attempt to rebury the material in the trench up to the depth of the bedrock profile prior to backfilling the remainder of the trench with spoil material and final grading of topsoil.

Should significant quantities of pyritic rock remain after trench backfill, National Fuel will attempt to treat the rock on-site according to the recommendations in the above reference PADEP publication. Alternatively, if

the volumes of rock are too large to effective treat, National Fuel will arrange to dispose of the rock at an approved facility.

Elk County

Question 16. §102.4(b)(5)(ix) Plan Drawings

Q16.a. Insufficient information has been provided to accurately measure slope length to the compost filter sock (CFS). For example, near the Medix area of Elk Co., the map is cut off before the top of the slope. This prevents us from measuring the full length. This should be checked for all areas where CFS is proposed. Additionally, we would recommend checking the sizing calculations. It appears likely that the CFS is undersized in a few locations.

Note: Similar figures based upon data from other states are not acceptable substitutes for Figure 4.2.

Response: Alignment sheet viewports were updated as part of this resubmission. Viewports were reviewed against the compost filter sock drainage areas and found to be inclusive of the entire upslope length for each compost filter sock (to the nearest break in drainage area).

Compost filter sock upslope lengths in the Medix area of Elk County were reviewed and revised as necessary. Compost filter socks were resized accordingly.

Compost filter socks were sized using the 'Maximum Slope Length for Compost Filter Sock' table located in the E&S Details (Figure 4C). This table was created using the ESPC Manual Figure 4.2.

Q16.b. Insufficient information has been provided on the site access. If new roads will need to be built, this should be included in the E&S plan and LOD. If existing roads are in good, working condition, again, this should be shown on the plan and documented. For example, it is unclear how the west side of Medix Run will be accessed to perform the end grout.

Response: No new access roads will be constructed to support the FM100 abandonment activities. In areas where the existing access roads do not lead directly to the

proposed work areas, small equipment will track down National Fuel's operational ROW to complete the work and track back out. Disturbed areas will be re-seeded to original vegetative cover.

Q16.c. Additionally, when more information is provided on the site access, please ensure access roads conform to the E&SPC Manual, "Access roads should be located above flood plains and avoid drainage courses wherever possible or have proper drainage measures installed."

Response: As stated above, no new access roads will be constructed to support the FM100 abandonment activities. National Fuel will conform to the E&SPC manual when designing erosion and sediment control measures across the project.

Q16.d. Upon review of aerial imagery, NWI mapping, LiDAR contours, and modeled wetland mapping, four (4) areas of concern (AOC) regarding potential wetlands were identified where no data forms or photographs were provided in the Wetland Investigation Report. The approximate central coordinates along the abandonment line for each of these areas are as follows: AOC 16 (41.322569, -78.253883), AOC 17 (along an access road; 41.302436, -78.317017), AOC 18 (along an access road; 41.255775, -78.356806), AOC 19 (41.255825, -78.359406). Please review these areas to determine the presence/absence of wetlands and update the plans as appropriate.

Response: Please see response to Q9.g.

Question 17. §102.4(b)(5)(vii) Sequence of BMP Installation and Removal

Q17.a. Following Chapter 2 of the E&SPC Manual, please provide a site-specific sequence of BMP installation and removal. For example, the first step of the Abandonment/Removal Construction Sequence only mentions ensuring that the appropriate E&S measures are in place but does not list any BMPs.

Response: At the time of abandonment/removal construction activities, all E&S BMPs should already be in place, as outlined in previous sections of the construction sequence.

As part of the "CONSTRUCTION PREPARATION ACTIVITIES" section, the rock construction entrances will be installed (see Note 10).

As part of the "SITE CLEARING (TREE CUTTING) & GRUBBING" section, perimeter controls (see Note 1A/1B) and temporary equipment bridges/temporary timber mats (see Note 3) will be installed.

As part of the "SITE GRADING" section, temporary waterbars will be installed (see Note 7).

The first step of the "ABANDONMENT/REMOVAL CONSTRUCTION" section has been revised to read, "ENSURE THAT APPROPRIATE EROSION AND SEDIMENT CONTROLS ARE IN PLACE AS OUTLINED HEREIN (I.E. ROCK CONSTRUCTION ENTRANCES, PERIMETER CONTROLS, TEMPORARY EQUIPMENT BRIDGES, TEMPORARY TIMBER MATS, AND TEMPORARY WATERBARS)."

Q17.b. It should be clear that stabilization is a critical step and disturbed areas will be stabilized upon reaching final grade. The timeframes for how long each step of the process will take have not been provided. E&SPC Manual Chapter 13 is referenced in the General Conditions. This chapter states timeframes from disturbance to stabilization should be provided by the station. The right-of-way length of the disturbance at any one time should be the minimum to efficiently install the pipeline and the allowable length specified in the E&S Plan.

Response: National Fuel understands that stabilization of disturbed areas is a critical step and must be completed as soon as possible after final grade. National Fuel intends to have a separate topsoil crew and seeding crew restoring the ROW spaced along the pipeline for continuous production. The seeding crew will follow the topsoil crew and National Fuel will adhere to the requirement that temporary stabilization must be provided for disturbed areas where earthwork is delayed or stopped for a period of four or more days.

The Project Construction Sequencing has been revised to state the following:

“WORK EFFORT WILL BE SUBDIVIDED INTO CATEGORIES AND PERFORMED BY SPECIALIZED CREWS (E.G., SITE PREPARATION/CLEARING, TRENCHING, PIPE CONSTRUCTION, TOPSOILING, SEEDING, ETC.). EACH CREW WILL PROGRESS IN A LOGICAL MANNER, GENERALLY FROM THE BEGINNING TO END OF THE PIPELINE. THE TIME PERIOD BETWEEN TRENCH EXCAVATION AND THE START OF SITE STABILIZATION SHALL NOT EXCEED 30 CALENDAR DAYS. RESTORATION WILL BE COMPLETED AS SOON

AS POSSIBLE AFTER GRADING. CESSATION OF ACTIVITY FOR FOUR DAYS OR LONGER REQUIRES TEMPORARY STABILIZATION."

There will be a few instances at HDDs, road bores, wetlands and waterbodies where travel lanes may remain open for specialty crews. In these instances, temporary erosion control will remain in place and be maintained until permanent restoration occurs.

Potter County

Question 18. §102.4(b)(5)(ix) Plan Drawings

Q18.a. All Access Roads/LOD should be provided on the Plan Drawings. Please remove any references to using access roads that are not on plans. ESCAMP section 10.4 indicates additional access may be obtained as necessary.

Response: All proposed Access Roads are shown on the E&S Plans. The statement indicating additional access may be obtained as necessary has been removed from section 10.4 of the ESCAMP.

Q18.b. Construction Details do not appear to be provided for Access Road construction and it is difficult to tell how BMPs will be utilized. The information does not appear to be provided for how non-existing access roads will be constructed.

Response: For the Modernization portion of the Project, the only non-existing access roads proposed are at the various aboveground facility sites. For these facility sites, access road details have been provided as part of each facility's PCSM drawing package.

For the Abandonment portion of the Project, no new access roads are proposed.

Q18.c. It is unclear on the Plan Drawings what work is to take place on the ROW for abandonment. Will roads be constructed on the ROW for access?

Response: Please refer to response to Question 18.d.

Q18.d. Abandonment areas should include a LOD travel lane for traversing ROW to gain access. The LOD for some abandonment areas is isolated and the access unclear. Please clearly demonstrate how all LOD areas will be accessed.

Response: Generally National Fuel intends to access identified abandonment work areas either directly from public roadways or temporary access roads as identified on the abandonment plans. For areas where the contractor would use the existing ROW to access a worksite, it is unknown at this time which portion of the ROW they would propose to use for access. In these cases, the entire ROW is identified for use from the point where the contractor would exit the public roadway. However, it is noted that the total disturbance along the ROW would be limited to a 12 to 15 feet wide area. Any impacts to these areas would be fully restored and revegetated to pre-construction condition upon completion of the abandonment activities.

In certain areas where wetlands or waterbodies would need to be crossed to access a worksite, the abandonment drawings specifically state how these areas would be accessed; via foot traffic only or if equipment is necessary. In all circumstances appropriate E&S measures are shown.

Q18.e. The timing and staging of earthmoving activities are unclear. More specifics are needed for temporary stabilization methods, trench backfilling, and permanent stabilization. Per the E&SPC Manual, in no case should an area exceeding 15,000 square feet, which is to have vegetative stabilization, reach final grade without being seeded and mulched.

Response: Due to the linear nature of the Project, it is not feasible to allow for only 15,000 square feet of disturbed area to reach final grade before initiating seeding and mulching operations. For this project, with a nominal corridor of 100-foot width, it would mean that only 150 feet of pipeline ROW could be graded before initiating seeding. This presents logistical issues as well as extends the time it takes to construct the pipeline and restore the ROW.

As discussed in the response to Question 17.b, National Fuel intends to have a separate topsoil crew and seeding crew restoring the ROW spaced along the pipeline for continuous production. The seeding crew will be following the topsoil crew and NFG will adhere to the requirement that temporary stabilization must be provided for earth-exposed areas where earthwork is delayed or stopped for a period of 4 or more days. The language applied to the Project Construction Sequencing applies to this response. As mentioned, there will be a few instances at HDDs, road bores, wetlands and waterbodies where travel lanes may remain open for specialty crews. In these instances, temporary erosion control will remain in place and be maintained until permanent restoration occurs.

Q18.f. The construction sequence should be more specific to this project and the activities to occur and not generalized.

Response: Abandonment drawing titled "Notes 004" presents the proposed sequence of construction for the Project. It covers construction preparation activities, site clearing and grubbing, and site grading. A section for stream crossings has been added for the pipe removal proposed through a stream, as specified on the plans. The wetland crossings section has been included for proposed work areas within wetlands. The sequence also includes a section for locations where pipe will be removed, and a section for locations where pipe will be abandoned in place.

As discussed in the response to Q17.a, the first step of the abandonment and removal sections of the construction sequence has been revised to more clearly indicate the specific BMPs to be installed. The sequence has also been revised to include the use of compost sock washouts at grouting locations.

Additionally, a table has been added to the construction sequence which provides work to be done by station value (i.e. removal, abandon in place, grout, foam).

Q18.g. Please provide specific seeding information if hydroseed mixes are to be utilized as well as the tactifier usage. Proper soil preparation and procedures should be used when hydroseeding to ensure seed makes proper contact with underlying soil and there is not any excessive abrasion of seed.

Response: Footnotes have been added to the seeding table on drawing "Notes 003" with further information regarding hydroseed mixes and tackifying.

Q18.h. Scarification methods and details are missing in the restoration plan.

Response: The Site Restoration Narrative outlines proposed methods to mitigate soil compaction. As indicated on drawing "SR NOTES 001," scarification for the Project will be in accordance with PADEP's ESPC Manual. As stated, "AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 3 TO 5 INCHES – 6 TO 12 INCHES ON COMPACTED SOILS - PRIOR TO PLACEMENT OF TOPSOIL. AREAS TO BE VEGETATED SHALL HAVE A MINIMUM 4-INCHES OF TOPSOIL IN

PLACE PRIOR TO SEEDING AND MULCHING. FILL OUTSLOPES SHALL HAVE A MINIMUM OF 2-INCHES OF TOPSOIL."

Q18.i. Upon review of aerial imagery, NWI mapping, LiDAR contours, and modeled wetland mapping, three (3) areas of concern (AOC) regarding potential wetlands were identified where no data forms or photographs were provided in the Wetland Investigation Report. The approximate central coordinates along the abandonment/modernization line for each of these areas are as follows: AOC 07 (entire access road corridor; 41.835519, -78.160281), AOC 08 (41.569992, -78.072894), AOC 09 (41.560889, -78.079458). Please review these areas to determine the presence/absence of wetlands and update the plans accordingly.

Response: Please see response to Q9.g.

Question 19. §102.11(a)(1) BMP and Design Standards

Q19.a. Wetland Crossing ESCAMP 4/4a Detail does not show filter fabric underlayment per the E&SPC Manual. All BMP details need to conform to the standards of this manual. Additionally, Modernization Details Figure 23 does not show a filter fabric underlayment.

Response: It is National Fuel's intention to provide a geotextile underlayment through wetland crossings, as noted in the E&S Details Figure 24. Figure 23 has been revised for additional clarity. ESCAMP Figures 4/4a have been revised to show a geotextile underlayment.

<u>Tamarack Compressor Station</u>

Question 20. §102.4(b)(5) E&S Plan Requirements

Q20.a. Resolutions to soil limitations are not clearly described, E&S narrative only states, "it is anticipated that proposed BMPs will be sufficient to manage and control limitations." Please provide resolutions to the site-specific limitations.

Response: Specific soil limit resolutions have been added to Appendix B of the E&S Report and Appendix B of the PCSM Report.

Q20.b. Please clarify the presence of wetlands on the project site. Surface Water Classification of narrative mentions a wetland delineation was performed but does not note results. A hydric soil limitation is listed, and the site is nearby the

Tamarack Swamp. Moreover, the construction sequence lists the delineating of wetlands in the first step.

Response: Environmental field surveys were conducted on June 13, 2018. The survey area for the proposed Tamarack Compressor Station consisted of a typical 300-foot-wide survey corridor developed to provide 100-feet on the non-working side and 200-feet on the working side of the proposed pipeline and additional area to capture proposed facility site footprints for a survey area of 47.86 acres.

Wetland and waterbody delineations identified no wetlands, natural streams, man-made drainage ditches, or man-made ponds within the survey area. The construction sequence for this area has been revised to remove the requirement to delineate wetlands.

Question 21. §102.4(b)(5)(ix) Plan Drawings

Q21.a. Land cover is not clearly shown on E&S Plan Maps. Plan drawings have an apparent indication for tree line/forested area, however, the legend does not include a tree line.

Response: The tree lines have been added to the legend on all of the plan drawings.

Q21.b. Please clarify why a bio-sock diversion berm was not placed above Temporary Topsoil/Stockpile/Tree Stump Area since berm was placed above laydown areas.

Response: A bio-sock diversion berm has been added above the Temporary Topsoil Stockpile on Sheet 2.

Q21.c. The proposed wet pond BMP has numerous deficiencies. Due to insufficient information provided for this proposed BMP, the BMP was reviewed to take into account most of the possible aspects of the BMP. These deficiencies can include but may not be limited to the following comments. BMP's should be site-specific designs that account for all characteristics of the proposed project site. Therefore, additional information should be provided as necessary.

Response: Based on a site investigation, the proposed wet pond has been revised to an infiltration basin in accordance with Chapter 6.4.2 of the Stormwater BMP Manual. All drawings, calculations, and narratives have been revised as needed.

Q21.c.i. Was the discharge point from sediment pond evaluated to demonstrate no accelerated erosion or damage from stormwater will occur? PA E&S Manual Chapter 7 – Sediment Basins, mentions this should be performed when discharge is to a location other than surface water by picking a point within 500 feet of discharge point and following bulleted items in off-site discharge factsheet, Document #3930-FS-DEP4124.

Response: An off-site discharge analysis has been performed in accordance with Chapter 7 of the E&S Manual and Fact Sheet 3930-FS-DEP4124. This analysis demonstrates that there will not be accelerated erosion or other adverse impacts downstream of the pond discharge location. This analysis has been included as Appendix D of the E&S Plan.

Q21.c.ii. Was testing performed to determine the seasonally high water table and suitability of the wet pond location? The bottom elevation should not be located below the seasonally high water table.

Response: A site investigation has been performed to verify that the proposed infiltration basin is located in an area that is suitable for an infiltration BMP. The site investigation included excavation of test pits to develop soil profiles and look for the presence of limiting layers (i.e., bedrock or seasonal high-water table). Infiltration tests were also performed as part of this investigation. This investigation demonstrated that the area is suitable for the proposed infiltration BMPs. No limiting layers were encountered and infiltration rates conducive to infiltration BMPs were found. An infiltration test report has been prepared to document the findings of the site investigation and is provided as Appendix D to the PCSM Report.

Q21.c.iii. The cleanout stake and detail do not appear to be provided.

Response: The cleanout stake has been added to the sediment pond details on Sheet 9.

Q21.c.iv. Please clarify embankment soil type listed on Standard Worksheet #13, SG D, since it is not one of the recommended soil types in the PA E&S Manual Chapter 7 – Sediment Basins. The recommended soils are GC, GM, SC, SM, CL, or ML.

Response: Worksheet 13 has been revised to only include the approved soil types listed the E&S Manual. The approved soil types are also listed in the sediment pond construction notes on Sheet 13.

Q21.d. The bottom elevation on the Compost Filter Sock Trap worksheet and shown on Plan Sheet 08 does not match trap contours on the E&S Map. Also, please keep in mind anticipated settlement when constructing the trap to maintain the freeboard.

Response: The bottom of trap elevation has been revised on the worksheet and on the trap detail on Sheet 8. Also, the height of the filter sock trap has been increased to provide additional freeboard to account for potential settlement.

Q21.e. The E&S Plans show riprap aprons for Culvert 4 and Culvert 5; however, these are not shown in the table on E&S Plan Sheet 08. Please clarify.

Response: The Culvert 4 and 5 aprons have been added to the apron table on Sheet 8. Calculations for these two aprons have also been added to Appendix C of the E&S Plan.

Q21.f. The fertilizer application rate of 150 lb/ac for the 10-10-10 fertilizer is less than the recommended 500 lb/ac recommended in the E&S Manual Table 11.2. Please clarify and justify it as necessary.

Response: The application rate for the 10-10-10 fertilizer has been changed to 500 lb/ac on Sheet 8 and in Appendix C of the E&S Plan.

Q21.g. Worksheet #1 could not be located for compost filter socks. Please provide.

Response: Worksheet 1 for sizing the filter socks has been added to Appendix C of the E&S Plan.

Q21.h. Channel Details do not match between E&S Plan Sheet 8 and E&S Narrative, specifically station entries for Ditch 4. Also, Ditch 6 has two entries on Worksheet 11 for what appears to be the same channel sections. Additionally, Ditch 5 has a Bottom Width: Flow Depth ratio of 12.9 for the temporary portion, which exceeds the 12:1 maximum. Please revise or justify it.

Response: The ditch calculations in Appendix C of the E&S Plan and the ditch schedules on Sheet 8 have been revised as necessary to address these comments.

Q21.i. Worksheet #12 lists R-3 riprap as the protective lining for the emergency spillway, however Emergency Spillway Section detail on E&S Plan Sheet 09 listings the lining as Vegetated NA Green S75 or equivalent. Additionally, the emergency spillway has a bottom width of 5', less than the 8' minimum. Please clarify.

Response: Worksheet 12 and Sheet 9 have both been revised to indicate Vegetated NA Green P300 lining on the emergency spillway. The spillway detail on Sheet 9, Worksheet 13, and all applicable calculations have been revised to show a bottom width of 8 feet for the emergency spillway.

Q21.j. Please include the table in Skimmer Construction Detail #7-1 with plans. It is difficult to tell if all the information was provided.

Response: The skimmer table has been added to Sheet 9.

Post Construction Stormwater Management

Question 22. §102.8 PCSM Requirements

Q22.a. Please review all Peak Flow Summary Tables in PCSM reports. It appears the first column in many tables is labeled incorrectly as Existing Disturbed Conditions Site and is referring to Existing Undisturbed Conditions. Please clarify and revise as necessary.

Response: Peak Flow summary tables in the plan narrative for each PCSM report have been confirmed to show that Column 1 lists the "Existing Disturbed Conditions Site Q (cfs)" the column heading has been updated to state this to alleviate confusion.

Q22.b. Please note – all proposed Infiltration Trench BMPs align more with the BMP 6.4.3 Subsurface Infiltration Bed in their design and usage proposal.

Response: Per discussion with PADEP on our phone call dated August 27, 2020, the BMPs are more aligned with BMP 6.4.4 Subsurface Infiltration trench. The proposed BMPs do not include vegetation or a soil layer and there for do not fit with the description given for BMP 6.4.3 Subsurface Infiltration Bed. It was agreed to leave the proposed BMPs as Infiltration trenches and no additional changes have been made to the reports or plan sets.

Q22.c. For several sites (MLVs, OPP, Interconnect), the NS BMP 5.5.1 Cluster Uses at Each Site is checked on Worksheet 10 as a primary BMP for water quality. Per the BMP description and site design, this BMP does not apply to this project. This BMP intends to significantly reduce impervious areas and disturbance on a project site by clustering development into one small area. When choosing

BMPs for water quality, please provide site-specific information on how the BMP will be utilized. Please revise.

Response: NS BMP 5.5.1 Cluster Uses at Each Site has been removed from Worksheet 10 as it does not apply to these sites. Each site has been reevaluated to qualify for water quality. Each site has been evaluated individually either includes a vegetated swale with 2-ft bed bottom, Landscape restoration and soil amendments.

Q22.d. Vegetated swales are proposed at several sites with a bottom width of 0.0 feet. If these are to be used for water quality, the PA Stormwater BMP Manual BMP 6.4.8 Vegetated Swale requires a bottom width of 2 to 8 feet. The Hydrologic and Hydraulic sections of the PCSM Reports mention that the vegetated swales are used for water quality, however, they are not checked on the Worksheet 10 for most sites. Please clarify.

Response: Worksheet 10 has been updated to include BMP 6.4.8 Vegetated Swale. All swales have been updated to have a 2-ft bed bottom to qualify as a vegetated swale.

Question 23. §102.8(f)(9) Plan Drawings

Q23.a. Please review all permanent waterbars and clarify utilization. In McKean County, there are no permanent waterbars between station 450+00 and 630+00.

Response: The waterbars between station 450+00 and 630+00 have been reviewed and subsequently revised from temporary to permanent.

Q23.b. Please clarify plans for restoring the temporary access roads (TARs). Narrative Section 9.2 Access Roads states all TARs will be restored to original conditions following construction. Will roads have topsoil and be seeded? The site restoration plans do not appear to show that the roads have been restored.

Response: Please refer to response to Question 5.e.

Q23.c. Please include additional seeding information. PCSM plans reference Table 11-3 for low fertility. However, this table did not appear to be included in the plan. Please include all information that will be utilized in the seeding process.

Response: Table 11-3 for low fertility has been included in the PCSM detail sheet.

Carpenter Hollow OPP

Question 24. §102.6(a)(1) Permit Requirements

Q24.a. Please define the OPP acronym.

Response: The OPP acronym stands for "Over Pressure Protection". The PCSM Narrative has been revised to define this term as part of the introduction.

Question 25. §102.8(f)(9) Plan Drawings

Q25.a. All PCSM Plan drawings show the proposed 20" YM58 Pipeline extending beyond the Carpenter Hollow OPP site. This is not shown on the Modernization E&S Plans or consistent with the application, as the Carpenter Hollow OPP site is the terminal location for this portion of the pipeline. Please clarify and revise accordingly.

Response: Proposed 20-inch YM58 pipeline has been removed from the plan set.

Question 26. §102.8(g)(2) Water Quality

Q26.a. Worksheet 4A lists Open Space as an existing condition. The only acceptable designations for existing conditions are meadow, woodlands, or impervious. Please revise.

Response: Open space has been updated to be shown as "meadow". This has been updated on all sites and required the Peak flow summaries to be updated with the updated flows.

Marvindale Compressor Station

Question 27. §102.8(f)(9) Plan Drawings

Q27.a. The proposed NS BMP Minimize Total Disturbed Area – Grading has several deficiencies. This BMP intends to reduce site grading, removal of existing vegetation, soil disturbance, and demonstrate the design conforms with existing topography. Special value and environmentally sensitive features are identified and avoided to eliminate the need for vegetation re-establishment. Typically, these areas are located within or adjacent to the "disturbed areas" on the site:

Response: Refer to response to Comment 27.a.v below.

Q27.a.i. All protected areas should be located, clearly delineated, and labeled on the PCSM plan and may either be located within the limit of disturbance or a reasonable and justifiable distance between the limit of disturbance and the NPDES boundary. Please provide.

Response: Refer to response to Comment 27.a.v below.

Q27.a.ii. The notation has not been provided on the PCSM plan that these areas are not to be subject to grading or movement of existing soils. Please provide.

Response: Refer to response to Comment 27.a.v below.

Q27.a.iii. The notation has not been provided on the PCSM plan to have these areas delineated in the field and protected before construction. Please provide.

Response: Refer to response to Comment 27.a.v below.

Q27.a.iv. The notation has not been provided on the PCSM plan to allow pruning, required maintenance, or additional planting of native vegetation. Please provide.

Response: Refer to response to Comment 27.a.v below.

Q27.a.v. Overall, more specifics are needed for this BMP. Please refer to the Pennsylvania Stormwater Best Management Practices Manual, December 30, 2006, Chapter 5, Minimize Total Disturbed Area, and the checklists in Chapter 8 for design criteria to provide site-specific details for how this BMP will be utilized.

Response: The E&S and PCSM plan drawings have been revised to provide additional requirements to meet this BMP. Justification for use of this BMP has been added to Appendix C of the PCSM Report. The revisions to the plan drawings include establishing a grading limit and a note to minimize topsoil stripping, removal of vegetation, and soil compaction outside of these limits. The recommended note regarding pruning and planting native vegetation has been added to Sheets 10 and 11.

Q27.b. Please provide additional details for proposed BMP Re-vegetate Disturbed Areas, Using Native species.

Response: Notes for this BMP have been added to Sheet 10 and justification for use of this BMP has been added to Appendix C of the PCSM Report.

Q27.b.i. Soil limitations table indicates soil in this area is a poor source of topsoil. Please clarify how this will be addressed.

Response: Soil limit resolutions have been added to Appendix B of the PCSM Report and a note specific to topsoil resolutions has been added to Drawing 10.

Q27.b.ii. Please provide maintenance measures for this BMP. Although many traditional measures are irrelevant, management is expected, especially during the early stages. This may include inspection, mowing, reseeding, and removal of invasive species.

Response: Maintenance requirement for this BMP have been added to Sheet 10.

Q27.c. Please clarify if bio-sock diversion berms will be the same sock filling as bio-sock infiltration berms. Please provide manufacturer specs for bio-sock to demonstrate reduced permeability.

Response: The proposed bio-sock diversion berms and bio-sock infiltration berms are specified to be filled with growing media. Specifications for the growing media are provided on Sheet 10. Growing media differs from compost fill used in standard compost filter socks used for sediment control, in that it is intended to act as a barrier and has low permeability rates – similar to a typical soil berm. The growing media specifications on Sheet 10 include material particle size requirements which helps to ensure low permeability rates. The growing media fill includes material that is very conducive to the establishment of permanent vegetation. National Fuel Gas Supply Corporation has successfully used bio-sock infiltration berms and diversion berms on numerous projects.

Q27.d. The proposed BMP "infiltration berms" have several deficiencies. Since an insufficient amount of information has been provided on the proposed BMP, the BMP was reviewed to take into account most of the possible aspects of the BMP. These deficiencies can include but may not be limited to the following comments. BMP's should be site-specific designs that take into account all characteristics of the proposed project site. Therefore, additional information should be provided as necessary.

Q27.d.i. Soils on which berms will be placed have a slow percolation limitation. Please clarify how this will not be a limiting factor for the BMP.

Response: A site investigation has been performed to verify that the proposed bio-sock infiltration berms are located in areas that are suitable for infiltration BMPs. The site investigation included the excavation of test pits to develop soil profiles and look for the presence of limiting layers (i.e., bedrock or seasonal high-water table). Numerous infiltration tests were also performed as part of this investigation. This investigation demonstrated that the area is suitable for the proposed infiltration BMPs. No limiting layers were encountered, and infiltration rates conducive to infiltration BMPs were found. An infiltration test report has been prepared to document the findings of the site investigation and is provided as Appendix D to the PCSM Report.

Q27.d.ii. Please provide additional information on the bio-sock media, demonstrating reduced permeability and promotion of vegetative growth.

Response: Refer to response to Comment 27.c above.

Q27.d.iii. Construction Sequence on PCSM Plan Sheet 10 does not mention the conversion of Filter Sock Traps to Infiltration Berms. Steps should include removal of accumulated sediment, removal of impoundment, and steps necessary to provide infiltration capacity.

Response: The construction sequence on Sheet 10 and in the narrative have been revised to include additional steps regarding removing the filter sock sediment traps and installing the infiltration berms.

Q27.d.iv Please clarify how berms will be installed and utilized, since they are in woodland areas. Installation of subsurface trenches is not recommended, as root systems can be damaged.

Response: Typically, the socks are placed on the ground along the proposed alignment while still empty. The socks are shifted as needed to avoid trees. If a tree has to be removed to ensure that the sock is installed at a constant level elevation, the tree is cut to grade, but the stump is left in place. Once the sock is in the proper place, it is filled with the growing media via a pneumatic blower, staked into place, and vegetated. This installation methods avoids the need to excavate into the existing ground and eliminates the potential to damage existing root systems. Details regarding installation of the socks are provided on Sheet 10.

Q27.d.v. Low berm height, 24 inches or less, is recommended to prevent ponding. Ponding may be an issue since infiltration testing has not been done and soils indicate low infiltration potential. Berm #1 is designed with a berm height of

32 inches. This appears to be done for volume control. Please adjust the height or justify it.

Response: The design of the infiltration berms has been revised to only use a maximum ponding height of 24-inches in the calculations. However, 32-inch diameter socks are still specified for these berms to reflect the in-place effective height of the berms and to account for potential settlement of the fill material. Revised calculations are provided in Appendix C of the PCSM Report.

Q27.e. Please clarify the intent for bio-sock diversion above access road. Sock appears to extend beyond the culvert.

Response: The bio-sock diversion berm in question is intended to divert run-on away from the access road and direct it to the cross culvert at Station 4+60. The alignment of the sock at the downstream end has been revised to more clearly show this.

Q27.f. Please clarify the intent for bio-sock diversion above the compressor station. Length and placement of bio-sock appear to have ponding potential.

Response: The alignment of the bio-sock diversion berm in question has been revised to eliminate the potential for ponding.

Question 28. §102.8(f)(2) Soil Limitations

Q28.a. Resolutions for soil limitations have not been accounted for. PCSM Report mentions "proposed BMPs will be sufficient to manage and control limitations that may be exhibited by the soils," however no specifics are provided in the report or on PCSM Plan. Please include the limitations of this site.

Response: Specific soil limit resolutions have been added to Appendix B of the PCSM Report.

<u>Marvindale Interconnect</u>

Question 29. §102.8(f)(9) Plan Drawings

Q29.a. The project location map on the PCSM Sheet 1 appears to show the location of the Marvindale Interconnect at the location of the Marvindale Compressor Station. Please revise.

Response: The Project Location map has been updated to show the correct location and name for the KL Valve set.

Q29.b. E&S Plans appear to refer to this site as the KL Valve Set. Please confirm the Marvindale Interconnect plans correspond with this location on the Modernization E&S Plans.

Response: The E&S Plans correctly label the KL Valve Set, and the PCSM plans correspond to this location. The PCSM Plans have been revised from "Marvindale Interconnect" to "KL Valve Set". The Marvindale Interconnect is an existing facility site and does not require any PCSM design.

Q29.c. Profile views shown on PCSM Plan Sheet 6 do not seem to correspond with designations on PCSM Plan Sheet 3. Section A-A and Section B-B seem to be switched. Please clarify.

Response: Section B-B is drawn correctly. In plan view the section arrows have been flipped to accurately show the section view.

Q29.d. Please include details on the PCSM Plan in the Maintenance and Inspection notes for the BMP Landscape restoration, such as inspection, remove weeds/invasive species, reseed, and mow as necessary. The PA Stormwater BMP Manual clarifies that this BMP is not, "no maintenance."

Response: Maintenance and inspection notes have been added to the PCSM Plan.

Question 30. §102.8(g) Stormwater Analysis

Q30.a. On Worksheet 4A. existing non-forested pervious areas must be considered meadow good condition or equivalent. Please adjust entries for Open-space and Gravel.

Response: All non-forested pervious areas have been updated to be modelled as Meadow in good condition with the appropriate CN value per Hydraulic soil group classifications. Model and flow tables have been updated appropriately.

<u>Tamarack Compressor Station</u>

Question 31. §102.8(f)(9) Plan Drawings

Q31.a. On PCSM Plan Sheet 11, Bio-sock Diversion Berm is missing. The BMP label is not pointing to anything. Please revise.

Response: This drawing has been revised accordingly.

Q31.b. Please provide a manufacturer spec sheet for Bio-sock to demonstrate reduced permeability.

Response: The proposed bio-sock diversion berms and bio-sock infiltration berm are specified to be filled with growing media. Specifications for the growing media are provided on Sheet 12. Growing media differs from compost fill used in standard compost filter socks used for sediment control, in that it is intended to act as a barrier and has low permeability rates – similar to a typical soil berm. The growing media specifications on Sheet 12 include material particle size requirements which helps to ensure low permeability rates. The growing media fill includes material that is very conducive to the establishment of permanent vegetation. National Fuel Gas Supply Corporation has successfully used bio-sock infiltration berms and diversion berms on numerous projects.

Q31.c. Please clarify the land cover for the infiltration berm area. PCSM Sheet 12 indicates that existing vegetation/trees will be left undisturbed for this forested area. However, the Post Development map included with the PCSM Report indicates that this area will have a meadow cover.

Response: The intent of the PCSM plan is to avoid tree removal in the filter sock trap/infiltration berm area. However, this area was assumed to be meadow for the calculations. This reflects that some isolated trees may be removed during installation of the filter sock trap and the infiltration berm. This is a conservative assumption since meadow has a higher curve number than forest (71 for meadow and 70 for forest).

Q31.d. On PCSM Plan Sheet 10, only two of the three stockpiles/bury areas have a Bio-sock diversion. Please clarify if the intent was to place a bio-sock above all three areas, or if there was a reason for not putting one by the third pile.

Response: Sheets 3 and 10 have been revised to include a bio-sock diversion berm upslope of the eastern-most berm.

Q31.e. Please add to the berm construction sequence to remove/flush accumulated sediment from the sediment trap and to evaluate ponding area for compaction and to scarify and topsoil as appropriate.

Response: The construction sequence on Sheet 12 has been revised to include additional steps to replace sediment barriers with infiltration berms.

Q31.f. Please provide resolutions to how the soil limitations listed in Table 1 of the PCSM report will be addressed.

Response: Specific soil limit resolutions have been added to Appendix B of the PCSM Report.

Q31.g. Channel 1 requires a sharp bend for water to enter Channel 3. Sharp bends should be avoided in channels to limit the potential for erosion. Please demonstrate this design will be effective and not elevate the erosive potential.

Response: Several changes to the design have been made to reduce the potential for erosion in this area, including: a much wider radius has been used in Channel 1 to eliminate the sharp bend, Channel 1 enters Channel 3 at an angle more in-line with the Channel 3 flow direction, the ditch lining at the lower end of Channel 1 has been upgraded to a material with a higher allowable shear stress, and the riprap lining in Channel 3 has been extended to the confluence with Channel 1. The drawings and calculations have been revised as necessary to reflect these changes.

Q31.h. Please include the method of dewatering sediment pond in wet pond conversion sequence on PCSM plan sheet 13.

Response: Additional details on dewatering the sediment pond prior to conversion to an infiltration basin have been added to Sheet 13 and to the PSCM Narrative.

Q31.i. The proposed BMP "wet pond/retention basin" has numerous deficiencies. Since an insufficient amount of information has been provided on the proposed BMP, the BMP was reviewed to take into account most of the possible aspects of the BMP. These deficiencies can include but may not be limited to the following comments. BMP's should be site-specific designs that take into account all characteristics of the proposed project site. Therefore, additional information should be provided as necessary.

Q31.i.i Was a seasonal water table evaluation performed for the wet pond location? As per the Pennsylvania Stormwater Best Management Practices Manual, Appendix C, Protocol 2, a 2-foot clearance should be maintained between the bottom of the proposed BMP where infiltration is to occur and any limiting zone (mottling, seasonally high water table, bedrock, etc.). The proposed BMP has the potential to have an inadequate distance as specified by the manual. Please provide testing/documentation that shows an adequate distance exists or revise the BMP as required.

Response: Refer to the response to Comment 21.c.ii.

Q31.i.ii. Please provide safety benches as detailed in the BMP manual. Please revise the detention basin to include them and provide details on the PCSM plan.

Response: Based on a site investigation, the proposed wet pond has been revised to an infiltration basin in accordance with Chapter 6.4.2 of the Stormwater BMP Manual. Safety benches are not a requirement for infiltration basins.

Q31.i.iii. The emergency spillway construction detail on PCSM Sheet 9 notes a bottom width of 5 feet for the spillway. The PA E&S Manual recommends a minimum bottom width of 8 feet. Please justify or revise.

Response: The spillway detail on Sheet 9, Worksheet 13, and all applicable calculations have been revised to show a bottom width of 8 feet for the emergency spillway.

Q31.i.iv. The plan does not mention a 25-foot buffer. The buffer enhances habitat value, water temperature, pond health and should be planted with trees, shrubs and, native ground cover.

Response: The proposed wet pond has been revised to an infiltration basin in accordance with Chapter 6.4.2 of the Stormwater BMP Manual. A 25-foot buffer is not a requirement for infiltration basins.

Q31.i.v. Please define major storm events for wet pond maintenance. PA Stormwater BMP manual defines it as greater than 2 inches in 24 hours.

Response: The maintenance requirement for the infiltration basin includes the requirement for inspections after each rainfall event greater that 2-inches in 24-hours, and a minimum of 2 inspections per year.

Q31.j. The proposed NS BMP Minimize Total Disturbed Area – Grading has several deficiencies. This BMP intends to reduce site grading, removal of existing vegetation, total soil disturbance, and design to the site topography. Special value and environmentally sensitive features are identified and avoided to eliminate the need for vegetation re-establishment. Typically, these areas are located within or adjacent to the “disturbed areas” on the site:

Q31.j.i. All protected areas should be located, clearly delineated, and labeled on the PCSM plan and may either be located within the limit of disturbance or a reasonable and justifiable distance between the limit of disturbance and the NPDES boundary. Please provide.

Response: Refer to response to Comment 31.j.v below.

Q31.j.ii. The notation has not been provided on the PCSM plan that these areas are not to be subject to grading or movement of existing soils. Please provide.

Response: Refer to response to Comment 31.j.v below.

Q31.j.iii. The notation has not been provided on the PCSM plan to have these areas delineated in the field and protected before construction. Please provide.

Response: Refer to response to Comment 31.j.v below.

Q31.j.iv. The notation has not been provided on the PCSM plan to allow pruning, required maintenance, or additional planting of native vegetation. Please provide.

Response: Refer to response to Comment 31.j.v below.

Q31.j.v. Overall, more specifics are needed for this BMP. Please refer to the Pennsylvania Stormwater Best Management Practices Manual, December 30, 2006, Chapter 5, Minimize Total Disturbed Area, and the checklists in Chapter 8 for design criteria to provide site-specific details for how this BMP will be utilized.

Response: The E&S and PCSM plan drawings have been revised to provide additional requirements to meet this BMP. Justification for use of this BMP has been added to Appendix C of the PCSM Report. The revisions to the plan drawings include establishing a grading limit and a note to minimize topsoil stripping, removal of vegetation, and soil compaction outside of these limits. The recommended note regarding pruning and planting native vegetation has been added to Sheets 10 and 11.

Q31.k. Please include details for BMP Re-vegetate Disturbed Areas, Using Native Species in PCSM Maintenance notes. Details may include inspection of vegetative health, necessary mowing, removal of weeds/invasive species, and reseeding as necessary.

Response: Maintenance requirement for this BMP have been added to Sheet 13.

Question 32. 102.8(g) Stormwater Analysis

Q32.a. Worksheet 5 for Drury Run North does not appear to have the correct numbers for the Berm area and volume removed. The numbers in the worksheet for BMP 6.4.10 Infiltration Berm & Retentive Grading do not match Worksheet 5.

Response: Worksheet 5 has been revised.

MLV-1

Question 33. §102.8(f)(9) Plan Drawings

Q33.a. The proposed BMP 'vegetated swales' has several deficiencies:

Q33.a.i. Please add Construction detail for vegetated swales to PCSM plans.

Response: The construction detail for vegetated swales have been added to the PCSM plans where required.

Q33.a.ii. Please include vegetated swales in the construction sequence.

Response: Vegetated swales have been included in PCSM Narrative for all project sites that include a swale. This sequence has also been updated in the PCSM plans.

Q33.a.iii. Please clarify if check dams will be installed within Vegetated Swales. Check dams are mentioned in the PCSM Plan Maintenance section, but not elsewhere. If provided, please document materials and interval spacing

Response: Check dams are not required for this vegetated swale. The swale is designed to have a slope of 3%. The reference to the check dams in the inspection and maintenance portion of the PCSM Narrative have been removed.

Q33.a.iv. Soil Limitations for swales include a poor source of topsoil and easily erodible. The Low Fertility resolution references Table 11-3 for appropriate vegetation, however, this table is not included in the plan.

Response: Table 11-3 has been included in the PCSM plan set.

Q33.a.v. Channel worksheets have a swale bottom width of 0.0 feet. The PA Stormwater BMP manual recommends a parabolic or trapezoidal shape with a bottom width from 2 to 8 feet. The vegetated swale is checked for water quality on Worksheet 10. Please clarify the design.

Response: The bed bottom width has been updated to be 2 feet for all vegetated swales to qualify as a water quality BMP. Worksheet 10 and the swale sizing calculations in the PCSM Narrative have been updated.

Q33.a.b. Please include details on the PCSM Plan in the Maintenance and Inspection notes for the BMP Landscape restoration, such as inspection, remove weeds/invasive species, reseed, and mow as necessary. The PA Stormwater BMP Manual clarifies that this BMP is not, "no maintenance." Additionally, a soil amendment may be necessary for landscape restoration, due to soil limitations.

Response: Maintenance and inspection notes addressing these items have been added to the PCSM Plan.

MLV-2

Question 34. §102.8(f)(9) Plan Drawings

Q34.a. The PCSM Construction Sequence does not provide details on the inlet box. Please include this in the sequence and clarify that it will be inspected by the engineer.

Response: Sequence of construction updated to include installation and inspection of installed inlet in the PCSM Narrative.

Q34.b. Please note – the soil at this location has a corrosive to concrete limitation and will need to be addressed for the concrete inlet box.

Response: Inlet box detail has notes added to the detail about corrosive soils.

Q34.c. Please add an inspection of the inlet box to PCSM Maintenance and Inspection Notes on Sheet 07.

Response: Inlet box inspection and installation have been added to the inspection notes.

Q34.d. Please confirm inlet design, specifically from drain to trench. Box invert elevation is 1511, while the bottom of the stone trench is 1511.50. Additionally, PCSM Sheet 03 has the Inlet Invert elevation at 1511.33', while PCSM Sheet 04 has the Inlet Invert elevation at 1511'. Please clarify.

Response: Inlet bottom, pipe invert and bed bottom have been updated to match.

Q34.e. Please clarify if check dams will be added to the vegetated swale. They are only referred to in the maintenance section. If utilized, please include information on materials and spacing.

Response: Check dams are not required for this vegetated swale. The swale is designed to have a slope of 3%. The reference to the check dams in the inspection and maintenance portion of the PCSM Narrative have been removed.

Q34.f. Please include details on the PCSM Plan in the Maintenance and Inspection notes for the BMP Landscape restoration, such as inspection, remove weeds/invasive species, reseed, and mow as necessary. The PA Stormwater BMP Manual clarifies that this BMP is not, "no maintenance." Additionally, a soil amendment may be necessary for landscape restoration, due to soil limitations.

Response: Maintenance and inspection notes have been added to the PCSM Plan.

Question 35. §102.8(g) Stormwater Analysis

Q35.a. Appendix A, Rainfall Data, does not contain any information. Please revise

Response: Rainfall Data has been included in Appendix A.

MLV-3

Question 36. §102.8(f)(9) Plan Drawings

Q36.a. The dimensions of the infiltration trench shown on the PCSM Plan Drawing Sheet 04 do not line up with the contour area for the Pond Report in the PCSM Report. Please clarify.

Response: Infiltration trench contours updated to match dimensions on plan. The intention was to have a trench under the pad as well as under the driveway access. The model has been updated to include the trench under on the pad area and an inlet has been extended to capture the runoff from the driveway area.

Q36.b. Please include details on the PCSM Plan in the Maintenance and Inspection notes for the BMP Landscape restoration, such as inspection, remove weeds/invasive species, reseed, and mow as necessary. The PA Stormwater BMP Manual clarifies that this BMP is not, "no maintenance." Additionally, a

soil amendment may be necessary for landscape restoration, due to soil limitations.

Response: Maintenance and inspection notes have been added to the PCSM Plan.

Question 37.

Q37.a. On Worksheet 7, the Total Impervious Area is listed as 0.271 acres. This appears to be a typo. Please correct.

Response: Impervious area type on Worksheet 7 has been corrected.

MLV-4

Question 38. 102.8(f)(9) Plan Drawings

Q38.a. In the PCSM Plan, Sheets 03 and 04 have the Flow arrow pointing upgradient. Please revise.

Response: Flow arrows have been updated to flow in the correct direction.

Q38.b. The dimensions of the infiltration trench shown on PCSM Plan Sheet 03 do not line up with the contour area for the Pond Report in the PCSM Report. Additionally, since the MLV has a steep angle, please ensure the infiltration bed dimensions are specific to bed, and not MLV surface area. Please clarify.

Response: Infiltration trench contours updated to match dimensions on plan. The intention was to have a trench under the pad as well as under the driveway access. In order to more accurately depict this, the single trench was broken up into two trenches. Each trench has its own pond in the model as well as a callout in the plans. The combined trenches are shown in the PCSM Narrative tables to meet Stormwater Requirements. An inlet at the bottom of the gravel driveway was added to collect runoff from the driveway and convey the runoff to the second infiltration trench.

Q38.c. The proposed BMP vegetated swale has several deficiencies:

Q38.c.i. Maintenance and Inspection notes mention inspecting check dams for the vegetated swale, however, check dams are not included in sequence or BMP description. Please clarify if the check dams are planned. If utilized, include material for dams and spacing.

Response: Maintenance and inspection notes and details have been added to the PCSM Plan

Q38.c.ii. Note – check dams are recommended for slopes greater than 3%.

Response: Check dams were added to this site as the swale has been designed to be at a 6% slope. Spacing calculations can be found within the calculations section of the PCSM Narrative.

Q38.c.iii. Please add the vegetated swale to Construction Sequence.

Response: Vegetated swales included in PCSM Narrative for all project sites that include a swale. This sequence has also been updated in the PCSM plans.

Q38.d. Please include details on the PCSM Plan in the Maintenance and Inspection notes for the BMP Landscape restoration, such as inspection, remove weeds/invasive species, reseed, and mow as necessary. The PA Stormwater BMP Manual clarifies that this BMP is not, "no maintenance."

Response: Maintenance and inspection notes have been added to the PCSM Plan.

ATTACHMENTS

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Attachment A: Riparian Buffer Management and Maintenance Plan

This attachment has been provided in response to Comment Q1.a.v.

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Attachment B: Wetland 125 Site Photographs

This attachment has been provided in response to Comment Q6.m.

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National Fuel Gas Supply Corp. - FM100 Project YM58
Representative Wetland Plot Photographs
Wetland 125 Revisited July 31, 2020

Picture 1: Wetland 125 TMM_S DATE: 7/31/2020

Picture 2: Wetland 125 TMM_N DATE: 7/31/2020

Attachment C: Unanticipated Discovery of Contaminated Materials Plan

This attachment has been provided in response to Comment Q10.a.

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MOTT MACDONALD

National Fuel

FM100 Project

Appendix 12-B: Unanticipated Discovery of Contaminated Materials Plan

July 2019

PF17-10-000: Public

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Murray, UT 84107

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Corporation
1100 State Street
Erie, PA 16501

FM100 Project

Appendix 12-B: Unanticipated Discovery of Contaminated Materials Plan

July 2019

PF17-10-000: Public

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Attachment 12.B-1: Unanticipated Discovery of Contaminated Materials Documentation Form 5

Acronyms

National Fuel	National Fuel Gas Supply Corporation
Plan	Unanticipated Discovery of Contaminated Materials Plan
Project	FM100 Project

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Unanticipated Discovery of Contaminated Materials Plan

1.1 Introduction

The purpose of this Unanticipated Discovery of Contaminated Materials Plan (Plan) is to provide work, investigation and reporting procedures for responding to the unanticipated discovery of contamination in soil, groundwater or sediment during work activities associated with the FM100 Project (Project).

Consistent with this purpose, the objectives of this Plan are to protect the health and safety of project personnel and the environment and to prevent the spread of contamination during and after an unanticipated discovery of contaminated materials.

The greatest potential for the discovery of unanticipated contaminated materials will occur during excavation activities at work sites. If any project personnel detect potential contamination such as:

- Odor;
- Visible staining on soil;
- Sheen on ground or purge water; and
- Unidentified underground service tank;

the following response plan will be executed.

1.2 Unanticipated Discovery Response Plan

The following describes the action that will be implemented upon discovery of potential contamination:

1.2.1 Initial Response

- Suspend all Work Activities: All work in the immediate area of the discovery shall stop. Personnel shall move to upwind areas as necessary.
- Identify Immediate Threats: If an immediate threat is detected, emergency response (i.e., 911) shall be notified. The area shall be evacuated.
- Secure the Area: If safe to do so, the area immediately around the potential contamination shall be secured with safety fencing or flagging. Site personnel shall remain onsite to restrict access as appropriate.

1.2.2 Conduct Notifications

The National Fuel Gas Supply Corporation (National Fuel) environmental manager shall be notified of the potential contamination. It shall be the decision of the National Fuel environmental manager to determine environmental agency or public official notification requirements.

1.2.3 Document

An appropriate National Fuel employee or designee will document the unanticipated contamination utilizing Attachment 12.B-1; which includes instructions to record the site name, locations, and how suspected contamination was determined. The National Fuel employee or designee will coordinate with the construction crew(s) who identified the contamination to assist in completing Attachment 12.B-1.

1.2.4 Remedial Action Planning

An onsite meeting (if appropriate) will be conducted among site personnel, National Fuel environmental professionals, and any appropriate contamination response contractors to determine remediation requirements and methodologies. Remedial activities should be conducted according to the following general sequence of events; however, a more robust, site-specific remedial action plan may apply depending on the complexity of the recommended remedial actions.

- Step 1 – Sampling: Representative samples should be collected and submitted to an environmental laboratory for analysis and/or waste classification. Results of this analysis may dictate notification requirements.
- Step 2 – Remedial Action Determination: Following laboratory analysis, the National Fuel environmental representative will evaluate the analysis results and, if appropriate, identify the type of remediation (in-situ, removal, etc.) to be completed.
- Step 3 – Remedial Action: National Fuel will mobilize an appropriate contractor and remediation activities will be conducted. Any soil and/or groundwater suspected of containing contamination will be segregated from clean soil and/or water using plastic sheets, fractionation tanks, or other appropriate methodologies. Containers will be clearly labeled. Known hazardous wastes will be labeled and separated with orange construction fencing.
- Step 4 – Disposal: Wastes will be disposed of properly at a permitted facility. National Fuel environmental professional will determine disposal requirements.

1.2.5 Record Keeping

A record of the sequence of events from the beginning (unanticipated discovery) to the end (disposal) of the incident will be recorded and kept on file with the National Fuel environmental manager in accordance with all mandated record keeping requirements.

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Attachments

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Attachment 12.B-1: Unanticipated Discovery of Contaminated Materials Documentation Form

Instructions: Complete this worksheet to document any unanticipated discoveries of contamination. Use a separate form for each occurrence.

1. Site name and physical location of potential contamination at the site.

2. How suspected contamination was determined (e.g., odor, stain, sheen, etc.); include photographs.

3. List dates, time identified and reported to National Fuel environmental scientist, personnel present at the time of identification, and officials notified.

4. Describe actions taken.

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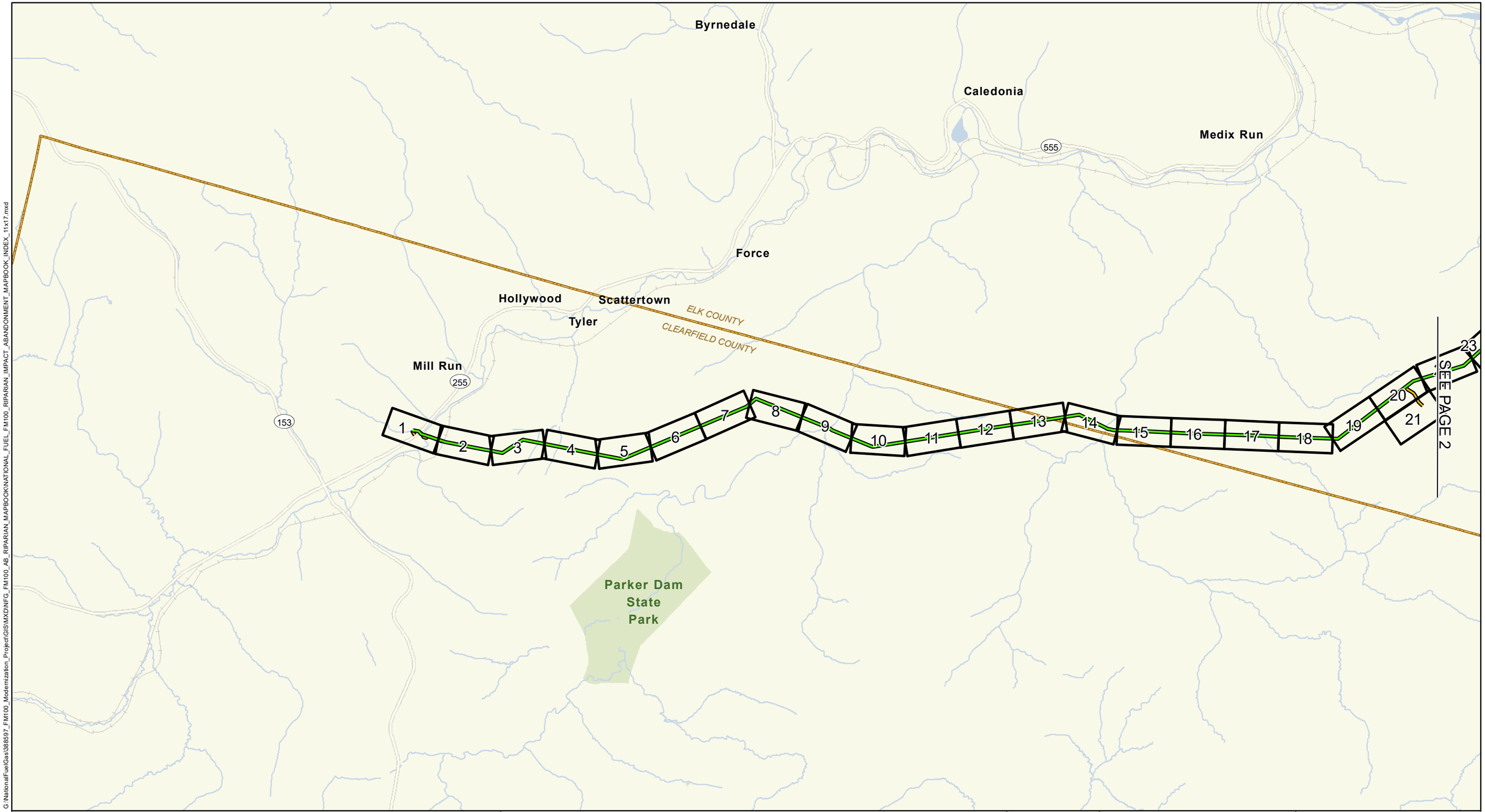

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EXISTING PIPELINE
ACCESS ROAD
MAJOR HIGHWAY
HIGHWAY
WATERBODY
CITY AREA
PARKS
COUNTY BOUNDARY

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDOMENT PROJECT
RIPARIAN RESTORATION INDEX
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National Fuel SUPPLY CORPORATION

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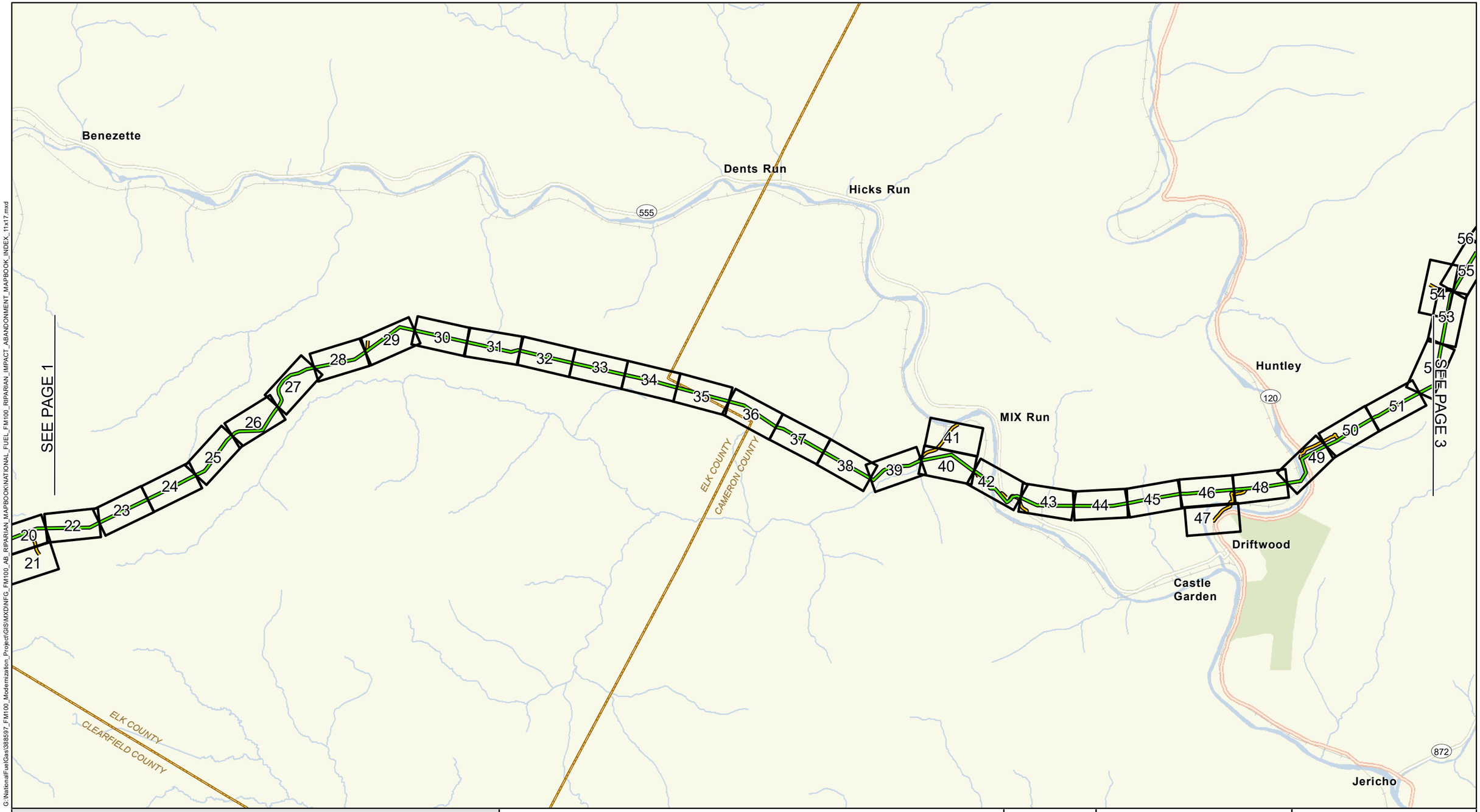

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- EXISTING PIPELINE
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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDOMENT PROJECT
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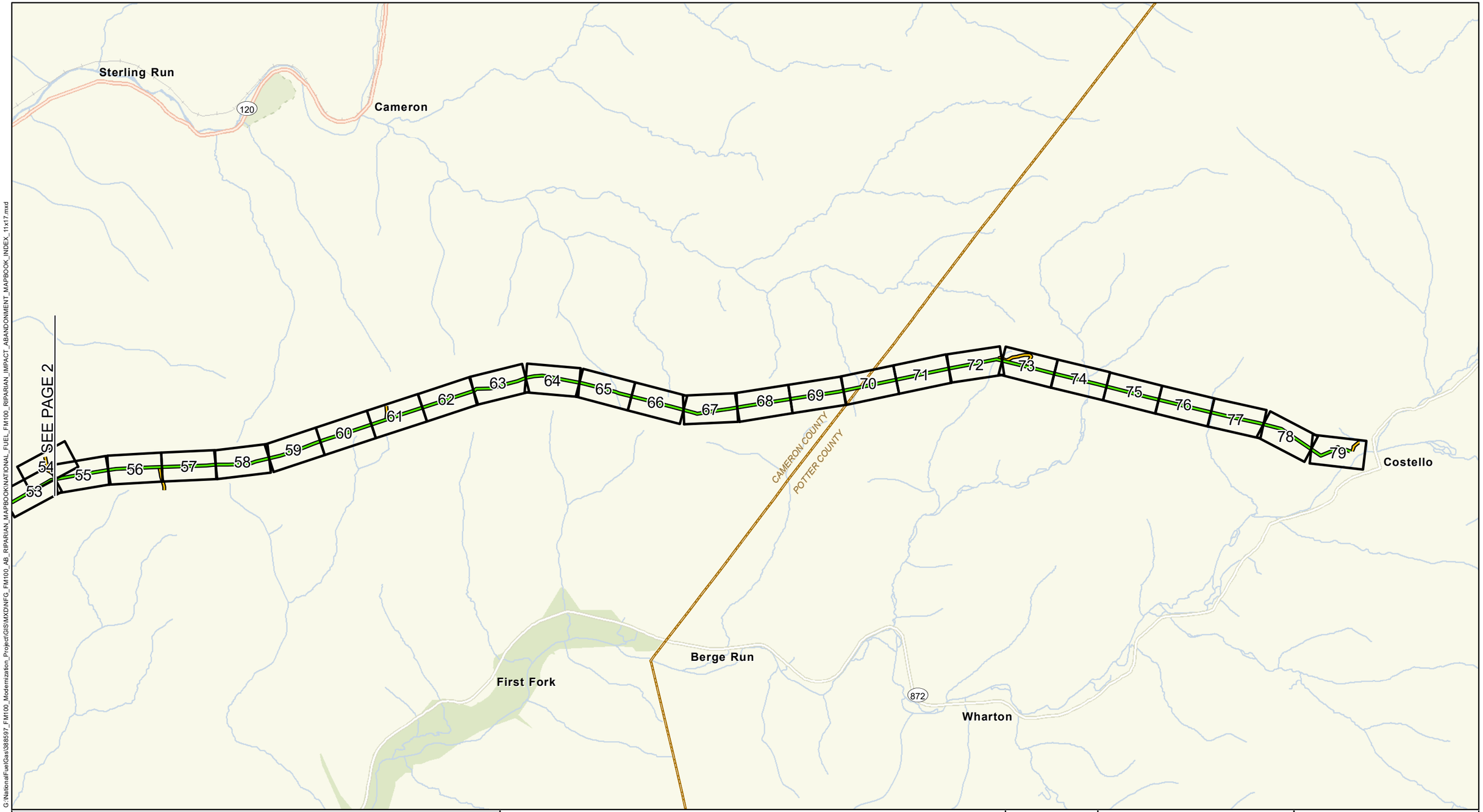

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30.0% *PANICUM CLANDESTINUM, 'TIOGA'* (DEERTONGUE, 'TIOGA')
20.0% *ELYMUS VIRGINICUS, PA ECOTYPE* (VIRGINIA WILDRYE, PA ECOTYPE)
11.8% *ANDROPOGON GERARDII, 'NIAGARA'* (BIG BLUESTEM, 'NIAGARA')
10.5% *SORGHASTRUM NUTANS, NY4 ECOTYPE* (INDIANGRASS, NY4 ECOTYPE)
5.0% *PANICUM VIRGATUM, 'SHELTER'* (SWITCHGRASS, 'SHELTER')
4.0% *CHAMAECRISTA FASCICULATA, PA ECOTYPE* (PARTRIDGE PEA, PA ECOTYPE)
4.0% *VERBENA HASTATA, PA ECOTYPE* (BLUE VERVAIN, PA ECOTYPE)
3.0% *JUNCUS EFFUSUS* (SOFT RUSH)
3.0% *RUDBECKIA HIRTA, COASTAL PLAIN NC ECOTYPE* (BLACKEYED SUSAN, □□□□□□□ □□□IN N□ E□□□□E□
2.0% *HELIOPSIS HELIANTHOIDES, PA ECOTYPE* (OXEYE SUNFLOWER, PA ECOTYPE)
1.0% *ASCLEPIAS INCARNATA, PA ECOTYPE* (SWAMP MILKWEED, PA ECOTYPE)
0.7% *ASTER NOVAE-ANGLIAE, PA ECOTYPE* (NEW ENGLAND ASTER, PA ECOTYPE)
0.7% *ASTER UMBELLATUS, PA ECOTYPE* (FLAT TOPPED WHITE ASTER, PA E□□□□E□
0.7% *EUPATORIUM PERFOLIATUM, PA ECOTYPE* (BONESET, PA ECOTYPE)
0.5% *AGROSTIS PERENNANS, ALBANY PINE BUSH-NY ECOTYPE* (AUTUMN □EN□GR□□□□
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0.5% *HELENIUM AUTUMNALE, PA ECOTYPE* (COMMON SNEEZEWEED, PA ECOTYPE)
0.5% *MONARDA FISTULOSA, FORT INDIANTOWN GAP-PA ECOTYPE* (WILD □ERG□M□□□F□R□ IN□I□N□□□ N G□□□□□ E□□□□E□
0.5% *VERNONIA NOVEBORACENSIS, PA ECOTYPE* (NEW YORK IRONWEED, PA E□□ □□□E□
0.4% *PYCNANTHEMUM TENUIFOLIUM* (NARROWLEAF MOUNTAINMINT)
0.4% *SOLIDAGO PATULA, PA ECOTYPE* (ROUGHLEAF GOLDENROD, PA ECOTYPE)
0.3% *EUPATORIUM FISTULOSUM, PA ECOTYPE* (JOE PYE WEED, PA ECOTYPE)
0.3% *LOBELIA SIPHILITICA, PA ECOTYPE* (GREAT BLUE LOBELIA, PA ECOTYPE)
0.2% *ASTER PUNICEUS, PA ECOTYPE* (PURPLESTEM ASTER, PA ECOTYPE)

TREE AN□ S□R□□ SPECIES □OR RIPARIAN REP□ANTIN□

	Species	Height (feet)/caliper	Wildlife Functions	Flood Tolerance
Shrubs/Small Trees				
	Mountain Laurel (*Kalmia latifolia*)	4 - 6	high value-browse and cover	intolerant
	Hombeam (*Carpinus caroliniana*)	35	food source-buds, seeds, leaves	intolerant
	Flowering Dogwood (Cornus florida)	35	food source	intolerant
	Witchhazel (*Hamamelis virginiana*)		Toxic to some	intolerant
	Winterberry (Ilex verticillata)	4 - 7	food source	intolerant
	Northern Arrowwood (*Viburnum recognitum*)	5-7	food source- fruit, flowers	tolerant
Trees				
	American beech (*Fagus grandifolia*)	75+/2-inch	food source- nuts	very intolerant
	Black birch (*Betula lenta*)	50+/2-inch	food source-buds, seeds, leaves	intolerant
	Red Maple (*Acer rubrum*)	75+/2-inch	food source and browse	tolerant
	Northern red oak (*Quercus rubra*)	75+/2-inch	nesting and food source- mast	medium tolerance
	Black willow (*Salix nigra*)	35 – 50/ 2-inch	food source-buds, fruit, twigs	very tolerant
	Elm (Ulmus spp.)	50 - 70+/ 2-inch	food source-seeds, twigs	tolerant

Source: Riparian Forest Buffer Guidance, Document Number 3945600-001

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National Fuel SUPPLY CORPORATION

M M MOTT MACDONALD

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDOMENT PROJECT
RIPARIAN RESTORATION
GENERAL NOTES

DRAWN BY:	MC 09/2020
CHECKED BY:	KEK 09/2020
APPROVED BY:	MJD 09/2020
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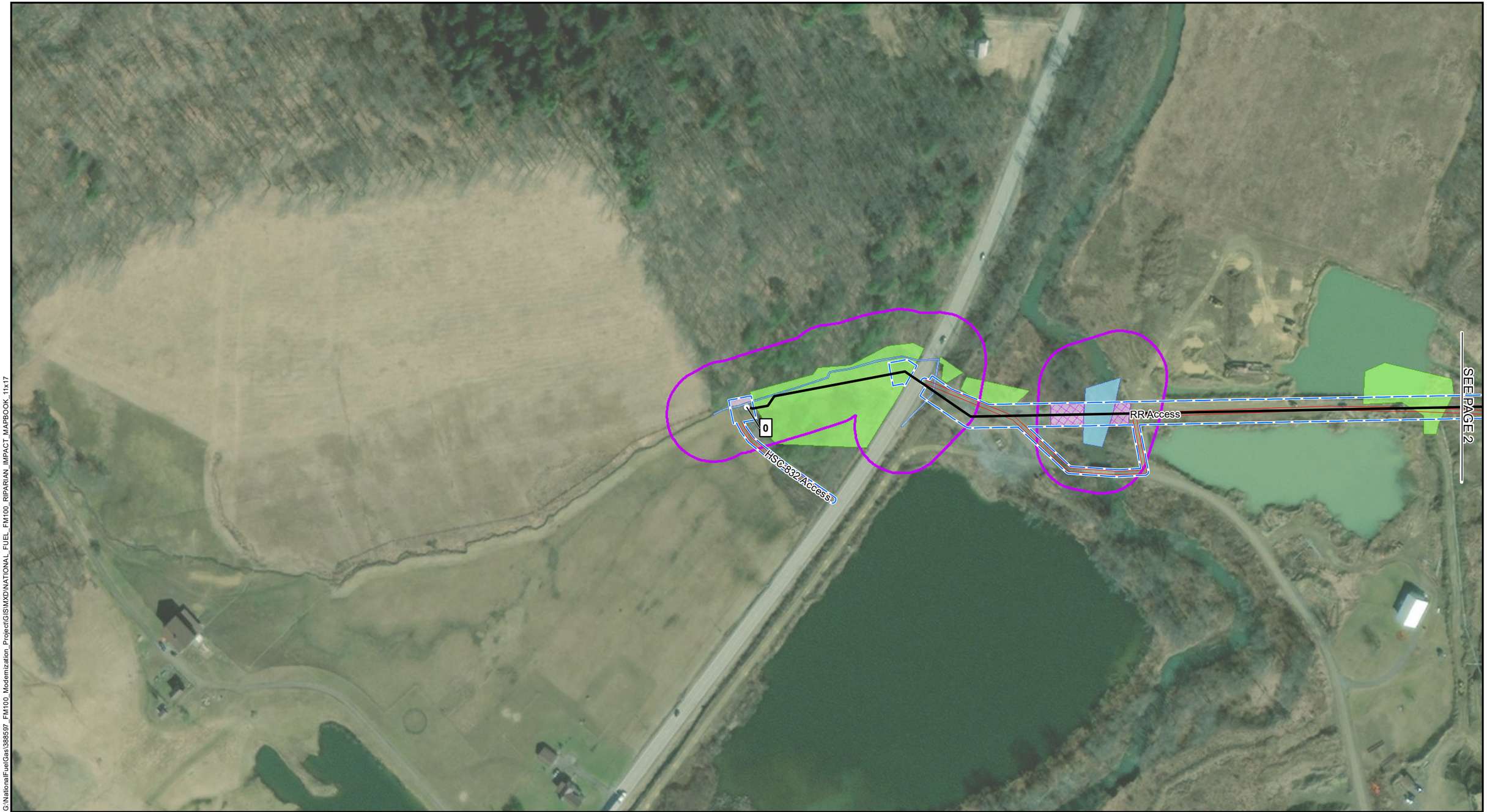

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- 1 MILE POST
- EXISTING PIPELINE
- ACCESS ROAD
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- DELINEATED WATERBODY
- DELINEATED WETLAND
- RIPARIAN BUFFER
- RIPARIAN SEEDING
- RIPARIAN PLANTING
- COUNTY BOUNDARY

NOTES:
1) MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY.

NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 ABANDONMENT PROJECT

RIPARIAN RESTORATION MAP

CLEARFIELD, COUNTY

200 100 0 200 400 FEET

N W E S

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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1 MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
ACCESS ROAD	RIPARIAN PLANTING
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FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

200 100 0 200 400 FEET

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CLEARFIELD, COUNTY

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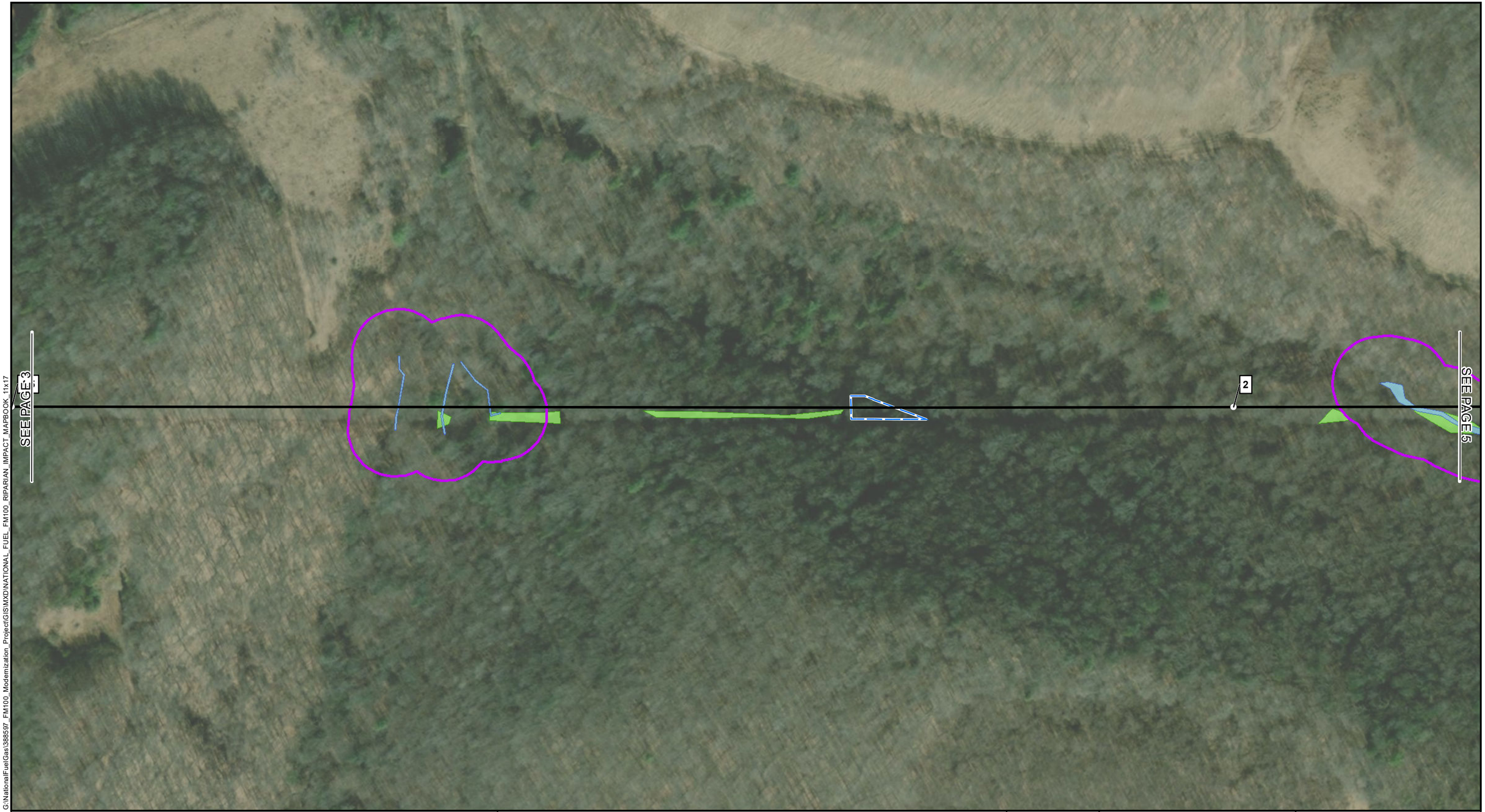

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CLEARFIELD, COUNTY

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

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NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 ABANDONMENT PROJECT

RIPARIAN RESTORATION MAP

CLEARFIELD, COUNTY

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FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

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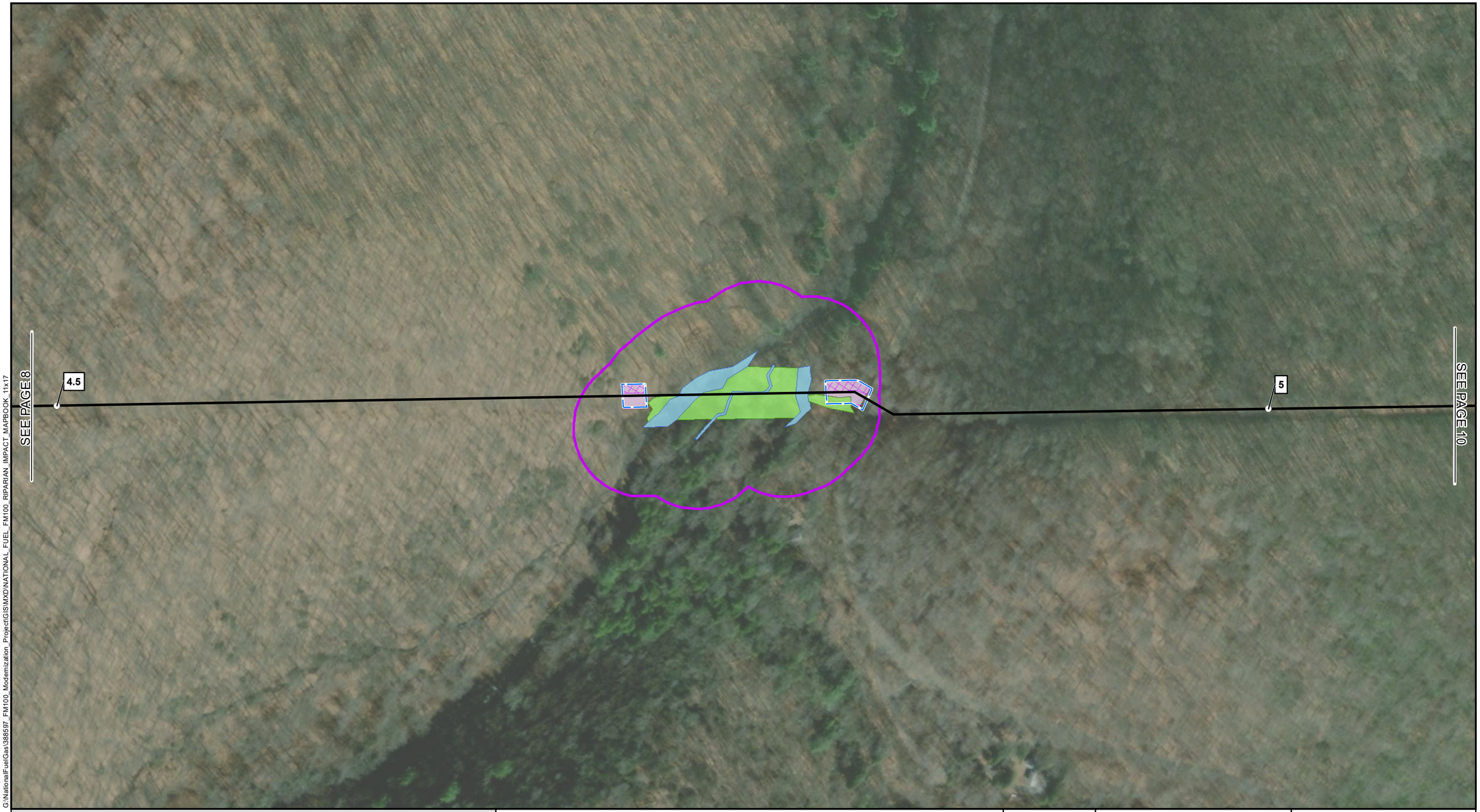

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1 MILE POST	RIPARIAN BUFFER
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FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

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1 MILE POST	RIPARIAN BUFFER
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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

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National Fuel SUPPLY CORPORATION

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NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 ABANDONMENT PROJECT

RIPARIAN RESTORATION MAP

CLEARFIELD, COUNTY

200 100 0 200 400 FEET

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

200 100 0 200 400 FEET

N W E S

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National Fuel SUPPLY CORPORATION

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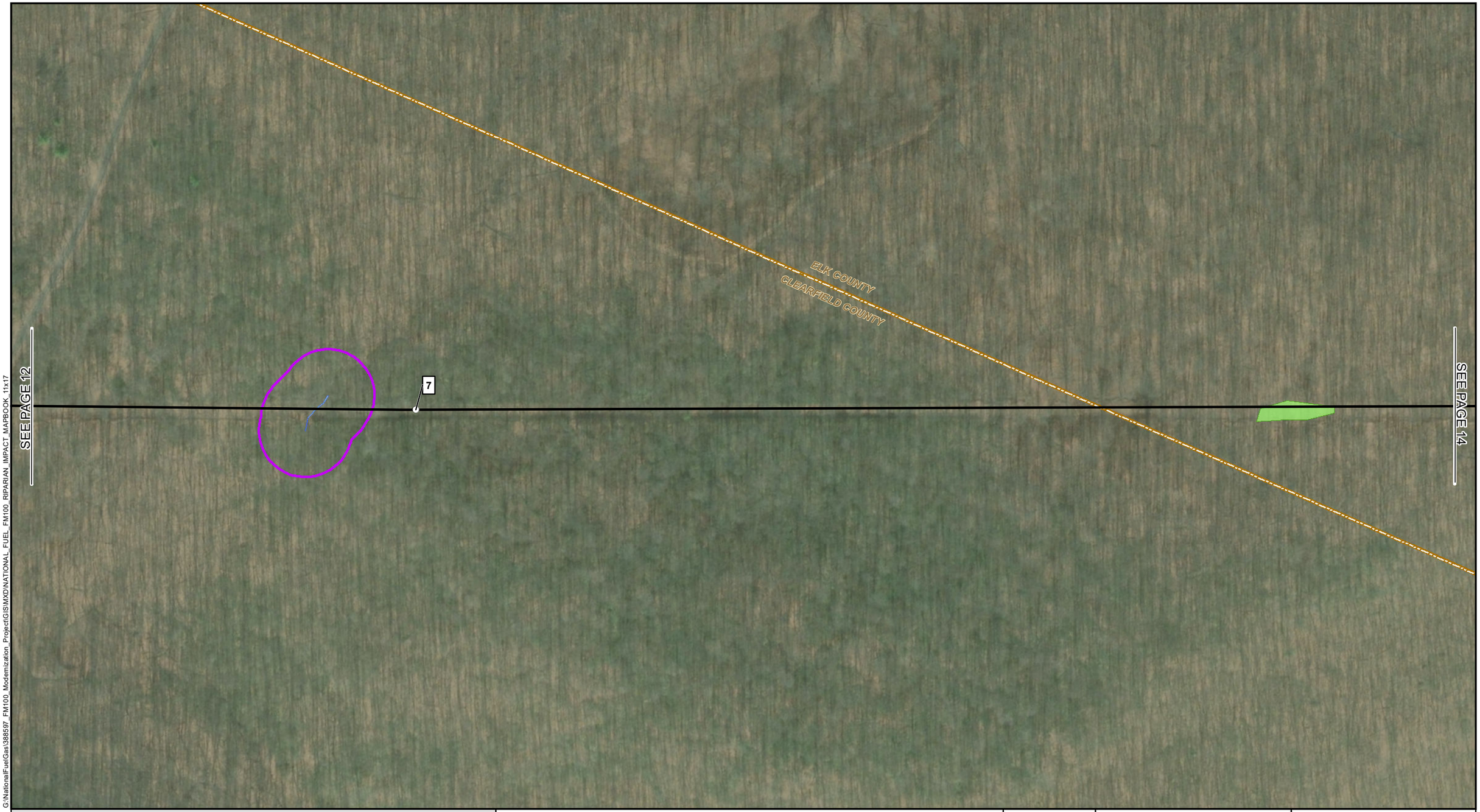

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CLEARFIELD, COUNTY

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
ELK, COUNTY

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RIPARIAN RESTORATION MAP
ELK, COUNTY

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ELK, COUNTY

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N W E S

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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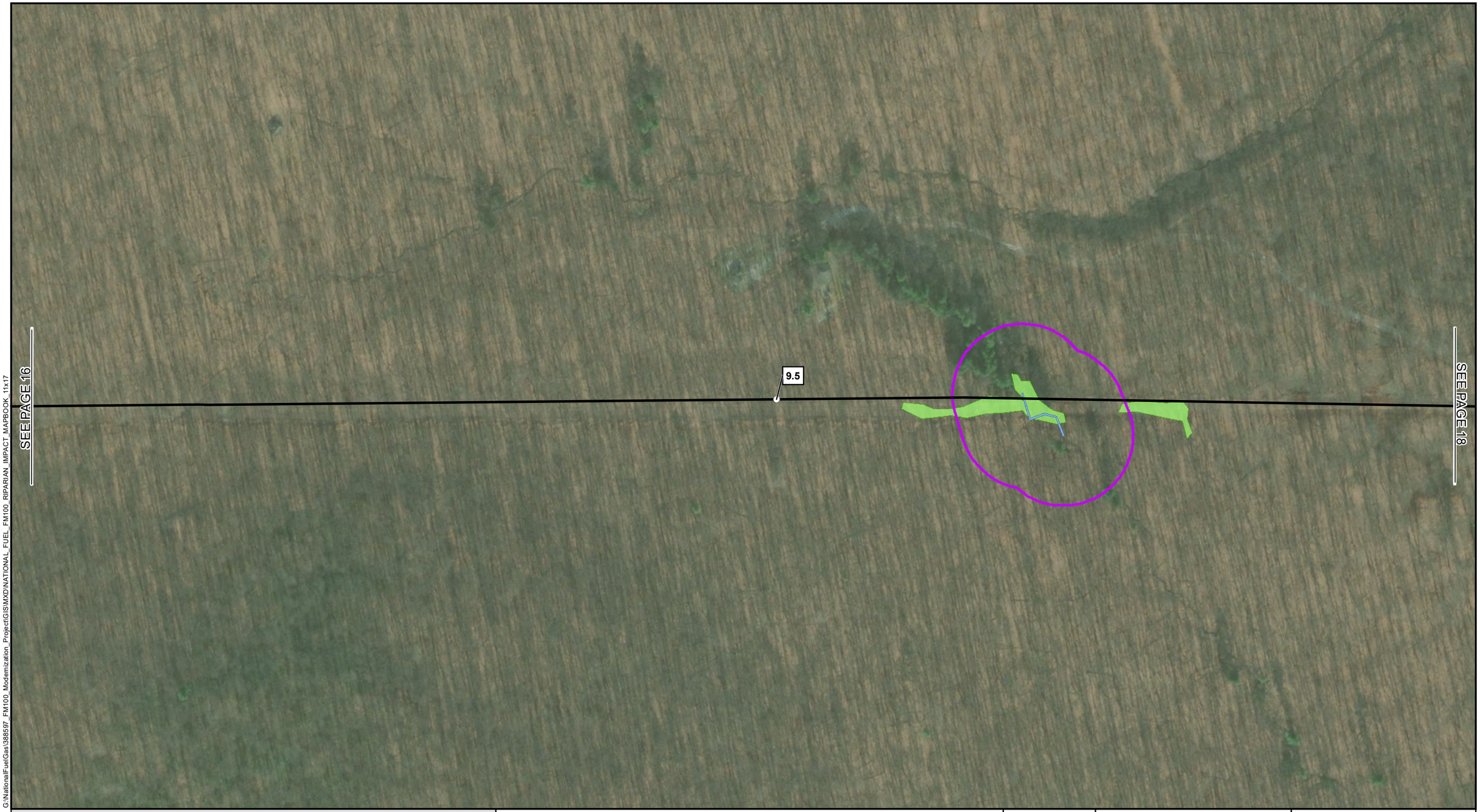

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- 1 MILE POST
- EXISTING PIPELINE
- ACCESS ROAD
- LIMITS OF DISTURBANCE
- DELINEATED WATERBODY
- DELINEATED WETLAND
- RIPARIAN BUFFER
- RIPARIAN SEEDING
- RIPARIAN PLANTING
- COUNTY BOUNDARY

NOTES:
1) MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY.

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
ELK, COUNTY

200 100 0 200 400 FEET

N W E S

ABSOLUTE SCALE: 1:2,400

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FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
ELK, COUNTY

200 100 0 200 400 FEET

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RIPARIAN RESTORATION MAP
ELK, COUNTY

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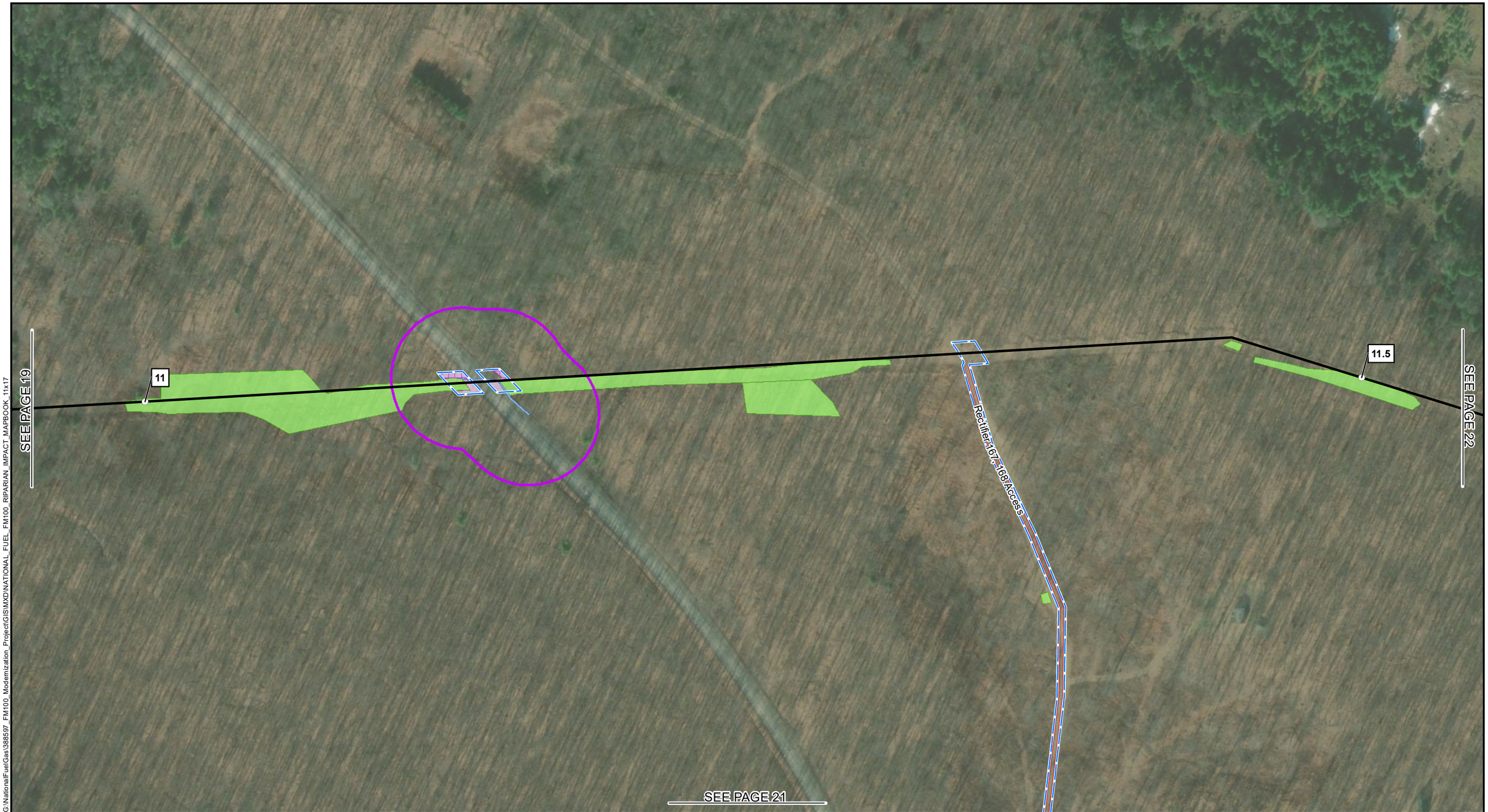

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1 MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
ACCESS ROAD	RIPARIAN PLANTING
LIMITS OF DISTURBANCE	COUNTY BOUNDARY
DELINEATED WATERBODY	
DELINEATED WETLAND	

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RIPARIAN RESTORATION MAP
ELK, COUNTY

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MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
ACCESS ROAD	RIPARIAN PLANTING
LIMITS OF DISTURBANCE	COUNTY BOUNDARY
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ELK, COUNTY

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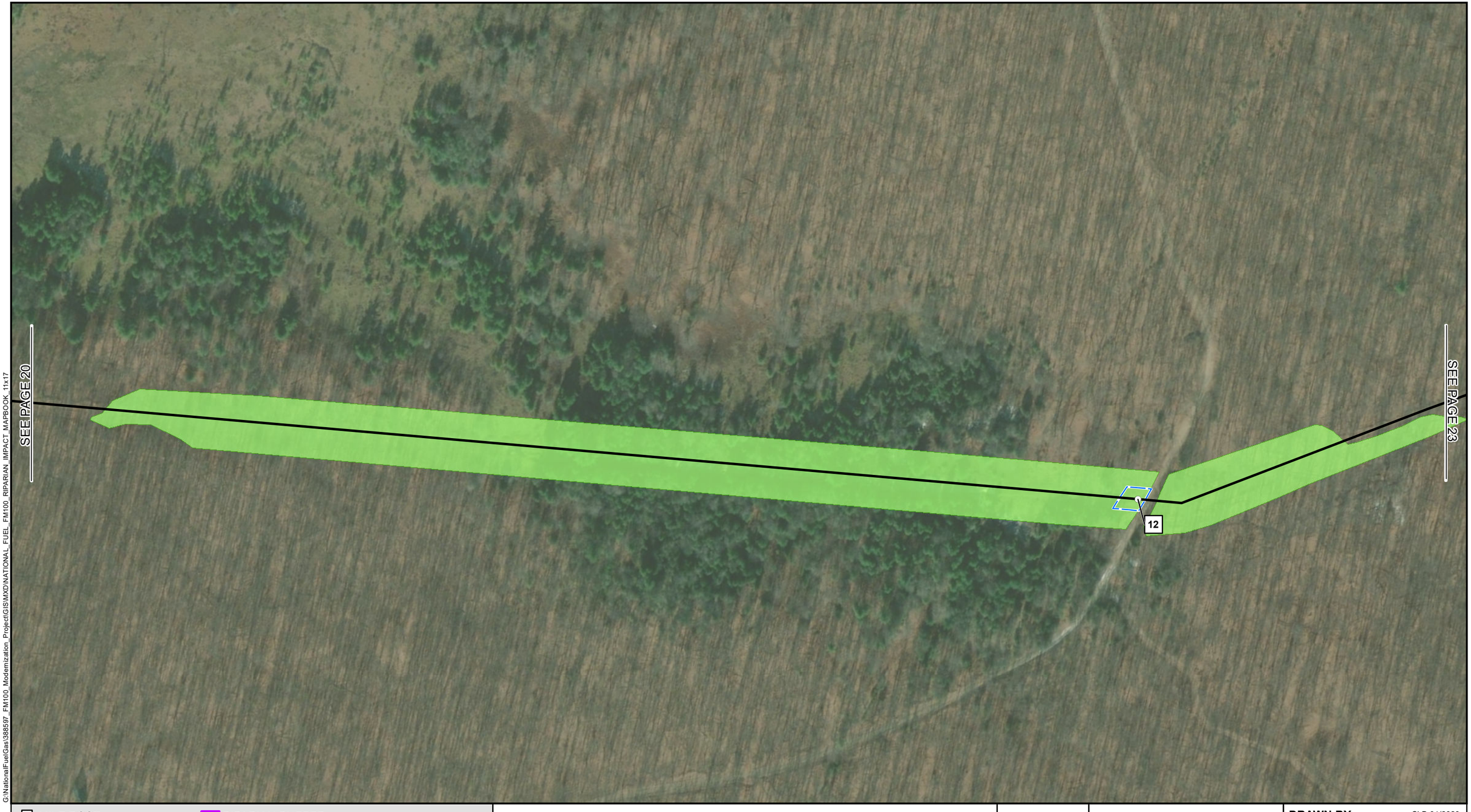

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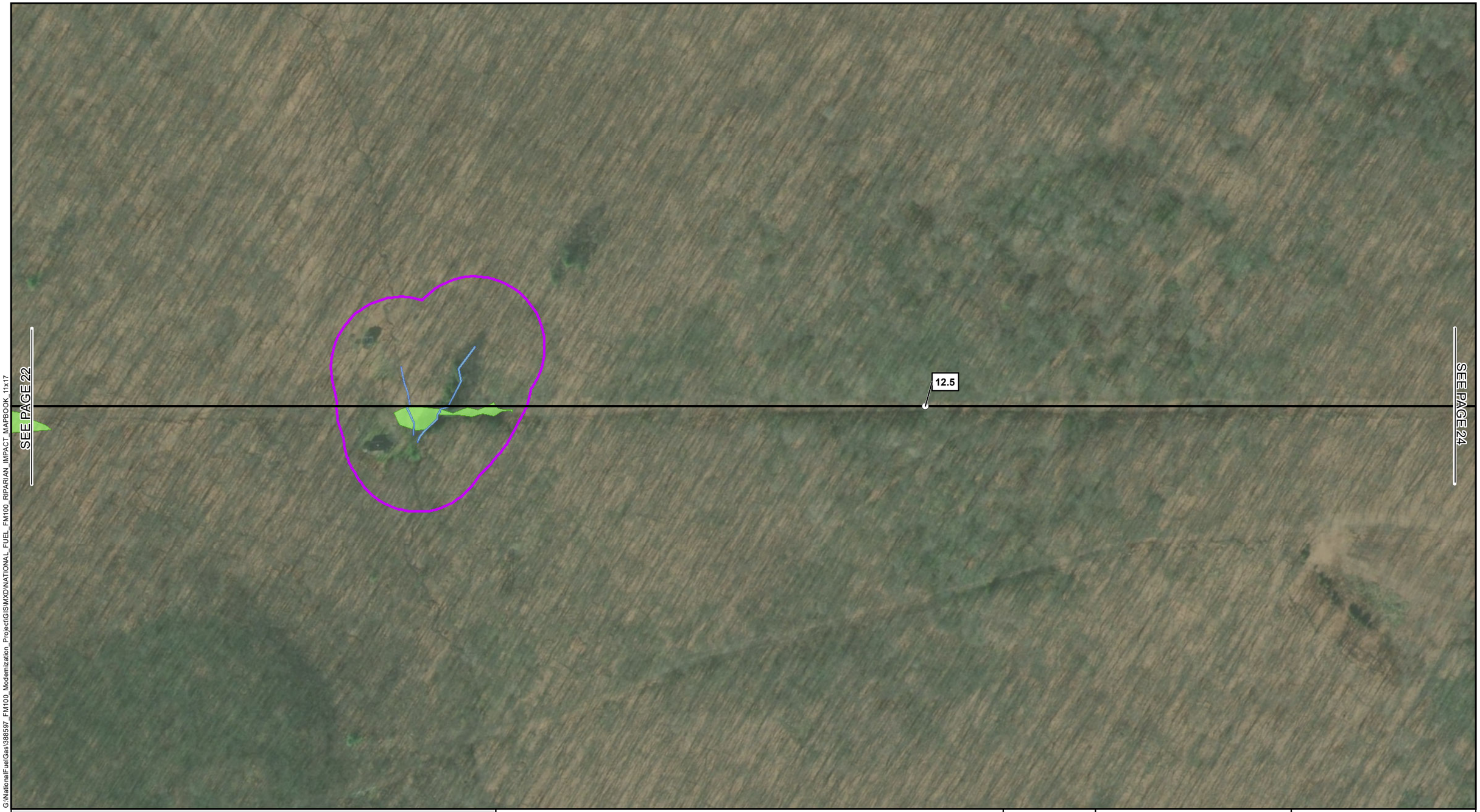

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FM100 ABANDONMENT PROJECT

RIPARIAN RESTORATION MAP

ELK, COUNTY

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RIPARIAN RESTORATION MAP
ELK, COUNTY

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RIPARIAN RESTORATION MAP
ELK, COUNTY

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1 MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
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RIPARIAN RESTORATION MAP
ELK, COUNTY

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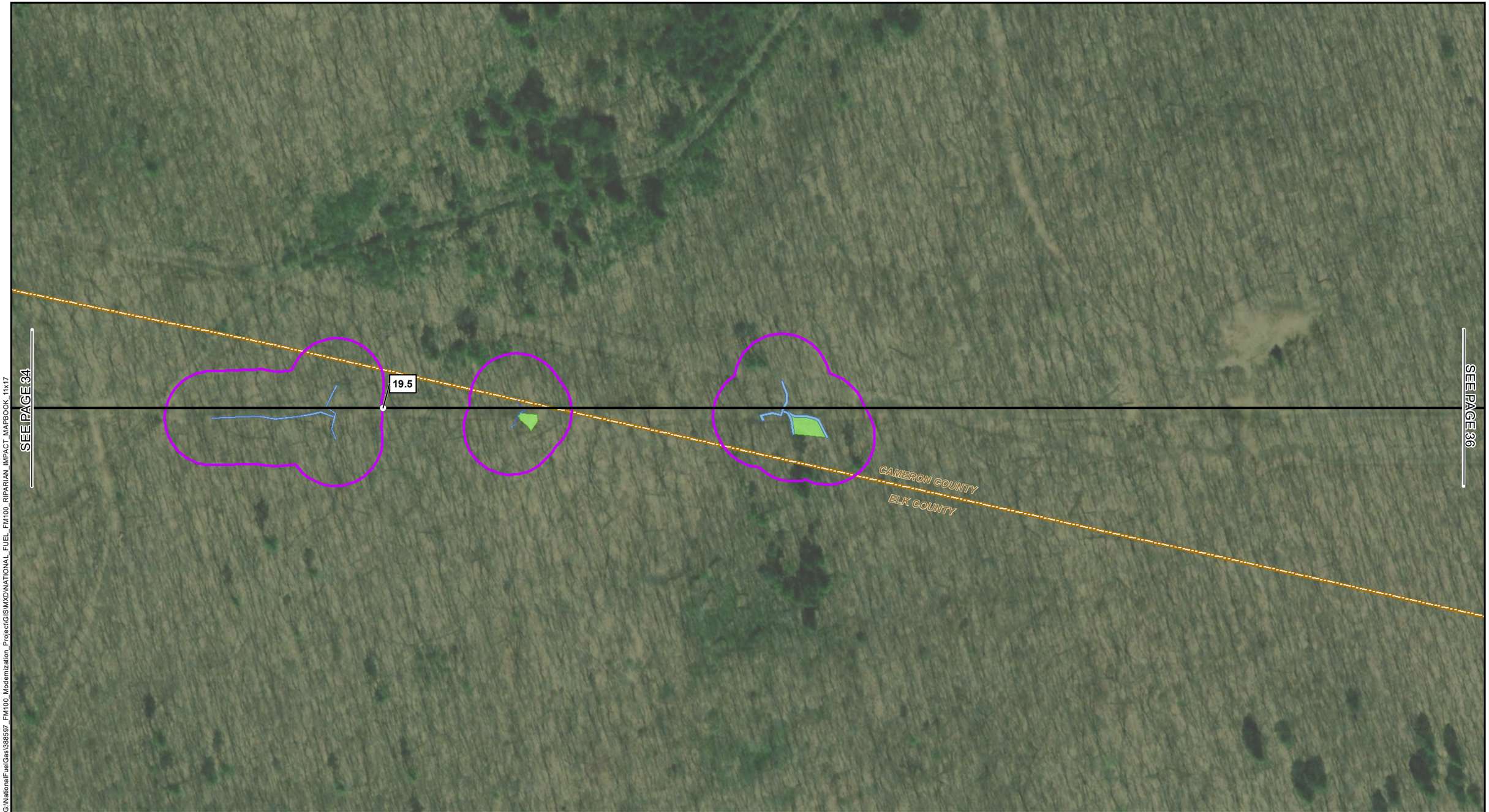

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1 MILE POST
EXISTING PIPELINE
ACCESS ROAD
LIMITS OF DISTURBANCE
DELINEATED WATERBODY
DELINEATED WETLAND
RIPARIAN BUFFER
RIPARIAN SEEDING
RIPARIAN PLANTING
COUNTY BOUNDARY

NOTES:
1) MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY.

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CAMERON, COUNTY

200 100 0 200 400 FEET

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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- MILE POST
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NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 ABANDONMENT PROJECT

RIPARIAN RESTORATION MAP

CAMERON, COUNTY

200 100 0 200 400 FEET

N W E S

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National Fuel SUPPLY CORPORATION

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1 MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
ACCESS ROAD	RIPARIAN PLANTING
LIMITS OF DISTURBANCE	COUNTY BOUNDARY
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CAMERON, COUNTY

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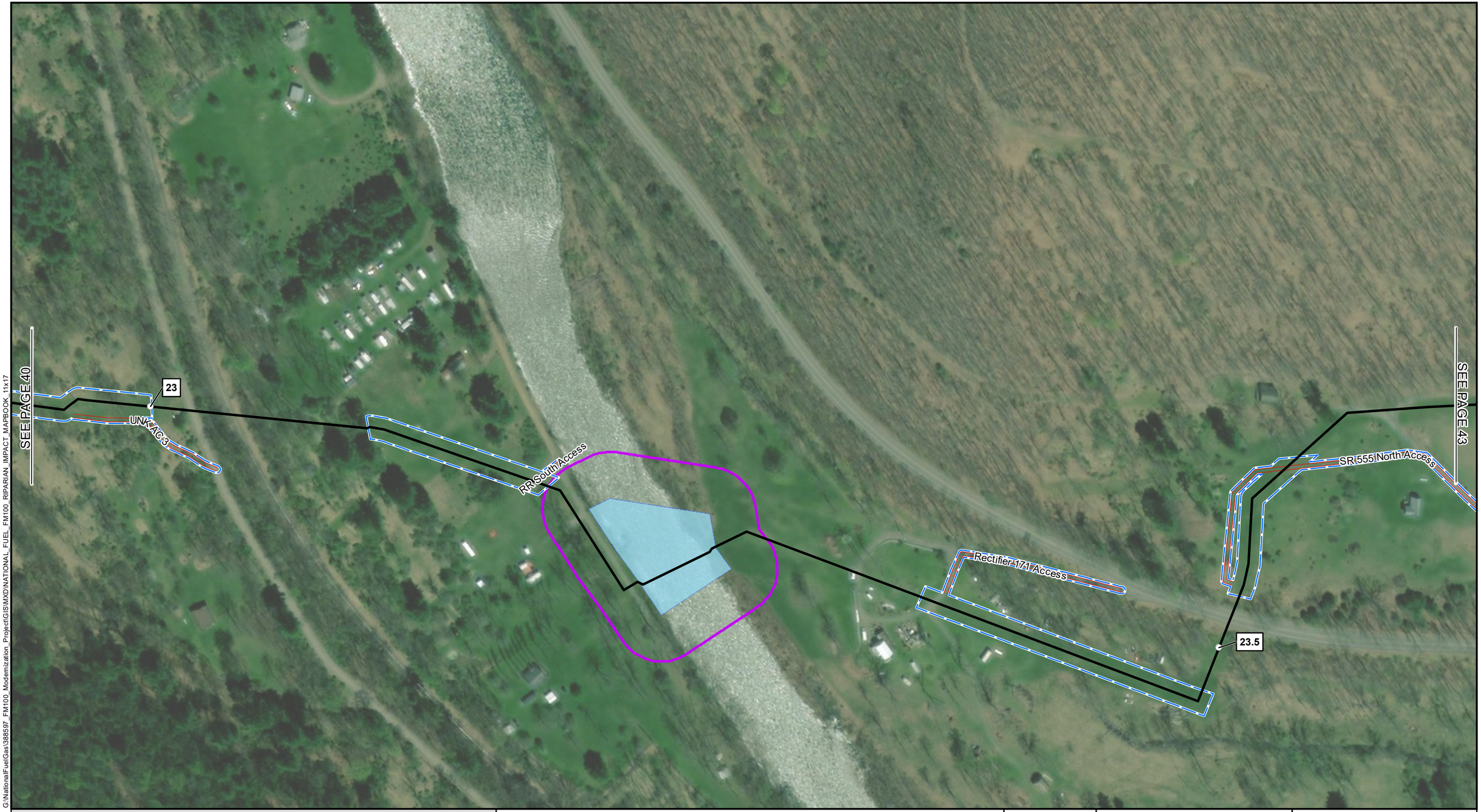

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1 MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
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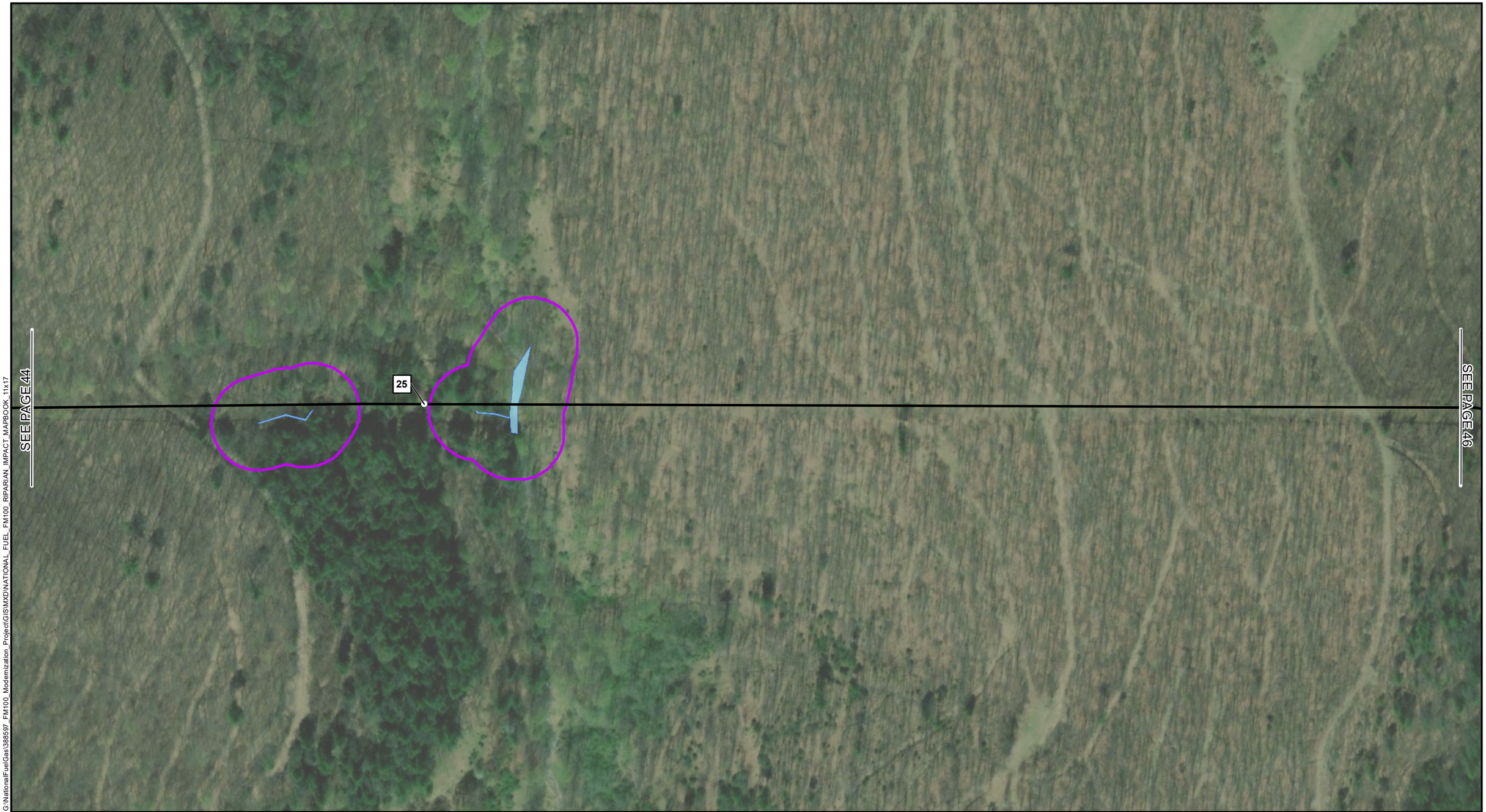

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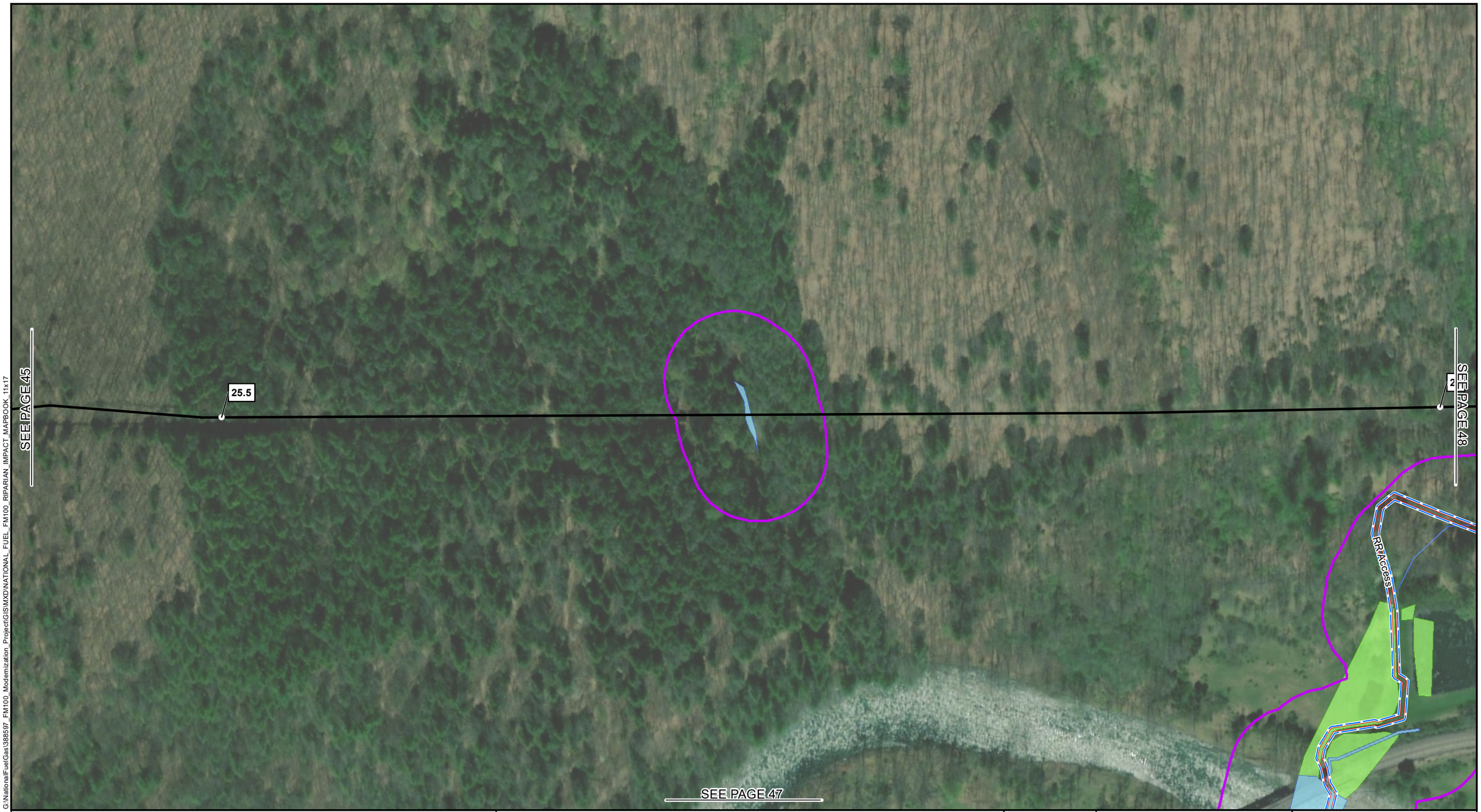

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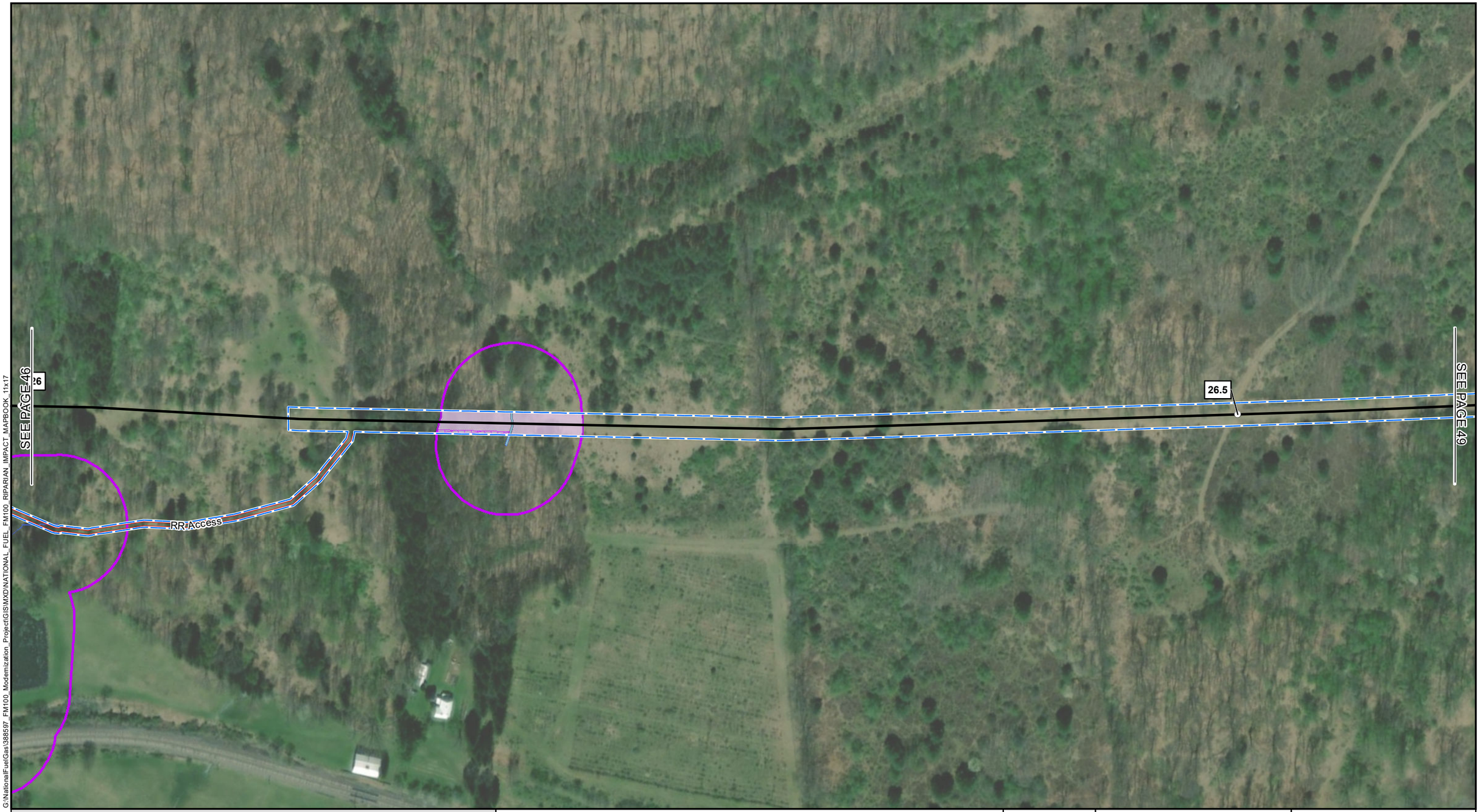

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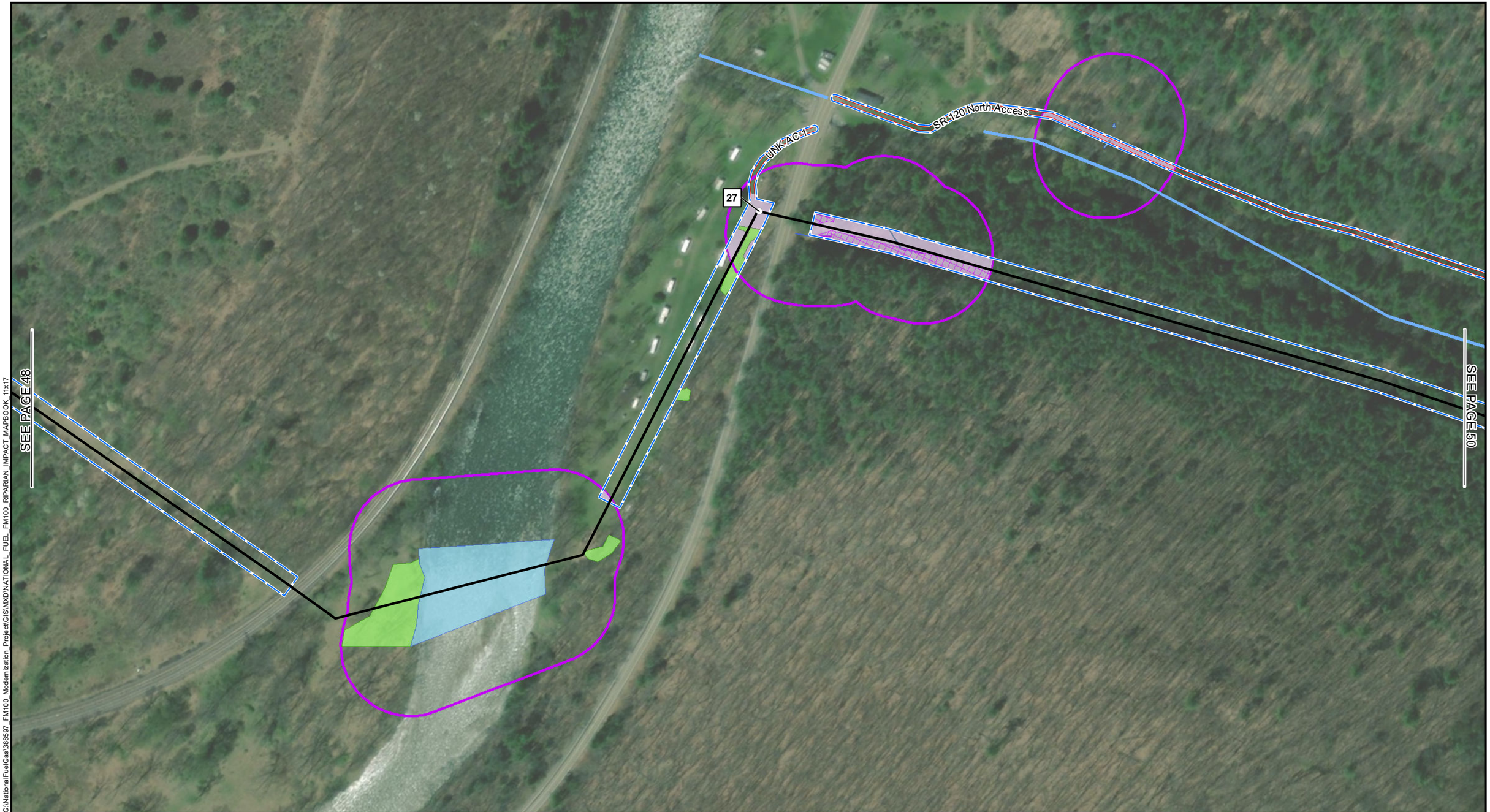

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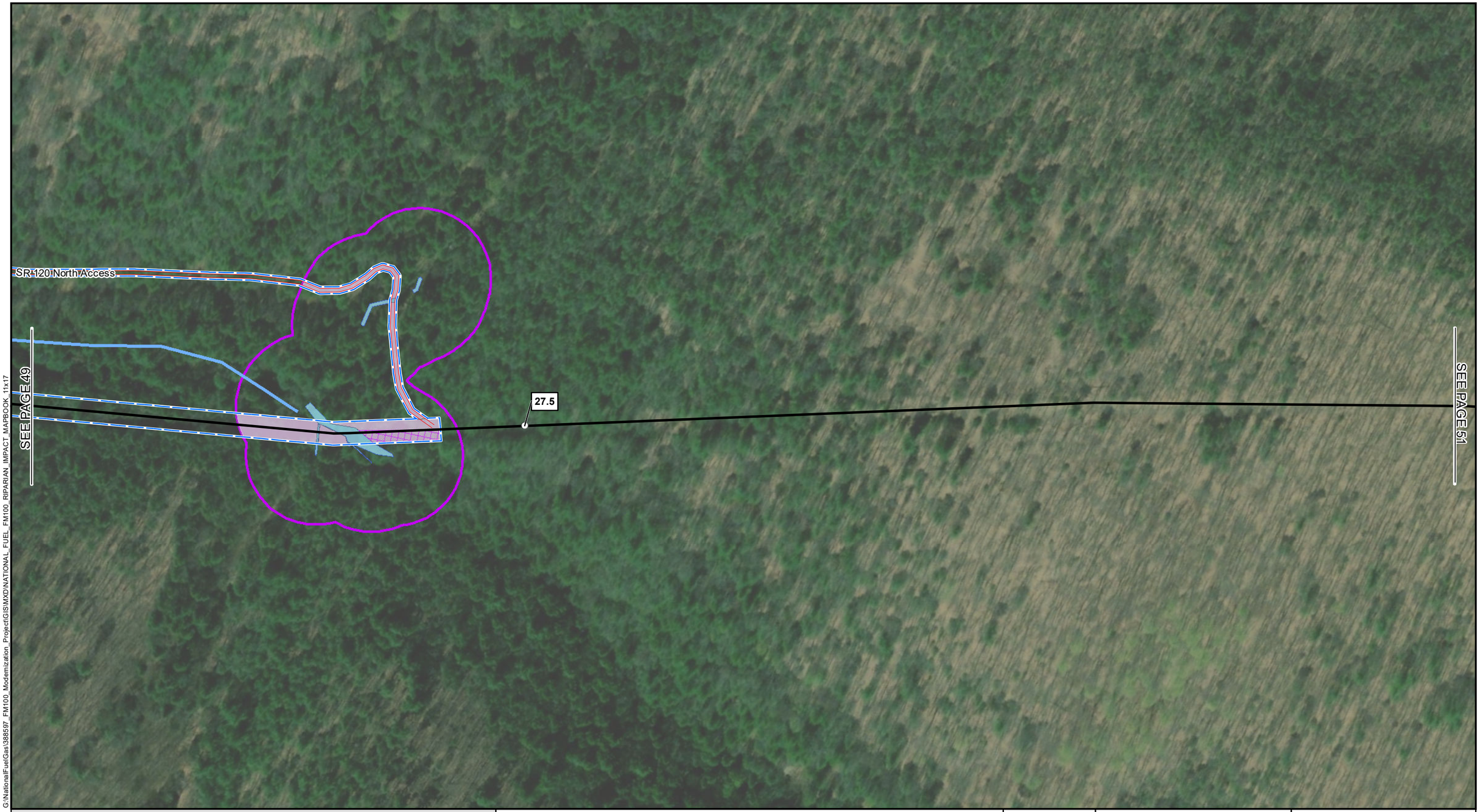

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RIPARIAN RESTORATION MAP
CAMERON, COUNTY

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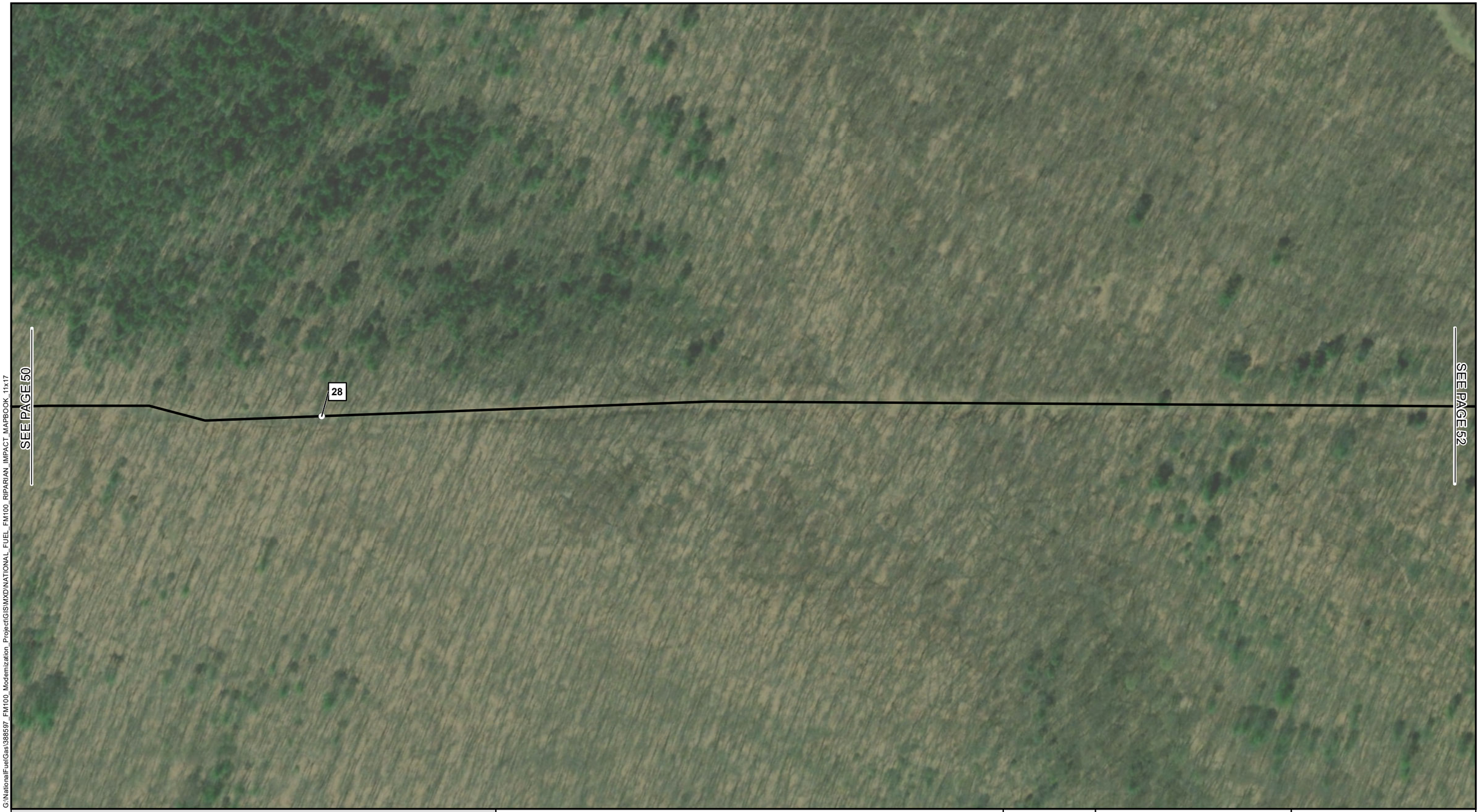

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CAMERON, COUNTY

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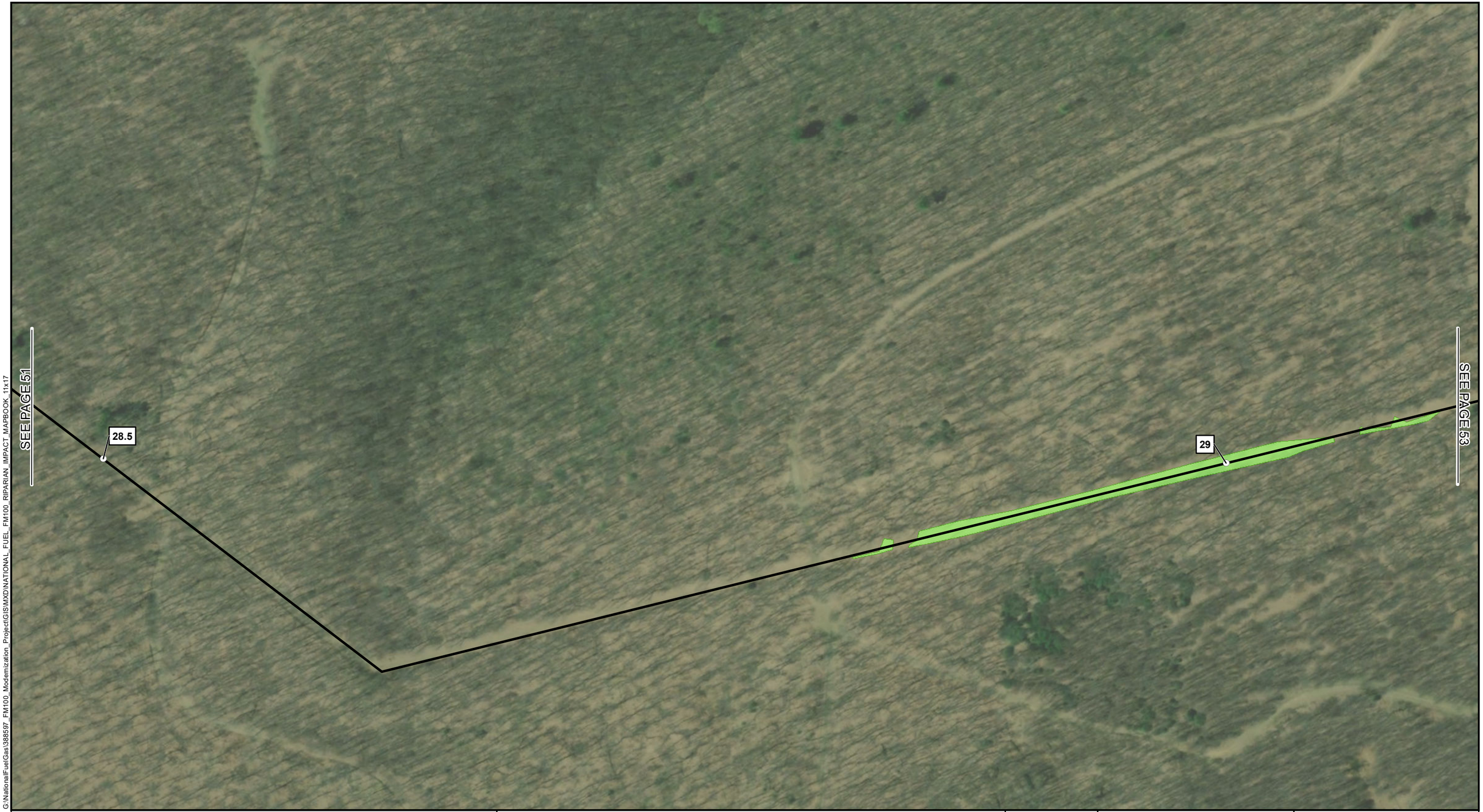

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RIPARIAN RESTORATION MAP
CAMERON, COUNTY

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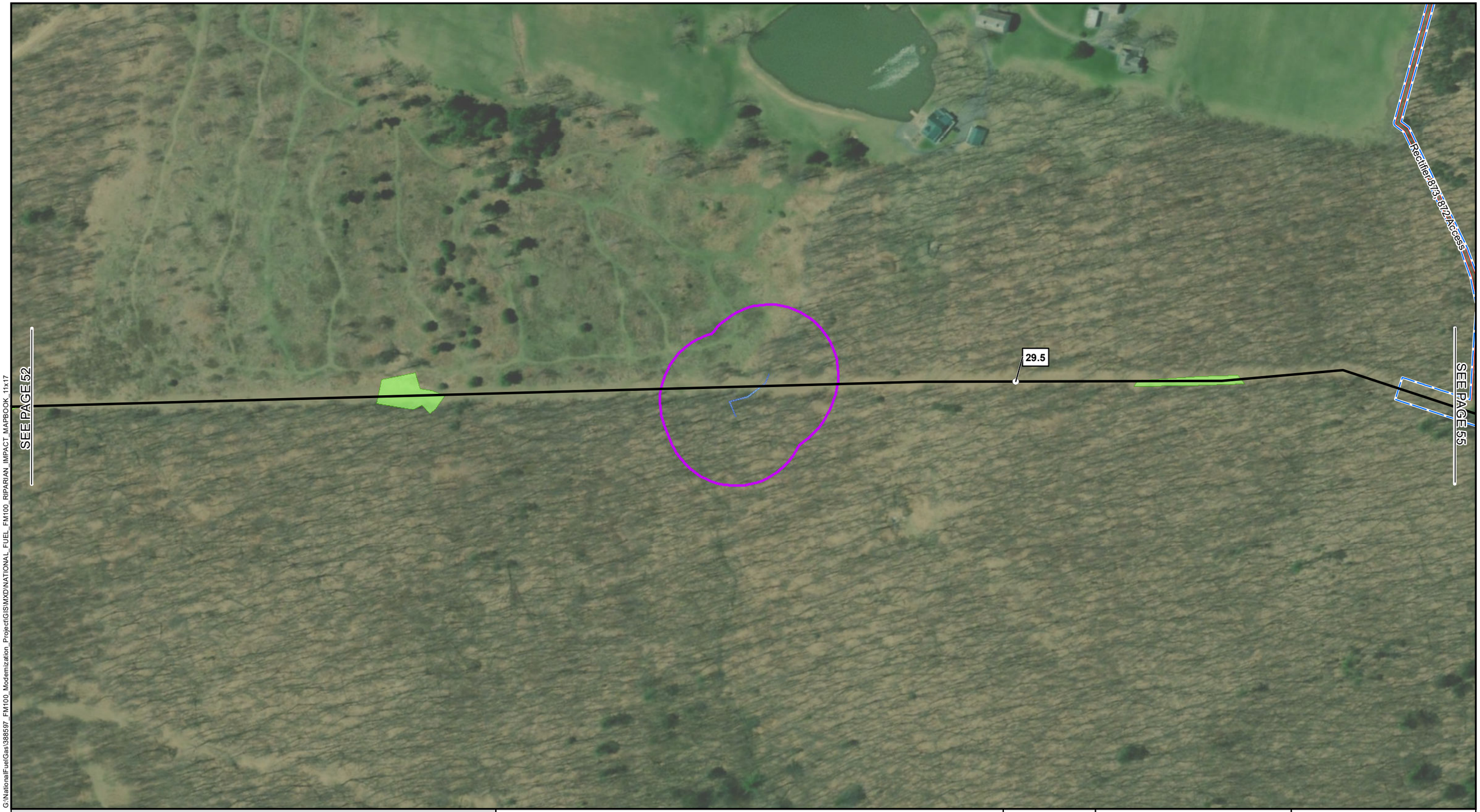

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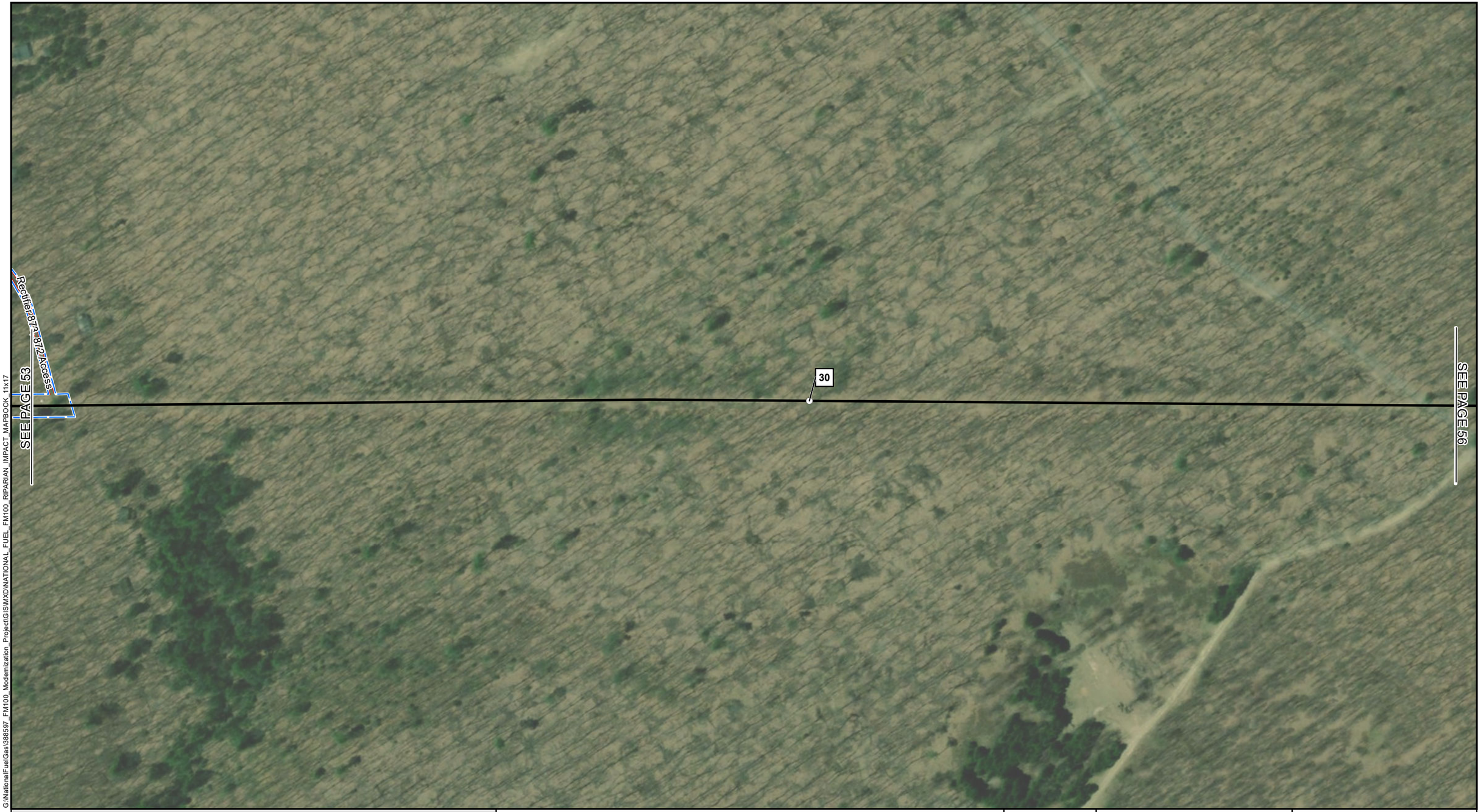

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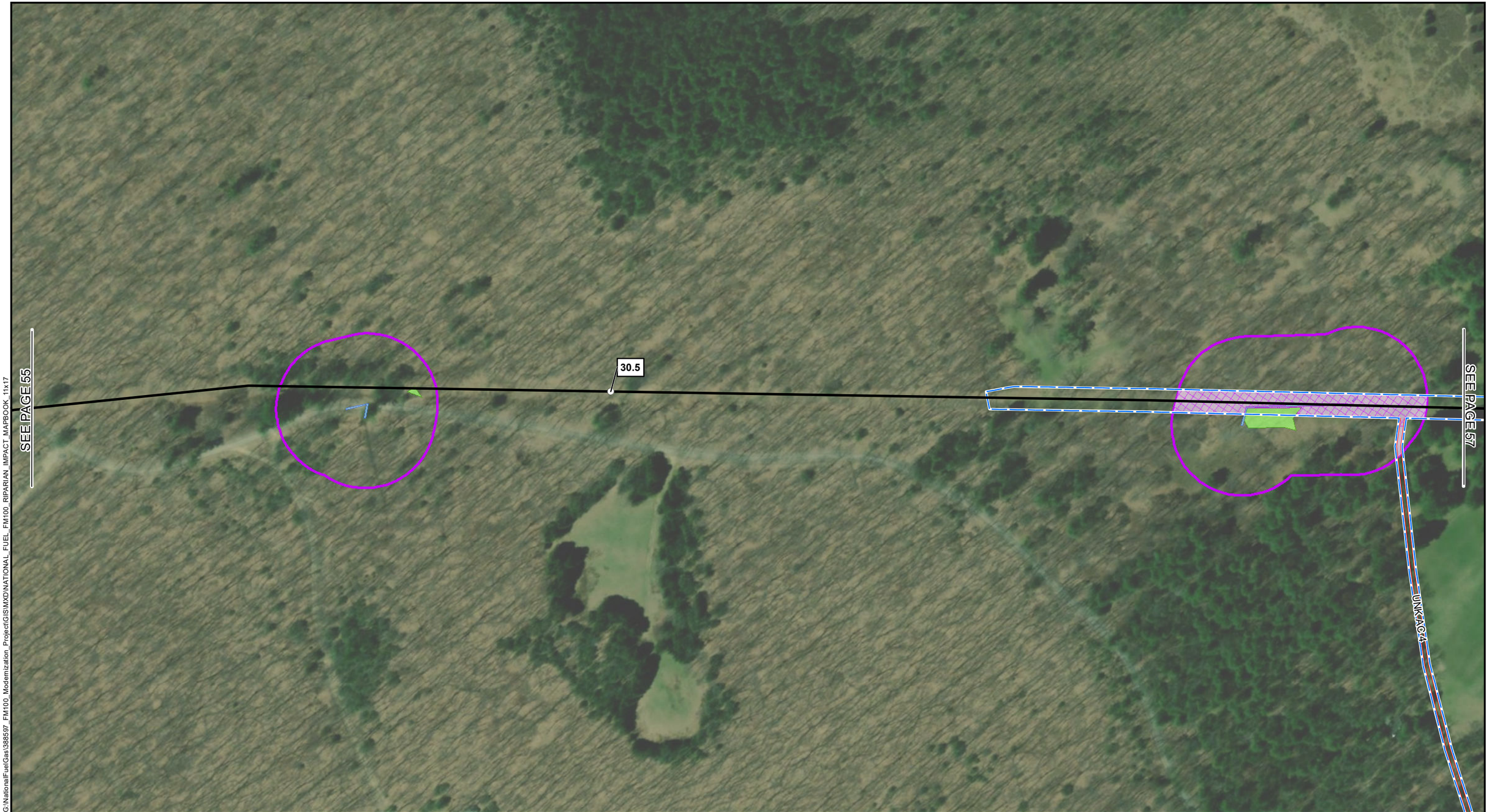

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 ABANDONMENT PROJECT
RIPARIAN RESTORATION MAP
CAMERON, COUNTY

200 100 0 200 400 FEET

W N S E

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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- MILE POST
- EXISTING PIPELINE
- ACCESS ROAD
- LIMITS OF DISTURBANCE
- DELINEATED WATERBODY
- DELINEATED WETLAND
- RIPARIAN BUFFER
- RIPARIAN SEEDING
- RIPARIAN PLANTING
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FM100 ABANDONMENT PROJECT

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CAMERON, COUNTY

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CAMERON, COUNTY

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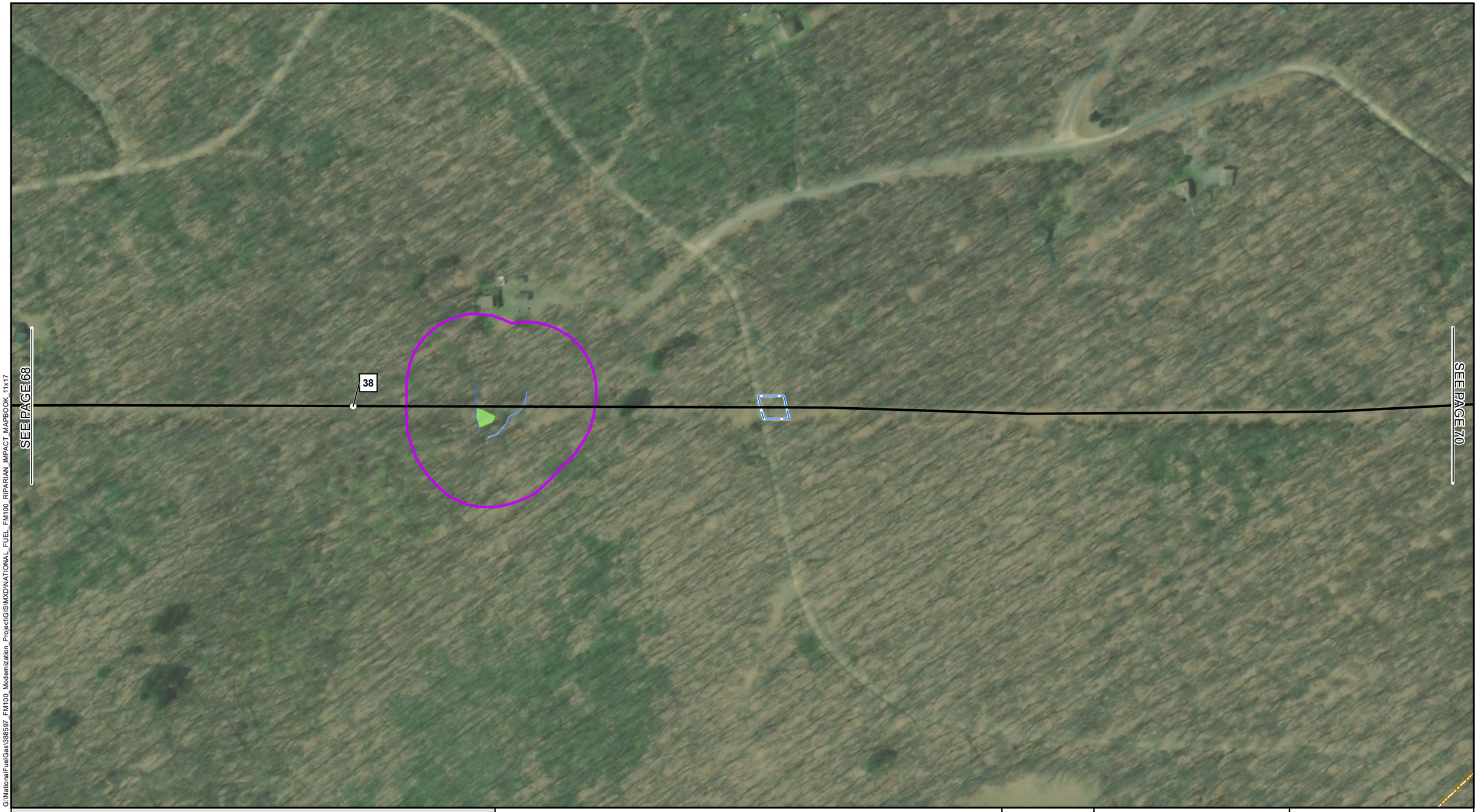

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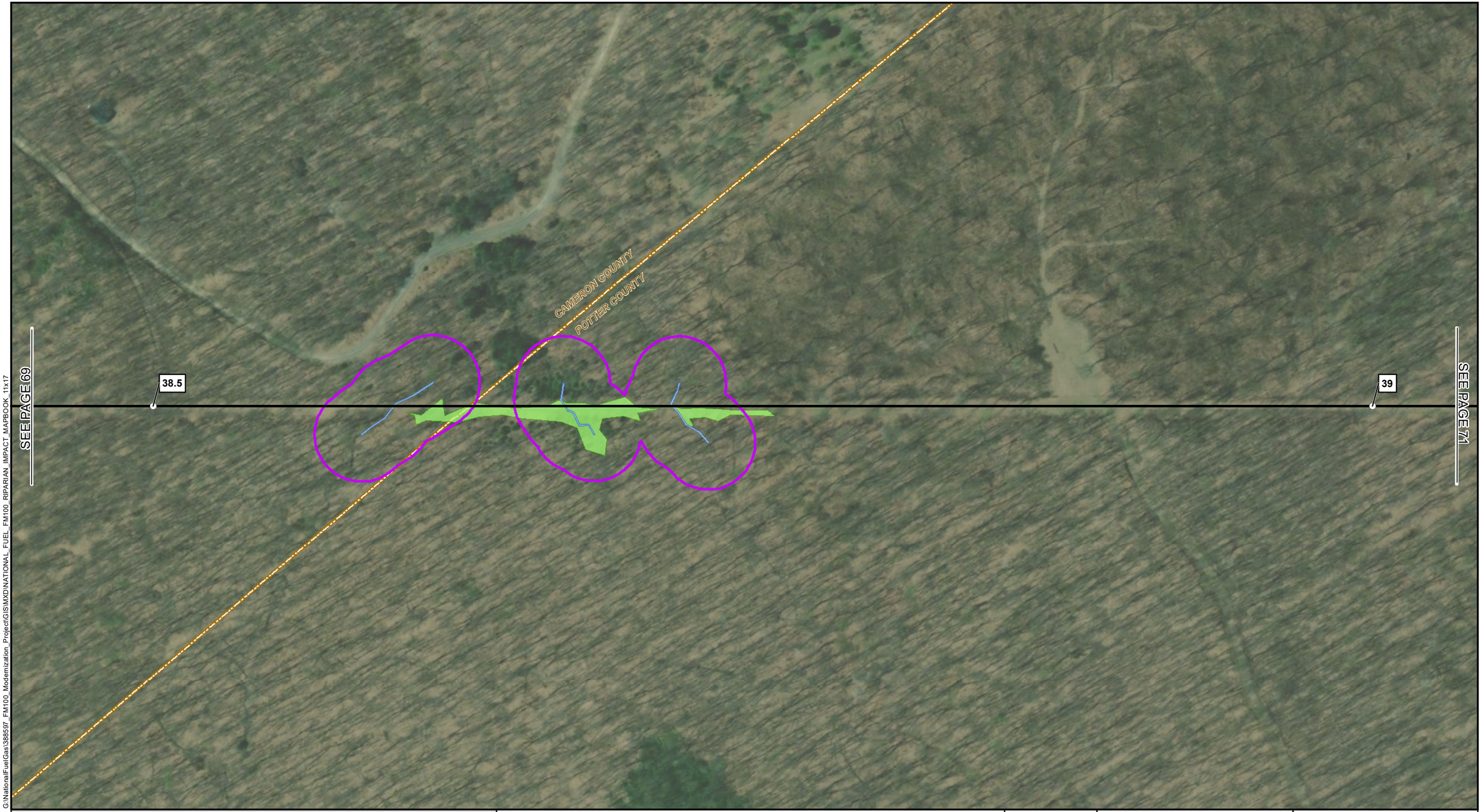

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1 MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
ACCESS ROAD	RIPARIAN PLANTING
LIMITS OF DISTURBANCE	COUNTY BOUNDARY
DELINEATED WATERBODY	
DELINEATED WETLAND	

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NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 ABANDONMENT PROJECT

RIPARIAN RESTORATION MAP

POTTER, COUNTY

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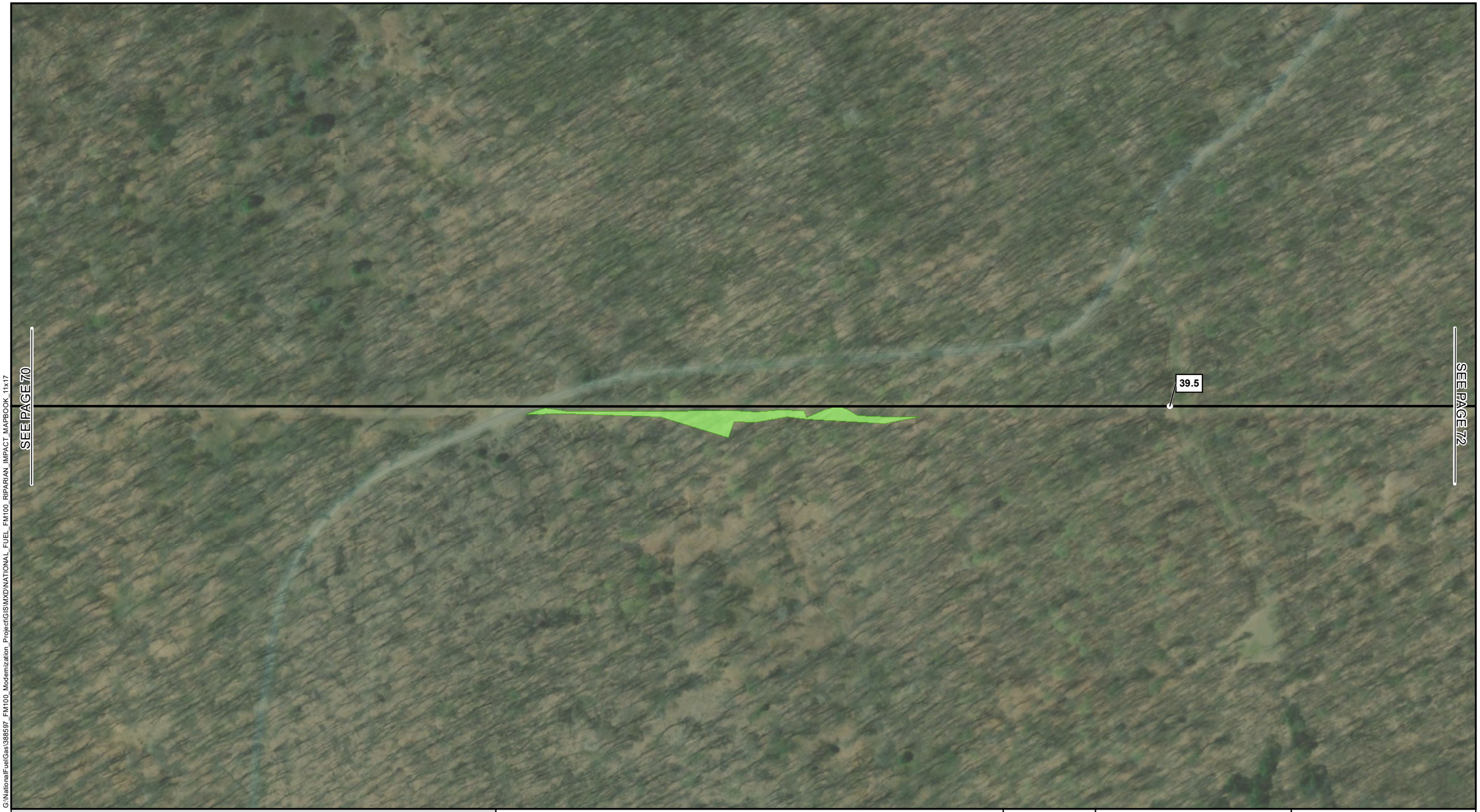

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FM100 ABANDONMENT PROJECT

RIPARIAN RESTORATION MAP

POTTER, COUNTY

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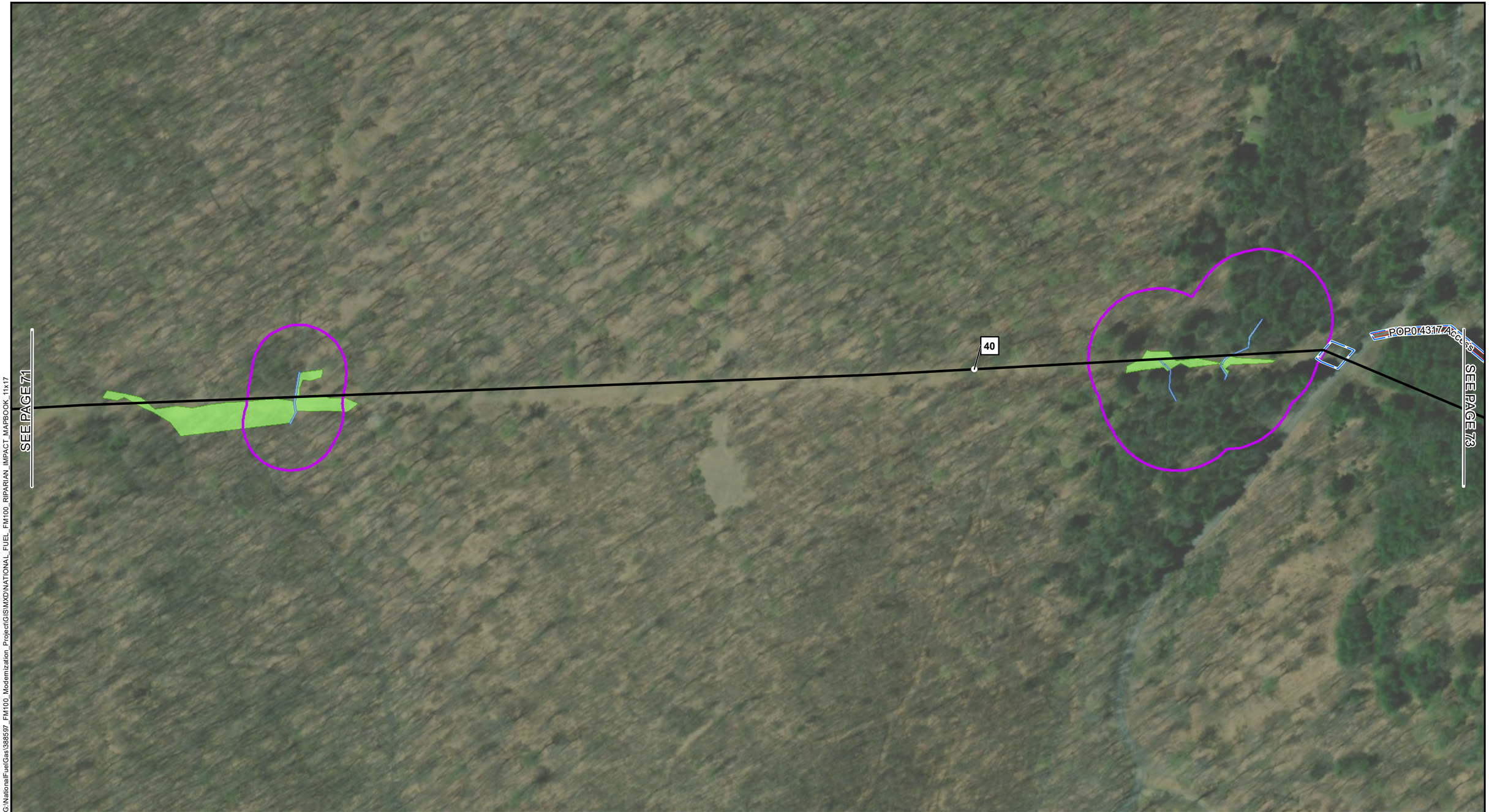

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1 MILE POST	RIPARIAN BUFFER
EXISTING PIPELINE	RIPARIAN SEEDING
ACCESS ROAD	RIPARIAN PLANTING
LIMITS OF DISTURBANCE	COUNTY BOUNDARY
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RIPARIAN RESTORATION MAP
POTTER, COUNTY

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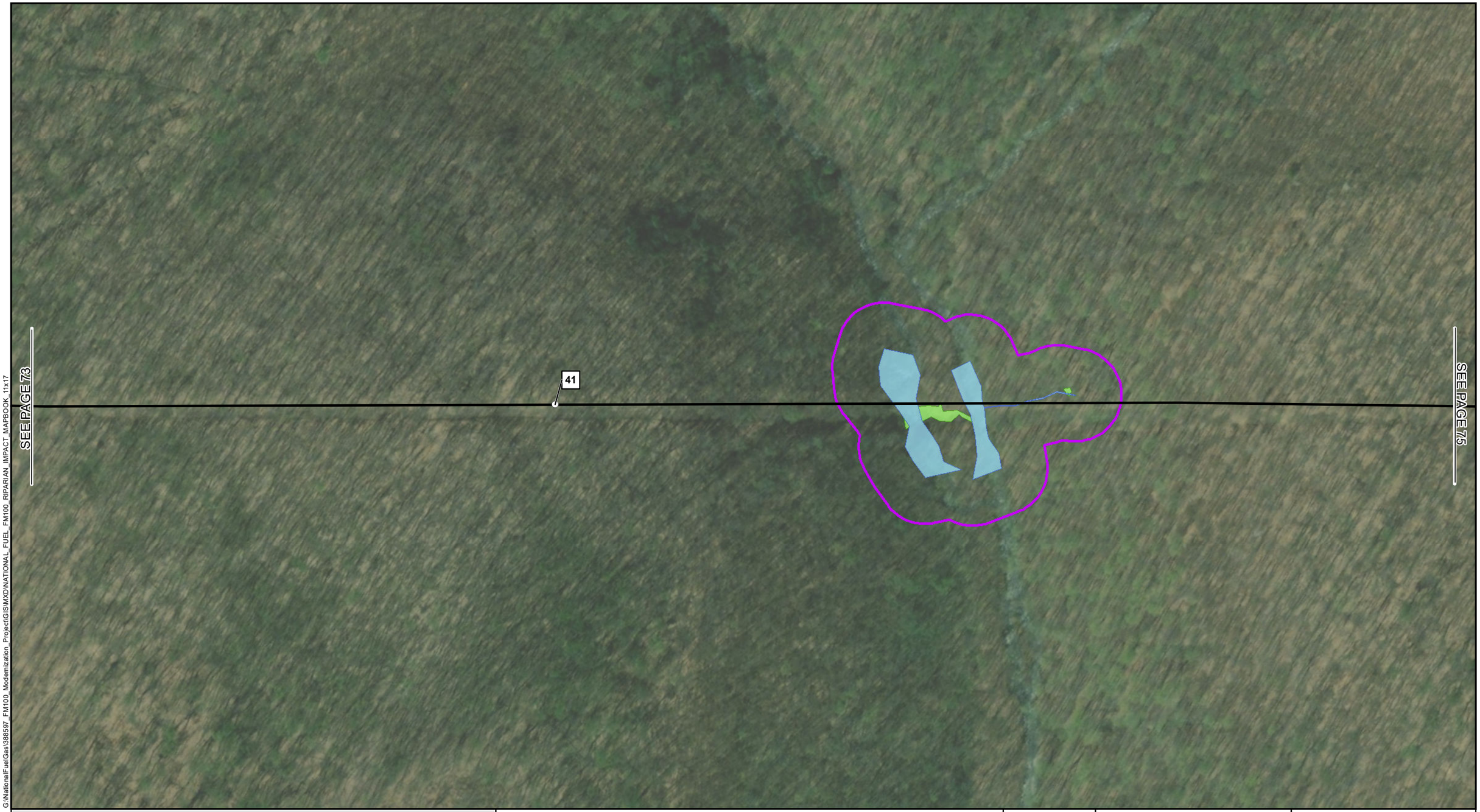

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RIPARIAN RESTORATION MAP
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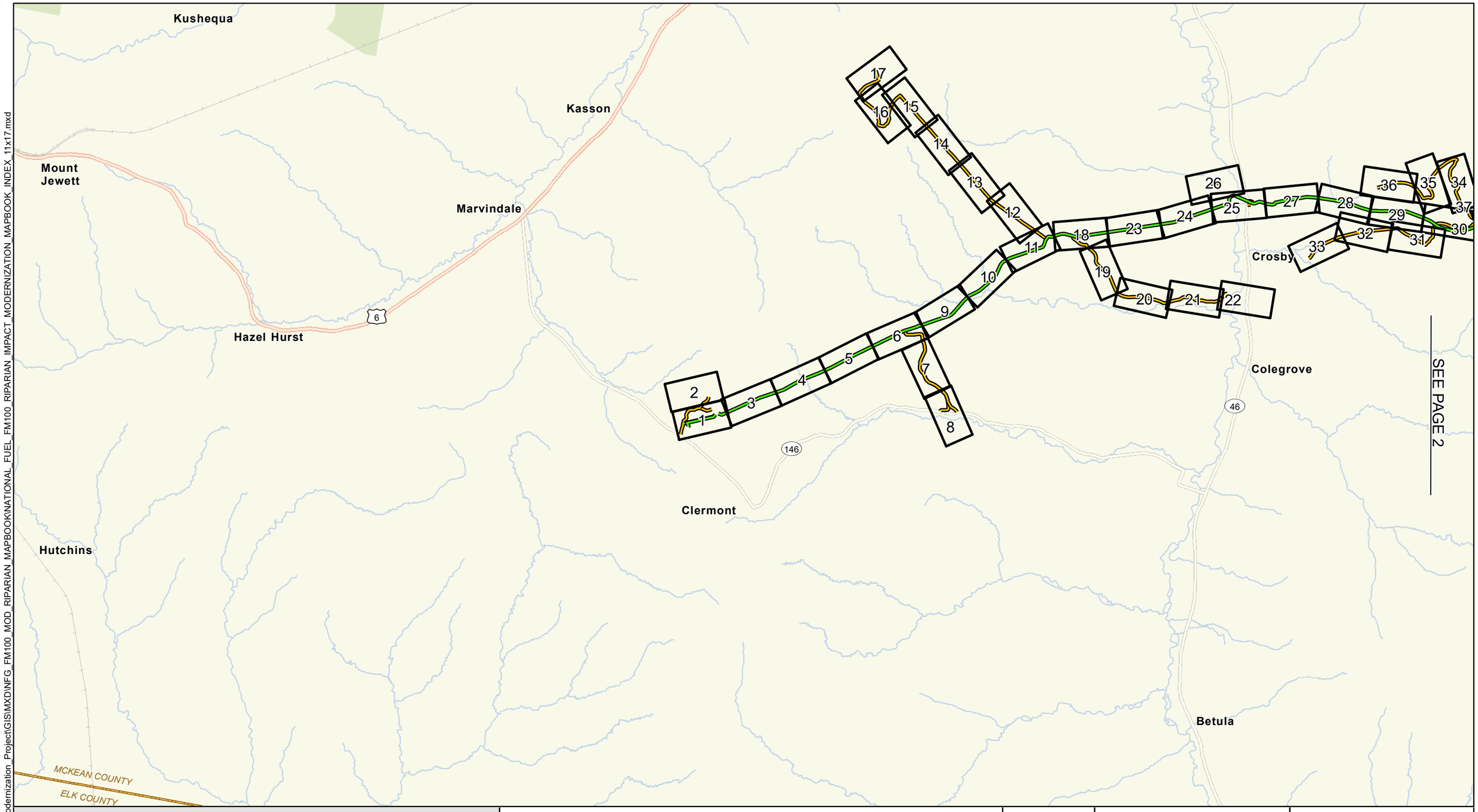

PROPOSED PIPELINE
PROPOSED ACCESS ROAD
MAJOR HIGHWAY
HIGHWAY
WATERBODY
CITY AREA
PARKS
COUNTY BOUNDARY

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION INDEX
PENNSYLVANIA

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N W E S

ABSOLUTE SCALE: 1:63,360

REFERENCE SCALE: 1 INCH = 1 MILE

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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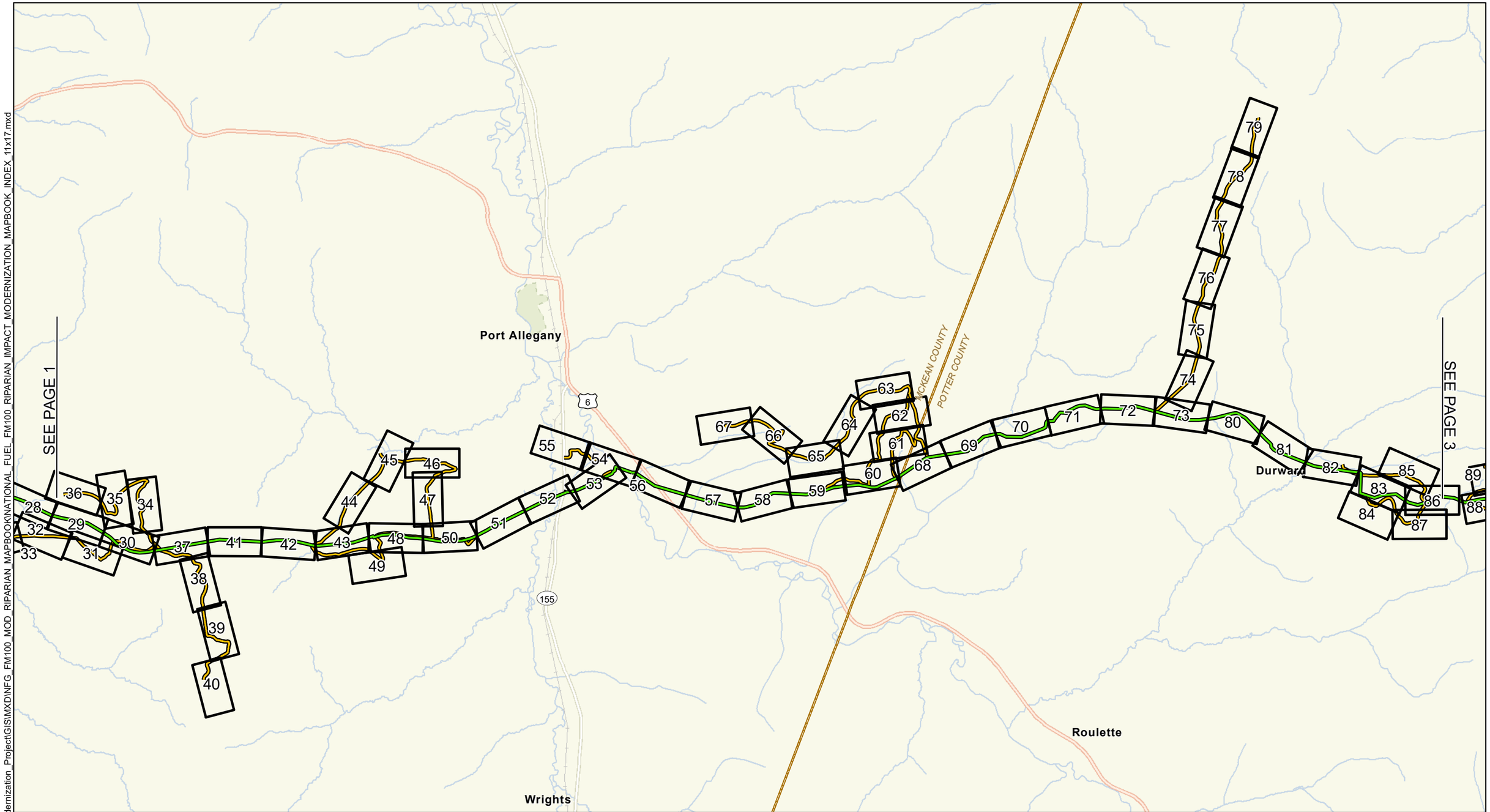

- PROPOSED PIPELINE
- PROPOSED ACCESS ROAD
- MAJOR HIGHWAY
- HIGHWAY
- WATERBODY
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- PARKS
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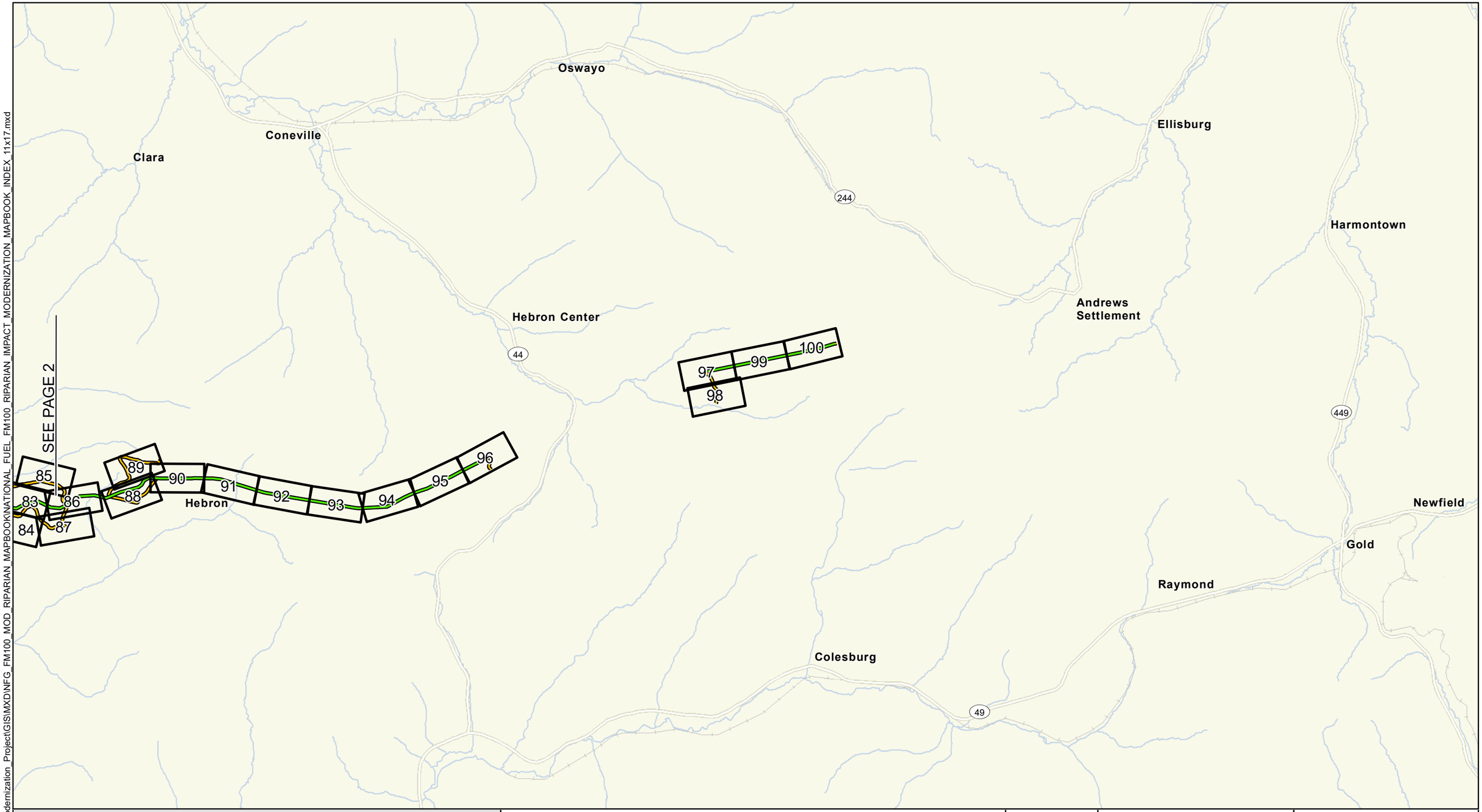

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30.0% *PANICUM CLANDESTINUM, 'TIOGA'* (DEERTONGUE, 'TIOGA')
20.0% *ELYMUS VIRGINICUS, PA ECOTYPE* (VIRGINIA WILDRYE, PA ECOTYPE)
11.8% *ANDROPOGON GERARDII, 'NIAGARA'* (BIG BLUESTEM, 'NIAGARA')
10.5% *SORGHASTRUM NUTANS, NY4 ECOTYPE* (INDIANGRASS, NY4 ECOTYPE)
5.0% *PANICUM VIRGATUM, 'SHELTER'* (SWITCHGRASS, 'SHELTER')
4.0% *CHAMAECRISTA FASCICULATA, PA ECOTYPE* (PARTRIDGE PEA, PA ECOTYPE)
4.0% *VERBENA HASTATA, PA ECOTYPE* (BLUE VERVAIN, PA ECOTYPE)
3.0% *JUNCUS EFFUSUS* (SOFT RUSH)
3.0% *RUDBECKIA HIRTA, COASTAL PLAIN NC ECOTYPE* (BLACKEYED SUSAN, □□□□□□□ □□□IN N□ E□□□□□E□
2.0% *HELIOPSIS HELIANTHOIDES, PA ECOTYPE* (OXEYE SUNFLOWER, PA ECOTYPE)
1.0% *ASCLEPIAS INCARNATA, PA ECOTYPE* (SWAMP MILKWEED, PA ECOTYPE)
0.7% *ASTER NOVAE-ANGLIAE, PA ECOTYPE* (NEW ENGLAND ASTER, PA ECOTYPE)
0.7% *ASTER UMBELLATUS, PA ECOTYPE* (FLAT TOPPED WHITE ASTER, PA E□□□□□E□
0.7% *EUPATORIUM PERFOLIATUM, PA ECOTYPE* (BONESET, PA ECOTYPE)
0.5% *AGROSTIS PERENNANS, ALBANY PINE BUSH-NY ECOTYPE* (AUTUMN □EN□GR□□□□
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0.5% *HELENIUM AUTUMNALE, PA ECOTYPE* (COMMON SNEEZEWEED, PA ECOTYPE)
0.5% *MONARDA FISTULOSA, FORT INDIANTOWN GAP-PA ECOTYPE* (WILD □ERG□M□□F□R□ IN□I□N□□□ N G□□□□□ E□□ □□□E□
0.5% *VERNONIA NOVEBORACENSIS, PA ECOTYPE* (NEW YORK IRONWEED, PA E□□□□□E□
0.4% *PYCNANTHEMUM TENUIFOLIUM* (NARROWLEAF MOUNTAINMINT)
0.4% *SOLIDAGO PATULA, PA ECOTYPE* (ROUGHLEAF GOLDENROD, PA ECOTYPE)
0.3% *EUPATORIUM FISTULOSUM, PA ECOTYPE* (JOE PYE WEED, PA ECOTYPE)
0.3% *LOBELIA SIPHILITICA, PA ECOTYPE* (GREAT BLUE LOBELIA, PA ECOTYPE)
0.2% *ASTER PUNICEUS, PA ECOTYPE* (PURPLESTEM ASTER, PA ECOTYPE)

TREE AN□ S□R□□ SPECIES □OR RIPARIAN REP□ANTIN□

	Species	Height (feet)/caliper	Wildlife Functions	Flood Tolerance
Shrubs/Small Trees				
	Mountain Laurel (*Kalmia latifolia*)	4 - 6	high value- browse and cover	intolerant
	Hornbeam (*Carpinus caroliniana*)	35	food source- buds, seeds, leaves	intolerant
	Flowering Dogwood (Cornus florida)	35	food source	intolerant
	Witchhazel (*Hamamelis virginiana*)		Toxic to some	intolerant
	Winterberry (Ilex verticillata)	4 - 7	food source	intolerant
	Northern Arrowwood (*Viburnum recognitum*)	5-7	food source- fruit, flowers	tolerant
Trees				
	American beech (*Fagus grandifolia*)	75+/2-inch	food source- nuts	very intolerant
	Black birch (*Betula lenta*)	50+/2-inch	food source- buds, seeds, leaves	intolerant
	Red Maple (*Acer rubrum*)	75+/2-inch	food source and browse	tolerant
	Northern red oak (*Quercus rubra*)	75+/2-inch	nesting and food source- mast	medium tolerance
	Black willow (*Salix nigra*)	35 – 50/ 2-inch	food source-buds, fruit, twigs	very tolerant
	Elm (Ulmus spp.)	50 - 70+/ 2-inch	food source- seeds, twigs	tolerant

Source: Riparian Forest Buffer Guidance, Document Number 3945600-001

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION
GENERAL NOTES

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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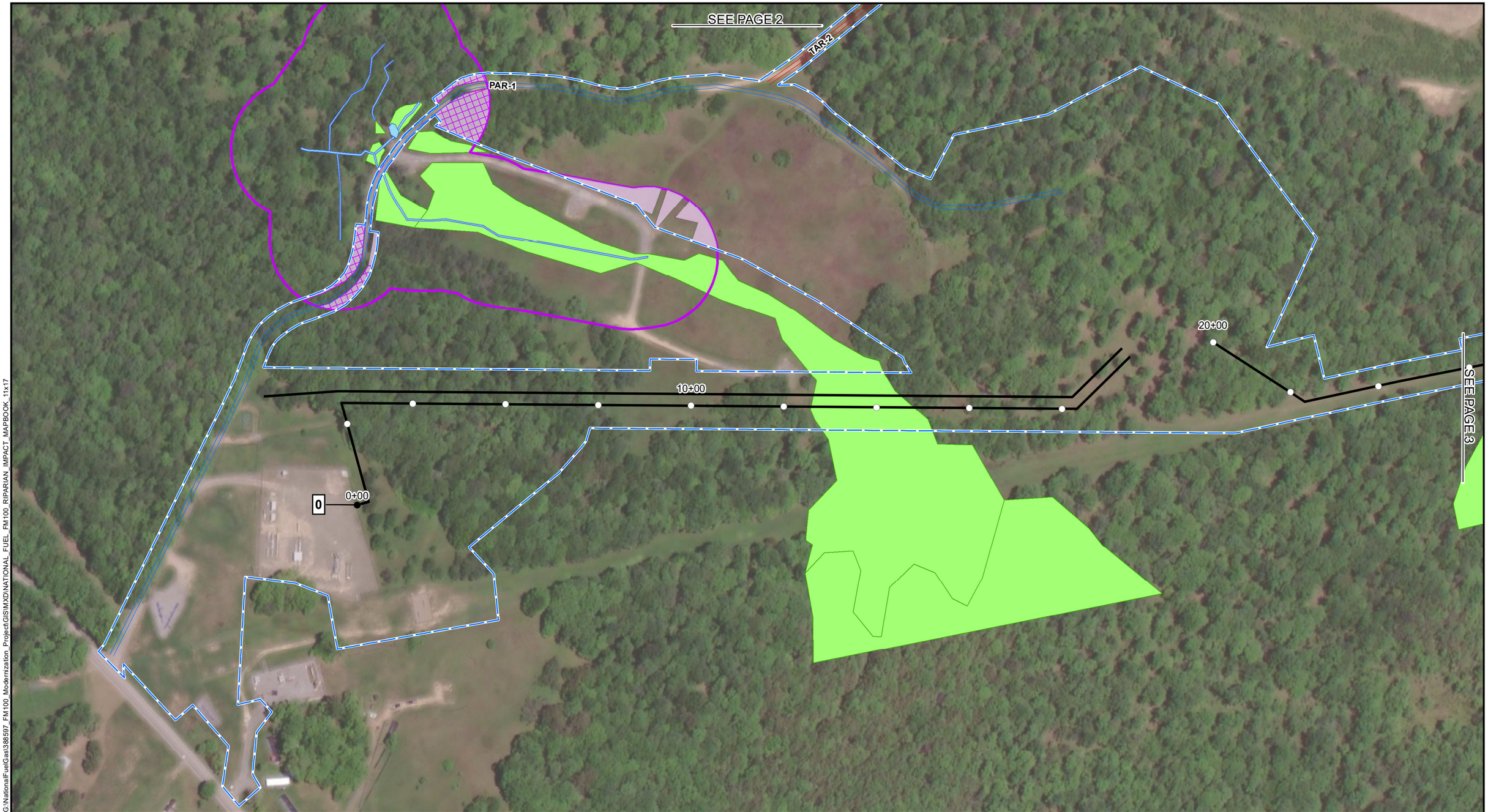

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1 MILE POST
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DELINEATED WATERBODY
DELINEATED WETLAND
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RIPARIAN SEEDING
RIPARIAN PLANTING
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NOTES:
1) MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY.

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION MAP
MCKEAN, COUNTY

200 100 0 200 400 FEET

N W E S

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

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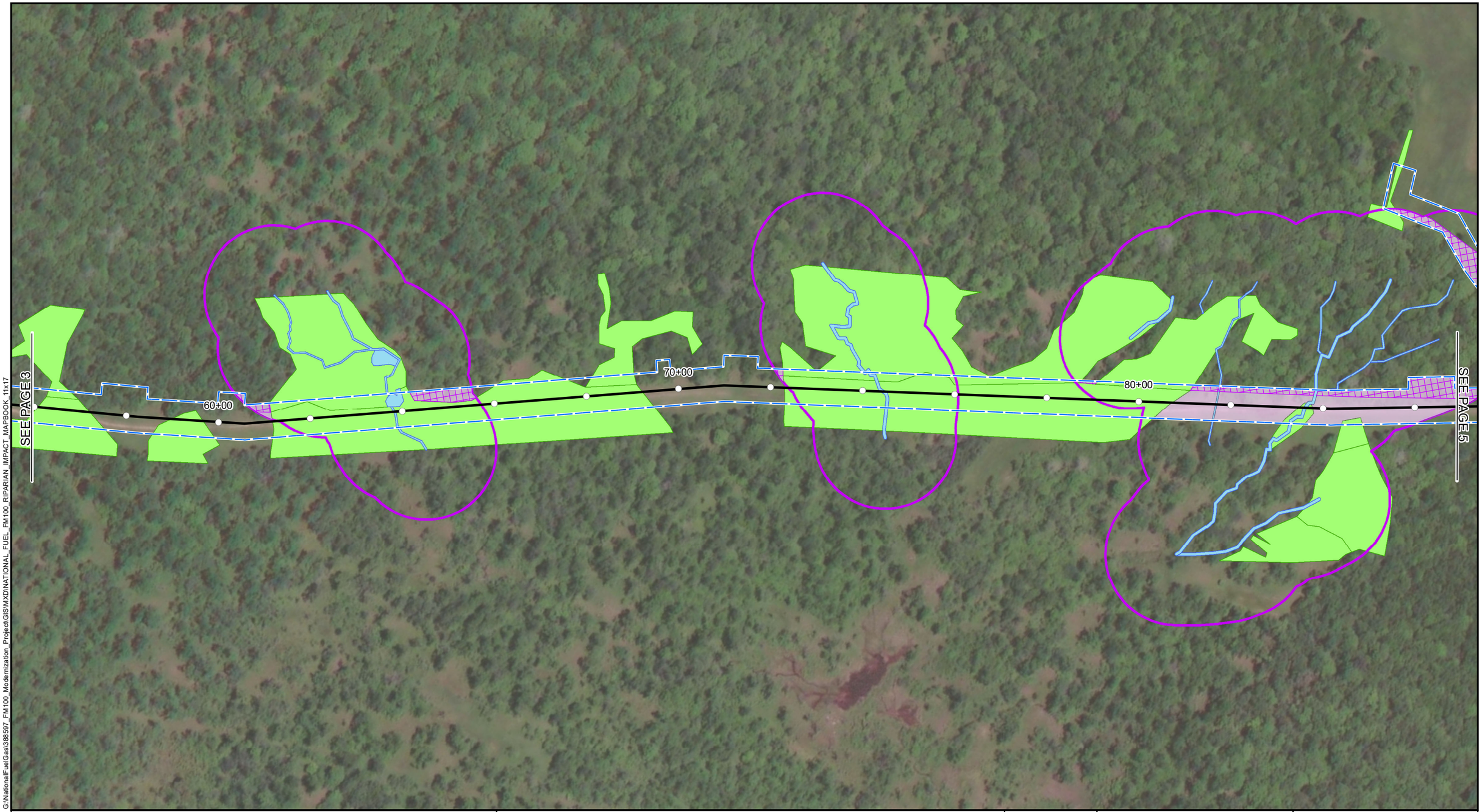

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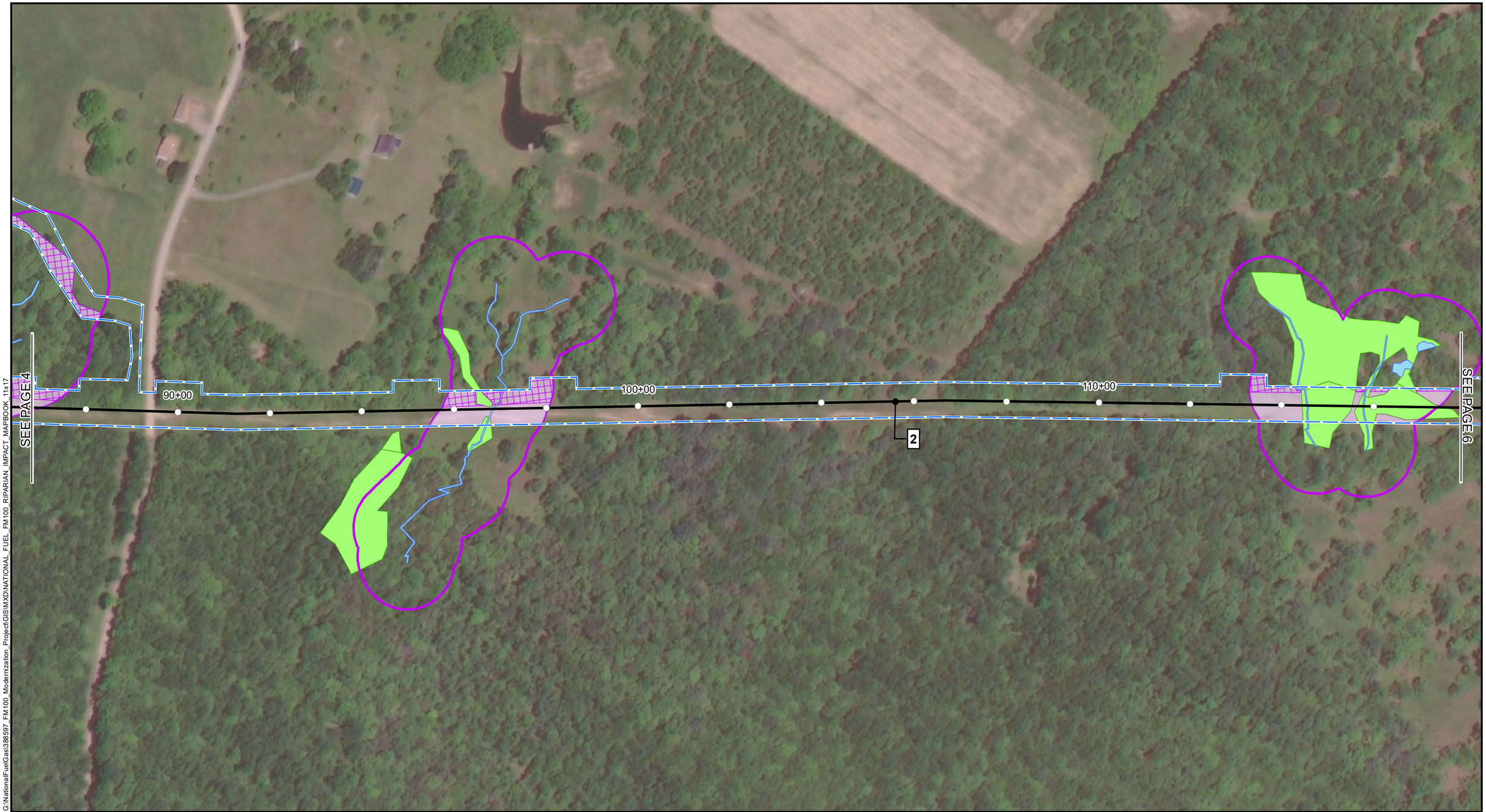

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1+00 STATION POINT
1 MILE POST
PROPOSED PIPELINE
PERMANENT ACCESS ROAD
TEMPORARY ACCESS ROAD
LIMITS OF DISTURBANCE
DELINEATED WATERBODY
DELINEATED WETLAND
RIPARIAN BUFFER
RIPARIAN SEEDING
RIPARIAN PLANTING
COUNTY BOUNDARY

NOTES:
1) MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY.

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION MAP
MCKEAN, COUNTY

200 100 0 200 400 FEET

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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1+00 STATION POINT	DELINEATED WATERBODY
1 MILE POST	DELINEATED WETLAND
PROPOSED PIPELINE	RIPARIAN BUFFER
PERMANENT ACCESS ROAD	RIPARIAN SEEDING
TEMPORARY ACCESS ROAD	RIPARIAN PLANTING
LIMITS OF DISTURBANCE	COUNTY BOUNDARY

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1+00 STATION POINT
1 MILE POST
PROPOSED PIPELINE
PERMANENT ACCESS ROAD
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RIPARIAN RESTORATION MAP
MCKEAN, COUNTY

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1+00 STATION POINT
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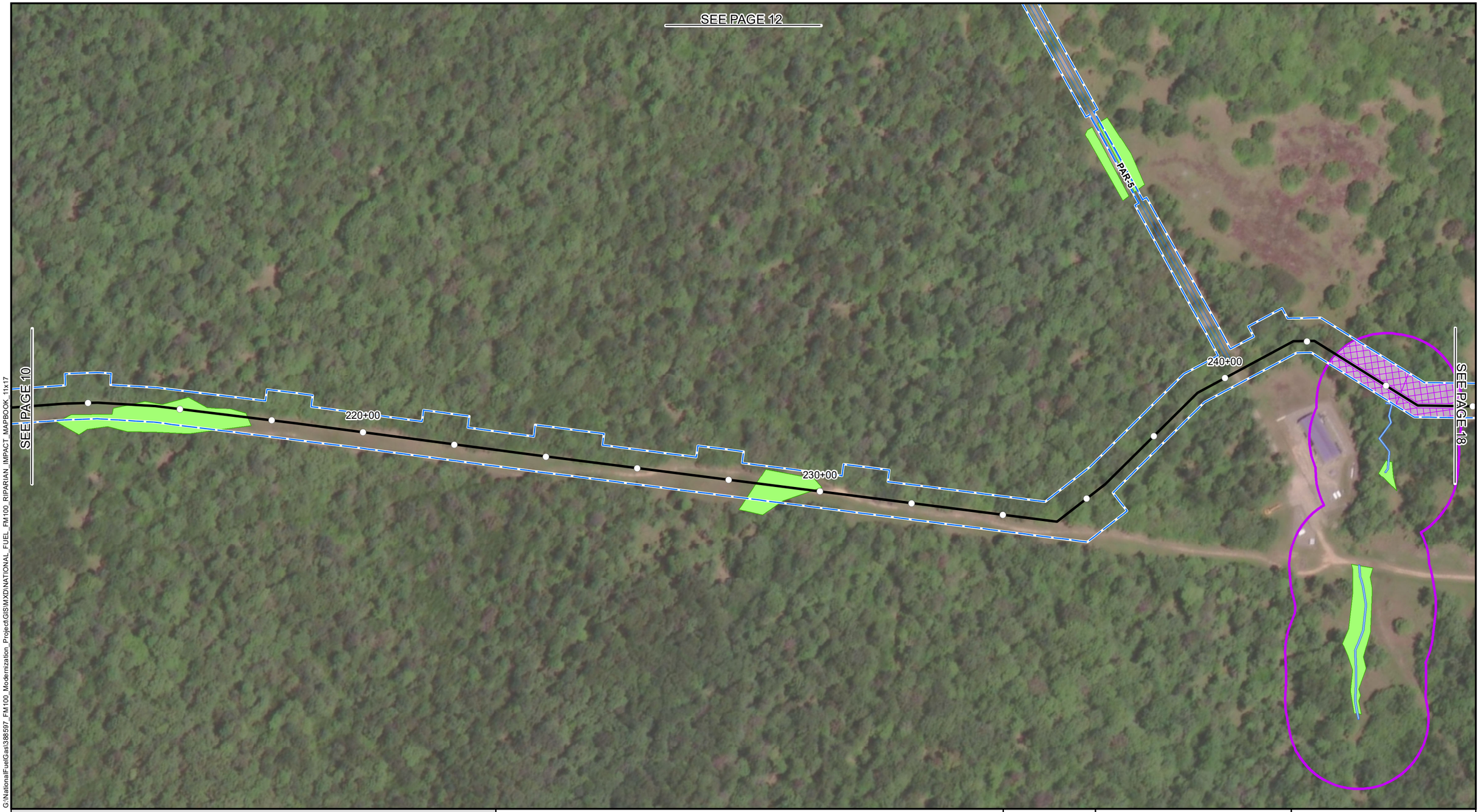

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1+00 STATION POINT
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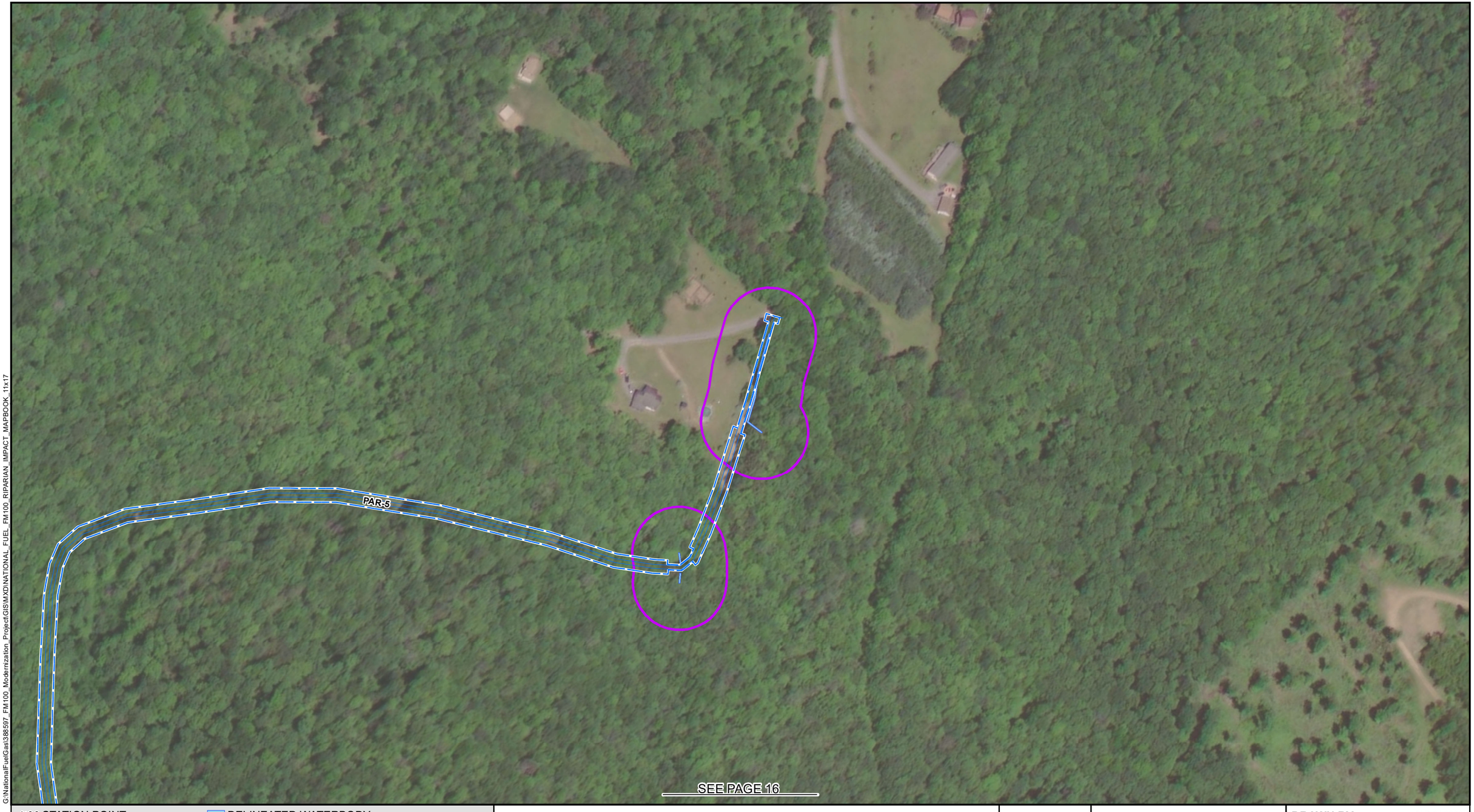

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MCKEAN, COUNTY

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MCKEAN, COUNTY

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1+00 STATION POINT
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MCKEAN, COUNTY

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National Fuel SUPPLY CORPORATION

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1+00 STATION POINT	DELINEATED WATERBODY
1 MILE POST	DELINEATED WETLAND
PROPOSED PIPELINE	RIPARIAN BUFFER
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FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION MAP
MCKEAN, COUNTY

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1+00 STATION POINT
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FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION MAP
MCKEAN, COUNTY

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340+00

350+00

360+00

370+00

TAR-35

TAR-8

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410+00

420+00

430+00

PAR-9

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National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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1+00 STATION POINT
1 MILE POST
PROPOSED PIPELINE
PERMANENT ACCESS ROAD
TEMPORARY ACCESS ROAD
LIMITS OF DISTURBANCE
DELINEATED WATERBODY
DELINEATED WETLAND
RIPARIAN BUFFER
RIPARIAN SEEDING
RIPARIAN PLANTING
COUNTY BOUNDARY

NOTES:
1) MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY.

NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 MODERNIZATION PROJECT

RIPARIAN RESTORATION MAP

MCKEAN, COUNTY

200 100 0 200 400 FEET

N W E S

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

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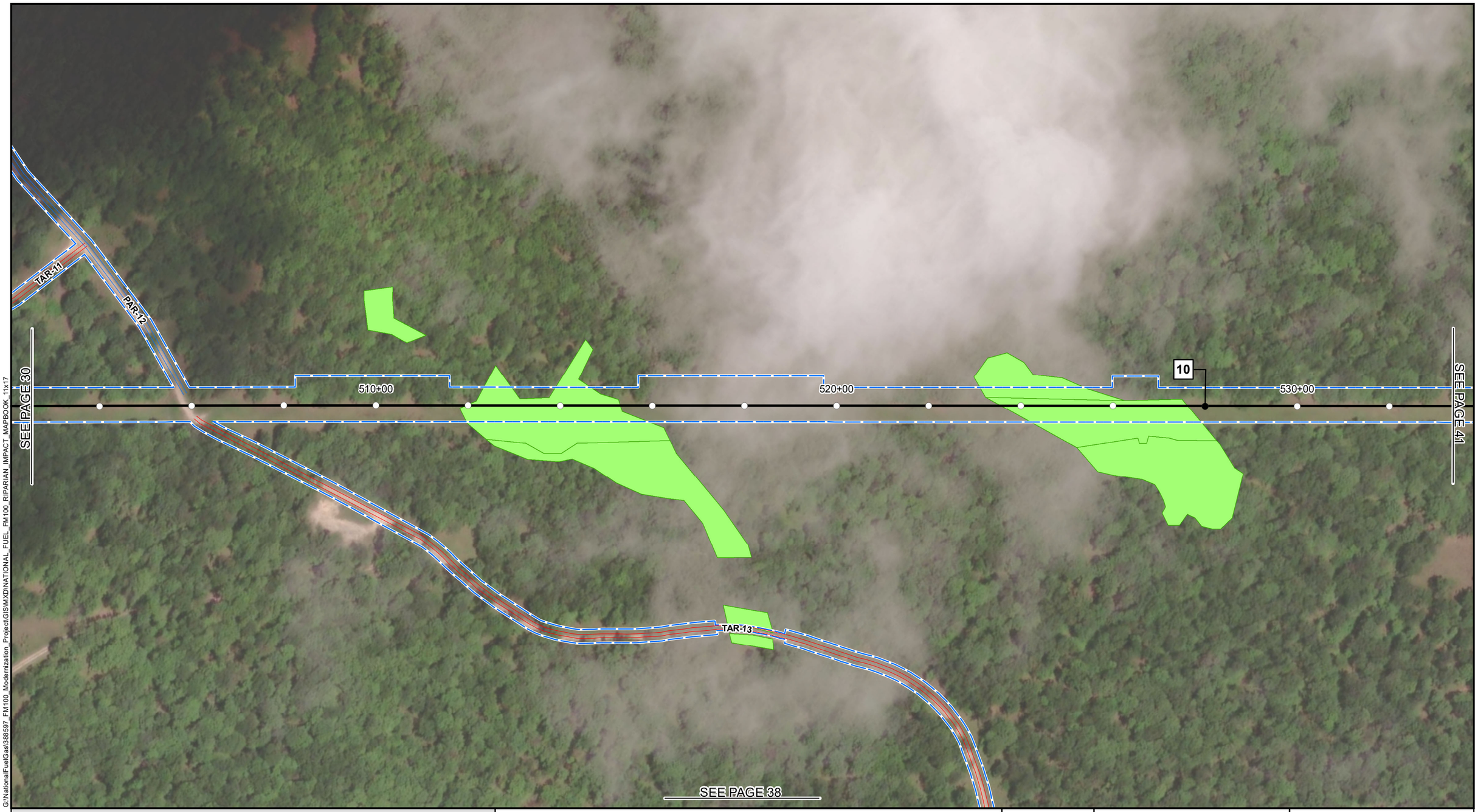

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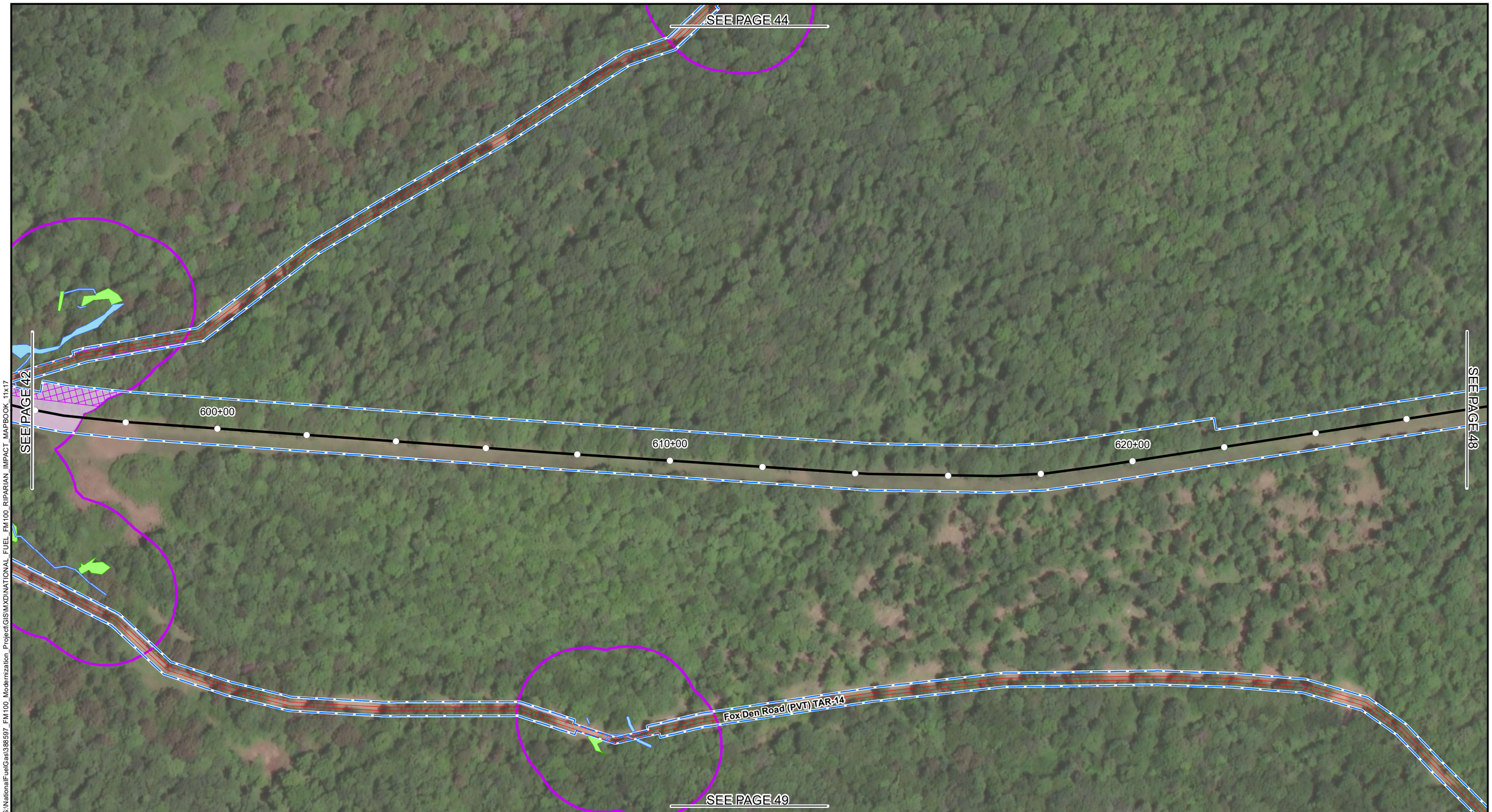

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TAR-15

640+00

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TAR-16

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Fox Den Road (PVI) TAR-14

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FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION MAP
MCKEAN, COUNTY

200 100 0 200 400 FEET

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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1+00 STATION POINT
1 MILE POST
PROPOSED PIPELINE
PERMANENT ACCESS ROAD
TEMPORARY ACCESS ROAD
LIMITS OF DISTURBANCE
DELINEATED WATERBODY
DELINEATED WETLAND
RIPARIAN BUFFER
RIPARIAN SEEDING
RIPARIAN PLANTING
COUNTY BOUNDARY

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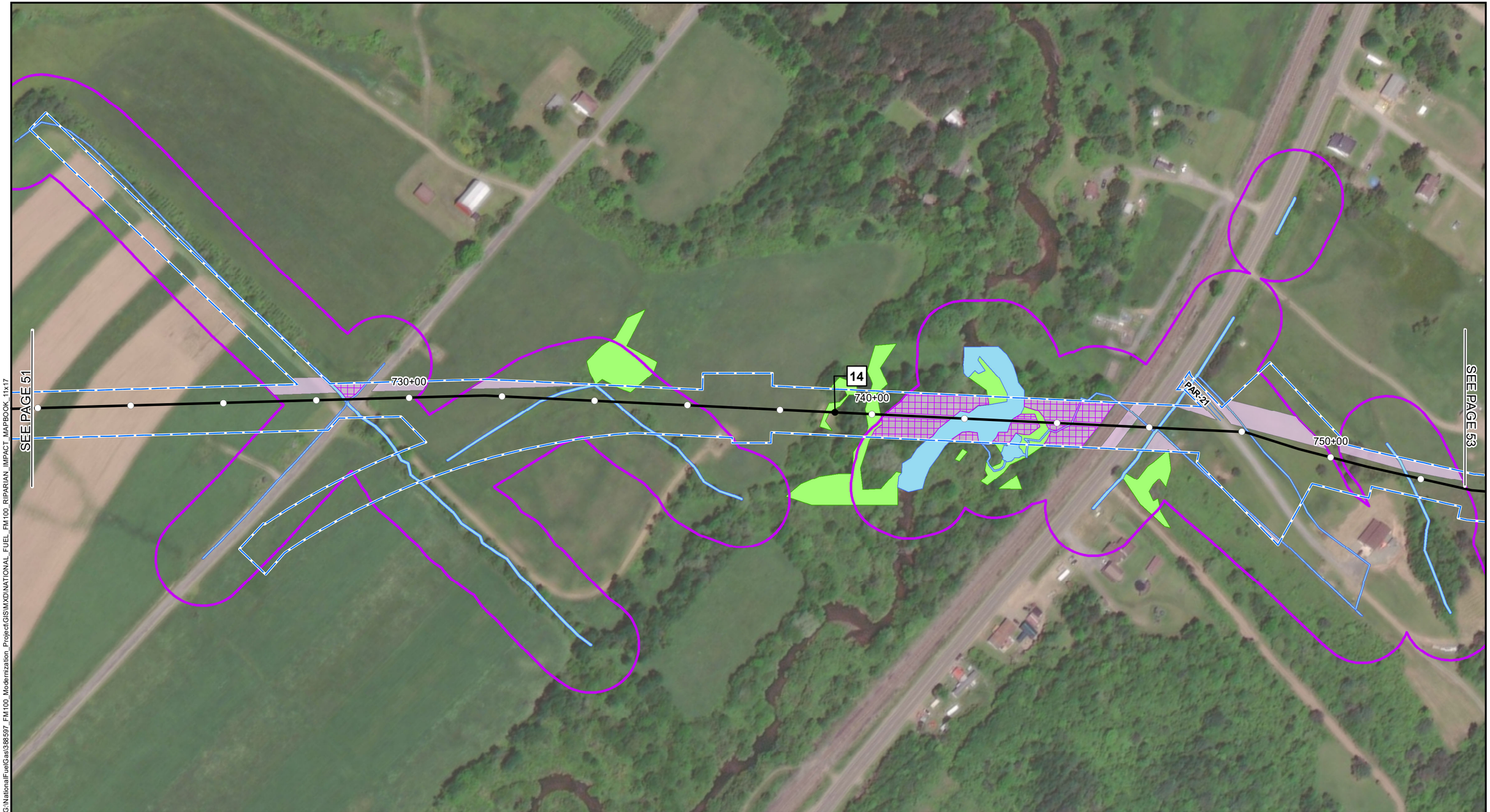

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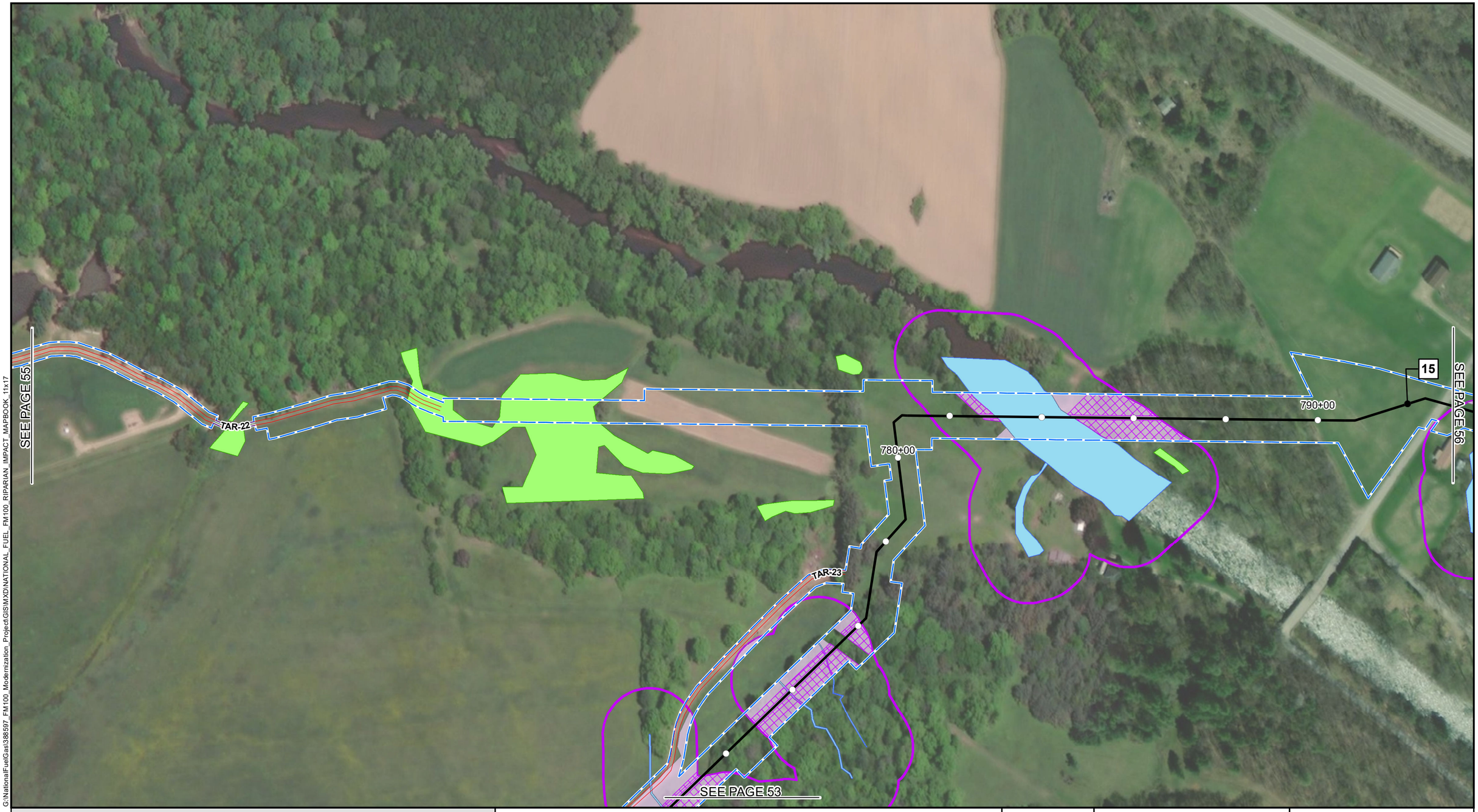

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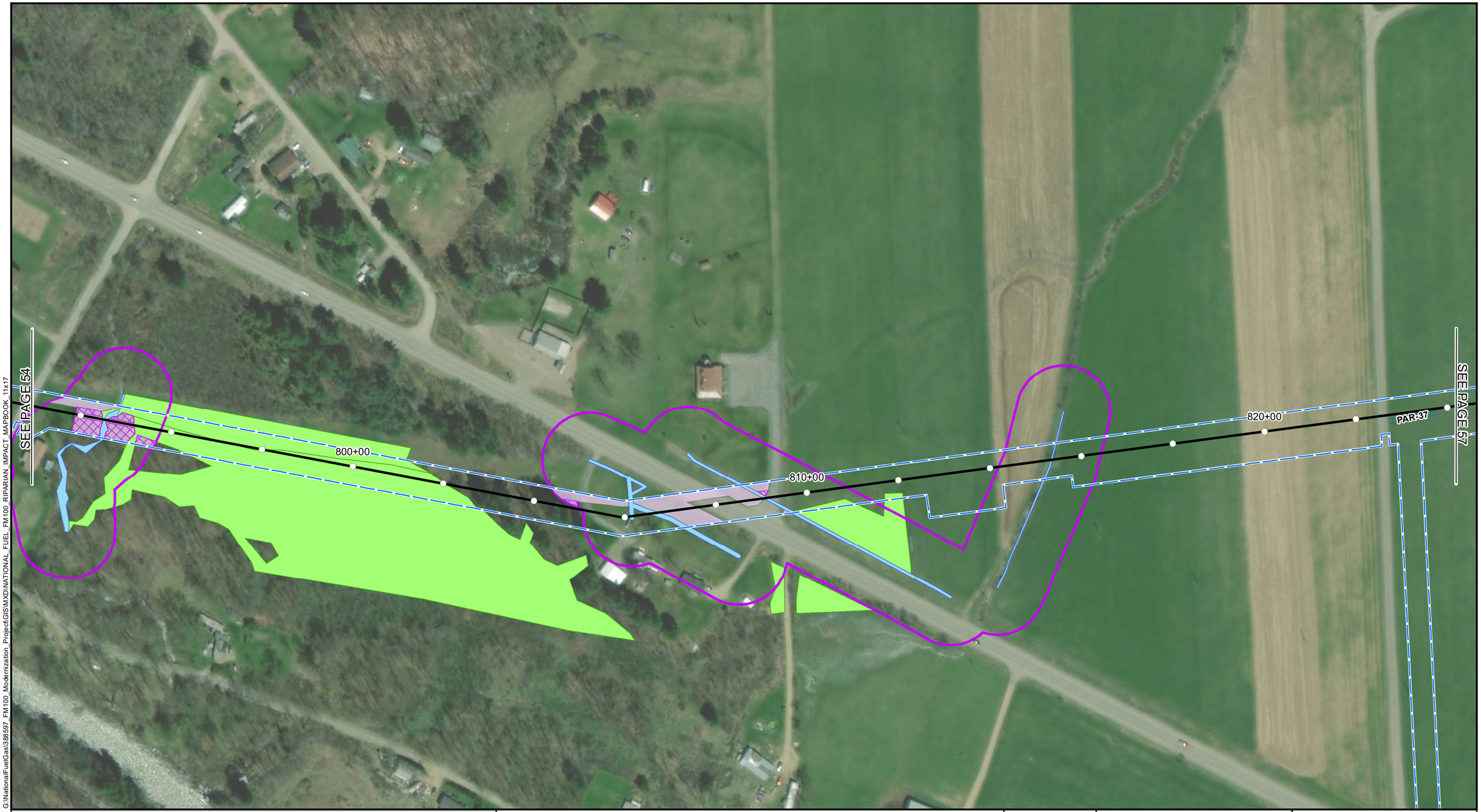

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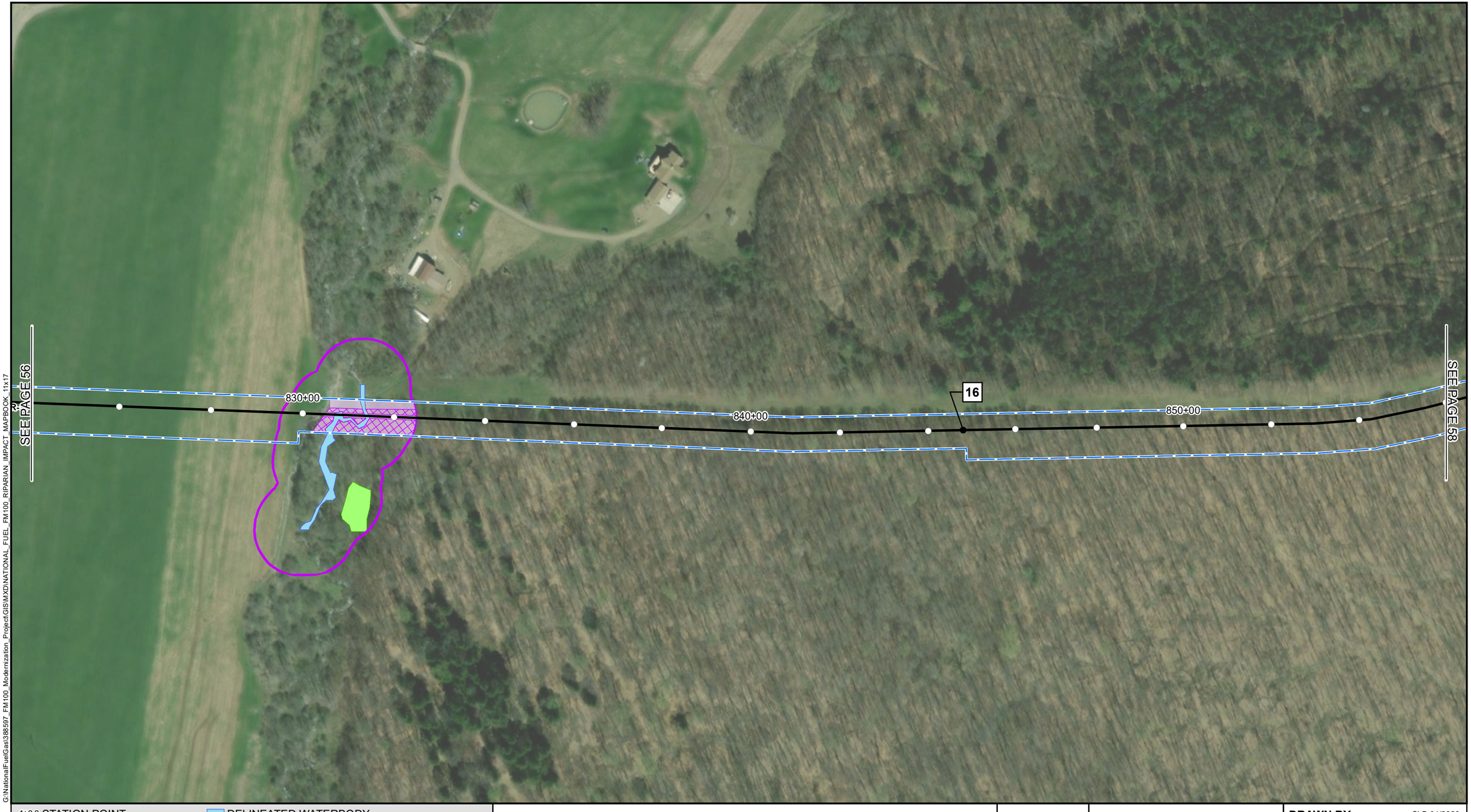

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TAR-27

MCKEAN COUNTY

POTTER COUNTY

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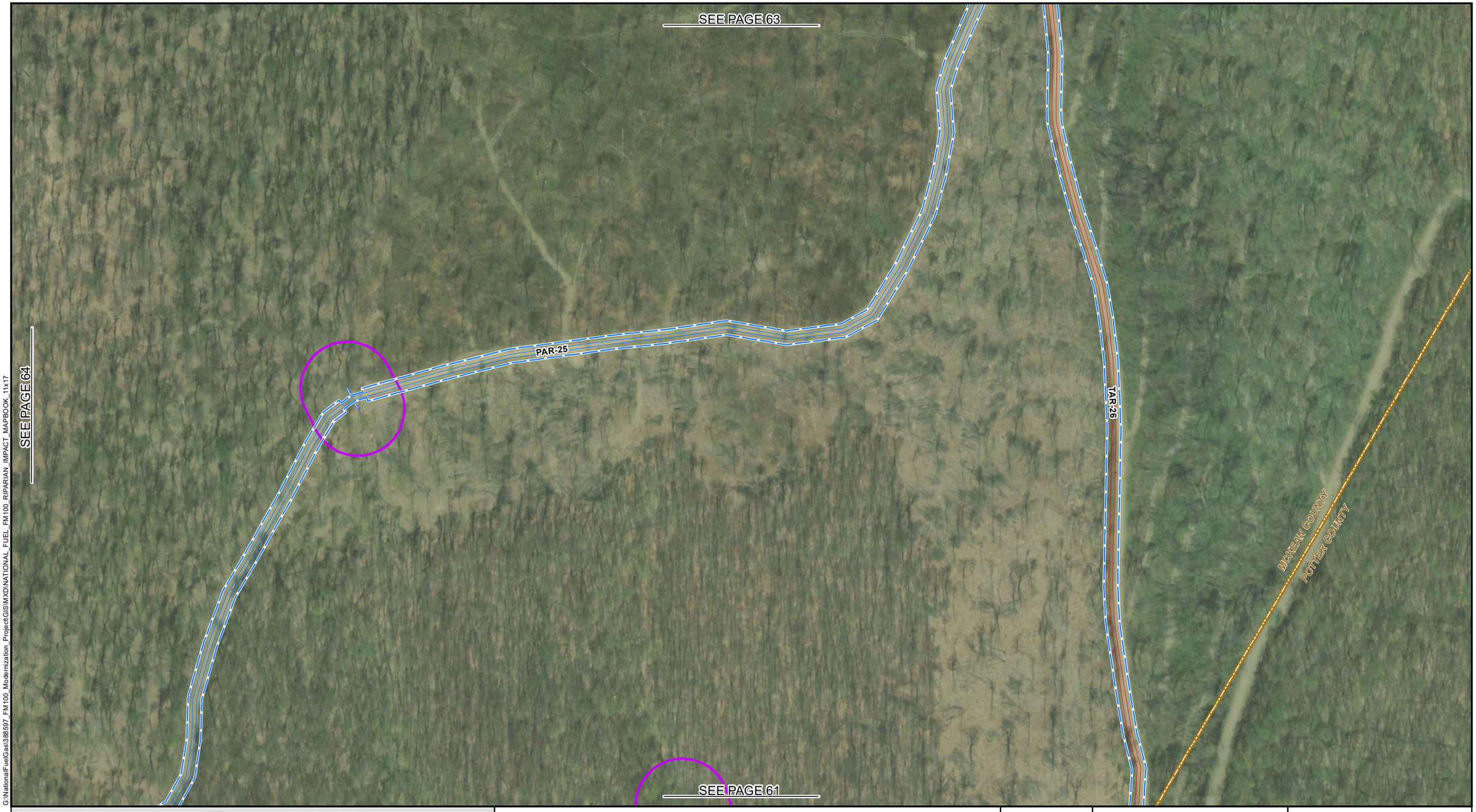

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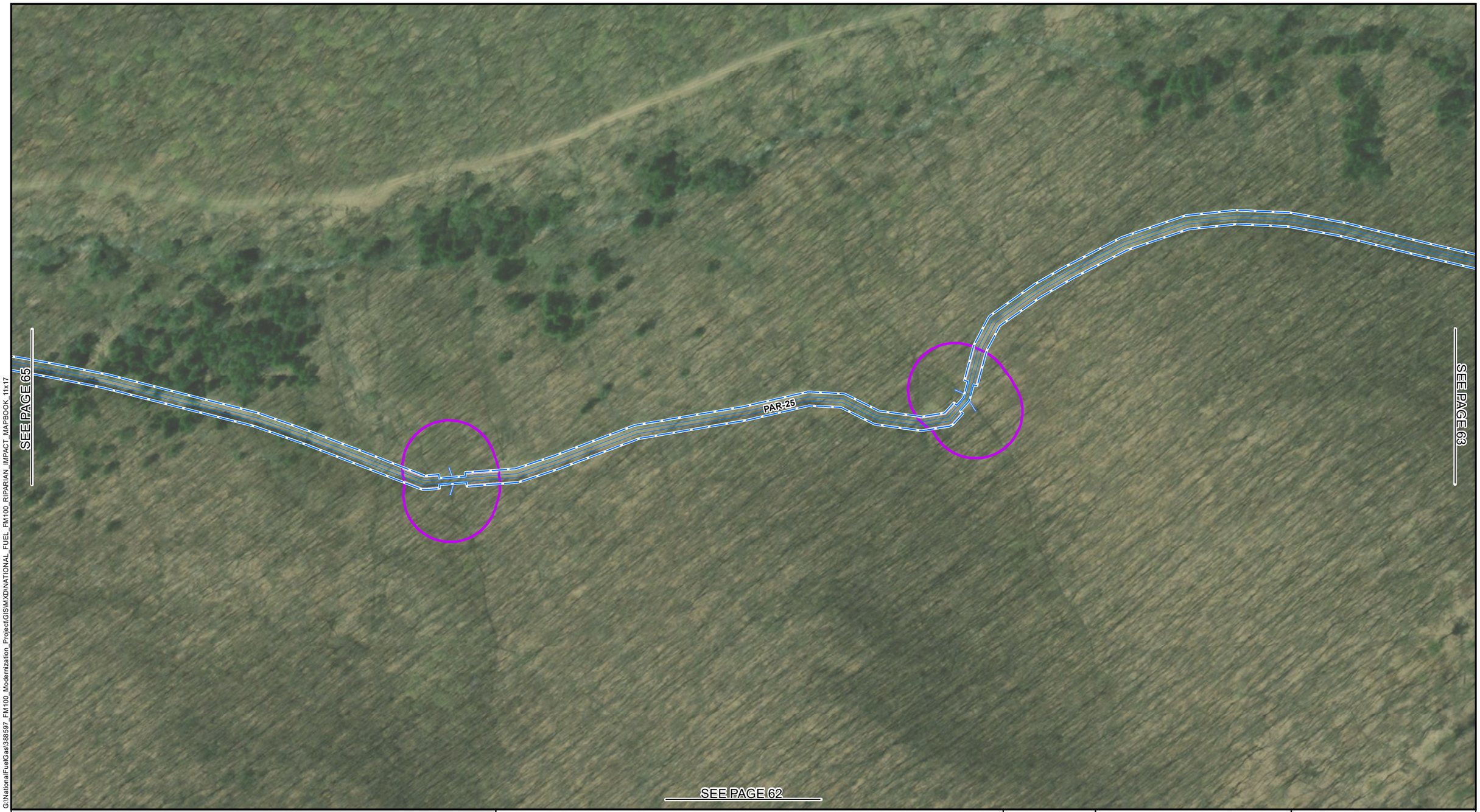

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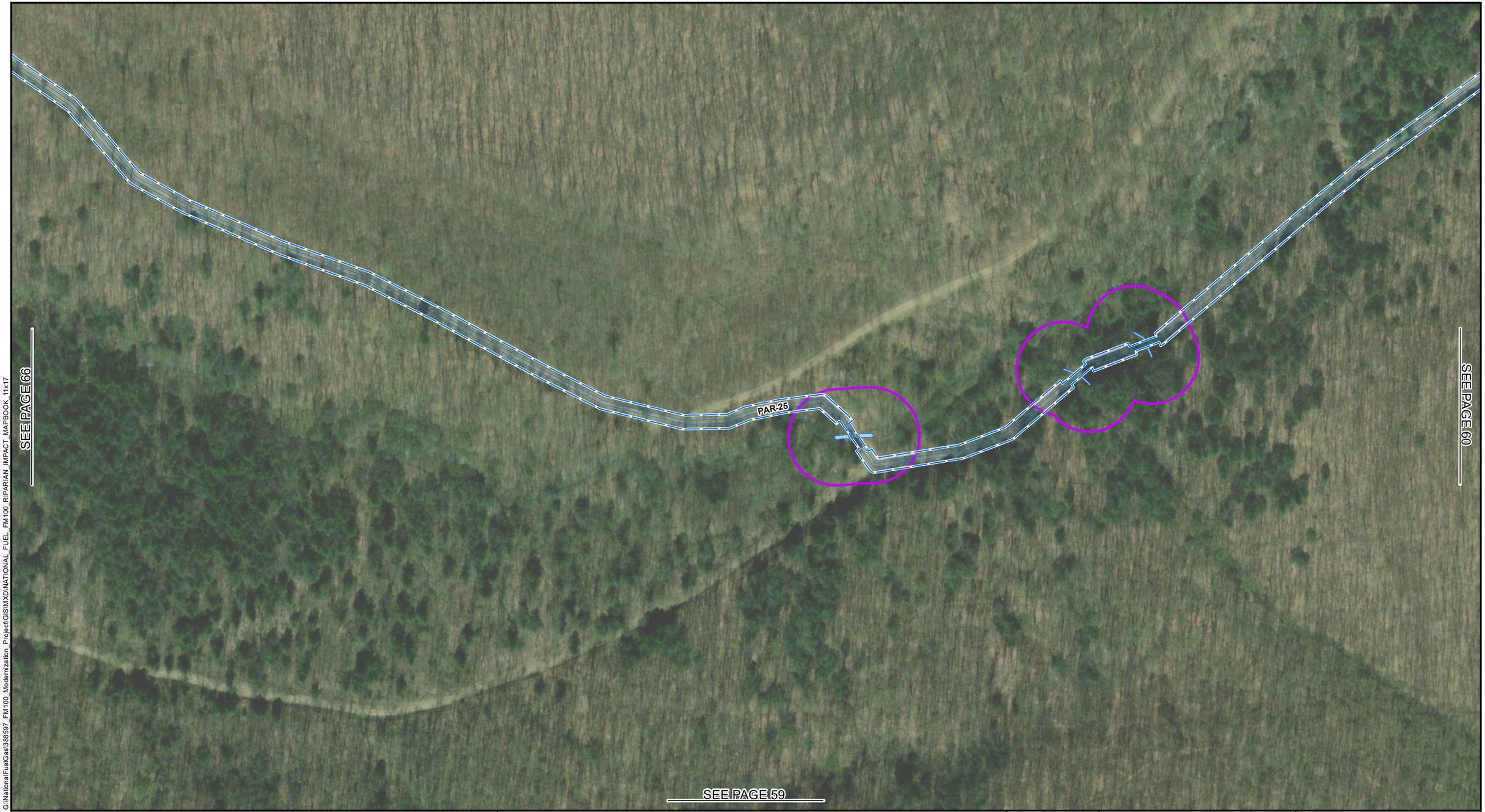

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RIPARIAN PLANTING
COUNTY BOUNDARY

NOTES:
1) MAPS COMPILED UTILIZING ESRI BASEMAP AERIAL IMAGERY.

NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION MAP
POTTER, COUNTY

200 100 0 200 400 FEET

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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1+00 STATION POINT
1 MILE POST
PROPOSED PIPELINE
PERMANENT ACCESS ROAD
TEMPORARY ACCESS ROAD
LIMITS OF DISTURBANCE
DELINEATED WATERBODY
DELINEATED WETLAND
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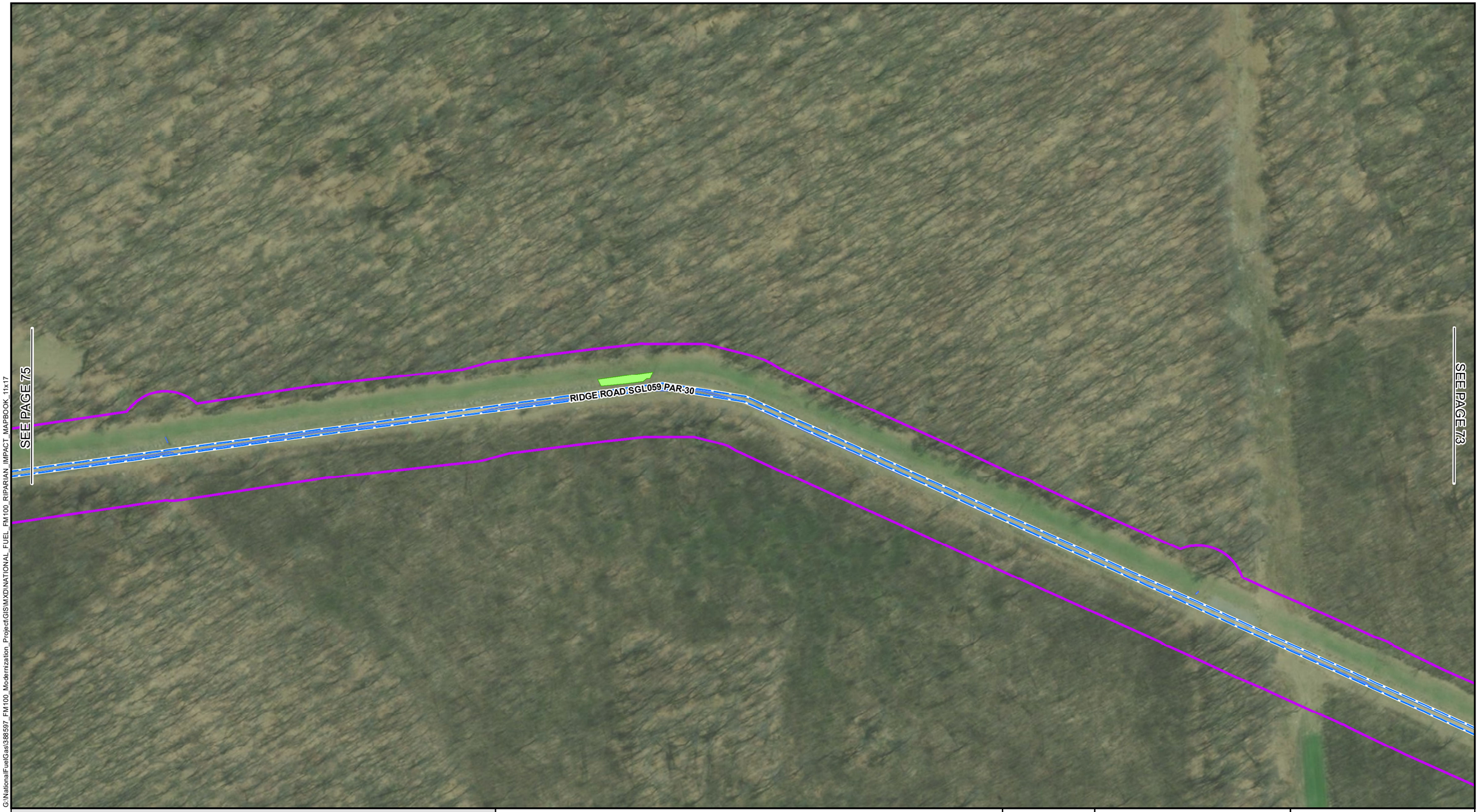

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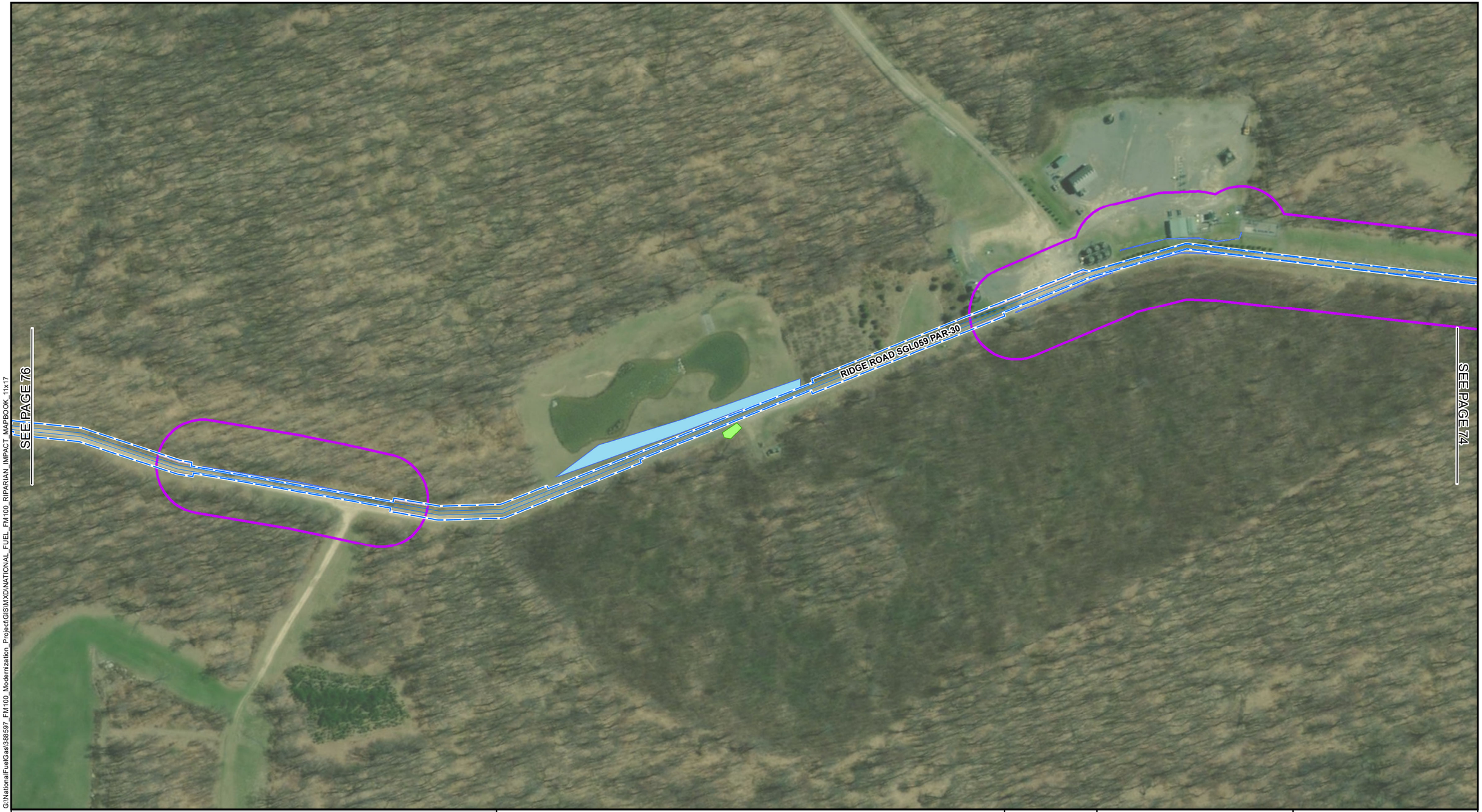

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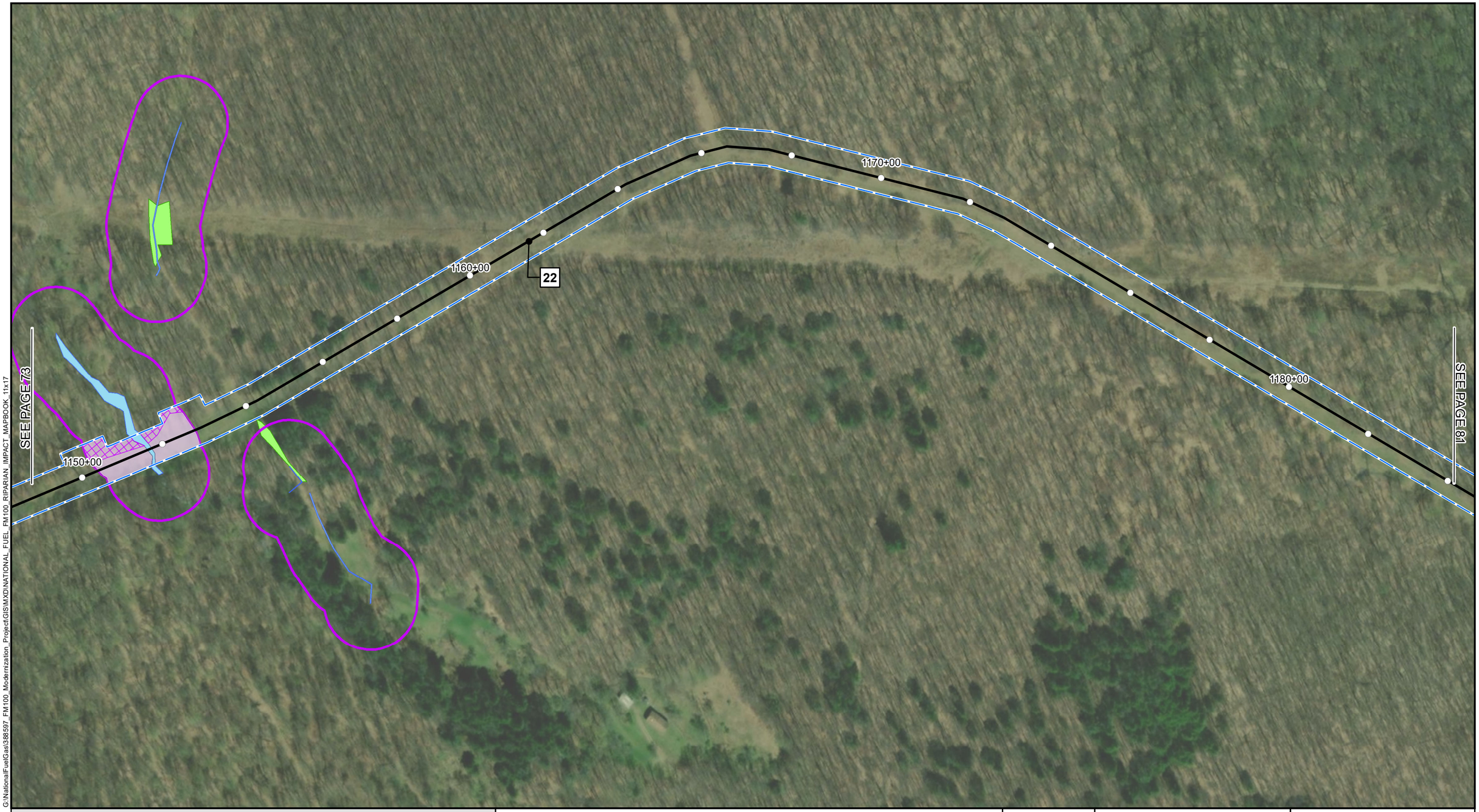

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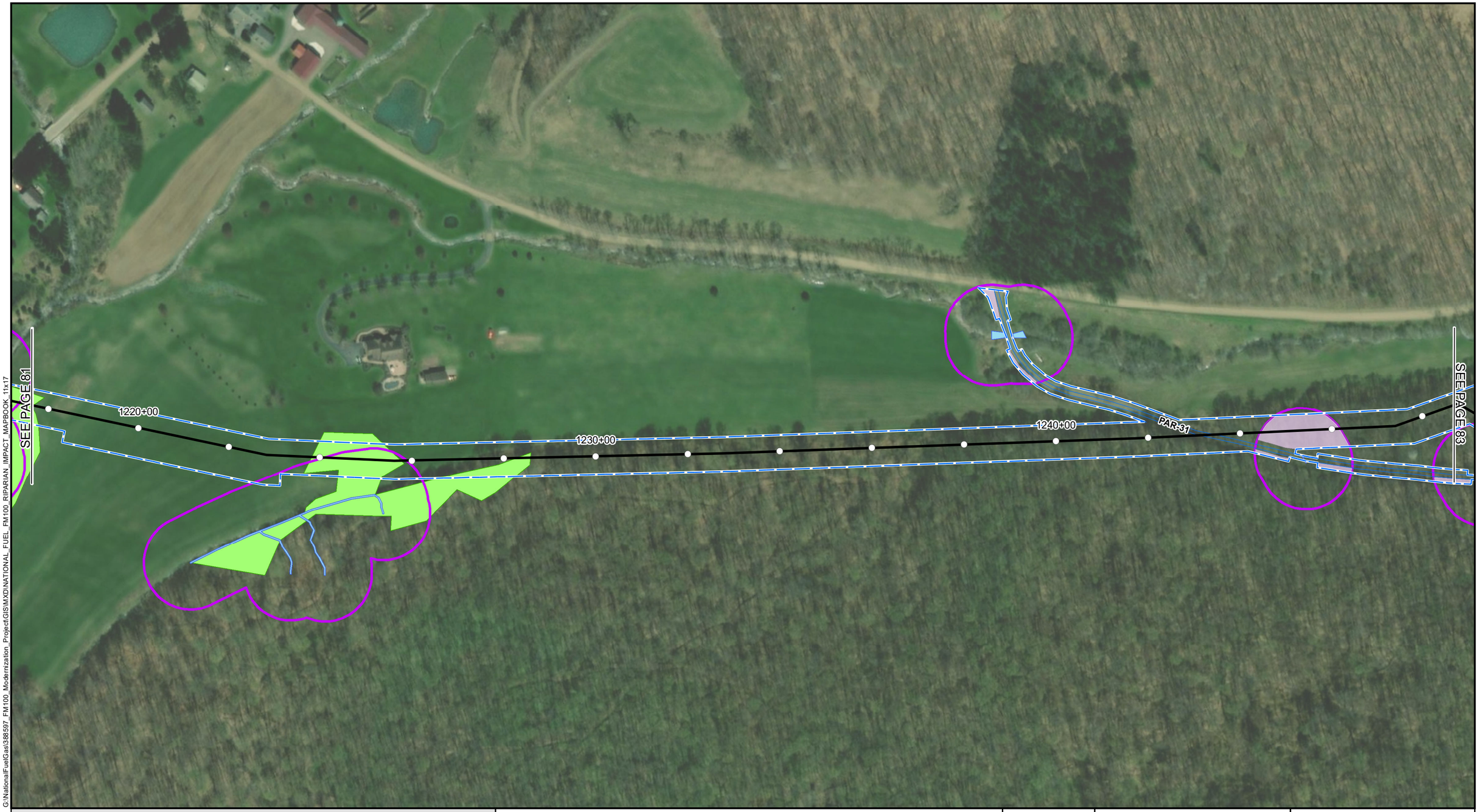

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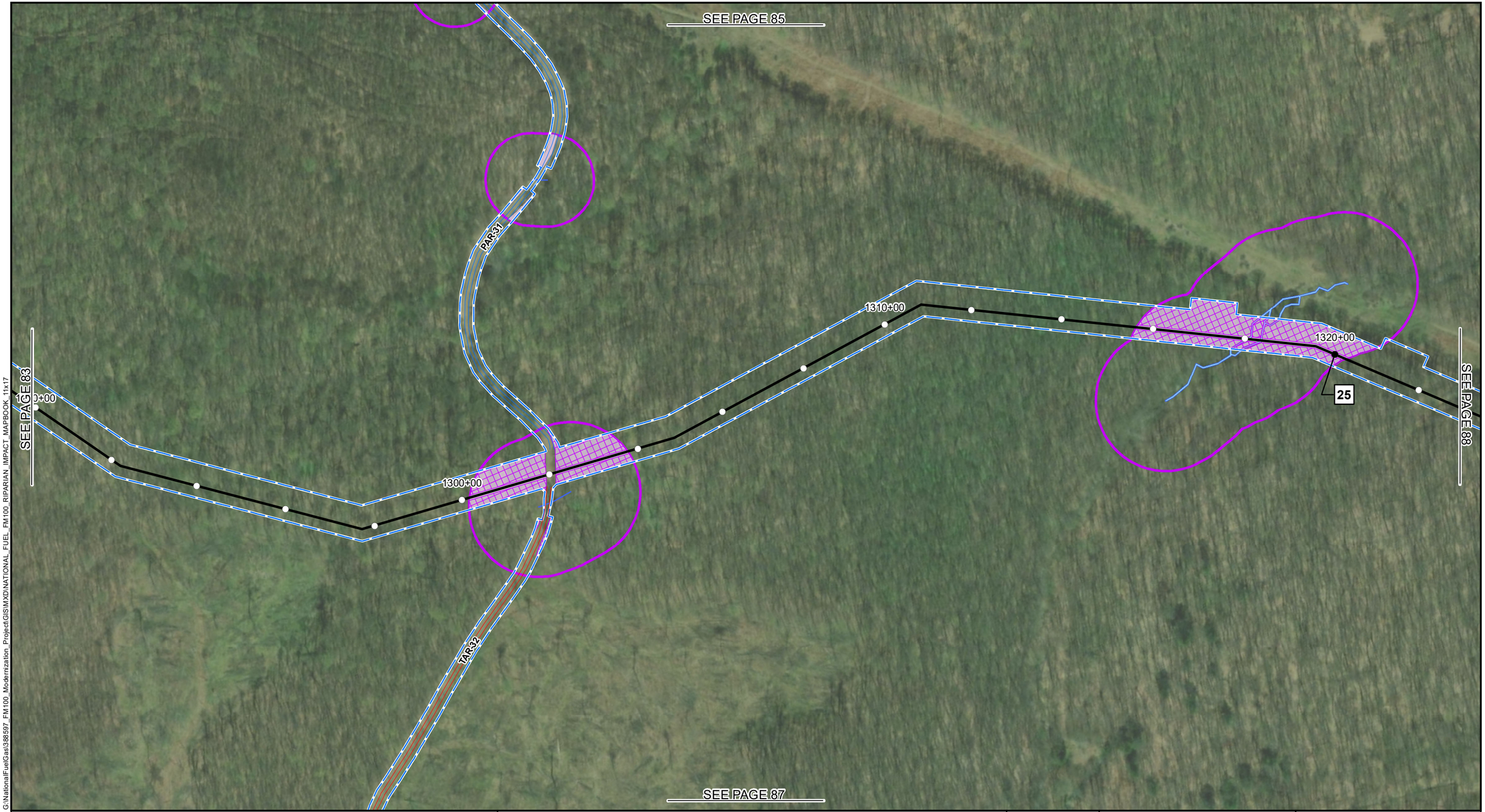

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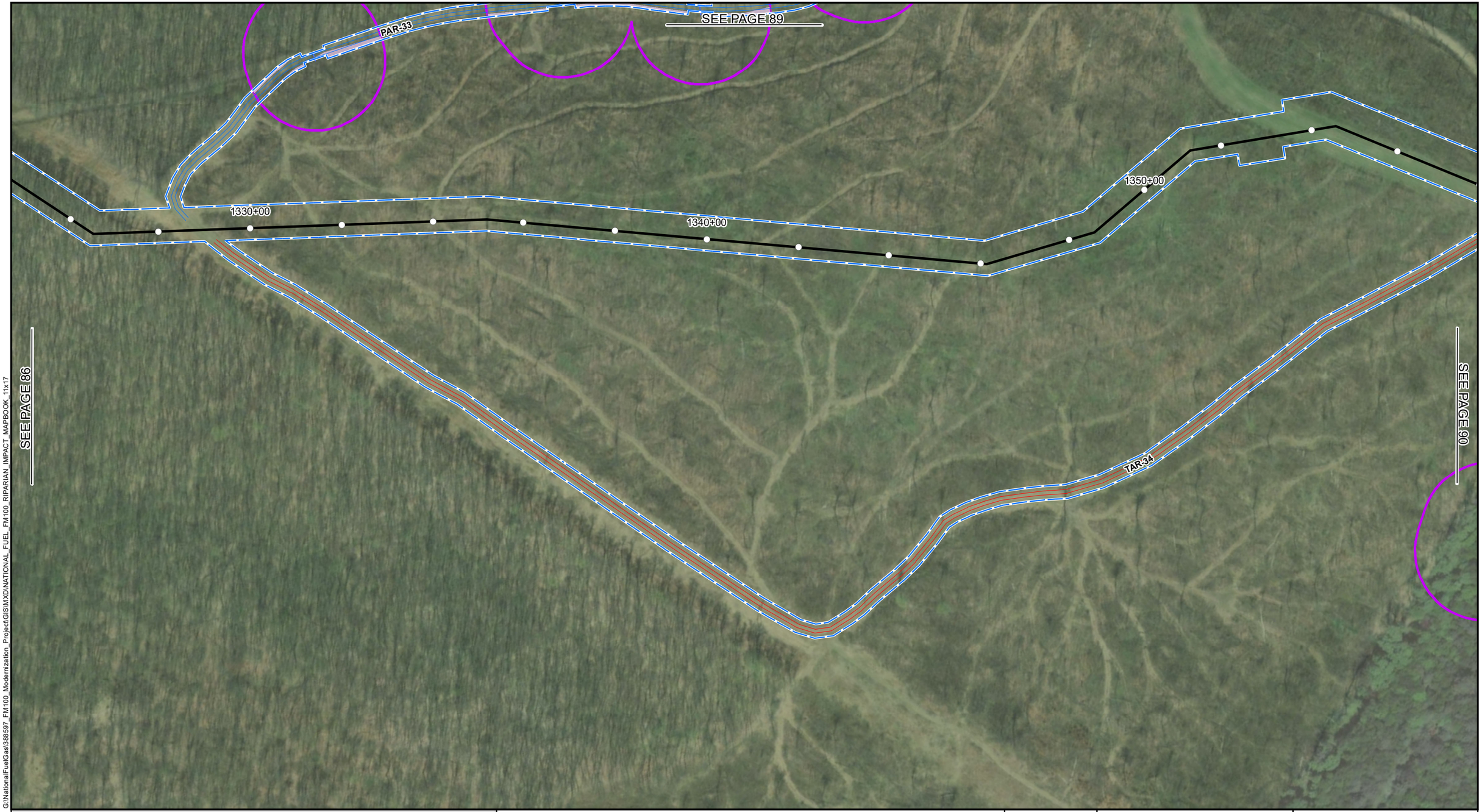

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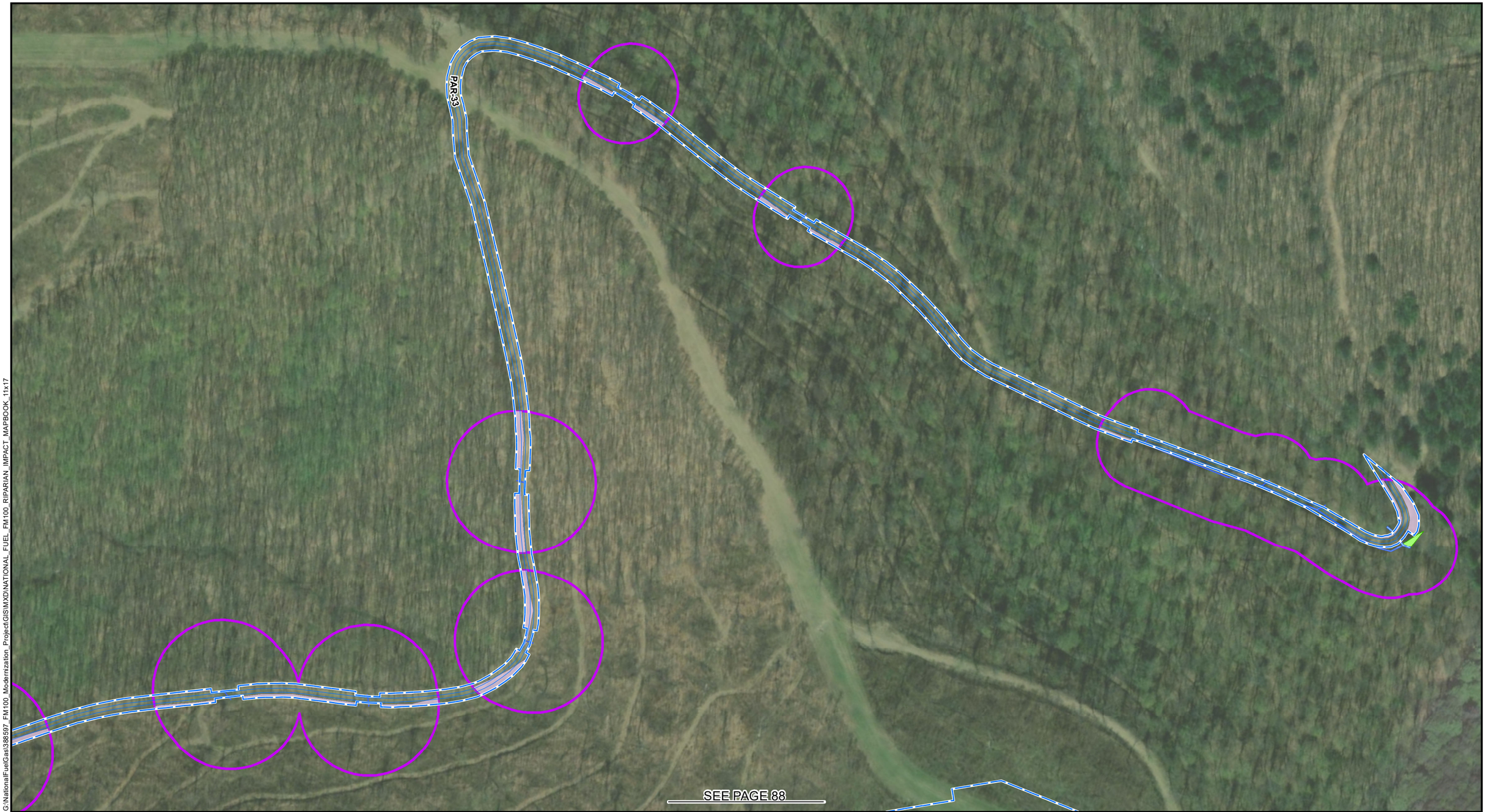

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NATIONAL FUEL GAS SUPPLY CORPORATION
FM100 MODERNIZATION PROJECT
RIPARIAN RESTORATION MAP
POTTER, COUNTY

200 100 0 200 400 FEET

N W E S

ABSOLUTE SCALE: 1:2,400

REFERENCE SCALE: 1 IN = 200 FT

National Fuel SUPPLY CORPORATION

MOTT MACDONALD

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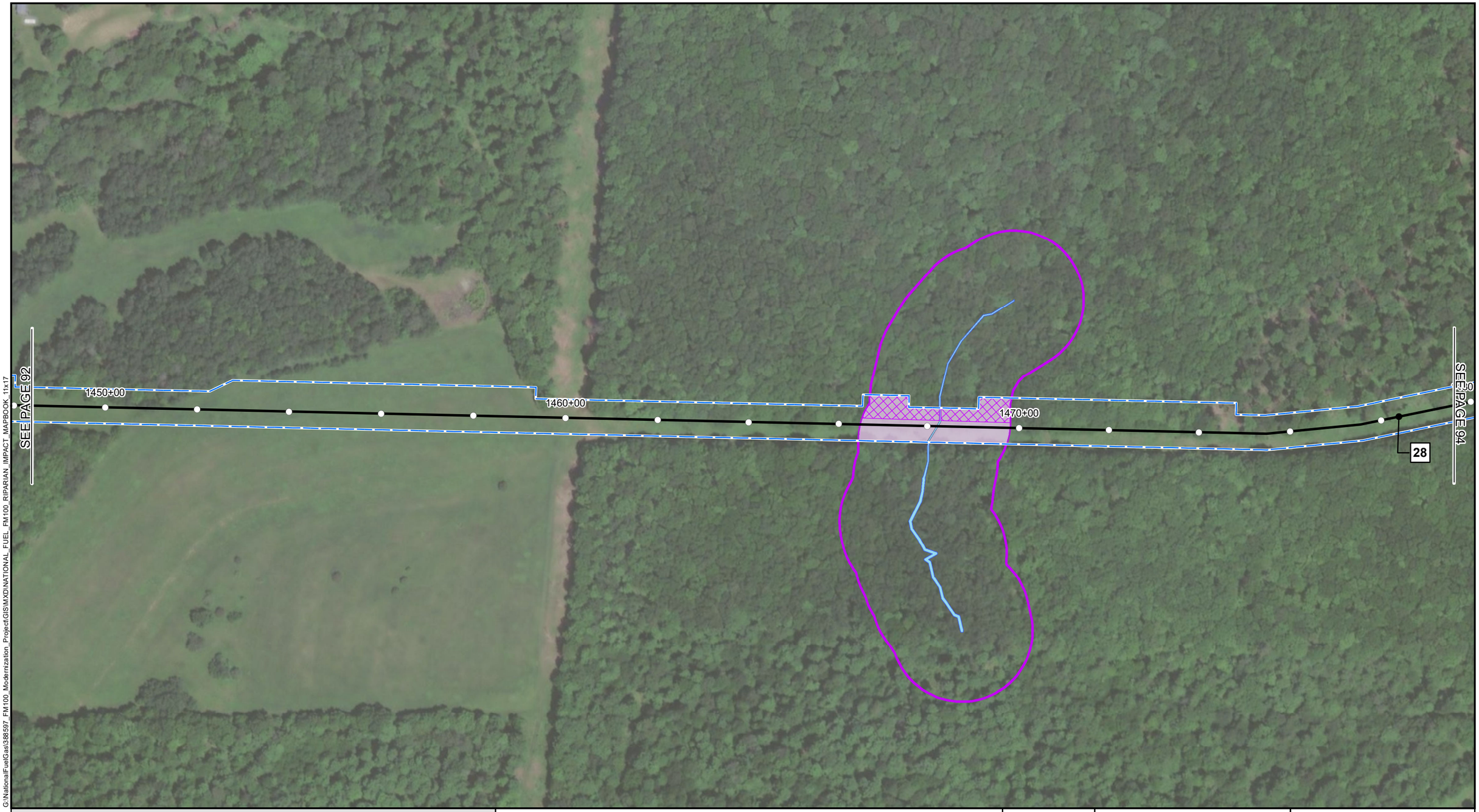

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF WATER PROGRAMS
OFFICE OF OIL AND GAS MANAGEMENT

OFFICIAL USE ONLY

ID # _____
Date Received _____
AUTH _____
SITE _____
CLNT _____
APS _____
Fee _____
Check No. _____
Check Date _____

NOTICE OF INTENT (NOI) FOR COVERAGE UNDER THE EROSION AND SEDIMENT CONTROL GENERAL PERMIT (ESCGP-3) FOR EARTH DISTURBANCE ASSOCIATED WITH OIL AND GAS EXPLORATION, PRODUCTION, PROCESSING, OR TREATMENT OPERATIONS OR TRANSMISSION FACILITIES

READ THE INSTRUCTIONS PROVIDED IN THIS PERMIT APPLICATION PACKAGE BEFORE COMPLETING THIS FORM. PLEASE PRINT OR TYPE INFORMATION IN BLACK OR BLUE INK.

SECTION A. APPLICATION TYPE

Check one:

NEW ☒ **RENEWAL** ☐ **MAJOR MODIFICATIONS (Provide ESCGP number)** ☐

PHASED ☐ (check only if applicable; *note: Most projects are not submitted as phased projects*)

Check one: EXPEDITED ☐ **STANDARD** ☒

If an Expedited Review Process being requested, be advised that the Expedited Review is not available for all projects. Refer to Section D - Expedited Review Process of the ESCGP-3 NOI Instructions to determine if the project is eligible.

SECTION B. CLIENT INFORMATION

Applicant's Last Name (If applicable)	First Name	MI	Telephone No.
Kittka	Jeffery		(814)871-8625

Organization Name or Registered Fictitious Name	Telephone No.
National Fuel Gas Supply Corporation	

DEP Client ID No. 74892

Headquarters Mailing Address	City	State	ZIP Code
6363 Main Street	Williamsville	NY	14221

Email Address kittkaj@natfuel.com

Co-Applicant's Last Name (If applicable)	First Name	MI	Telephone No.

Organization Name or Registered Fictitious Name	Telephone No.

Address	City	State	ZIP Code

Email Address

SECTION C. SITE INFORMATION

Is there an existing ESCGP associated with this site? ☐ Yes ☒ No If yes, Permit No. _____

Has a well permit application been submitted for this site? ☐ Yes ☒ No If yes, Permit No. _____

Does this site have a 911 address? ☒ Yes ☐ No If yes, provide site location address. 128 Kin Foks Lane Mount Jewett, PA 16740

Site Name
FM100 Modernization Project / Abandonment Project

Site Location	Site No. (if another permit has been issued for the site)
See Section 1-4 of this ESCGP-3 Application	

Site Location – City	State	ZIP Code
See Section 1-4 of this ESCGP-3 Application		

Detailed Written Directions to Site

Line KL/Line YM58 Begin (Sergeant Twp, McKean County): Take Grand Army of the Republic - Route 6 to Clermont Rd. Head south on Clermont Rd for ~3 miles to Kin Foks Ln.

Line YM224 Begin (Hebron Twp, Potter County): Take State Route 44 N to South Branch Rd. Follow South Branch Rd ~2 miles to Carmer Ln.

Existing Line FM100 Abandonment Begin (Huston Twp, Clearfield County): Access driveway via Bennetts Valley Hwy 255 (~1 mile NE of crossing with State Park Rd 153.

Tamarack Compressor Station (Leidy Twp, Clinton County): Take Tamarack Rd 144 to Stewart Hill Rd. Follow Stewart Hill Rd ~1.5 miles NE to access driveway.

Primary Location	County	Municipality	City	Boro	Twp.
	See Attachment 1	See Attachment 1	☐	☒	☒

SECTION D. EXPEDITED REVIEW

I. Expedited Review Eligibility

1. Is any part of the project in the watershed of a surface water with an existing or designated use of exceptional value or high quality pursuant to Chapter 93 (relating to water quality standards), in an exceptional value wetland in accordance with 25 Pa. Code § 105.17, or in the watershed of an impaired surface water where the cause of the impairment is identified as siltation?	☒ Yes ☐ No
2. Will the project in which the well pad will be constructed be in or on a floodplain?	☐ Yes ☒ No
3. Is any earth disturbance located or proposed to be located on land known to be contaminated by the release of regulated substances as defined in Section 103 of Act 2, 35 P.S. § 6026.103?	☐ Yes ☒ No
4. Will naturally occurring geologic formations or soil conditions provide hazards to the project or surrounding environment or have the potential to cause or contribute to pollution when disturbed?	☒ Yes ☐ No
5. Do any unresolved non-compliance issues exist with the applicant or the facility?	☐ Yes ☒ No
6. Is the project a transmission project?	☒ Yes ☐ No

If yes to any of the above questions the project is not eligible for Expedited Review; If the project is eligible for Expedited Review, all the following items must be completed.	
II. Expedited Review Process	
1. Is the technically and administratively complete and accurate NOI package prepared and certified by a licensed professional?	☐ Yes ☐ No
2. Are E&S and PCSM/Site Restoration Plan drawings and narrative prepared and sealed by a licensed professional? *(Include interim restoration details when needed)*	☐ Yes ☐ No
3. Include a Resource Delineation Report and answer the following questions: (If the answer to question a. is "Yes" then skip to #4. If the answer to a. is "No" the applicant must answer "Yes" to at least one of the questions, b. through d. to be eligible for expedited review.)	
a. Were all wetland resources delineated during the growing season?	☐ Yes ☐ No
b. If not during the growing season, was a follow-up visit conducted during the growing season to verify/adjust boundaries and look for potentially missed resources?	☐ Yes ☐ No
c. Was a quality assurance field review conducted at a later date by an independent qualified wetland professional to verify boundaries and look for potentially missed resources? (If yes, attach Quality Assurance Field Review Report)	☐ Yes ☐ No
d. Was a Jurisdictional Determination (JD) or Preliminary JD conducted by the US Army Corps of Engineers on the whole project? (If yes, attach Preliminary or Jurisdictional Determination Report)	☐ Yes ☐ No
4. If applicable, have you included PNDI clearance letters or other documentation from applicable resource agencies?	☐ Yes ☐ No
5. If the project site contains, is along, or within 100 feet of a river, stream, creek, lake, pond or reservoir, will you establish new or preserve existing riparian forest buffer at least 100 feet in width between the top of streambank or normal pool elevation of a lake, pond or reservoir and areas of earth disturbances. If no, will a waiver be obtained? ☐ Yes ☐ No	☐ Yes ☐ No
6. Name of Licensed Professional Company	
Address	
Phone	

SECTION E. PROJECT INFORMATION

1. Total Project Area/Project Site (Ac):	538.1	Total Disturbed Area (Ac):	538.1
Increased disturbed acreage *(for permit modification only)*			
Fee: ***(For additional information regarding fees, refer to NOI Instructions #3 Permit NOI Filing Fees.)***			$ See Section 1-3 of this ESCGP-3 Application

2. Project Name: FM100 Modernization Project / Abandonment Project

3. Project Type (Check all that apply)

- ☐ Oil/Gas Well [1]
- ☐ Gathering Facility
- ☐ Treatment Facility
- ☒ Compressor Station
- ☒ Pipeline
- ☐ Storage Field Facility
- ☐ Other
- ☒ Transmission Facility
- ☐ Processing Facility
- ☐ Well Development Impoundment
- ☐ Non-FERC regulated Transmission Facility
- ☐ Ground/Surface Water Withdrawal Site

[1] If Oil/Gas Well; is the well conventional or unconventional? ☐ Conventional ☐ Unconventional

Project Description

See Section 2-1 of this ESCGP-3 Application

Provide the date of pre-application meeting (if conducted with the Department)

4. Provide the latitude and longitude coordinates for the center of the project. The coordinates should be in Decimal degrees and North American Datum 1983. The coordinates must meet the current DEP policy regarding locational accuracy. For linear projects provide the project's termini.

Line KL Begin / End: 41.703, -78.500 / 41.705, -78.494
Line YM58 Begin / End: 41.702, -78.499 / 41.857, -78.017
Line YM 224 Begin / End: 41.878, -77.975 / 41.886, -77.950
Existing Line FM100 Abandonment Begin / End: 41.220, -78.559 / 41.590, -78.058
Tamarack Compressor Station: 41.436, -77.836

Horizontal Collection Method: ☒ GPS ☐ Interpolated from U.S.G.S. Topographic Map ☐ DEP's eMAP

5. U.S.G.S. 7.5 min. topographic quadrangle Name (*Include a copy of the project area on the 7.5 min quad map)* See Section 1-4 of this ESCGP-3 Application

6. Will the project be conducted as a phased permit project? ☐ Yes ☒ No
If Yes, Include Master Site Plan Estimated Timetable for Phased Projects. ☐ Additional sheet(s) attached.

Phase No. or Name	Description	Total Area	Disturbed Area	Start Date	End Date

7. List existing and previous land use for a minimum of the previous 5 years. See Section 2-1 of this ESCGP-3 Application

8. Other Pollutants: Will the stormwater discharge contain pollutional substances other than sediment? ☐ Yes ☒ No
   If yes, explain and provide any available quantitative data.

9. Will fuels, chemicals, solvents, other hazardous waste or materials be used or stored on site during earth disturbance activities or will Horizontal Directional Drilling (HDD) activities be conducted?
   Yes ☒ No ☐ ***(If yes, Preparedness, Prevention and Contingency (PPC) Plan must be maintained on site during earth disturbance. See NOI Instructions, E.9 PPC Plan Guidance for further information.)***

10. Is the project in the watershed of an impaired surface water where the cause of the impairment is identified as siltation?
    Yes ☐ No ☒ ***(If yes, show how the project will not result in a net change in volume, rate or water quality. See section I below, and E.10 of NOI instructions.)***

11. Are there potentially hazardous naturally occurring geological or soil conditions in any portion of the project or surrounding area? Yes ☒ No ☐

    If yes, do the potentially hazardous geologic or soil conditions have the potential to cause or contribute to pollution as a result of the proposed earth disturbance activities? No.

    If no, provide an explanation. See Section 2.5.5 of the ESCGP-3 Narrative (Section 2-1 of this Application)

    If yes, Geologic Hazard Mitigation Plan must be attached and explain where in this application details are provided.

12. Has the Act 14 Municipal Notification and proof of receipt of notification been attached to the NOI?
    Yes ☒ No ☐ ***(If not, the NOI is not complete, see E.12 and #4 Municipal Notification in the NOI Instructions for additional guidance.)***

13. Has the PNDI receipt been attached to the NOI?
    Yes ☒ No ☐ ***(If not, the NOI is not complete, see E.13 and #5 PNHP in the NOI Instructions for additional guidance.)***

14. Have the E&S Plan and PCSM/SR Plan been planned and designed to be consistent?
    Yes ☒ No ☐

15. Have existing and/or proposed Riparian Forest Buffers been identified?
    Yes ☒ N/A ☐ ***(If yes, they must be shown on the E&S Plan as well as the PCSM/SR Plans.)***

16. Have antidegradation implementation requirements for special protection waters been addressed?
    Yes ☒ No ☐ N/A ☐ ***(If yes, antidegradation requirements must be included in the plan.)***

17. Has the seasonal high groundwater level been identified and 20-inch separation established at all excavation locations for pits for conventional operations and Well Development Impoundments for unconventional operations?
    Yes ☐ No ☐ N/A ☒

18. Receiving Waters	Chapter 93, Designated Use Stream Classification	Chapter 93, Existing Use Stream Classification
Watersheds crossed (See ESCGP-3 Section 2-2A and 2-2B for locations in plan view): Allegheny Portage Creek (TSF), Allegheny River (CWF), Baker Hollow (CWF), Bear Creek (CWF), Bemis Hollow (HQ), Bennett Branch Sinnemahoning Creek (CWF), Bennett Branch Sinnemahoning Creek (WWF), Benson Hollow (CWF), Berge Run (EV), Boyer Brook (HQ), Browns Mill Hollow (CWF), Coalbed Hollow (HQ), Coleman Hollow (CWF), Combs Creek (CWF), Deloy Hollow (EV), Donley Fork (HQ), Driftwood Branch Sinnemahoning Cr. (EV), Drury Run (EV), Dry Hollow (CWF), East Branch Fishing Creek (HQ), Ernst Hollow (CWF), First Fork Sinnemahoning Creek (EV), Fishing Creek (CWF), Fishing Creek (CWF), Fisk Hollow (CWF), Gifford Hollow (CWF), Green Hollow (CWF), Grove Run (HQ-CWF), Irons Hollow (CWF), Johnson Run (EV), Jordan Hollow (CWF), Lamb Hollow (CWF), Larson Hollow (CWF), Laurel Run (HQ-CWF), Lick Island Run (EV), Little Bailey Run (HQ), Medix Run (HQ-CWF), Mix Run (HQ-CWF), Oswayo Creek (CWF), Potato Creek (TSF), Red Mill Brook (CWF), Right Fork Big Run (EV), Right Fork Brooks Run (EV), Robbins Brook (HQ), Sartwell Creek (CWF), Saunders Run (HQ-CWF), Skinner Creek (HQ), South Branch Oswayo Creek (EV), Sullivan Run (HQ), Walcott Brook (CWF), Warner Brook (HQ), Wernwag Hollow (HQ), White Hollow (CWF), Whitney Creek (EV), Wiemer Hollow (CWF), Young Hollow (EV) See ESCGP-3 Section 2-1 for full list of receiving waters crossed by the Project	☒ HQ ☒ EV ☒ Other TSF, CWF ☐ Siltation-impaired ☐ HQ ☐ EV ☐ Other _____ ☐ Siltation-impaired ☐ HQ ☐ EV ☐ Other _____ ☐ Siltation-impaired ☐ HQ ☐ EV ☐ Other _____ ☐ Siltation-impaired	☐ HQ ☒ EV ☐ Other _____ ☐ Siltation-impaired ☐ HQ ☐ EV ☐ Other _____ ☐ Siltation-impaired ☐ HQ ☐ EV ☐ Other _____ ☐ Siltation-impaired ☐ HQ ☐ EV ☐ Other _____ ☐ Siltation-impaired
Secondary Receiving Water	Secondary Chapter 93, Designated Use	Secondary Existing Use

Name of Municipal or Private Separate Storm Sewer Operator, if applicable.

N/A

Non-Surface Receiving Water: (include off-site discharges)

N/A

SECTION F. EROSION AND SEDIMENT CONTROL (E&S) PLAN

See the attached Instructions for additional guidance with E&S Plans

Erosion and Sediment Control Plan BMPs should be designed to minimize accelerated erosion and sedimentation through limiting the extent and duration of earth disturbance, protection of existing drainage and vegetation, limiting soil compaction and controlling the generation of increased runoff. The Department recommends the use of the *Pennsylvania Erosion & Sedimentation Pollution Control Program Manual (E&S Manual)* (363-2134-008) to achieve this goal. The E&S Plan must meet the requirements of Pa. Code § 102.4(b) and submitted with the NOI. Also, see section 2. of the NOI instruction for detailed information on completing the E&S plan and additional requirements.

a. E&S Plan Summary

Provide a summary of proposed E&S BMPs and their performance to manage E&S for the project.

Typical pipeline BMPs that are proposed include waterbars, trench plugs, sediment barriers (compost filter socks), rock filter outlets, erosion control blanket, rock construction entrances, temporary equipment bridges, timber mats, mulch, and seed. An appropriate sediment removal device (filter bag, dewatering structure) and well-vegetated area will be utilized for trench and hydrostatic test dewatering. Antidegradation Best Available Combination of Technolgies (ABACT) BMPs, including compost filter socks and extended rock construction entrances with daily maintenance, will be utilized in HQ/EV watersheds. Additional information about the proposed BMPs are discussed in the Erosion and Sediment Control Plan.

b. E&S Plan BMP Design

Check those that apply:

☒ E&S Plan is designed using BMPs in the *E&S Manual*.

☐ E&S Plan is designed using an alternative BMP or design standard approved by DEP.

Note: NOI packages submitted with alternate BMPs not approved by the Department will be returned to the Applicant.

c. Do you have any information regarding riparian buffer which differs from Section G, Riparian Buffer?

Yes ☐ No ☒

Explain:

d. Thermal Impacts Analysis

Explain how thermal impacts associated with this project were avoided, minimized, or mitigated.

Pipeline

Clearing and grading associated with the pipeline construction may result in temporary loss of tree canopy and riparian vegetation along surface waters and wetlands, potentially resulting in thermal impacts from the loss of shading. However, the thermal impacts will be minimized by limiting the construction ROW to 75 feet, where possible, at wetlands and limiting the maintained permanent ROW to 10 feet at wetlands.

In streams and wetlands, trees and brush will be cut just above or to ground level, leaving the stumps and root systems intact. Tree stumps will be preserved to the maximum extent practicable and will be removed only over the trenchline and where the stumps present a safety hazard for construction. Leaving stumps and root systems in this manner will promote re-growth in some species.

Facilities

Clearing and grading associated with the site development for aboveground facilities was limited to the least amount of space required for safe construction. Runoff from the site will flow over long stretches of vegetated areas before reaching receiving streams, which will provide for additional cooling and infiltration. Additionally, shade areas will be preserved to the greatest extent possible.

e. Off-Site Discharge Analysis

Does the activity propose any off-site discharges to areas other than surface waters? ☒ Yes ☐ No

If yes, it is the applicant's responsibility to ensure that they have legal authority for any off-site discharge to neighboring properties.

The applicant must provide a demonstration in both E&S and PCSM/SR plans that the discharge will not cause erosion, damage, or a nuisance to off-site properties.

Please refer to Appendix D of the Tamarack CS E&S Plan for the off-site discharge analysis (ESCGP-3 Application Section 2-3).

SECTION G. RIPARIAN BUFFER

1. Will you be protecting, converting or establishing a voluntary riparian forest buffer as part of this project? ☐ Yes ☒ No
   If yes, as part of the PCSM/SR Plan, provide a Buffer Management Plan.
2. Will proposed earth disturbance activities be conducted in an EV or HQ watershed AND within 150 feet of a perennial or intermittent river, stream, or creek, or lake, pond, or reservoir? ☒ Yes ☐ No

   If no, proceed to the next section/module.
3. Does this project qualify for an exception (see § 102.14(d)(1))? ☐ Yes ☒ No

   If yes, indicate below the type of project for which the exception applies by marking the appropriate box.

   ☐ Oil and gas activities for which site reclamation or restoration is part of the permit authorization in Chapter 78 and 78a.

   ☐ Road maintenance activities.

   ☐ The repair or maintenance of existing pipelines and utilities.

   ☐ Other (see §102.14(d)(1))

   If exceptions are checked, explain how existing riparian buffer will be undisturbed to the extent practicable. Provide a demonstration that the requirements of §102.14(b) are met, or provide the necessary information to request a riparian buffer waiver.
4. Are you requesting a riparian buffer waiver for this project (see § 102.14(d)(2))? ☒ Yes ☐ No

   If yes, indicate below the type of project for which you are requesting a waiver by marking the appropriate box.

   ☒ Linear project that may include pipelines, public roadways, rail lines, or utility lines.

   ☐ Project is of a temporary nature where the site will be fully restored to its preexisting conditions during the ESCGP permit term.

   ☐ Project where compliance with mandatory riparian buffers is not appropriate or feasible due to site characteristics or existing structures at the project site.

   ☐ Other (see §102.14(d)(2)):

   If waivers are checked, explain how existing riparian buffers will be undisturbed to the extent practicable.

   Note: If “Yes” to #2 **AND** “No” to #3 and #4, provide an attachment to demonstrate how the requirements of §102.14 are met.

   Please refer to Section 2-1 of this ESCGP-3 Application for Riparian Buffer Waiver Request

SECTION H. POST CONSTRUCTION STORMWATER MANAGEMENT (PCSM) AND/OR SITE RESTORATION(SR) PLAN

See NOI Instructions for additional guidance with PCSM Plans

PCSM/SR BMPs should be designed to use natural measures to eliminate pollution, infiltrate runoff, not require extensive construction/maintenance, promote pollutant reduction, and preserve the integrity of stream channels. All PCSM/SR BMPs proposed in the PCSM/SR Plan must be designed in accordance with Ch. 102, Ch. 78a for unconventional operations, Ch. 78 for conventional operations and the *Pennsylvania Stormwater Best Management Practices Manual (Stormwater BMP Manual)* (363-0300-002). If alternate design criteria are utilized for the proposed project, they must have prior approval by the Department, or the NOI Application will be returned to the Applicant.

After construction is completed, how much of the entire disturbed area will be restored to meadow in good condition or better, or existing conditions? ☐ All ☒ Partial ☐ None

Include PCSM narrative and drawings for remaining impervious area. Also include a map showing the proposed contours of the site restoration plan.

If there are additional stages of the project prior to permit termination or expiration, list the stages and provide the documents required by subsection 'a' to section 'g' for each stage (e.g. partial restoration or changes to the amount of compacted areas, gravel, and/or impervious areas). Upload a narrative for each additional stage in addition to the drawings.

EXAMPLE

Stage No	Stage Name	PCSM Plan	SR Plan
Stage 1		☐	☐
Stage 2		☐	☐
Stage 3		☐	☐
Stage 4		☐	☐

Act 167 Consistency. Check those that apply.

Is there an Act 167 Plan? ☒ Yes ☐ No

☒ The attached PCSM/SR Plan is consistent with an applicable approved Act 167 Plan.

Complete the following for all approved Act 167 Stormwater Management Plans. (Use additional sheets if necessary)

Act 167 Plan Name	Date Adopted	
McKean County Act 167 Stormwater Management Plan	June 2010	Consistency Letter Included ☐
Potter County Act 167 Stormwater Management Plan	May 2010	Verification Report Included ☒

Note: A consistency letter is not required if a verification report is provided. See NOI Instructions. The PCSM/SR Plan must satisfy either sub paragraph 1, 2, or 3 below. Check those that apply.

1. ☒ Act 167 Plan approvals on or after January 2005 – The attached PCSM/SR Plan, in its entirety, is consistent with all requirements pertaining to rate, volume, and water quality from an Act 167 Stormwater Management Plan approved by DEP on or after January 2005. Box 1 must be checked if a current, DEP approved Act 167 plan exists.

2. ☒ The PCSM/SR Plan meets the standard design criteria from sections 102.8(g)(2) and (3) and the *Stormwater BMP Manual*. For projects involving oil and gas activities authorized by a permit issued under Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure, post construction stormwater management requirements are met for all areas that are restored to preconstruction conditions or to a condition of meadow in good condition or better. *[Note: PCSM plans must meet both the volume and rate requirements in the regulations, which are provided in the 2 sections mentioned in this paragraph].*

3. ☐ Alternative Design Standard – The attached PCSM/SR Plan was developed using approaches as provided in 102.8(g)(2)(iv) and 102.8(g)(3)(iii). Demonstrate/explain in the space provided below how this standard will be either more protective than what is required in 102.8(g)(2) and 102.8(g)(3) or will maintain and protect existing water quality and existing and designated uses.

PCSM/SR BMP Alternative Standards:

Has the alternative BMP or design standard been approved by the Department? NOT APPLICABLE

☐ Yes

☐ No – Do not submit the ESCGP-3 application and see Section (H) of the NOI Instructions concerning the alternative BMP approval process.

Water Quality Compliance:

Does the PCSM/SR plan comply with requirements for volume control? ☒ Yes ☐ No

If yes, is at least 90% of the disturbed area controlled by a PCSM BMP? ☒ Yes ☐ No

If yes, do you have the Standard PCSM Worksheet # 10 attached to show water quality compliance has achieved?
☒ Yes ☐ No

If no, attach Standard PCSM Worksheets # 12 and #13 to show water quality compliance has achieved.

If PCSM/SR plan is not complying with the requirements for volume control, attach Standard PCSM Worksheets # 11, # 12 and #13 to show water quality compliance has achieved.

a. PCSM/SR Plan Summary

Provide a summary of proposed BMPs and their performance to manage PCSM/SR for the project.

Along the mainline pipeline, typical E&S BMPs such as permanent waterbars and erosion control blanket will be left in place as part of site restoration for the project. At the aboveground facility sites, typical PCSM BMPs such as infiltration trenches, infiltration berms, infiltration basins, and retentive berms will be used and left in place as part of site restoration for facility sites. refer to the PCSM/SR Plans for additional information.

Check all that apply ☒ PCSM BMPs ☒ SR BMPs

b. Do you have any information regarding riparian buffer which differs from what was submitted in the Section G, Riparian Buffer?

☐ Yes ☒ No

Explain:

c. Thermal Impacts Analysis

Explain how thermal impacts associated with this project were avoided, minimized, or mitigated.

Aboveground Facilities
Infiltration of runoff collected in the PCSM facilities will mitigate thermal impacts from post construction stormwater. Further, it is not expected that runoff collected in stormwater infiltration basins and discharged overland to the receiving water will be retained for more than 24 hours, thus providing additional mitigation of potential thermal impacts of discharge from the PCSM facilities. Existing shade trees will be preserved to the greatest extent possible, and excessive riprapping and installation of concrete channels is avoided, which will minimize the transfer of heat to the runoff.
Pipeline
Once pipeline construction activities are complete, disturbed areas will be restored to pre-construction contours and seeded as described in the E&SCP. Temporary workspace disturbed for construction will be allowed to re-establish with woody and herbaceous vegetation species.

d. Off-Site Discharge Analysis.

Does the activity propose any off-site discharges to areas other than surface waters? ☒ Yes ☐ No

If yes, it is the applicant's responsibility to ensure that they have legal authority for any off-site discharge to neighboring properties.

The Applicant must provide a demonstration in both the E&S and PCSM/SR Plans that the discharge will not cause erosion, damage, or a nuisance to off-site properties.

For Tamarack CS: Refer to Appendix D of the Tamarack CS E&S Plan for the off-site discharge analysis (ESCGP-3 Application Section 2-3).
For Carpenter Hollow OPP, KL Valve Set, MLV-1, MLV-2, MLV-3, and MLV-4: Refer to Section 5 of each PCSM Report (ESCGP-3 Section 3-1) for off-site discharge analysis; Refer to each PCSM drawing package (ESCGP-3 Section 3-2) for the Off-site Stormwater Discharge Plan.

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: South Branch Oswayo Creek

Volume Control design storm frequency 2-year Rainfall amount 2.41 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.000	0.000	+0.000
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.056	0.080	+0.024
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.000	-0.056
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	0.697 cfs	0.000 cfs	-0.697 cfs
2) 10-Year/24-Hour	1.472 cfs	0.036 cfs	-1.436 cfs
3) 50-year/24-Hour	2.651 cfs	0.745 cfs	-1.909 cfs
4) 100-year/24-Hour	3.339 cfs	2.065 cfs	-1.274 cfs

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY ☐ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☐ VC ☐ RC ☐ WQ	_____	_____
Bio-infiltration areas	Infiltration/Recharge		VC/WC: 3,778; RC: 6,581	
☒ Infiltration Trench		☒ VC ☒ RC ☒ WQ		1.109
☐ Infiltration Bed		☐ VC ☐ RC ☐ WQ	_____	_____
☐ Infiltration Basin		☐ VC ☐ RC ☐ WQ	_____	_____
☐ Rain Garden/ Bioretention		☐ VC ☐ RC ☐ WQ	_____	
☐ Infiltration Berm		☐ VC ☐ RC ☐ WQ	_____	_____

Natural Area Conservation ☐ Streamside Buffer Zone ☐ Wetland Buffer Zone ☐ Sensitive Area Buffer Zone ☐ Pre-Construction Drainage Pattern Intact	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____
Stormwater Retention ☐ Constructed Wetlands ☐ Wet Ponds ☐ Retention Basin	Detention/Retention	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Sediment and Pollutant Removal ☐ Vegetated Filter Strips ☐ Compost Filter Sock ☐ Detention Basins	Water Quality Treatment	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Access Road Design ☐ Road Crowning ☐ Ditches ☐ Turnouts ☐ Culverts ☐ Roadside Vegetated Filter Strips	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Stormwater Energy Dissipaters ☐ Level Spreaders ☐ Riprap Aprons ☐ Upslope Diversions ☐ Other_____	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. Engineer shall inspect the subsurface infiltration facilities prior to backfilling.
2. Engineer shall inspect final stabilization prior to removal of temporary measures.

KL Valve Set

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: Warner Brook

Volume Control design storm frequency 2-year Rainfall amount 2.50 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.000	0.040	+0.040
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.033	0.378	+0.345
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.000	-0.033
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	0.559 cfs	0.000 cfs	-0.559 cfs
2) 10-Year/24-Hour	1.057 cfs	0.026 cfs	-1.031 cfs
3) 50-year/24-Hour	1.699 cfs	0.441 cfs	-1.258 cfs
4) 100-year/24-Hour	2.020 cfs	1.485 cfs	-0.535 cfs

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY				
☐ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☐ VC ☐ RC ☐ WQ	_____	_____
Bio-infiltration areas	Infiltration/Recharge		VC/WQ: 1,585; RC: 2,406	
☒ Infiltration Trench		☒ VC ☒ RC ☒ WQ		0.43
☐ Infiltration Bed		☐ VC ☐ RC ☐ WQ	_____	_____
☐ Infiltration Basin		☐ VC ☐ RC ☐ WQ	_____	_____
☐ Rain Garden/ Bioretention		☐ VC ☐ RC ☐ WQ	_____	
☐ Infiltration Berm		☐ VC ☐ RC ☐ WQ	_____	_____

Natural Area Conservation ☐ Streamside Buffer Zone ☐ Wetland Buffer Zone ☐ Sensitive Area Buffer Zone ☐ Pre-Construction Drainage Pattern Intact	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____
Stormwater Retention ☐ Constructed Wetlands ☐ Wet Ponds ☐ Retention Basin	Detention/Retention	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Sediment and Pollutant Removal ☐ Vegetated Filter Strips ☐ Compost Filter Sock ☐ Detention Basins	Water Quality Treatment	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Access Road Design ☐ Road Crowning ☐ Ditches ☐ Turnouts ☐ Culverts ☐ Roadside Vegetated Filter Strips	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Stormwater Energy Dissipaters ☐ Level Spreaders ☐ Riprap Aprons ☐ Upslope Diversions ☐ Other_____	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. Engineer shall inspect the subsurface infiltration facilities prior to backfilling.
2. Engineer shall inspect final stabilization prior to removal of temporary measures.
3. Engineer shall inspect the subsurface infiltration facilities prior to backfilling.

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: White Hollow

Volume Control design storm frequency 2-year Rainfall amount 2.43 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.000	0.040	+0.040
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.006	0.155	+0.149
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.000	-0.006
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	0.491 cfs	0.375 cfs	-0.116 cfs
2) 10-Year/24-Hour	1.472 cfs	1.124 cfs	-0.348 cfs
3) 50-year/24-Hour	2.447 cfs	1.869 cfs	-0.578 cfs
4) 100-year/24-Hour	2.951 cfs	2.378 cfs	-0.573 cfs

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY ☐ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☐ VC ☐ RC ☐ WQ	_____	_____
Bio-infiltration areas ☒ Infiltration Trench ☐ Infiltration Bed ☐ Infiltration Basin ☐ Rain Garden/ Bioretention ☐ Infiltration Berm	Infiltration/Recharge	☒ VC ☒ RC ☒ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	VC/WQ: 896; RC: 1,278 _____ _____ _____ _____	0.094 _____ _____ _____

Natural Area Conservation ☐ Streamside Buffer Zone ☐ Wetland Buffer Zone ☐ Sensitive Area Buffer Zone ☐ Pre-Construction Drainage Pattern Intact	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____
Stormwater Retention ☐ Constructed Wetlands ☐ Wet Ponds ☐ Retention Basin	Detention/Retention	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Sediment and Pollutant Removal ☐ Vegetated Filter Strips ☐ Compost Filter Sock ☐ Detention Basins	Water Quality Treatment	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Access Road Design ☐ Road Crowning ☐ Ditches ☐ Turnouts ☐ Culverts ☐ Roadside Vegetated Filter Strips	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Stormwater Energy Dissipaters ☐ Level Spreaders ☐ Riprap Aprons ☐ Upslope Diversions ☐ Other_____	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. Engineer shall inspect the subsurface infiltration facilities prior to backfilling.
2. Engineer shall inspect final stabilization prior to removal of temporary measures.

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: Allegheny River

Volume Control design storm frequency 2-year Rainfall amount 2.43 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.000	0.040	+0.040
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.000	0.007	+0.007
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.000	+0.000
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	0.000 cfs	0.000 cfs	-0.000 cfs
2) 10-Year/24-Hour	0.000 cfs	0.000 cfs	-0.000 cfs
3) 50-year/24-Hour	0.000 cfs	0.000 cfs	-0.000 cfs
4) 100-year/24-Hour	0.003 cfs	0.002 cfs	-0.001 cfs

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY ☐ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☐ VC ☐ RC ☐ WQ	_____	_____
Bio-infiltration areas ☒ Infiltration Trench ☐ Infiltration Bed ☐ Infiltration Basin ☐ Rain Garden/ Bioretention ☐ Infiltration Berm	Infiltration/Recharge	☒ VC ☒ RC ☒ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	VC/WQ: 467; RC: 1,084 _____ _____ _____ _____	0.07 _____ _____ _____

Natural Area Conservation ☐ Streamside Buffer Zone ☐ Wetland Buffer Zone ☐ Sensitive Area Buffer Zone ☐ Pre-Construction Drainage Pattern Intact	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____
Stormwater Retention ☐ Constructed Wetlands ☐ Wet Ponds ☐ Retention Basin	Detention/Retention	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Sediment and Pollutant Removal ☐ Vegetated Filter Strips ☐ Compost Filter Sock ☐ Detention Basins	Water Quality Treatment	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Access Road Design ☐ Road Crowning ☐ Ditches ☐ Turnouts ☐ Culverts ☐ Roadside Vegetated Filter Strips	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Stormwater Energy Dissipaters ☐ Level Spreaders ☐ Riprap Aprons ☐ Upslope Diversions ☐ Other_____	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. Engineer shall inspect the subsurface infiltration facilities prior to backfilling.
2. Engineer shall inspect final stabilization prior to removal of temporary measures.
3. Engineer shall inspect inlet installation prior to backfilling.

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: South Branch Oswayo Creek

Volume Control design storm frequency 2-year Rainfall amount 2.39 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.000	0.014	+0.014
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.000	0.005	+0.005
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.000	+0.000
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	0.000 cfs	0.000 cfs	+0.000 cfs
2) 10-Year/24-Hour	0.000 cfs	0.000 cfs	+0.000 cfs
3) 50-year/24-Hour	0.000 cfs	0.000 cfs	+0.000 cfs
4) 100-year/24-Hour	0.003 cfs	0.000 cfs	-0.003 cfs

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY				
☐ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☐ VC ☐ RC ☐ WQ	_____	_____
Bio-infiltration areas	Infiltration/Recharge		VC/WQ: 249;	
☒ Infiltration Trench		☒ VC ☒ RC ☒ WQ	RC: 994	0.071
☐ Infiltration Bed		☐ VC ☐ RC ☐ WQ	_____	_____
☐ Infiltration Basin		☐ VC ☐ RC ☐ WQ	_____	_____
☐ Rain Garden/ Bioretention		☐ VC ☐ RC ☐ WQ	_____	
☐ Infiltration Berm		☐ VC ☐ RC ☐ WQ	_____	_____

Natural Area Conservation ☐ Streamside Buffer Zone ☐ Wetland Buffer Zone ☐ Sensitive Area Buffer Zone ☐ Pre-Construction Drainage Pattern Intact	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____
Stormwater Retention ☐ Constructed Wetlands ☐ Wet Ponds ☐ Retention Basin	Detention/Retention	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Sediment and Pollutant Removal ☐ Vegetated Filter Strips ☐ Compost Filter Sock ☐ Detention Basins	Water Quality Treatment	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Access Road Design ☐ Road Crowning ☐ Ditches ☐ Turnouts ☐ Culverts ☐ Roadside Vegetated Filter Strips	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Stormwater Energy Dissipaters ☐ Level Spreaders ☐ Riprap Aprons ☐ Upslope Diversions ☐ Other_____	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. Engineer shall inspect the subsurface infiltration facilities prior to backfilling.
2. Engineer shall inspect final stabilization prior to removal of temporary measures.
3. Engineer shall inspect inlet installation prior to backfilling.

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: Oswayo Creek

Volume Control design storm frequency 2-year Rainfall amount 2.39 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.00	0.032	+0.032
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.069	0.077	+0.008
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.000	-0.069
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	0.046 cfs	0.042 cfs	-0.004 cfs
2) 10-Year/24-Hour	0.098 cfs	0.091 cfs	-0.007 cfs
3) 50-year/24-Hour	0.178 cfs	0.168 cfs	-0.010 cfs
4) 100-year/24-Hour	0.225 cfs	0.212 cfs	-0.013 cfs

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY ☐ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☐ VC ☐ RC ☐ WQ		
Bio-infiltration areas	Infiltration/Recharge		VC/WQ: 402;	
☒ Infiltration Trench		☒ VC ☒ RC ☒ WQ	RC: 1,501	1.39
☐ Infiltration Bed		☐ VC ☐ RC ☐ WQ		
☐ Infiltration Basin		☐ VC ☐ RC ☐ WQ		
☐ Rain Garden/ Bioretention		☐ VC ☐ RC ☐ WQ		
☐ Infiltration Berm		☐ VC ☐ RC ☐ WQ		

Natural Area Conservation ☐ Streamside Buffer Zone ☐ Wetland Buffer Zone ☐ Sensitive Area Buffer Zone ☐ Pre-Construction Drainage Pattern Intact	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____
Stormwater Retention ☐ Constructed Wetlands ☐ Wet Ponds ☐ Retention Basin	Detention/Retention	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Sediment and Pollutant Removal ☐ Vegetated Filter Strips ☐ Compost Filter Sock ☐ Detention Basins	Water Quality Treatment	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____	_____ _____ _____
Access Road Design ☐ Road Crowning ☐ Ditches ☐ Turnouts ☐ Culverts ☐ Roadside Vegetated Filter Strips	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Stormwater Energy Dissipaters ☐ Level Spreaders ☐ Riprap Aprons ☐ Upslope Diversions ☐ Other_____	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ _____ _____

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. Engineer shall inspect the subsurface infiltration facilities prior to backfilling.
2. Engineer shall inspect final stabilization prior to removal of temporary measures.
3. Engineer shall inspect inlet installation prior to backfilling.

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: Warner Brook

Volume Control design storm frequency 2-year Rainfall amount 2.50 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.58	4.87	+4.29
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.78	1.39	+0.61
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.77	-0.01
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	0.03 cfs	0.00 cfs	-0.03 cfs
2) 10-Year/24-Hour	0.54 cfs	0.21 cfs	-0.34 cfs
3) 50-year/24-Hour	5.31 cfs	2.65 cfs	-2.66 cfs
4) 100-year/24-Hour	10.00 cfs	9.18 cfs	-0.82 cfs

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY ☒ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☒ VC ☒ RC ☒ WQ		4.6
Bio-infiltration areas	Infiltration/Recharge			
☐ Infiltration Trench		☐ VC ☐ RC ☐ WQ		
☐ Infiltration Bed		☐ VC ☐ RC ☐ WQ		
☐ Infiltration Basin		☐ VC ☐ RC ☐ WQ		
☐ Rain Garden/ Bioretention		☐ VC ☐ RC ☐ WQ	26,734 cf (2-yr)	
☒ Infiltration Berm		☒ VC ☒ RC ☒ WQ	88,310 cf (100-yr)	7.4

Natural Area Conservation	Infiltration/Recharge			
☐ Streamside Buffer Zone		☐ VC ☐ RC ☐ WQ		
☐ Wetland Buffer Zone		☐ VC ☐ RC ☐ WQ		
☐ Sensitive Area Buffer Zone		☐ VC ☐ RC ☐ WQ		
☐ Pre-Construction Drainage Pattern Intact		☐ VC ☐ RC ☐ WQ		
Stormwater Retention	Detention/Retention			
☐ Constructed Wetlands		☐ VC ☐ RC ☐ WQ		
☐ Wet Ponds		☐ VC ☐ RC ☐ WQ		
☐ Retention Basin		☐ VC ☐ RC ☐ WQ		
Sediment and Pollutant Removal	Water Quality Treatment			
☐ Vegetated Filter Strips		☐ VC ☐ RC ☐ WQ		
☒ Compost Filter Sock		☐ VC ☐ RC ☒ WQ		
☐ Detention Basins		☐ VC ☐ RC ☐ WQ		
Access Road Design	Infiltration/Recharge			
☐ Road Crowning		☐ VC ☐ RC ☐ WQ		
☒ Ditches		☐ VC ☐ RC ☐ WQ		0.3
☐ Turnouts		☐ VC ☐ RC ☐ WQ		
☒ Culverts		☐ VC ☐ RC ☐ WQ		13.8
☐ Roadside Vegetated Filter Strips		☐ VC ☐ RC ☐ WQ		
Stormwater Energy Dissipaters	Infiltration/Recharge			
☐ Level Spreaders		☐ VC ☐ RC ☐ WQ		
☒ Riprap Aprons		☐ VC ☐ RC ☐ WQ		14.1
☐ Upslope Diversions		☐ VC ☐ RC ☐ WQ		
☐ Other_____		☐ VC ☐ RC ☐ WQ		

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. A licensed professional or designee shall be present on site during installation of bioretention sock infiltration/retention berms to verify that the BMP is being implemented in accordance with the approved plan.

2. Upon completion of construction, a licensed professional or designee shall complete an inspection to verify that BMPs are in place and functioning as designed.

3. After the first growing season, a licensed professional or designee shall perform an inspection to verify that BMPs continue to function as designed and verify that permanent vegetative stabilization has been established.

e. Summary Table for Supporting Calculation and Measurement Data
(See NOI Instructions for additional guidance with this section)

The remainder of this section (Summary Table for Calculation and Measurement Data) does not need to be completed for areas of projects involving oil and gas activities authorized by Chapter 78 or Chapter 78a (well pads) or pipelines and other similar utility infrastructure which will be restored to meadow in good condition or better or existing conditions.

Watershed Name: Drury Run - North Watershed			
Volume Control design storm frequency 2 year/24 hour Rainfall amount 2.50 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.00	0.40	+0.40
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.11	0.17	+0.06
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.03	-0.08
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	1.55	1.17	-0.38
2) 10-Year/24-Hour	5.17	3.75	-1.42
3) 50-year/24-Hour	11.18	8.21	-2.97
4) 100-year/24-Hour	14.60	10.77	-3.83
Watershed Name: Drury Run - South Watershed			
Volume Control design storm frequency 2 year/24 hour Rainfall amount 2.50 inches	Pre-construction	Post Construction	Net Change
Impervious area (acres)	0.00	4.56	+4.56
Volume of stormwater runoff (acre-feet) without planned stormwater BMPs	0.57	1.18	+0.61
Volume of stormwater runoff (acre-feet) with planned stormwater BMPs		0.54	-0.03
Stormwater discharge rate for the design frequency storm	Pre-construction	Post Construction	Net Change
1) 2-Year/24-Hour	6.34	4.34	-2.00
2) 10-Year/24-Hour	19.92	14.18	-5.74
3) 50-year/24-Hour	41.95	33.90	-8.05
4) 100-year/24-Hour	54.43	45.17	-9.26

f. Summary Description of PCSM/SR BMPs

In the lists below, check the BMPs identified in the PCSM Plan. The primary function(s) of the BMP listed in the functions column (infiltration/recharge; detention/retention; water quality). Additional functions may be added if applicable to that BMP. List the stormwater volume and area of runoff to be treated by each BMP type when calculations are required. If any BMP in the PCSM/SR Plan is not listed below, describe it in the space provided after "Other". A summary table with infiltration testing information (Attachment E, included in the NOI Instructions) must be submitted for all Bio-infiltration BMPs included in PCSM/SR plan.

For Rate control provide the volume of stormwater treated and acres treated for the 100-year/24-hour storm event.

For volume control and water quality provide the volume of stormwater treated and acres treated for the 2-year/24-hour storm event.

Key for BMP purpose(s): VC = Volume Control; RC = Rate Control; and WQ = Water Quality

BMP	Function(s)	Purpose(s)	Volume of stormwater treated	Acres treated
Site Restoration ONLY				
☒ Restore Site to Meadow in Good Condition or Better, or Existing Conditions	Infiltration/Recharge Detention/WQ Treatment	☒ VC ☒ RC ☒ WQ		10.7
Bio-infiltration areas	Infiltration/Recharge			
☐ Infiltration Trench		☐ VC ☐ RC ☐ WQ		
☐ Infiltration Bed		☐ VC ☐ RC ☐ WQ	28,090 cf (2-yr)	
☒ Infiltration Basin		☒ VC ☒ RC ☒ WQ	114,115 cf (100-yr)	7.9
☐ Rain Garden/ Bioretention		☐ VC ☐ RC ☐ WQ	5,928 cf (2-yr)	
☒ Infiltration Berm		☒ VC ☒ RC ☒ WQ	26,387 cf (100-yr)	2.5
Natural Area Conservation	Infiltration/Recharge			
☐ Streamside Buffer Zone		☐ VC ☐ RC ☐ WQ		
☐ Wetland Buffer Zone		☐ VC ☐ RC ☐ WQ		
☐ Sensitive Area Buffer Zone		☐ VC ☐ RC ☐ WQ		
☐ Pre-Construction Drainage Pattern Intact		☐ VC ☐ RC ☐ WQ		
Stormwater Retention	Detention/Retention			
☐ Constructed Wetlands		☐ VC ☐ RC ☐ WQ		
☐ Wet Ponds		☐ VC ☐ RC ☐ WQ		
☐ Retention Basin		☐ VC ☐ RC ☐ WQ		
Sediment and Pollutant Removal	Water Quality Treatment			
☐ Vegetated Filter Strips		☐ VC ☐ RC ☐ WQ		
☒ Compost Filter Sock		☐ VC ☐ RC ☒ WQ		
☐ Detention Basins		☐ VC ☐ RC ☐ WQ		
Access Road Design	Infiltration/Recharge			
☐ Road Crowning		☐ VC ☐ RC ☐ WQ		
☐ Ditches		☐ VC ☐ RC ☐ WQ		
☐ Turnouts		☐ VC ☐ RC ☐ WQ		
☐ Culverts		☐ VC ☐ RC ☐ WQ		
☐ Roadside Vegetated Filter Strips		☐ VC ☐ RC ☐ WQ		

Stormwater Energy Dissipaters ☐ Level Spreaders ☐ Riprap Aprons ☒ Upslope Diversions ☐ Other_____	Infiltration/Recharge	☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☐ WQ ☐ VC ☐ RC ☒ WQ ☐ VC ☐ RC ☐ WQ	_____ _____ _____ _____	_____ _____ 38.8 _____

g. Critical PCSM Plan stages

Identify and list critical stages of implementation of the PCSM Plan for which a licensed professional or designee shall be present on site.

1. A licensed professional or designee shall be present on site during installation of the bioretention sock infiltration berm and the conversion of the sediment basin into a wet pond to verify that the BMPs are being implemented in accordance with the approved plan.

2. Upon completion of construction, a licensed professional or designee shall complete an inspection to verify that BMPs are in place and functioning as designed.

3. After the first growing season, a licensed professional or designee shall perform an inspection to verify that BMPs continue to function as designed and verify that permanent vegetative stabilization has been established.

SECTION I. ANTIDEGRADATION ANALYSIS

This section must be completed where earth disturbance activities will be conducted in the watershed of a surface water with an existing or designated use of exceptional value or high quality pursuant to Chapter 93 (relating to water quality standards), projects where any part is located in an exceptional value wetland in accordance with 25 Pa. Code § 105.17, and projects where any part is located in the watershed of an impaired surface water where the cause of impairment is identified as siltation.

Part 1 - NONDISCHARGE ALTERNATIVES EVALUATION

The applicant must consider and describe any and all non-discharge alternatives for the entire project area which are environmentally sound and will**:**

- Minimize accelerated erosion and sedimentation during the earth disturbance activity
- Achieve no net change from pre-development to post-development volume, rate and concentration of pollutants in water quality

E & S Plan	PCSM/SR Plan
Check off the environmentally sound nondischarge Best Management Practices (BMPs) listed below to be used prior to, during, and after earth disturbance activities that have been incorporated into your E & S Plan based on the site analysis. For non-discharge BMPs not checked, provide an explanation of why they were not utilized. Also for BMPs checked, provide an explanation of why they were utilized. (Provide the analysis and attach additional sheets if necessary)	Check off the environmentally sound nondischarge Best Management Practices (BMPs) listed below to be used after construction that have been incorporated into the PCSM/SR Plan based on your site analysis. For non-discharge BMPs not checked, provide an explanation of why they were not utilized. Also for BMPs checked, provide an explanation of why they were utilized. (Provide the analysis and attach additional sheets if necessary)
Nondischarge BMPs ☐ Alternative Siting ☐ Alternative location ☐ Alternative configuration ☐ Alternative location of discharge ☒ Limited Disturbed Area ☒ Limiting Extent & Duration of Disturbance (Phasing, Sequencing) ☐ Riparian Buffers (150 ft. min.) ☐ Riparian Forest Buffer (150 ft. min.) ☐ Other _____	**Nondischarge BMPs** ☐ Alternative Siting ☐ Alternative location ☐ Alternative configuration ☐ Alternative location of discharge ☐ Low Impact Development (LID / BSD) ☐ Riparian Buffers (150 ft. min.) ☐ Riparian Forest Buffer (150 ft. min.) ☒ Infiltration ☐ Water Reuse ☐ Other _____
Will the non-discharge alternative BMPs eliminate the net change in rate, volume and quality during construction? ☐ Yes ☒ No If yes, antidegradation analysis is complete. If no, proceed to Part 2.	Will the non-discharge alternative BMPs eliminate the net change in rate, volume and quality after construction? ☐ Yes ☒ No If yes, antidegradation analysis is complete. If no, proceed to Part 2.

PART 2 - ANTIDEGRADATION BEST AVAILABLE COMBINATION OF TECHNOLOGIES (ABACT)

If the net change in stormwater discharge from or after construction is not fully managed by nondischarge BMPs, the applicant must utilize ABACT BMPs to manage the difference. The Applicant must specify whether the discharge will occur during construction, post-construction or both, and identify the technologies that will be used to ensure that the discharge will be a non-degrading discharge. ABACT BMPs include but are not limited to:

E & S Plan

- ☒ **Treatment BMPs:**
  - ☒ Sediment basin with skimmer
  - ☐ Sediment basin ratio of 4:1 or greater (flow length to basin width)
  - ☒ Sediment basin with 4-7 day detention
  - ☐ Flocculants
  - ☒ Compost Filter Socks
  - ☐ Compost Filter Sock Sediment Basin
  - ☐ RCE w/ Wash Rack
- ☒ **Land disposal:**
  - ☐ Vegetated filters
  - ☐ Riparian buffers <150ft.
  - ☐ Riparian Forest Buffer <150ft.
  - ☒ Immediate stabilization
- ☒ **Pollution prevention:**
  - ☐ PPC Plans
  - ☒ Street sweeping
  - ☒ Channels, collectors and diversions lined with permanent vegetation, rock, geotextile or other non-erosive materials
- ☐ **Stormwater reuse technologies:**
  - ☐ Sediment basin water for dust control
  - ☐ Sediment basin water for irrigation
- ☒ **Other** 100-ft long rock construction entrances with street sweeping

Are the ABACT BMPs selected sufficient to minimize E&S discharges to the extent that existing or designated surface water uses are protected?

☒ Yes ☐ No

If yes, Antidegradation analysis is complete.
If no, NOI Application will be returned to the Applicant.

PCSM/SR Plan

- ☒ **Treatment BMPs:**
  - ☒ Infiltration Practices
  - ☐ Wet ponds
  - ☐ Created wetland treatment systems
  - ☐ Vegetated swales
  - ☐ Manufactured devices
  - ☐ Bio-retention/infiltration
  - ☐ Green Roofs
- ☐ **Land disposal:**
  - ☐ Vegetated filters
  - ☐ Riparian Buffers <150ft.
  - ☐ Riparian Forest Buffer <150ft.
  - ☐ Disconnection of roof drainage
  - ☐ Bio-retention/bio-infiltration
- ☒ **Pollution prevention:**
  - ☐ Street sweeping
  - ☐ Nutrient, pesticide, herbicide or other chemical application plan alternatives
  - ☐ PPC Plans
  - ☒ Non-structural Practices
  - ☒ Restoration BMPs
- ☐ **Stormwater reuse technologies:**
  - ☐ Divert rainwater into impoundment
  - ☐ Underground storage
- ☐ Spray/Drip Irrigation
- ☐ **Other** _____

Are the ABACT BMPs selected sufficient to achieve no net change and assure that existing or designated surface water uses are protected?

☒ Yes ☐ No

If yes, Antidegradation analysis is complete.
If no, NOI Application will be returned to the Applicant.

SECTION J. COMPLIANCE HISTORY REVIEW

Is/was the applicant(s) in violation of any Department regulation, order, schedule of compliance or permit or in violation of any department regulated activities within the past five years?

☐ Yes ☒ No

If yes, provide the permit number or facility name, a brief description of the violation, the compliance schedule (including dates and steps to achieve compliance) and the current compliance status. (Attach additional information on a separate sheet, when necessary)

Permit Program or Activity: _____ **Permit Number (if applicable):** _____

Brief Description of non-compliance:

Steps taken to achieve compliance	Date(s) compliance achieved

Current Compliance Status: ☐ In-Compliance ☐ In Non-Compliance

If in non-compliance, attach schedule for achieving compliance.

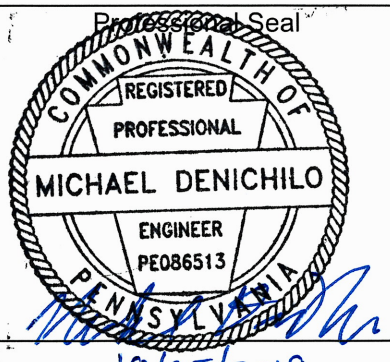
PERSON PREPARING E&S PLANS

SECTION K. CERTIFICATION BY PERSON PREPARING E&S AND PCSM/SR PLANS

I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plans are true and correct, represent actual field conditions, and are in accordance with the 25 Pa. Code Chapters 78/78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Print Name Michael DeNichilo	Signature
Company Mott MacDonald	
Address 111 Wood Avenue South, Iselin, NJ 08830-4112	
Phone (973)379-3400	
Most Recent DEP Training Attended -	Location - / Date -
e-Mail Address michael.denichilo@mottmac.com	

Professional Seal



10/25/2019

EXPEDITED REVIEW PROCESS

In addition to the certification required above, applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plans developed and sealed by a licensed professional engineer, surveyor or professional geologist. The plans shall contain the following certification:

I do hereby certify to the best of my knowledge, information, and belief, that the E & S Control and PCSM/SR BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 / 78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

SECTION L. APPLICANT CERTIFICATION

Applicant Certification

I certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that this application and all related attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my own knowledge and on inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. The responsible official's signature also verifies that the activity is eligible to participate in the ESCGP, and that the applicant agrees to abide by the terms and conditions of the permit. BMP's, E&S Plan, PPC Plan, PCSM Plan, and other controls are being or will be, implemented to ensure that water quality standards and effluent limits are attained.

I grant permission to the agencies responsible for the permitting of this work, or their duly authorized representative to enter the project site for inspection purposes. I will abide by the conditions of the permit if issued and will not begin work prior to permit issuance.

(For individuals no indication of title is necessary, choose the box below. All others proceed to the next paragraph)

☐ **Individual; proceed to signature portion.**

I hereby certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that I am the person who is responsible for decision-making regarding environmental compliance functions for Enter Entity name, the manager of one or more manufacturing, production, or operating facilities of the applicant and am authorized to make management decisions which govern the operation of regulated facility including having explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure the applicant's long term environmental compliance with environmental laws and regulations; and I am responsible for ensuring that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements.

PERSON PREPARING PCSM PLANS FOR MARVINDALE INTERCONNECT, CARPENTER HOLLOW OPP, MLV-1, MLV-2, MLV-3, MLV-4

SECTION K. CERTIFICATION BY PERSON PREPARING E&S AND PCSM/SR PLANS

I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plans are true and correct, represent actual field conditions, and are in accordance with the 25 Pa. Code Chapters 78/78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Print Name W. Michael Clark	Signature
Company Mott MacDonald	
Address 111 Wood Avenue South, Iselin, NJ 08830-4112	
Phone (973)379-3400	
Most Recent DEP Training Attended -	Location - Date -
e-Mail Address michael.clark@mottmac.com	

Professional Seal

10/25/2019

EXPEDITED REVIEW PROCESS

In addition to the certification required above, applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plans developed and sealed by a licensed professional engineer, surveyor or professional geologist. The plans shall contain the following certification:

I do hereby certify to the best of my knowledge, information, and belief, that the E & S Control and PCSM/SR BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 / 78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

SECTION L. APPLICANT CERTIFICATION

Applicant Certification

I certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that this application and all related attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my own knowledge and on inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. The responsible official's signature also verifies that the activity is eligible to participate in the ESCGP, and that the applicant agrees to abide by the terms and conditions of the permit. BMP's, E&S Plan, PPC Plan, PCSM Plan, and other controls are being or will be, implemented to ensure that water quality standards and effluent limits are attained.

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(For individuals no indication of title is necessary, choose the box below. All others proceed to the next paragraph)

☐ **Individual; proceed to signature portion.**

I hereby certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that I am the person who is responsible for decision-making regarding environmental compliance functions for Enter Entity name, the manager of one or more manufacturing, production, or operating facilities of the applicant and am authorized to make management decisions which govern the operation of regulated facility including having explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure the applicant's long term environmental compliance with environmental laws and regulations; and I am responsible for ensuring that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements.

PERSON PREPARING E&S AND PCSM PLANS FOR MARVINDALE COMPRESSOR STATION AND TAMARACK COMPRESSOR STATION

SECTION K. CERTIFICATION BY PERSON PREPARING E&S AND PCSM/SR PLANS

I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plans are true and correct, represent actual field conditions, and are in accordance with the 25 Pa. Code Chapters 78/78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Print Name Gregory Heilman, P.E.	Signature	Professional Seal
Company Michael Baker International		
Address 100 Airside Drive, Moon Township, PA 15108		
Phone 412-269-6096		
Most Recent DEP Training Attended: DEP Oil and Gas Training	Location: Greentree, PA	Date: 12/2017
e-Mail Address gheilman@mbakerintl.com		

EXPEDITED REVIEW PROCESS

In addition to the certification required above, applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plans developed and sealed by a licensed professional engineer, surveyor or professional geologist. The plans shall contain the following certification:

I do hereby certify to the best of my knowledge, information, and belief, that the E & S Control and PCSM/SR BMPs are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 / 78a and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

SECTION L. APPLICANT CERTIFICATION

Applicant Certification

I certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that this application and all related attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my own knowledge and on inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. The responsible official's signature also verifies that the activity is eligible to participate in the ESCGP, and that the applicant agrees to abide by the terms and conditions of the permit. BMP's, E&S Plan, PPC Plan, PCSM Plan, and other controls are being or will be, implemented to ensure that water quality standards and effluent limits are attained.

I grant permission to the agencies responsible for the permitting of this work, or their duly authorized representative to enter the project site for inspection purposes. I will abide by the conditions of the permit if issued and will not begin work prior to permit issuance.

(For individuals no indication of title is necessary, choose the box below. All others proceed to the next paragraph)

☐ **Individual; proceed to signature portion.**

I hereby certify under penalty of law, as provided by 18 Pa. C.S.A. § 4904, that I am the person who is responsible for decision-making regarding environmental compliance functions for National Fuel Supply Corporation, the manager of one or more manufacturing, production, or operating facilities of the applicant and am authorized to make management decisions which govern the operation of regulated facility including having explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure the applicant's long term environmental compliance with environmental laws and regulations; and I am responsible for ensuring that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements.

(choose one of the following; not applicable for individuals):

☐ The responsible corporate officer ☐ president ■ vice president ☐ secretary
☐ treasure of NATIONAL FUEL GAS SUPPLY (Corporation)/Company
Entity name

☐ The ☐ member or ☐ manager of _____ LLC
Entity name

☐ The general partner of _____ partnership/LP/LLP
Entity name

☐ The principal executive officer or ranking elected official of _____ Municipality/State/Federal/other public agency
Entity name

☐ Power of Attorney/delegation of contractual authority (documentation supporting delegation of contracting authority must be provided) for _____
Entity name

JEFFERY J. KITTKA, VICE PRESIDENT
Print Name and Title of Applicant

_____
Print Name and Title of Co-Applicant (if applicable)

Signature of Applicant

_____
Signature of Co-Applicant

11/5/19
Date Application Signed

_____
Date Application Signed

Notarization

Sworn to and subscribed to before me this
5th day of November, 2019

Jeannine M. Bacher
Notary Public

AFFIX SEAL

Commonwealth of Pennsylvania
County of _____

My Commission expires _____

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Jeannine M. Bacher, Notary Public
City of Erie, Erie County
My Commission Expires Nov. 24, 2019
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

SECTION M. ADDITIONAL CONTACT INFORMATION				
Contact's Last Name Gibbons	First Name Douglas	MI	Phone (801) 571-6522 FAX	
Mailing Address 5295 S. Commerce Drive	City Murray		State UT	ZIP + 4 84107-4719
e-Mail Address douglas.gibbons@mottmac.com				

Summary of Bio-Infiltration BMPs														
	Infiltration Information					Drainage Information				BMP Information				
Proposed Structural bio-Infiltration BMPs (site specific)	Measured Infiltration Rate[1] (in./hr)	Factor of safety (min. of 2)	Design Infiltration rate (in./hr)	De-watering time[2] (hr)	Elevation of limiting zone-water table bedrock, etc.[3]	Total drainage area to BMP (sq. ft)	Total impervious drainage area to BMP (sq. ft)	Infiltration BMP Surface area (sq. ft)	Volume of runoff tributary to BMP during the 2yr/24 hr design storm[4] (cf)	Calculated removed volume (cf)	Maximum water surface elevation in BMP from 2yr storm[6]	Infiltration elevation bottom of bed/basin[6]	Elevation of infiltration test[7]	Elevation of E&S sediment basin bottom (if applies)
CARPENTER HOLLOW OPP INFILTRATION TRENCH	0.125 IN/HR	2	0.063 IN/HR	22.41 HR	N/A	0.356 ACRES	0.356 ACRES	0.356 ACRES	3,778 CF	3,778 CF	2,268.91	2,268.30	2,269.00	N/A
KL VALVE SET TRENCH	0.38 IN/HR	2	0.19 IN/HR	39.40 HR	N/A	0.067 ACRES	0.067 ACRES	0.067 ACRES	1,585 CF	1,585 CF	2,090.45	2,089.10	2,092	N/A
MLV 1 INFILTRATION TRENCH	8.31 IN/HR	2	4.16 IN/HR	2.76 HR	N/A	0.155 ACRES	0.094 ACRES	0.036 ACRES	873 CF	873 CF	1,584.89	1,583.50	1,584	N/A
MLV 2 INFILTRATION TRENCH	10.28 IN/HR	2	5.14 IN/HR	11.94 HR	N/A	0.293 ACRES	0.048 ACRES	0.036 ACRES	402 CF	402 CF	1,512.14	1,511.50	1,511	N/A
MLV 3 INFILTRATION TRENCH	4.50 IN/HR	2	2.50 IN/HR	27.54 HR	N/A	0.517 ACRES	0.071 ACRES	0.071 ACRES	249 CF	249 CF	2,233.20	2,232	2,232.25	N/A
MLV 4 INFILTRATION TRENCH - 1	3.00 IN/HR	2	1.50 IN/HR	6.20 HR	N/A	1.355 ACRES	0.058 ACRES	0.090 ACRES	143 CF	143 CF	2,279.64	2,279.50	2,274	N/A
MLV 4 INFILTRATION TRENCH - 2	3.00 IN/HR	2	1.50 IN/HR	9.40 HR	N/A	0.032 ACRES	0.032 ACRES	0.032 ACRES	259 CF	259 CF	2,270.46	2,270.00	2,274	N/A

All information should be based on the 2-yr/24-hr storm.
Provide page numbers from the stormwater narrative identifying the location of the above information.

[1]The infiltration testing information should be located on the plan view of the PCSM plan and should include infiltration test elevation and rate
[2]Can include active infiltration time-dewatering time should not exceed 72 hours after the 2-yr/24-hr storm
[3]Depth to limiting zone is recommended to be at least 2 ft below infiltration
[4]The value should be greater than or equal to the volume to be infiltrated or managed by the BMP
[6]A maximum of 2 ft hydraulic head is recommended
[7]Provide supporting field notes/documentation from soil evaluation

Any deviation from the recommendations above should be adequately justified by a qualified professional and included with the application.

Note: This chart is for summary purposes only and should be consistent with all design calculations and worksheets.

Summary of Bio-Infiltration BMPs														
	Infiltration Information					Drainage Information				BMP Information				
Proposed Structural bio-Infiltration BMPs (site specific)	Measured Infiltration Rate[1] (in./hr)	Factor of safety (min. of 2)	Design Infiltration rate (in./hr)	De-watering time[2] (hr)	Elevation of limiting zone-water table bedrock, etc.[3]	Total drainage area to BMP (sq. ft)	Total impervious drainage area to BMP (sq. ft)	Infiltration BMP Surface area (sq. ft)	Volume of runoff tributary to BMP during the 2yr/24 hr design storm[4] (cf)	Calculated removed volume (cf)	Maximum water surface elevation in BMP from 2yr storm[6]	Infiltration elevation bottom of bed/basin[6]	Elevation of infiltration test[7]	Elevation of E&S sediment basin bottom (if applies)
Infiltration Berm	4.5	2	2.2	5.0	N/A	111,513	12,632	7,055	5,928	5,928	1741.0	1739.0	1739.0	N/A
Infiltration Basin	2.0 & 0.9	5 & 2	0.4	51.9	N/A	341,946	211,581	14,437	36,490	28,090	1710.8	1708.0	1708.0	1708.5

All information should be based on the 2-yr/24-hr storm.
Provide page numbers from the stormwater narrative identifying the location of the above information.

[1]The infiltration testing information should be located on the plan view of the PCSM plan and should include infiltration test elevation and rate
[2]Can include active infiltration time-dewatering time should not exceed 72 hours after the 2-yr/24-hr storm
[3]Depth to limiting zone is recommended to be at least 2 ft below infiltration
[4]The value should be greater than or equal to the volume to be infiltrated or managed by the BMP
[6]A maximum of 2 ft hydraulic head is recommended
[7]Provide supporting field notes/documentation from soil evaluation

Any deviation from the recommendations above should be adequately justified by a qualified professional and included with the application.

Note: This chart is for summary purposes only and should be consistent with all design calculations and worksheets.

***** As per item 7 on Page 117 of the BMP Manual, since the proposed berms are located in existing woodlands, infiltration testing was not required.**

Summary of Bio-Infiltration BMPs														
	Infiltration Information					Drainage Information				BMP Information				
Proposed Structural bio-Infiltration BMPs (site specific)	Measured Infiltration Rate[1] (in./hr)	Factor of safety (min. of 2)	Design Infiltration rate (in./hr)	De-watering time[2] (hr)	Elevation of limiting zone-water table bedrock, etc.[3]	Total drainage area to BMP (sq. ft)	Total impervious drainage area to BMP (sq. ft)	Infiltration BMP Surface area (sq. ft)	Volume of runoff tributary to BMP during the 2yr/24 hr design storm[4] (cf)	Calculated removed volume (cf)	Maximum water surface elevation in BMP from 2yr storm[6]	Infiltration elevation bottom of bed/basin[6]	Elevation of infiltration test[7]	Elevation of E&S sediment basin bottom (if applies)
Infiltration Berm 1	8.0	2	4.0	3.1	N/A	175,847	121,104	8,346	16,493	8,684	2103.0	2101.0	2101.0	N/A
Infiltration Berm 2	8.0	2	4.0	2.9	N/A	245,767**	163,186**	15,591	14,482	14,482	2100.0	2098.0	2098.0	N/A
Infiltration Berm 3	24.0	2	12.0	1.0	N/A	271,400**	166,440**	12,269	1,185	1,185	2095.4	2095.0	2095.0	N/A
Infiltration Berm 4	6.0	2	3.0	3.8	N/A	14,384	3,254	1,931	847	847	2087.4	2086.0	2086.0	N/A
Infiltration Berm 5	6.4	2	3.2	3.6	N/A	15,422	4,292	1,044	827	827	2087.8	2086.0	2086.0	N/A
Infiltration Berm 6	5.3	2	2.6	4.5	N/A	290,753**	166,440**	12,779	709	709	2092.2	2092.0	2092.0	N/A

All information should be based on the 2-yr/24-hr storm.
Provide page numbers from the stormwater narrative identifying the location of the above information.

[1]The infiltration testing information should be located on the plan view of the PCSM plan and should include infiltration test elevation and rate
[2]Can include active infiltration time-dewatering time should not exceed 72 hours after the 2-yr/24-hr storm
[3]Depth to limiting zone is recommended to be at least 2 ft below infiltration
[4]The value should be greater than or equal to the volume to be infiltrated or managed by the BMP
[6]A maximum of 2 ft hydraulic head is recommended
[7]Provide supporting field notes/documentation from soil evaluation

Any deviation from the recommendations above should be adequately justified by a qualified professional and included with the application.

Note: This chart is for summary purposes only and should be consistent with all design calculations and worksheets.

**** Berm is in series. Value includes all contributing areas.**

Attachment 1

Municipalities/Counties Impacted by Project

McKean County
Keating Twp
Liberty Twp
Norwich Twp
Sergeant Twp
Potter County
Allegany Twp
Clara Twp
Hebron Twp
Pleasant Valley Twp
Portage Twp
Roulette Twp
Wharton Twp
Cameron County
Driftwood Boro
Gibson Twp
Grove Twp
Lumber Twp
Elk County
Benezette Twp
Clearfield County
Huston Twp
Lawrence Twp
Clinton County
Leidy Twp

CLINTON COUNTY CONSERVATION DISTRICT

45 COOPERATION LANE, MILL HALL, PA 17751
PHONE: (570) 726-3798
FAX: (570) 726-7977
conserve@clintoncountypa.com

APPLICATION FOR AN EROSION AND SEDIMENT POLLUTION CONTROL PLAN REVIEW

FOR DISTRICT USE ONLY
Date received

P#_____

This application must be completed by the applicant or his/her agent and submitted along with the other listed requirements before an Erosion and Sedimentation Pollution Control Plan review can begin.

Project Name FM 100 Project *Application Date* 09/2020

Project Type/Brief Description Updated information to the FM100 Project

*Receiving Stream*_____ *Chapter 93 Classification* Choose One

Total Project Area (Acres) 538.1 *Total **Disturbed** Area (Acres)* 15.6 *Municipality* Leidy

Owner/Developer Information

Name Jake Lybrook, National Fuel Gas Supply Company

Address 1100 State Street

City Erie

State/Zip PA, 16501

Phone 814- 871-8521

Email lybrookj@natfuel.com

Plan Preparer Information **(If different than Owner)**

Name Michael DeNichilo, Mott MacDonald

Address 111 Wood Avenue South

City Iselin

State/Zip NJ 08830

Phone 973-379-3400

Email michael.denichilo@mottmac.com

Excavator Information

Name_____

Address_____

City_____

State/Zip_____

Phone _____

Email _____

APPLICATION CHECKLIST:

_____ One (1) copy E&S Plan (blue/green sheets)
_____ One (1) copy completed application form
_____ Check made payable to:
Clinton County Conservation District in the appropriate amount. (See attached fee schedule.)

Amount of check $_____ Check# _____

Received by _____

Chapter 105 Permit (GP) Attached?
☐ Yes ☐ No

Application for NPDES Permit?
☐ Yes ☐ No

CCCWF Ck#_____
Amt.$ _____
PACWF Ck# _____
Amt. $ _____

Fees and plans showing the required information are to be submitted with this application. Any additional plans or information required by the Clinton County Conservation District should be submitted promptly.

I, the undersigned, agree to comply with all the requirements of TITLE 25, Chapter 102 EROSION CONTROL RULES AND REGULATIONS set forth by the Pennsylvania Department of Environmental Protection and further agree to obtain all necessary Federal, State, County, and Local permits and approvals connected with subject project. The applicant also agrees to notify the District at least three (3) days prior to the start of the project; to maintain a copy of the approved Erosion and Sediment Pollution Control Plan on site at all times: to notify the District upon completion of the project; and to allow District Representatives to enter upon the project site at any time for inspection.

9/14/2020

Applicant's Signature/Title Date

Updated on 12/3/2013

ORIGINAL SUBMISSION

CLINTON COUNTY CONSERVATION DISTRICT

45 COOPERATION LANE, MILL HALL, PA 17751
PHONE: (570) 726-3798
FAX: (570) 726-7977
conserve@clintoncountypa.com

APPLICATION FOR AN EROSION AND SEDIMENT POLLUTION CONTROL PLAN REVIEW

FOR DISTRICT USE ONLY
Date received

P#_____

This application must be completed by the applicant or his/her agent and submitted along with the other listed requirements before an Erosion and Sedimentation Pollution Control Plan review can begin.

Project Name FM100 Project *Application Date* 11/2019

*Project Type/Brief Description*_____

*Receiving Stream*_____ *Chapter 93 Classification* Choose One

Total Project Area (Acres) 547.0 *Total **Disturbed** Area (Acres)* 6.6 *Municipality* Leidy

Owner/Developer Information

Name Wayne Graham, National Fuel Gas Supply Corporation

Address 1100 State Street

City Erie

State/Zip PA, 16501

Phone (814) 871-8582

Email grahamw@natfuel.com

Plan Preparer Information **(If different than Owner)**

Name Michael DeNichilo, Mott MacDonald

Address 111 Wood Avenue South

City Iselin

State/Zip New Jersey, 08830

Phone (973) 379 - 3400

Email michael.denichilo@mottmac.com

Excavator Information

Name_____

Address_____

City_____

State/Zip_____

Phone_____

Email_____

APPLICATION CHECKLIST:

_____ One (1) copy E&S Plan (blue/green sheets)
_____ One (1) copy completed application form
_____ Check made payable to:
Clinton County Conservation District in the appropriate amount. (See attached fee schedule.)

Amount of check $_____ Check#_____

Received by_____

Chapter 105 Permit (GP) Attached? ☐ Yes ☐ No

Application for NPDES Permit? ☐ Yes ☐ No

CCCWF Ck#_____
Amt.$_____
PACWF Ck#_____
Amt. $_____

Fees and plans showing the required information are to be submitted with this application. Any additional plans or information required by the Clinton County Conservation District should be submitted promptly.

I, the undersigned, agree to comply with all the requirements of TITLE 25, Chapter 102 EROSION CONTROL RULES AND REGULATIONS set forth by the Pennsylvania Department of Environmental Protection and further agree to obtain all necessary Federal, State, County, and Local permits and approvals connected with subject project. The applicant also agrees to notify the District at least three (3) days prior to the start of the project; to maintain a copy of the approved Erosion and Sediment Pollution Control Plan on site at all times; to notify the District upon completion of the project; and to allow District Representatives to enter upon the project site at any time for inspection.

Wayne Graham ENVIRONMENTAL COMPLIANCE MANAGER 11/5/2019

Applicant's Signature/Title Date

Updated on 12/3/2013

Please make and keep a copy of this plan for yourself and your contractor!

Erosion and Sediment Pollution Control Plan

INFORMATION SHEET

This information will be used to determine whether a Low Hazard Erosion and Sediment Pollution Control Plan will be adequate for your earth disturbance project, according to newly mandated EPA regulations.

PLEASE PRINT. Only use black or blue pen or typewrite information. Please do not leave blank spaces. Incomplete information will cause a delay in processing and approval of paperwork. If you are unsure of specific information, please inquire before submitting this form to our office. It is not our responsibility to fill in information.

Landowner Name: _____

Project Name: _____

Project Location (Municipality): _____ Township/Boro/City

Have you contacted the municipality to discuss this project? _____

Is this parcel a portion of a larger development? If yes, please give name and phase of the development. If not, write N/A.

_____

Project Address or give **specific** directions for locating the project site. Include distances, landmarks, or special features. Also, attach a map if possible. Please make sure that property corners and proposed driveway entrance are staked/flagged out.

Project Address: _____

Specific Directions:

_____

_____

_____

Briefly describe your project and the extent of earthmoving.

_____

_____

_____

Is the earth disturbance in a known floodway, floodplain, or within 50 feet of a stream or waterway?

Yes ☐ No ☐

Return plan to:
CLINTON COUNTY CONSERVATION DISTRICT
45 COOPERATION LANE
MILL HALL, PA 17751
570.726.3798

Estimated dates for project start and completion.

START_____ END_____

List the name of the watershed (nearest receiving stream) and Chapter 93 classification in which the project is proposed._____

Project Acres (total lot size/parcel size where project is located) _____

Total Amount of **DISTURBED** Area:

	Total Length	x	Average Width	=	Area (Square Ft)
Access Roads/Driveways		x		=	0
Foundation/Building #1		x		=	0
Foundation/Building #2		x		=	0
Lawn/Landscape Area		x		=	0
Water/Sewer/Septic		x		=	0
Other (includes topsoil pile)		x		=	0

TOTAL AREA = 0 SQ.FT.

TOTAL AREA 0 SQ.FT. ÷ 43560 = 0.00 Acres Disturbed

- Are steep slopes in excess of 10% within your project boundaries, or in the immediate surrounding areas? Yes ☐ No ☐
- % Slope of proposed access road and/or driveway? _____
- Does off-site drainage exist? Yes ☐ No ☐
- What is the total square footage of **new impervious area (roof coverage, driveways, parking areas, and/or stoned surfaces)** on your site following the new construction? _____
- Are you aware of a ***point source discharge*** to ***surface waters of the Commonwealth*** which may occur from this construction site? Yes ☐ No ☐

Point Source Discharge - "any discernable, confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure...from which pollutants are or may be discharged."

Surface Waters of the Commonwealth - "any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourse, storm sewers, lakes, dammed water, ponds, springs, wetlands and all other bodies or channels of conveyance of surface water...whether natural or artificial, within or on the boundaries of this Commonwealth."

FOR OFFICE USE ONLY:

Chapter 93 Designation _____ **Wild Trout Stream?** _____
Is there a point source discharge to surface waters of the Commonwealth? _____

Under 1 Acre of Disturbance _____
1 to 4.99 Acres of Disturbance _____
5 Acres or more of Disturbance _____

Is an NPDES permit needed? _____ **Individual?** _____ **General?** _____

LANDOWNER NAME_____

Earth Disturbance activities shall be planned and conducted to minimize the extent and duration of the disturbance. Please take this into account when planning and designing your earthmoving project.

PROJECT ADDRESS _____

The implementation and maintenance of erosion and sediment control BMPs (best management practices) are required to minimize the potential for accelerated erosion and sedimentation, including those activities which disturb less than 5,000 square feet. This means that, regardless if a plan is reviewed by the conservation district, best management practices (E&S controls) must be in place, operating properly, and maintained throughout the life of the project.

Temporary Controls

This section details any and all temporary erosion control practice best management practices (BMPs) that will be implemented in your project. Check each temporary control that will be used and show it on the plan drawing:

- ☐ Rock Construction Entrance
- ☐ Water Bar
- ☐ Filter Fabric Fence (Silt Fence)
- ☐ Culvert
- ☐ Straw Bale Barrier
- ☐ Crowned Roadway
- ☐ Rock Filters
- ☐ Open Top Culvert
- ☐ Silt Sock
- ☐ Road Side Ditch
- ☐ Temporary Seeding/Mulching (Required during non-growing season or on disturbed soil if work ceases for a period of 4 or more days)
- ☐ Temporary Swale
- ☐ Ditch Relief Culvert
- ☐ Vegetated Filter Strip
- ☐ E & S Blankets

Please check one:

- ☐ All items checked above will be to state specifications.
- ☐ Alternative controls and/or specifications are proposed and are attached.

LANDOWNER NAME_____

Also required is a **maintenance program** which provides for inspection of BMPs on a weekly basis and after each measurable rainfall event, including the repair of the BMPs to ensure effective and efficient operation. If you agree to this, initial the space below.

_____ *I agree to* inspect the BMPs *at a minimum* on a weekly basis and after each measurable rainfall event, and ensure the immediate required repair of any BMP that needs maintenance.

_____ I will provide an alternative plan for a BMP maintenance program which is included with this E&S plan and must be approved by the county conservation district.

Permanent Controls

Prior to the completion of the project, state law requires that completion of any stage or phase of the earth disturbance activity requires immediate seeding, mulching or other protection from accelerated erosion and sedimentation. Implementation and maintenance of BMPs (Best Management Practices) are required until the completion of permanent stabilization of the disturbed area. Types of permanent stabilization include: (1) uniform 70% perennial vegetative cover, with density capable of resisting erosion or (2) other acceptable BMPs that permanently minimize accelerated erosion and sedimentation.

All disturbed areas must be protected to prevent accelerated erosion. In other words, soil cannot be left exposed. Revegetating an area should include the seeding mixture, top soil applications, lime and fertilizer instructions.

Check one:

☐ Permanent vegetation will be established per the recommendations of this office or the Penn State Erosion Control & Conservation Plantings on Noncropland document.

☐ Alternative specifications have been developed for revegetation and are attached.

Please attach the completed "Erosion and Sediment Pollution Control Plan Information Cover Sheet" to this document before submission to the conservation district office.

☐ I agree to contact the Clinton County Conservation District at least three (3) days prior to the start of the project.

Signature_____

Date_____

SEQUENCE OF CONSTRUCTION

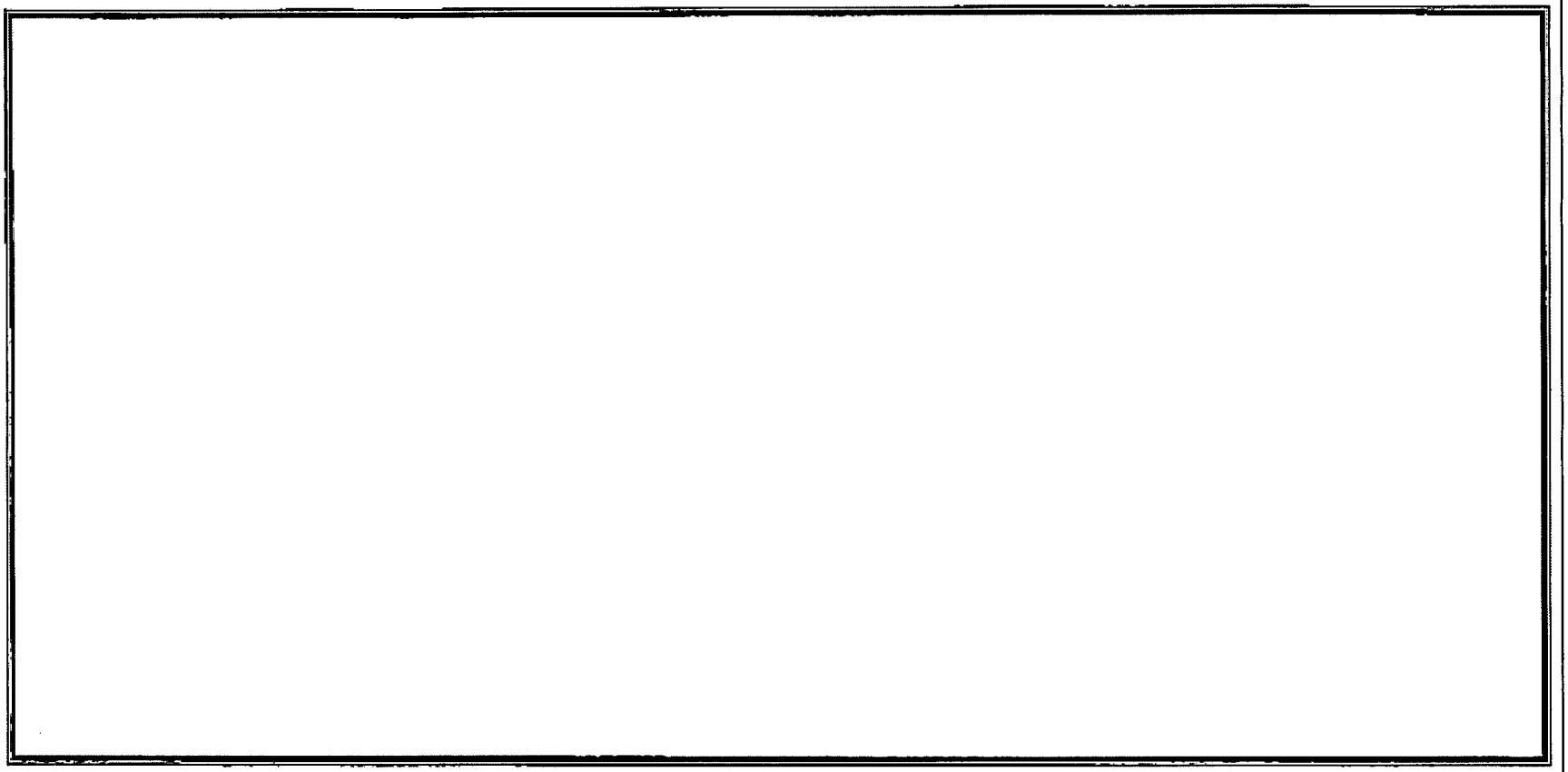
In order for an erosion and sediment control plan to be effective, all phases of construction must take place in an orderly sequence. Every effort should be made to minimize the amount of earth disturbance and limit the time disturbed earth is exposed to the forces of erosion. The first step in nearly all projects would be the installation of sediment barriers or traps below the project, and installation of any needed practices to handle run-off onto the project. The sequence should then describe the various construction steps necessary to complete the project, and end with removal of all temporary controls after final stabilization is complete. Please use the space below and label each step in numerical order.

Who will be responsible for the final seeding and mulching of the earth disturbance; the landowner or the contractor?_____

LANDOWNER NAME_____

PRELIMINARY

PLAN DRAWING FOR EROSION & SEDIMENT CONTROL PLAN



Landscape Features

Live Stream

Swale or Waterway

Slope or Grade 8%

Project Boundary

Topsoil Stockpile TS

Diversion Ditch

Silt Sock SS SS

Riprap/Rock-lined Ditch

Strawbale Barrier

Filter Fabric Fence FF FF

Rock Construction Entrance

Vegetated Filter Strip VFS

Water Bar

Culvert

E & S Blankets

Construction Sequence May Include the Following:

1) Installation of proposed best management practices (ie. silt sock, silt fence, rock construction entrance, etc...) downslope of proposed disturbance.

2) Excavation and installation of access road and/or driveway with proposed best management practices.

3) Clearing and grubbing of the site if necessary.

4) Excavation for proposed structures.

5) Placement of excavated soil stockpiles upslope of proposed best management practices.

6) Seed and mulch soil stockpile if necessary.

7) Construct proposed structures.

8) Install utility lines with trenching operation limited to the amount that can be excavated, installed and backfilled within one day.

9) Grade necessary areas, construct swales and/or drainage features and apply a permanent seed and mulch mixture.

10) Excess spoils associated with excavation must be permanently stabilized as backfill and grading purposes, or placed at a dump site approved by the Clinton County Conservation District.

11) Remove temporary best management practices once a 70% uniform vegetative cover has been established, or site is otherwise stabilized.

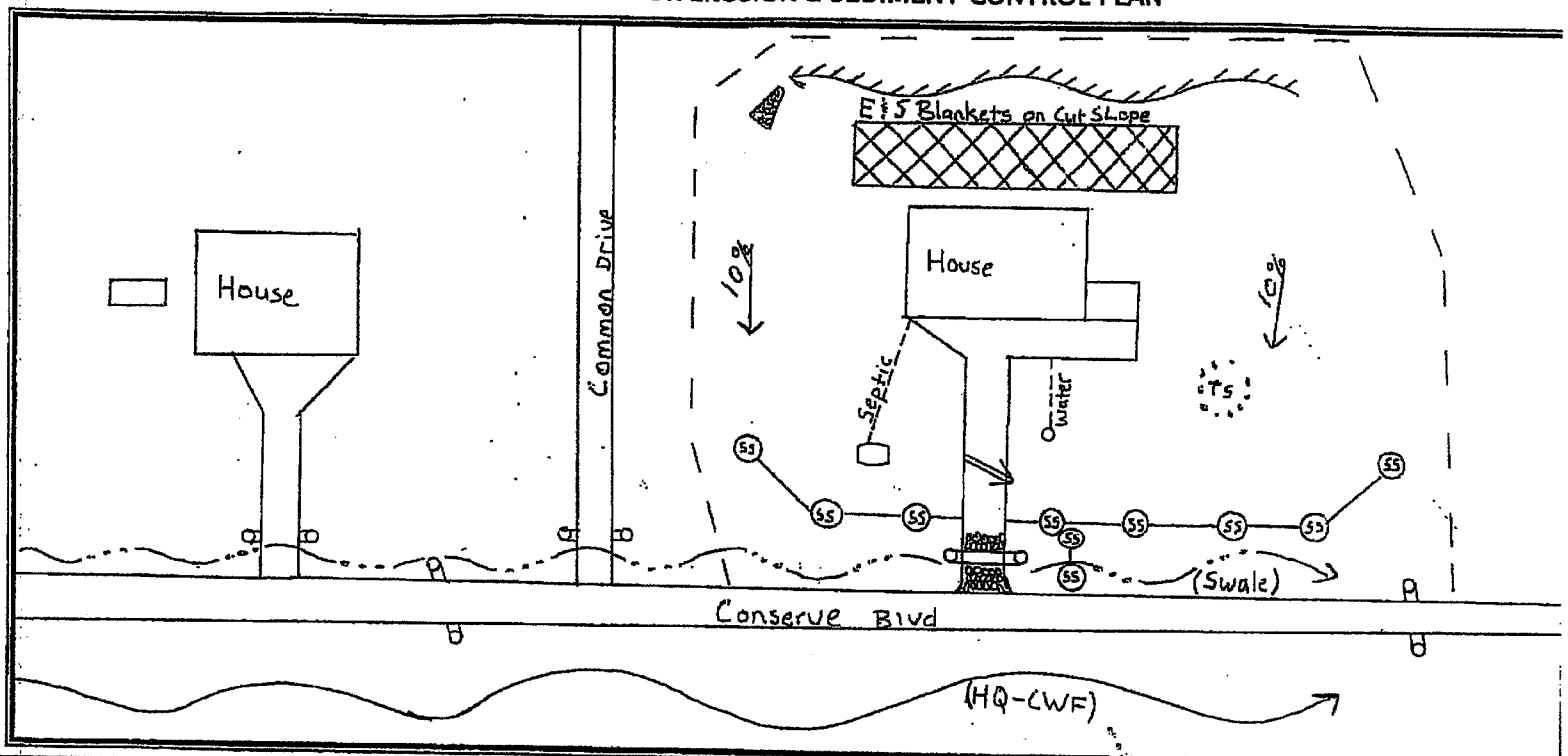
12) Permanently seed and mulch any remaining disturbed areas.

Sample

LANDOWNER NAME Example

PRELIMINARY

PLAN DRAWING FOR EROSION & SEDIMENT CONTROL PLAN



Landscape Features

- Live Stream
- Swale or Waterway
- Slope or Grade 8%
- Project Boundary
- Topsoil Stockpile TS
- Diversion Ditch
- Silt Sock SS SS
- Riprap/Rock-lined Ditch
- Strawbale Barrier
- Filter Fabric Fence FF FF
- Rock Construction Entrance
- Vegetated Filter Strip VFS
- Water Bar
- Culvert
- E & S Blankets

Clinton County Conservation District
E&SPC Plan Review Fee Schedule

Effective Date: March 2013

The following fees will be charged by the Clinton County Conservation District for Erosion and Sediment Pollution Control (E&SPC) Plan reviews as authorized by Act 217—The Conservation District Law. Applications will not be accepted for review without the appropriate fee, a completed application form and the required plan.

RESIDENTIAL (SINGLE FAMILY HOME)

- **For use with Low Hazard E&SPC Plan**
- **Non-commercial/industrial**
- **No subdivisions**
- ***Not* for use with NPDES Permits**

0 – 0.25 acres disturbed	$65
0.26 – 0.99 acres disturbed	$120

RESIDENTIAL (WITH NPDES PERMIT)

1 – 2.99 acres disturbed	$200
3 – 4.99 acres disturbed	$300
5 acres and over disturbed	$350
Plus $25 per acre over 5 acres	

CHARITABLE, RELIGIOUS, EDUCATIONAL, ENVIRONMENTAL ORGANIZATIONS, AND MUNICIPAL AUTHORITIES

- **Includes Private and Public**
- **Requires confirmation of status**

0 – 0.25 acres disturbed	$65
0.26 – 0.99 acres disturbed	$120

SAME STATUS (WITH NPDES PERMIT)

1 – 2.99 acres disturbed	$200
3 – 4.99 acres disturbed	$300
5 acres and over disturbed	$350
Plus $25 per acre over 5 acres	

INDUSTRIAL/COMMERCIAL

- **Structural Activities**
- **Includes Subdivisions**
- **NO Low Hazard E&SPC Plan**

Less than 1 acre disturbed	$350

INDUSTRIAL/COMMERCIAL (WITH NPDES PERMIT)

1 – 2.5 acres disturbed	$500
2.51 – 4.99 acres disturbed	$700
5 – 9.99 acres disturbed	$1000
10 – 14.99 acres disturbed	$1250
15 – 24.99 acres disturbed	$1500
Over 25 acres disturbed	$1600
Plus $50 per acre over 25 acres	

INDUSTRIAL/COMMERCIAL (NON-STRUCTURAL)

- **Only Non-structural Activities**
- **Minimal Fill Areas**
- **Non-Permitted Sites**

0 – 0.5 acres disturbed	$100
0.5 – 0.99 acres disturbed	$200

Not Applicable over 1 acre

TIMBER HARVESTING (Total TRACT Size)

0 – 99 acres	$100
100 – 199 acres	$150
200 – 299 acres	$200
300 – 399 acres	$250
400 – 499 acres	$300
500 or more acres	$350
plus $50 per 100 acres over 500 acres	

AGRICULTURAL

0 – 0.25 acres disturbed	$100
0.26 – 0.99 acres disturbed	$200

AGRICULTRUAL WITH NPDES PERMIT

1 – 2.99 acres disturbed	$300
3 – 4.99 acres disturbed	$400
5 acres and over disturbed	$500
Plus $25 per acre over 5 acres	

Chapter 105 General Permits (E&S Plan Reviews)

$0 per review per site per permit

Adopted Oct. 15, 2009 (Updated Feb. 2011 & Mar 2013)

National Pollutant Discharge Elimination System (NPDES) Permits

The Commonwealth of Pennsylvania, through mandates from Federal Law, requires a fee for construction activities based on the disturbed acreage of a project. These fees are separate from the Erosion and Sediment Pollution Control Plan Review Fees. These fees are based on the following criteria:

NPDES Permit Criteria	Permit Required	Fees
1 acre disturbance NOT in High Quality or Exceptional Value watersheds; or if project will not discharge pollutants or toxins	NPDES General Permit	**$500** – Payable to the Clinton County Clean Water Fund plus $100 per disturbed acre – Payable to the Commonwealth of PA Clean Water Fund (.5 acres or above round up, always round to the even hundred dollar)
1 acre disturbance and in High Quality or Exceptional Value watersheds, or if project will discharge pollutants or toxins	NPDES Individual Permit	**$1,500** – Payable to the Clinton County Clean Water Fund plus $100 per disturbed acre – Payable to the Commonwealth of PA Clean Water Fund (.5 acres or above round up, always round to the even hundred dollar)

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF WATER PROGRAMS
OFFICE OF OIL AND GAS MANAGEMENT

NOTICE OF INTENT (NOI) ADMINISTRATIVE COMPLETENESS CHECKLIST EROSION AND SEDIMENT CONTROL GENERAL PERMIT (ESCGP-3) FOR EARTH DISTURBANCE ASSOCIATED WITH OIL AND GAS EXPLORATION, PRODUCTION, PROCESSING, OR TREATMENT OPERATIONS OR TRANSMISSION FACILITIES

Please check the following list to make sure that you have included all the required information. Place a check mark in the column provided for all items completed and/or provided. Failure to provide all of the requested information will delay the processing of the application, may preclude the use of the Expedited Review, and may result in the application being placed ON HOLD with NO ACTION, or being considered withdrawn and the application file closed.

THIS CHECKLIST MUST BE COMPLETED AND ENCLOSED WITH YOUR GENERAL PERMIT NOI

✓CHECKLIST FOR EROSION AND SEDIMENT CONTROL GENERAL PERMIT NOI

☒ **NEW NOI** ☐ **RENEWAL** ☐ **PHASED** ☐ **MAJOR MODIFICATION**

If a Renewal, Phased or Major Modification, identify ESCGP Authorization # _____

Minor revisions are not required to be submitted to the regional office for review.

CLIENT NAME National Fuel Gas Supply Corporation

PROJECT and PHASE NAME _____ **(If applicable)** FM100 Project

				Applicant Check ✓ if Included	Official Use Only
1.	Fully completed, properly signed and notarized Notice of Intent form (1 original and 2 copies for paper application). (Not required for subsequent phases)			☒	☐
2.	Is expedited review requested? If yes, complete items (a) and (b) below. If no, proceed to section 3 of this checklist.			☐ Yes	☒ No
	a. Expedited review eligibility has been completed and determined.	Location: _____	Page: _____	☐	☐
	b. Expedited review process related questions have fully been answered.	Location: _____	Page: _____	☐	☐
3.	Complete **Erosion and Sediment Control (E&S) Plans.** (1 original and 2 copies for paper application) NOTE: Identify locations as Drawings (D), Narrative (N). (Identify Not Applicable as "N/A") The E & S Plan must contain, at a minimum, the following:			☒ Yes	☐ No
	a. Topographic Features Existing topographic features of the project site and immediate surrounding area. Include the project area outlined on an 8 ½" x 11" photocopy of the U.S.G.S. topo map area. The map must include the name of the appropriate 1:24,000 scale U.S.G.S. 7.5 minute series quadrangle map where the project is located.	Location: D	Page: ESCGP-3 Section 1-4; Section 2-2A & 2-2B: alignment sheets	☒	☐
	b. Soil Characteristics Types, depth, slope, locations and limitations of the soils including methods for resolution of all soil limitations.	Location: N and D	Page: ESCGP-3 Section 2-1: page 8; Section 2-2A and 2-2B: Drawing "SOILS" alignment sheets	☒	☐
	c. Earth Disturbance Activity The characteristics of the earth disturbance activity, including the past, present and proposed land uses and proposed alteration to the project site.	Location: N and D	Page: ESCGP-3 Section 2-1: pages 5-12; Section 2-2A and 2-2B: alignment sheets	☒	☐
	d. Project Site Runoff The Volume and rate of runoff from the project site and its upstream watershed area. Runoff impact analysis on downstream watercourse, design computations for protective measures if applicable, discharge analysis for non-surface water discharges.	Location: N	Page: ESCGP-3 Section 2-1: page 12	☒	☐

	e.	**Surface Water Classification** The Location of all surface waters of this Commonwealth which may receive runoff within or from the project site including their classification under Chapter 93 and status as siltation-impaired water. All streams, springs, wetlands, and floodways within, adjacent or receiving water from the project site must be shown on drawings with proper identification of special protection waters and existing uses.	Location: N and D	Page: ESCGP-3 Section 2-1: pages 5-8; Section 2-2A & 2-2B: alignment sheets	☒	☐
	f.	**BMP Description Narrative** A narrative description of the location and type of perimeter and onsite BMPs used before, during, and after the earth disturbance activity.	Location: N	Page: ESCGP-3 Section 2-1: pages 16-18	☒	☐
	g.	**BMP Installation Sequence Narrative** A sequence of BMP installation and removal in relation to the scheduling of earth disturbance activities, prior to, during and after earth disturbance activities that ensures proper functioning of BMPs.	Location: N and D	Page: ESCGP-3 Section 2-1: pages 30-39; Section 2-2A and 2-2B: Drawings "NOTES 004" and "NOTES 005"	☒	☐
	h.	**Supporting Calculations and Measurements** All BMP design calculations and information must be attached with the E&S plans.	Location: N	Page: ESCGP-3 Section 2-1 Appendices B & C	☒	☐
	i.	**Plan Drawings** Plan drawings must include locations of proposed BMPs and a legend for all symbols used on the drawing. Construction details, notes, and specifications must be included to explain the drawings.	Location: D	Page: ESCGP-3 Section 2-2A & 2-2B	☒	☐
	j.	**Maintenance Program** A maintenance program which provides for the operation and maintenance of BMPs and the inspection of BMPs on a weekly basis and after each stormwater event, including the repair or replacement of BMPs to ensure effective and efficient operation. The program must provide for completion of a written report documenting each inspection and all BMP repair, or replacement and maintenance activities.	Location: N and D	Page: ESCGP-3 Section 2-1: pages 14-15, 33, 35, 37; Section 2-2A & 2-2B: "NOTES 002," "DETAILS 001" through "DETAILS 007"	☒	☐
	k.	**Material Recycling and Disposal** Procedures which ensure that the proper measures for the recycling or disposal of materials associated with or from the project site will be undertaken in accordance with this title.	Location: N and D	Page: ESCGP-3 Section 2-1: page 22; Section 2-2A & 2-2B: "NOTES 001," "NOTES 002," and "NOTES 005"	☒	☐
	l.	**Naturally Occurring Geologic Formations and Soil Conditions** Identify naturally occurring geologic formations or soil conditions that may have the potential to cause pollution during earth disturbance activities and include the locations on plan drawings. Include BMPs to avoid or minimize potential pollution and its impacts from the formations. If the applicant suspects substantial possibility of potential slope failure, include a geotechnical report prepared by a geotechnical engineer.	Location: N	Page: ESCGP-3 Section 2-1: pages 8-11 and Appendix E	☒	☐
	m.	**Thermal Impacts** Identification of potential thermal impacts to surface waters of this Commonwealth from the earth disturbance activity including BMPs to avoid, minimize or mitigate potential pollution from thermal impacts.	Location: N	Page: ESCGP-3 Section 2-1: page 33	☒	☐

	n.	**E&S Plan and PCSM/SR Plan Consistency** The E&S Plan shall be planned, designed and implemented to be consistent with the PCSM Plan under § 102.8. Unless otherwise approved by the Department, the E&S Plan must be separate from the PCSM Plan and labeled "E&S" or "Erosion and Sediment Control Plan" and be the final plan for construction.	Location: N	Page: ESCGP-3 Section 2-1: page 1	☒	☐
	o.	**Riparian Forest Buffers** Identification of existing and proposed riparian forest buffers should be included on the plan drawings if incorporated into the project site.	Location: N	Page: ESCGP-3 Section 2-1: pages 26-28	☒	☐
	p.	**Antidegradation Requirements** Satisfy antidegradation implementation requirements for special protection water and siltation-impaired waters including evaluation of nondischarge alternatives and ABACT.	Location: N	Page: ESCGP-3 Section 2-1: pages 23-29	☒	☐
4.		**Permit NOI Filing Fees** of $500 to the appropriate Clean Water Fund plus $100/Acre of earth disturbance payable to the Commonwealth of PA Clean Water Fund ($500 filing fee not required for subsequent phases) is required. For NOIs submitted to delegated county conservation districts, the administrative fee of $500 must be paid to the conservation district and disturbed acreage fee to the Commonwealth of PA (two checks).	Location: N/A ESCGP Section 1-3	Page: N/A	☒	☐
5.		**Municipal Notification:** (3 copies) Not required for subsequence phases.			☒	☐
	a.	Act 14 Municipal Notifications to the local municipality and county governments that specify that the application is for Erosion and Sediment Control General Permit for Earth Disturbance Associated with Oil and Gas Activities. A "sample" notification letter is provided as Attachment C of the instructions. **Proof or Receipt** of municipal notifications: copies of certified mail receipts, proof of deliver from a commercial carrier or acknowledgment letters from the local municipality and county government.	Location: N/A ESCGP Section 1-5	Page: N/A	☒	☐
	b.	Pennsylvania Inventory of Historical Places and the National Register of Historical Places: When conducting earth disturbance activities, the permittee shall protect archaeological specimens and historic resources in accordance with applicable State and Federal laws. For permitted activities on lands of the Allegheny National Forest (ANF) or other federal lands, the permittee should coordinate with the appropriate ANF Ranger or other appropriate federal agency on the protection of historic properties.	Location: N/A ESCGP Section 1-6A	Page: N/A	☒	☐
6.		**Pennsylvania Natural Heritage Program (PNHP).** Include PNDI receipt, PNDI clearance and other information depending on the permit application option. (3 copies for paper application).	Location: N/A ESCGP Section 1-6B	Page: N/A	☒	☐
7.		**Complete PCSM/SR Plans.** (1 Original, 2 copies) NOTE: Identify location(s) as Drawing (D), Narrative (N). (Identify Not Applicable as "N/A".) The PCSM/SR Plan must contain, at a minimum, the following:			☒	☐
	a.	**Topographic Features** The existing topographic features of the project site and immediate surrounding area must be shown plan drawings. The name of the USGS quadrangle map must be included.	Location: N and D	Page: ESCGP-3 Section 1-4; Section 3-2: "COVER SHEET" and all plan drawings; Section 3-1: section 3.1.1(f)(1); Section 3-3: pages 13 and 14; Section 3-4A and 3-4B: all plan drawings	☒	☐

CARPENTER HOLLOW OPP, MARVINDALE INTERCONNECT, MLV-1, MLV-2, MLV-3, MLV-4

	b.	**Characteristics of Naturally Occurring Geologic Formations and Soil Conditions** The types, depth, slope, locations and limitations of the soils and geologic formations.	Location: N and D	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(2) and Appendix D; Section 3-2: all plan drawings; Section 3-3: pages 15-17; Section 3-4A and 3-4B: "SR SOILS" and all plan drawings	☒	☐
	c.	**Earth Disturbance Activity Characterization** The characteristics of the project site, including the past, present and proposed land uses Limit of Disturbance (LOD), areas of cuts and fill, proposed impervious areas, locations of roads, proposed contours of project area and the proposed alteration of the project site.	Location: N and D	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(3) and Appendices E and F; Section 3-2: all plan drawings; Section 3-3: pages 13 and 14; Section 3-4A and 3-4B: all plan drawings	☒	☐
	d.	**Net Change in Volume and Rate of Runoff** An identification of the net change in volume and rate of stormwater from preconstruction hydrology to post construction hydrology for the entire project site and each drainage area. Include pre-development and post-development drainage area map. Post-development drainage area map must show Point of Discharge(s) (PODs) from PCSM BMPs.	Location: N and D	Page: ESCGP-3 Section 3-1: sections 3.1.1(f)(4) and 4; Section 3-2: Drawing Titled "OFFSITE DISCHARGE"; Section 3-3: page 24	☒	☐
	e.	**Surface Water Classification** An identification and location of surface waters of this Commonwealth, which may receive runoff within or from the project site and their classification under Chapter 93.	Location: N and D	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(5); Section 3-2: Drawing Titled "OFFSITE DISCHARGE"; Section 3-3: page 18; Section 3-4A & 3-4B: all plan drawings	☒	☐
	f.	**BMP Description Narrative** A written description of the location and type of PCSM/Site Restoration BMPs including construction details for permanent stormwater BMPs including permanent stabilization specifications and locations.	Location: N and D	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(6); Section 3-2: all "DETAILS" sheets; Section 3-3: page 20; Section 3-4A & 3-4B: all "SR DETAILS" sheets	☒	☐
	g.	**BMP Installation Sequence Narrative** A sequence of PCSM/Site Restoration BMP implementation or installation in relation to earth disturbance activities of the project site and a schedule of inspections for critical stages of PCSM/Site Restoration BMP installation.	Location: N and D	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(7); Section 3-2: "DETAILS" sheet; Section 3-3: pages 20-22; Section 3-4A & 3-4B: "SR NOTES 001"	☒	☐
	h.	**Supporting calculations** All design information and calculations must be included with the PCSM/SR plan. Include verification of PCSM/SR plan consistency with the Act 167 plan, if a current and DEP approved Act 167 plan exists. Include summary of bio-infiltration BMPs used for the project using Attachment E of the NOI instructions.	Location: N	Page: ESCGP-3 Section 1-1, Attachment E; Section 3-1A; Section 3-1: Appendix B	☒	☐
	i.	**Plan Drawings** The locations of BMPs with tributaries must be shown on the drawings. Notes, specifications, any constructions details, and any other supporting information needed to explain the drawings must also be included.	Location: N and D	Page: ESCGP-3 Section 3-1: Appendices E and F; Section 3-2; Section 3-4A & 3-4B	☒	☐
	j.	**Long Term Operation and Maintenance Schedule** A long-term operation and maintenance schedule, which provides for inspection of PCSM/Site Restoration BMPs, including the repair, replacement or other routine maintenance of the PCSM/Site Restoration BMPs to ensure proper function and operation. The program must provide for completion of a written report documenting each inspection and all BMP repair and maintenance activities and how access to the PCSM/Site Restoration BMPs will be provided.	Location: N and D	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(10); Section 3-2: "DETAILS" sheet; Section 3-3: pages 21-22	☒	☐

CARPENTER HOLLOW OPP, MARVINDALE INTERCONNECT, MLV-1, MLV-2, MLV-3, MLV-4

	k.	**Material Recycling and Disposal** Procedures which ensure that the proper measures for recycling or disposal of materials associated with or from the PCSM/Site Restoration BMPs are in accordance with Department laws, regulations and requirements.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(11); Section 3-3: pages 22-23	☒	☐
	l.	**Addressing Impacts from Naturally Occurring Geologic Formations and Soil Conditions** An identification of naturally occurring geologic formations or soil conditions that may have the potential to cause pollution after earth disturbance activities are completed and PCSM/Site Restoration BMPs are operational and development of a management plan to avoid or minimize potential pollution and its impacts.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(12); Section 3-3: pages 16-17	☒	☐
	m.	**Thermal Impacts** An Identification of potential thermal impacts from post construction stormwater to surface water of this Commonwealth including BMPs to avoid, minimize or mitigate potential thermal pollution from thermal impacts.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.1(f)(13); Section 3-3: page 25	☒	☐
	n.	**Riparian Forest Buffer Management Plan** A riparian forest buffer management plan when required under § 102.14.	Location: N/A	Page: N/A	☐	☐
	o.	**Antidegradation Requirements** A demonstration of compliance with antidegradation implementation requirements including evaluation of nondischarge alternatives and ABACT for where activities will be conducted in special protection waters or siltation impaired waters.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.2(h); Section 3-3: page 24	☒	☐
8.	**PCSM Plan Stormwater Analysis** Do the regulated activities require site restoration or reclamation? If Yes, skip to Item 9. If No, provide the following information:			☐ Yes ☒ No	☒	☐
	a.	**Site Characterization and Assessment** Predevelopment site characterization and assessment of soil and geology including infiltration and geotechnical studies that identify location and depths of test sites and methods used.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.2(g)(1) and Appendix G	☒	☐
	b.	**Volume Reduction and Water Quality Requirements** Analysis demonstrating that the PCSM BMPs will meet the volume reduction and water quality requirement specified in an applicable Department approved and current Act 167 stormwater management watershed plan; **or** manage the net change for storms up to and including the 2-year/24-hour storm event when compared to preconstruction runoff volume and water quality.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.2(g)(2)	☒	☐
	c.	**Rate Requirements** Analyses demonstrating that the PCSM BMPs will meet the rate requirements specified in an applicable Department approved and current Act 167 stormwater management watershed plan; **or** manage the net change in peak rate for the 2-, 10-, 50-, and 100-year/24-hour storm event in a manner not to exceed preconstruction rates.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.2(g)(3)	☒	☐
	d.	**Calculation Methodologies** Identification of the methodologies for calculating total runoff volume and peak rate of runoff and provide supporting documentation and calculations.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.2(g)(4), 4, and Appendices B & G	☒	☐

CARPENTER HOLLOW OPP, MARVINDALE INTERCONNECT, MLV-1, MLV-2, MLV-3, MLV-4

	e.	**Construction Techniques** Identification of construction techniques or special consideration to address soil and geologic limitations.	Location: N and D	Page: ESCGP-3 Section 3-1: section 3.1.2(g)(5); Section 3-2	☒	☐
	f.	**Antidegradation Requirements** Demonstration of compliance with antidegradation implementation requirements including evaluation of nondischarge alternatives and ABACT for where activities will be conducted in special protection waters or siltation impaired waters.	Location: N	Page: ESCGP-3 Section 3-1: section 3.1.2(h)	☒	☐
9.	**Phased Projects** Is the activity being conducted as a phased project? ☐ Yes ☒ No If yes, all of the following must be completed:				☐	☐
	a.	Initial Phase - Is the master plan included? ☐ Yes ☐ No				
	b.	Subsequent Phase(s) – Is(are) the subsequent phase(s) identified in the master plan? ☐ Yes ☐ No				
10.	**Preparedness, Prevention and Contingency (PPC) Plan** Will fuels, chemicals, solvents, other hazardous materials be used or stored on site during earth disturbance activities? ☒ Yes ☐ No If yes, a PPC Plan must be maintained on the site during earth disturbance.				☐	☐
11.	**Subsequent Phase Certification for Expedited Reviews** Is the activity being conducted as a phased project? ☐ Yes ☒ No Is an expedited review being requested for subsequent phase? ☐ Yes ☒ No If yes, all of the following must be completed:				☐	☐

I do hereby certify to the best of my knowledge, information, and belief, that the Erosion and Sediment Control and PCSM/Site Restoration Plan are true and correct, represent actual field conditions and are in accordance with the 25 Pa. Code Chapters 78 and 102 of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature	Professional Seal
Company Mott MacDonald	NOT REQUESTING EXPEDITED REVIEW
Address 111 Wood Avenue South, Iselin, NJ 08830-4112	
Phone (973) 379-3400	
Most Recent DEP Training Attended Location ——— Date ———	
e-Mail Address michael.denichilo@mottmac.com	

EXPEDITED REVIEW PROCESS

In addition to the certification required above, applicants using the expedited permit review process must attach an E&S and PCSM/Site Restoration Plan developed and sealed by a licensed professional engineer, landscape architect, surveyor or professional geologist. The plans shall contain the following certification:

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12.	**Permit Renewal** Is a permit renewal being requested? ☐ Yes ☒ No If yes, all of the following must be completed:		☐	☐
	a.	Administratively complete, signed, and notarized Notice of Intent Form, including Items 1-8. (1 signed original and 2 copies of the NOI/application for paper application)	☐	☐
	b.	Permit filing fee of $500 payable to the appropriate clean water fund plus $100/Acre of earth disturbance payable to the Commonwealth of PA Clean Water Fund.	☐	☐

	n.	**E&S Plan and PCSM/SR Plan Consistency** The E&S Plan shall be planned, designed and implemented to be consistent with the PCSM Plan under § 102.8. Unless otherwise approved by the Department, the E&S Plan must be separate from the PCSM Plan and labeled "E&S" or "Erosion and Sediment Control Plan" and be the final plan for construction.	Location: _____	Page: _____	☐	☐
	o.	**Riparian Forest Buffers** Identification of existing and proposed riparian forest buffers should be included on the plan drawings if incorporated into the project site.	Location: _____	Page: _____	☐	☐
	p.	**Antidegradation Requirements** Satisfy antidegradation implementation requirements for special protection water and siltation-impaired waters including evaluation of nondischarge alternatives and ABACT.	Location: _____	Page: _____	☐	☐
4.		**Permit NOI Filing Fees** of $500 to the appropriate Clean Water Fund plus $100/Acre of earth disturbance payable to the Commonwealth of PA Clean Water Fund ($500 filing fee not required for subsequent phases) is required. For NOIs submitted to delegated county conservation districts, the administrative fee of $500 must be paid to the conservation district and disturbed acreage fee to the Commonwealth of PA (two checks).	Location: _____	Page: _____	☐	☐
5.		**Municipal Notification:** (3 copies) Not required for subsequence phases.			☐	☐
	a.	Act 14 Municipal Notifications to the local municipality and county governments that specify that the application is for Erosion and Sediment Control General Permit for Earth Disturbance Associated with Oil and Gas Activities. A "sample" notification letter is provided as Attachment C of the instructions. **Proof or Receipt** of municipal notifications: copies of certified mail receipts, proof of deliver from a commercial carrier or acknowledgment letters from the local municipality and county government.	Location: _____	Page: _____	☐	☐
	b.	Pennsylvania Inventory of Historical Places and the National Register of Historical Places: When conducting earth disturbance activities, the permittee shall protect archaeological specimens and historic resources in accordance with applicable State and Federal laws. For permitted activities on lands of the Allegheny National Forest (ANF) or other federal lands, the permittee should coordinate with the appropriate ANF Ranger or other appropriate federal agency on the protection of historic properties.	Location: _____	Page: _____	☐	☐
6.		**Pennsylvania Natural Heritage Program (PNHP).** Include PNDI receipt, PNDI clearance and other information depending on the permit application option. (3 copies for paper application).	Location: _____	Page: _____	☐	☐
7.		**Complete PCSM/SR Plans.** (1 Original, 2 copies) NOTE: Identify location(s) as Drawing (D), Narrative (N). (Identify Not Applicable as "N/A".) The PCSM/SR Plan must contain, at a minimum, the following:			☒	☐
	a.	**Topographic Features** The existing topographic features of the project site and immediate surrounding area must be shown plan drawings. The name of the USGS quadrangle map must be included.	Location: N	Page: 1	☒	☐

	b.	**Characteristics of Naturally Occurring Geologic Formations and Soil Conditions** The types, depth, slope, locations and limitations of the soils and geologic formations.	Location: N	Page: 2 & 9	☒	☐
	c.	**Earth Disturbance Activity Characterization** The characteristics of the project site, including the past, present and proposed land uses Limit of Disturbance (LOD), areas of cuts and fill, proposed impervious areas, locations of roads, proposed contours of project area and the proposed alteration of the project site.	Location: N	Page: 2	☒	☐
	d.	**Net Change in Volume and Rate of Runoff** An identification of the net change in volume and rate of stormwater from preconstruction hydrology to post construction hydrology for the entire project site and each drainage area. Include pre-development and post-development drainage area map. Post-development drainage area map must show Point of Discharge(s) (PODs) from PCSM BMPs.	Location: N	Page: 2	☒	☐
	e.	**Surface Water Classification** An identification and location of surface waters of this Commonwealth, which may receive runoff within or from the project site and their classification under Chapter 93.	Location: N	Page: 4	☒	☐
	f.	**BMP Description Narrative** A written description of the location and type of PCSM/Site Restoration BMPs including construction details for permanent stormwater BMPs including permanent stabilization specifications and locations.	Location: N	Page: 5	☒	☐
	g.	**BMP Installation Sequence Narrative** A sequence of PCSM/Site Restoration BMP implementation or installation in relation to earth disturbance activities of the project site and a schedule of inspections for critical stages of PCSM/Site Restoration BMP installation.	Location: N	Page: 5	☒	☐
	h.	**Supporting calculations** All design information and calculations must be included with the PCSM/SR plan. Include verification of PCSM/SR plan consistency with the Act 167 plan, if a current and DEP approved Act 167 plan exists. Include summary of bio-infiltration BMPs used for the project using Attachment E of the NOI instructions.	Location: N	Page: 6, Appendix C	☒	☐
	i.	**Plan Drawings** The locations of BMPs with tributaries must be shown on the drawings. Notes, specifications, any constructions details, and any other supporting information needed to explain the drawings must also be included.	Location: N, D	Page: 6, Appendix D	☒	☐
	j.	**Long Term Operation and Maintenance Schedule** A long-term operation and maintenance schedule, which provides for inspection of PCSM/Site Restoration BMPs, including the repair, replacement or other routine maintenance of the PCSM/Site Restoration BMPs to ensure proper function and operation. The program must provide for completion of a written report documenting each inspection and all BMP repair and maintenance activities and how access to the PCSM/Site Restoration BMPs will be provided.	Location: N	Page: 6	☒	☐

	k.	**Material Recycling and Disposal** Procedures which ensure that the proper measures for recycling or disposal of materials associated with or from the PCSM/Site Restoration BMPs are in accordance with Department laws, regulations and requirements.	Location: N	Page: 8	☒	☐
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	n.	**Riparian Forest Buffer Management Plan** A riparian forest buffer management plan when required under § 102.14.	Location: N	Page: 10	☒	☐
	o.	**Antidegradation Requirements** A demonstration of compliance with antidegradation implementation requirements including evaluation of nondischarge alternatives and ABACT for where activities will be conducted in special protection waters or siltation impaired waters.	Location: N	Page: 10	☒	☐
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Signature	Professional Seal
Company	
Address	
Phone	
Most Recent DEP Training Attended Location _____ Date _____	
e-Mail Address	

EXPEDITED REVIEW PROCESS

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Signature	Professional Seal
Company	
Address	
Phone	
Most Recent DEP Training Attended Location _____ Date _____	
e-Mail Address	

EXPEDITED REVIEW PROCESS

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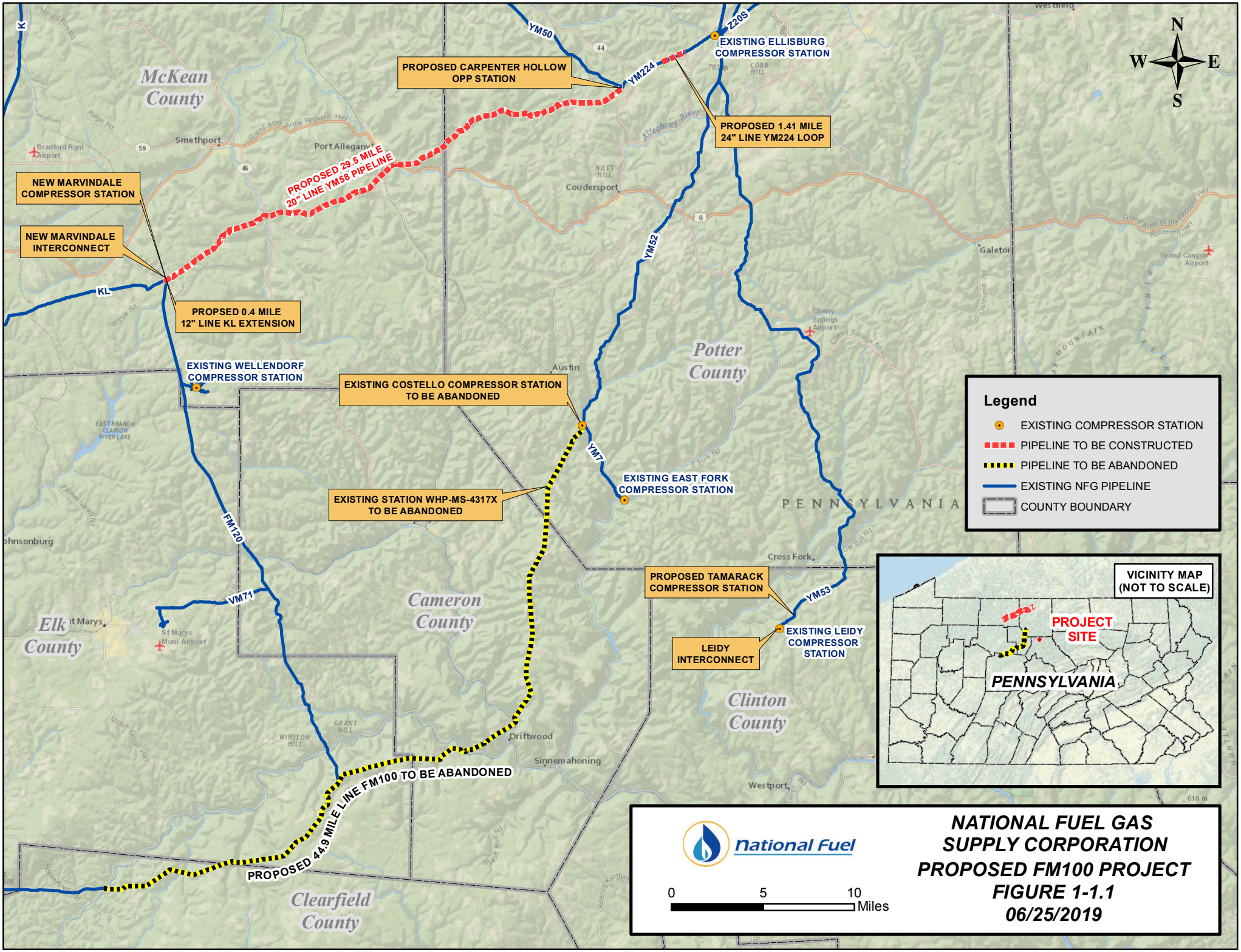
	b.	Permit filing fee of $500 payable to the appropriate clean water fund plus $100/Acre of earth disturbance payable to the Commonwealth of PA Clean Water Fund.	☐	☐

ESCPG-3 Fee Calculations

And Check Copy

Confidential and Sensitive Information

Not for Public Distribution


PROPOSED CARPENTER HOLLOW OPP STATION
EXISTING ELLISBURG COMPRESSOR STATION
PROPOSED 1.41 MILE 24" LINE YM224 LOOP
PROPOSED 29.5 MILE 20" LINE YM68 PIPELINE
NEW MARVINDALE COMPRESSOR STATION
NEW MARVINDALE INTERCONNECT
PROPSED 0.4 MILE 12" LINE KL EXTENSION
EXISTING WELLENDORF COMPRESSOR STATION
EXISTING COSTELLO COMPRESSOR STATION TO BE ABANDONED
EXISTING STATION WHP-MS-4317X TO BE ABANDONED
EXISTING EAST FORK COMPRESSOR STATION
PROPOSED TAMARACK COMPRESSOR STATION
EXISTING LEIDY COMPRESSOR STATION
LEIDY INTERCONNECT
PROPOSED 44.9 MILE LINE FM100 TO BE ABANDONED
McKean County
Potter County
Cameron County
Elk County
Clinton County
Clearfield County
PENNSYLVANIA
YM50
YM224
YM52
YM7
YM53
VM71
FM120
KL
220S
Legend
EXISTING COMPRESSOR STATION
PIPELINE TO BE CONSTRUCTED
PIPELINE TO BE ABANDONED
EXISTING NFG PIPELINE
COUNTY BOUNDARY
VICINITY MAP (NOT TO SCALE)
PROJECT SITE
PENNSYLVANIA
National Fuel
0 5 10 Miles
NATIONAL FUEL GAS SUPPLY CORPORATION
PROPOSED FM100 PROJECT
FIGURE 1-1.1
06/25/2019

MOTT MACDONALD

Jodi Brennan, Director
Clearfield County Planning Board
Clearfield County Administrative Offices
212 East Locust Street,
Clearfield, PA 16830

via USPS

National Fuel Gas Supply Corporation
FM 100 Project
Land Use Notification Letter: Request for Land Use Response
Clearfield County, Pennsylvania

5295 South Commerce Drive
Suite 500
Murray, UT 84107
United States of America

T +1 (801) 571 6522
F +1 (801) 261 3913
www.mottmac.com/americas

October 25, 2019

Dear Ms. Brennan,

On behalf of National Fuel Gas Supply Corporation (National Fuel), Mott MacDonald is sending this notice to inform you of National Fuel's intent to submit an application for coverage under the Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit (ESCGP-3) for Earth Disturbance Associated with Oil & Gas Exploration, Production, Processing or Treatment Operations Facilities, and a USACE Joint Permit - Chapter 105 Water Obstructions and Encroachment Permit. National Fuel has a PAG 10 for discharges from hydrostatic testing.

This notification satisfies the requirements of Acts 14, 67, 68, 127 of the Pennsylvania Municipalities Planning Code for the following project:

Project Name: FM 100 Project (Project)

Project Description: The primary purpose of the Project, as designed and filed with FERC (Docket No. CP-19-491-000), is to modernize a portion of National Fuel's existing pipeline system. The Project will allow for the removal from service and abandonment of approximately 44.9 miles of vintage steel pipe. National Fuel's risk analysis has prioritized the replacement of these aging facilities. In order to continue to provide the existing transportation and storage services provided by the facilities proposed to be abandoned, approximately 29.5 miles of new 20-inch diameter coated steel pipeline, 0.4 miles of new 12-inch diameter coated steel pipeline to be used as a suction/discharge header, and 4,055 hp of compression and related facilities at the proposed Marvindale Compressor Station will be installed. The Project will enhance the reliability and safety of the National Fuel system for transportation services, local distribution market needs, storage management purposes and local production collection and transportation. Line FM100 is National Fuel's only connecting pipeline between its western and eastern operating systems.

MOTT MACDONALD

In addition to modernizing its existing system, National Fuel also proposes to construct additional facilities designed to create 330,000 Dth/day of incremental transportation capacity ("Transportation Capacity") from the Sergeant Township area to Transco at Leidy, PA. These additional facilities include 11,110 hp at the proposed Marvindale Compressor Station, 22,220 hp at the proposed Tamarack Compressor Station, an increase in the YM58 pipe diameter to 20-inch, and measurement upgrades at National Fuel's interconnection with Transco at Leidy.

The Transportation Capacity, which is fully subscribed to Transco under a proposed capacity lease, will provide upstream gas supply from shale producing areas in central PA to Transco's "Leidy South Project" (Docket No. CP-19-494-000) on behalf of Transco's foundation shipper. The companion projects will allow abundant, reliable, and economic gas supply to access the interstate pipeline system grid where it can reach key consuming market centers in the northeastern United States via the Transco pipeline system.

Within Clearfield County, National Fuel proposes to impact approximately 2.7 acres of land for Rights-of-Way (ROW) and Access Roads to plug and abandon a section of the exisitng Line 100 system.

Applicant Contact:
National Fuel Gas Supply Corporation
c/o: Wayne Graham, Environmental Compliance Manager
1100 State Street
Erie, PA 16512

Section 1905-A of the Commonwealth Administrative Code, as amended by Act 14, requires that each applicant for a PADEP permit must give written notice to the municipality and the county in which the permitted activity is located. Acts 67, 68 and 127, which amended the Municipalities Planning Code, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities and infrastructure and specify that state agencies may rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code.

Enclosed is a Project Location Map (Attachment 1) and a copy of the PADEP General Information Form (GIF) (Attachment 2) that has been completed by Mott MacDonald on behalf of the Applicant. PADEP invites you to review and comment on the land use aspects of this Project. If you wish to submit comments to DEP to consider in a land use review of this Project, you must respond within 30 days of receipt of this letter to the DEP regional office listed below:

Pennsylvania Department of Environmental Protection
Regional Permit Coordination Office
400 Market Street
Harrisburg, PA 17101

If no land use comments are received by the end of the comment period, PADEP will assume that there are no substantive land use conflicts and proceed with the normal application review process. For more information about this land use review process, please visit www.dep.pa.gov (Keyword: Land Use Reviews).

If you have any questions, please do not hesitate to contact me at the number/email listed below.

Sincerely,

Mott MacDonald

Douglas Gibbons, CEP
Principal Project Manager
T +1 (801) 704 0301
C +1 (801) 633 6293
Douglas.gibbons@mottmac.com

Enclosures: (1) Location Map
(2) PADEP General Information Form

cc: Wayne Graham - National Fuel
Project file

MOTT MACDONALD

Supervisor
Huston Township Planning Commission
11837 Bennetts Valley Highway,
Suite 1
Penfield, PA 15849

via USPS

National Fuel Gas Supply Corporation
FM 100 Project
Land Use Notification Letter: Request for Land Use Response
Huston Township, Clearfield County, Pennsylvania

5295 South Commerce Drive
Suite 500
Murray, UT 84107
United States of America

T +1 (801) 571 6522
F +1 (801) 261 3913
www.mottmac.com/americas

October 25, 2019

Dear Supervisor,

On behalf of National Fuel Gas Supply Corporation (National Fuel), Mott MacDonald is sending this notice to inform you of National Fuel's intent to submit an application for coverage under the Pennsylvania Department of Environmental Protection (PADEP) Chapter 102 Erosion and Sediment Control General Permit (ESCGP-3) for Earth Disturbance Associated with Oil & Gas Exploration, Production, Processing or Treatment Operations Facilities, and a USACE Joint Permit - Chapter 105 Water Obstructions and Encroachment Permit. National Fuel has a PAG 10 for discharges from hydrostatic testing.

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Within Hutson Township, Clearfield County, National Fuel proposes to impact approximately 2.5 acres of land for Rights-of-Way (ROW) and Access Roads to plug and abandon a section of the existing Line 100 system.

Applicant Contact:
National Fuel Gas Supply Corporation
c/o: Wayne Graham, Environmental Compliance Manager
1100 State Street
Erie, PA 16512

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Sincerely,

Mott MacDonald

Douglas Gibbons, CEP
Principal Project Manager
T +1 (801) 704 0301
C +1 (801) 633 6293
Douglas.gibbons@mottmac.com

Enclosures: (1) Location Map
(2) PADEP General Information Form

cc: Wayne Graham - National Fuel
Project file

MOTT MACDONALD

Supervisor
Lawrence Township Planning Commission
Lawrence Township Municipal Building
45 George Street,
Clearfield, PA 16830

via USPS

National Fuel Gas Supply Corporation
FM 100 Project
Land Use Notification Letter: Request for Land Use Response
Lawrence Township, Clearfield County, Pennsylvania

5295 South Commerce Drive
Suite 500
Murray, UT 84107
United States of America

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October 25, 2019

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Within Lawrence Township, Clearfield County, National Fuel proposes to impact approximately 0.2 acres of land for Rights-of-Way (ROW) and Access Roads to plug and abandon a section of the Line 100 system.

Applicant Contact:
National Fuel Gas Supply Corporation
c/o: Wayne Graham, Environmental Compliance Manager
1100 State Street
Erie, PA 16512

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If you have any questions, please do not hesitate to contact me at the number/email listed below.

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C +1 (801) 633 6293
Douglas.gibbons@mottmac.com

Enclosures: (1) Location Map
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cc: Wayne Graham - National Fuel
Project file

Clinton Co.

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10/26/2019

Sent To
Clinton Co. Planning Commission
Street and Apt. No., or PO Box No.
2 Piper Way, Suite 244
City, State, ZIP+4®
Lock Haven, PA 17745

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7018 1830 0000 0357 9150

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10/26/2019

Sent To
Supervisor, Leidy Township Planning Commission
Street and Apt. No., or PO Box No.
7214 Kettle Creek Road
City, State, ZIP+4®
Renovo, PA 17764

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

PHMC, PNDI and IPaC Correspondence

Confidential and Sensitive Information

Not for Public Distribution

NATIONAL FUEL GAS COMPANY

SPILL PREVENTION
and
RESPONSE PROCEDURES

March 2017

Revised: January 31, 2019

1100 State Street (Engineering Dept.)
Erie, PA 16501

SPILL PREVENTION and RESPONSE PROCEDURES

GENERAL DESCRIPTION

Typical Equipment Used

Typical construction equipment used includes, but is not limited to: dozers, backhoes, excavators, sidebooms, tractor-trailers, flatbed trucks, pickup trucks, and passenger vehicles. Auxiliary equipment typically used includes, but is not limited to: chain saws, air compressors, welding equipment, water pumps, logging equipment, road graders and vibratory tampers, skidders, chippers, cultimulchers, light plants and rock rakes.

Hazardous Materials Handling

All employees handling fuels and other hazardous materials will be properly trained.
All equipment will be in good operating order and inspected on a regular basis. Fuel trucks transporting fuel to on-site equipment will travel only on approved access roads. All equipment will be parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary, unless the Environmental Inspector determines that there is no reasonable alternative, and appropriate steps have been taken (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill. Hazardous materials, including chemicals, fuels, and lubricating oils, will not be stored within 100 feet of a wetland, waterbody, or designated municipal watershed area, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials and does not apply to normal operation or use of equipment in these areas. Concrete coating activities will not be performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. These activities can occur closer only if the Environmental Inspector (EI) determines that there is no reasonable alternative, and appropriate steps have been taken (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill. Pumps operating within 100 feet of a waterbody or wetland boundary will be contained within appropriate secondary containment systems to prevent spills. Bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils will be contained within appropriate secondary containment systems to prevent spills.

Operations will be structured in such a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. Each construction crew (including cleanup crews) will have on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and will follow the procedures for reporting spills and unanticipated discoveries of contamination. Each construction crew will have on hand sufficient tools and material to stop leaks.

Typically, mobile equipment mechanics will perform routine maintenance. This position will perform daily inspections, accomplish oiling, greasing, hydraulics, and fueling operations. Primary to this job is the preventive maintenance activities associated with mobile equipment; specifically monitoring equipment for potential leaking connections. Smaller vehicles that will be traveling on town and state roads in addition to the pipeline right-of-way will be fueled and maintained by their operators at local gasoline stations whenever possible or at designated staging area(s).

SPILL PREVENTION and RESPONSE PROCEDURES

EMERGENCY RESPONSE PROGRAM

Our intent is to minimize the hazards of storing and transferring liquids during the project. Only the minimum volumes required for the efficiency of the operation will be on site, either in staging areas or on the right-of-way. Company and contractor personnel on the job will be trained in the proper handling of materials and in spill prevention, containment, and disposal procedures.

In staging areas, all hazardous liquids will be stored within diked areas, the volumetric capacity of which shall be at least 110% of the largest tank within the dike. Walls of the diked area shall be earth with an 8-mil plastic lining, unless the storage container is an approved double-walled vessel.

Along the right-of-way, fuels and other equipment related fluids will be handled in OSHA approved containers.

Each material will be properly labeled. Material Safety Data Sheets (MSDS) describing proper handling and the hazards associated with each material will be available on site or through a call-in MSDS agency.

Company construction inspectors and contractor employees have received specific training in the handling of materials to be used on the job including:

1. Hazmat training.
2. Chemicals present in the workplace.
3. Emergency Communication Procedures.
4. Observation and inspection techniques used to detect the presence or release of hazardous chemicals in the work area.
5. Signs and symptoms of human exposure.
6. Personal Protective Equipment requirements.
7. Emergency exposure procedures.
8. Spill Containment & Cleanup techniques.

SPILL PREVENTION and RESPONSE PROCEDURES

SPILL, LEAK PREVENTION and RESPONSE

Emergency Spill Control Kits will be available at local field office, with each work crew, or at convenient and accessible locations along the job.

Much of the spill control program will rely on thoroughly considered material location within a job site, daily inspection, and the care in handling potential contaminants. This will be reinforced with the construction inspectors during training specific to this project.

All inspectors will have had hazardous material training. This training includes methods and procedures on leak prevention, containment, and removal of hazardous spills.

Spill potential will be evaluated at each site used on the project prior to occupancy with special attention to streams and wetlands. Provisions will be made to locate potential contaminants on site so as to minimize movement within and off site should a spill occur. Where large volumes of potential contaminants will be located on site, containment facilities will be constructed.

All materials must be properly labeled, including contents, and the start date of accumulation. Allowable storage times of containers are determined by the amount of waste generated per month. Adequate supplies of absorbent materials compatible with potential contaminants will be available on site. Site inspections should occur at an appropriate frequency to determine the integrity of storage facilities, containment facilities, the contractors' adherence to requested handling procedures, and housekeeping.

In the event of a leak or spill the following steps will be taken:

1. Personnel will be mobilized to the leak or spill site and will contain the spill by constructing a dike or emergency containment structure. Use of absorbent materials may also be necessary.
2. Contents of a leaking container will be removed and placed in another tank.
3. All soil showing obvious signs of contamination will be excavated.
4. Depending on the type and extent of spill, testing with a photo-ionization meter for additional soil contamination and excavation of any remaining contaminated soils will be performed.
5. If storage of contaminated soil is necessary; the soil shall be placed on an 8-mil plastic liner and covered with an 8-mil plastic liner.
6. The excavated area will be backfilled with clean soil.
7. Major spills will have soil samples taken and sent to a certified laboratory to ensure that all contamination has been removed.
8. Contaminated soils will be hauled by a standard triaxle (covered) or dump truck (covered) to a landfill authorized to take such material.
9. For contaminated soils identified as hazardous, arrangements will be made with a licensed hazardous waste hauler to transport the material to a registered landfill.

SPILL PREVENTION and RESPONSE PROCEDURES

UNANTICIPATED HAZARDOUS WASTE DISCOVERIES

When unanticipated contamination is discovered in the right-of-way, especially if it is located in the path of construction, the appropriate preventive actions will need to be performed to address the contaminants. In the event that previously unreported or unanticipated hazardous wastes or contaminated sites are discovered during construction, the following procedures will be followed:

IDENTIFICATION

Identification and Recognition of Contamination (Hazardous Materials)

During construction, indicators of possible contamination may include, but are not limited to:

- Rusted barrels and containers
- Stained or discolored earth in contrast with adjoining soil
- Fill material containing debris other than construction-related items
- Household trash covered by earth or industrial waste debris
- Gasoline smells or other odors which emanate when the earth is disturbed
- Oily residue intermixed with earth
- Sheen on groundwater
- Cinders and other combustion products like ash; and
- Structures such as asbestos cement (transite) pipe, abandoned oil & gas lines, and underground storage tanks also require special handling when disturbed.

RESPONSE

a) Contractor will immediately stop work in the vicinity of any suspected contamination.

b) Contractor will cordon off or otherwise restrict access to the suspected area. Contractors, subcontractors, or other personnel will not handle or disturb potentially contaminated material or the surrounding soil until review with EI and Environmental Manager.

c) Contractor will immediately notify National Fuels' on-site Environmental Inspector (EI).

d) National Fuels' on-site Environmental Inspector will immediately notify the National Fuel Environmental Manager.

e) National Fuel will notify the landowner(s) of the suspected parcel(s).

f) Document the event starting with the discovery.

SPILL PREVENTION and RESPONSE PROCEDURES

IMPLEMENTATION PLAN (if deemed necessary by National Fuel EI)

a. Contact a qualified consultant and/or testing laboratory to assist with the determination of the extent and nature of the contamination.

b. Devise a plan for additional site-specific investigations as necessary.

c. Conduct the necessary level of site-specific testing and/or laboratory analysis to determine extent and nature of contamination.

d. Notify all applicable environmental authorities as required by law (see EMERGENCY CONTACTS at the end of this document).

e. Devise a site-specific plan depending on the nature and extent of the contamination encountered for continuation of construction. This step may involve evaluation of avoidance options an/or exposure minimization options, soil/groundwater segregation, disposal management of affected materials, and/or cleanup options as necessary to support the construction of the proposed facilities.

f. Devise a strategy or plan for handling wastes in an appropriate manner including waste characterization, hauling, manifesting, and disposal necessary to support continuing pipeline construction.

g. Devise a plan for site stabilization, backfilling and restoration.

h. Complete all required and necessary agency follow-ups and reporting.

SPILL PREVENTION and RESPONSE PROCEDURES

MATERIAL and WASTE INVENTORY
(Bulk Waste Disposal Plan)

Spill Control Kit

At a minimum, Spill Control Kits shall maintain: Hazmat Response Absorbent Sheets, Goggles, Latex Gloves, Drum Liner, Tyvek Coveralls, Environmental Clean-up Materials such as: Booms, Overpack Drum, Oil Off Water Pillow, Oil Off Water Skimmer.

Rights-of-way

Right-of-way requirements vary greatly from job to job; therefore the following documents should be reviewed for restrictions:

Landowner Restriction List

Earth disturbance permit and ESCAMP/SWPPP

The Project bid documents

In the event unforeseen contaminated soil is discovered while excavating during a project, the material will be contained and prevented from moving off site until local authorities are notified, if deemed necessary. Disposal arrangements will be determined.

Miscellaneous

1. Methanol will be dispersed into an OSHA approved container and removed to an approved incinerator.
2. Expended welding supplies and coating and wrapping residue will be returned to storage containers at the staging areas, and then transported to an approved landfill.
3. Miscellaneous materials (seed bags, wire, lumber, non-hazardous scrap) will be separated and returned to storage containers at the staging area. These will be recycled or disposed of at an approved landfill.
4. Unused materials, not considered waste, will be returned to inventory.

SPILL PREVENTION and RESPONSE PROCEDURES

NATIONAL FUEL APPROVED DISPOSAL SITES

If a spill occur, the first priority is containment. After containment has been achieved, the appropriate emergency contacts will be made, and arrangements will be made for proper disposal of the collected material.

Approved Sites	**Waste Products**
Lake View Landfill 851 Robison Road Erie, PA 814/825-8588	Contaminated Soil
CID Landfill 10860 Olean Road Chafee, NY 14030 716/496-5000	Fuels, Oils, Antifreeze
Greentree Landfill (BFI) 635 Toby Road Kersey, PA 15846 814/265-1744	Fuels, Oils, Antifreeze
Clarion Environmental State Route 36 P.O. Box 237 Leeper, PA 16233 814/744-8220	Fuels, Oils, Antifreeze
United Environmental Services 241 McAleer Road Sewickley, PA 15143 412/367-4427	Spent Methanol

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The following contractors are available to provide support, if required to the general contractor:

Fox Construction North Collins, NY 716/337-2546	water, brine hauling, dump truck, dozer
Haley Construction Little Valley, NY 716/938-9183	backhoe, dozer, dump truck
Winter's Rigging North Collins, NY 716/337-3930	heavy equipment moving, crane truck services
Kirila Contractors, Inc. 505 Bedford Road, Brookfield, OH 44403 330/448-4055	water, dump truck, dozer,

Lineal Industries, Inc. 5631 Steubenville Pike Pittsburgh, PA 15136 412/787-0410	backhoe, dozer, dump truck
Belser Hale 814/368-4467	backhoe, dozer, dump truck
International Waste Niagara Falls, NY 716/285-9101	waste disposal

EMERGENCY CONTACTS

		Mailing Address
1.	**The National Response Center (NRC)** 800/424-8802	U.S. Coast Guard 2100 Second St. SW Washington, DC 20593
2.	**On-Scene Coordinator (OSC)** (732) 906-6813	EPA Region II – New York 2890 Woodbridge Avenue, MS211 Edison, NJ 08837-3679
	215/814-5700	EPA Region III - Pennsylvania 1650 Arch Street Philadelphia, PA 19103-2029
3.	**State Spill Hotline** 800/457-7362	New York State Dept. of Environmental Conservation 50 Wolf Road Albany, NY 12233-3520

Notification must be reported to the NYSDEC Hotline listed above within 2 hours.

800/541-2050 814/332-6945	Pennsylvania State Dept. of Environmental Protection Rachel Carlson State Office Building Harrisburg, PA 17105

4. Local Authorities

585/226-2466 - days 607/732-2214 – Alt. (Elmira Sub-Office)	New York State Region 8 Dept. of Environmental Conservation 6274 Avon-Lima Rd Avon, NY 14414-9516
716/851-7220 - days 800/457-7362 - evenings	New York State Region 9 Dept. of Environmental Conservation 270 Michigan Ave.

	Buffalo, NY 14203-2999
814/332-6945 - days 800/373-3398 - evenings	Pennsylvania Northwest Region Dept of Environmental Protection 230 Chestnut Street Meadville, PA 16335
570/327-3636 - days 570/327-3636 - evenings/emergency	Pennsylvania Northcentral Region Dept of Environmental Protection 208 West Third Street, Suite 101 Williamsport, PA 17701-6448
412/442-4000 - days 412/442-4000 - evenings	Pennsylvania Southwest Region Dept. of Environmental Protection 400 Waterfront Drive Pittsburgh, PA 15222-4745
716/851-7010	NYS Office of Parks, Recreation, & Historical Preservation Fish, Wildlife & Marine Resources Region IX 270 Michigan Avenue Buffalo, NY 14203
814/337-0444 Northwest Region 814/359-5250 Northcentral Region	Pennsylvania Fish & Boat Commission 1601 Elmerton Avenue Harrisburg, PA 17110

5. Poison Centers

800/222-1222 – emergency	Poisoning incident
412/390-3300	Pittsburgh Poison Control Center 3705 Fifth Avenue Pittsburgh, PA 15213
716/878-7654	Western NY Poison Control Center 219 Bryant Street Buffalo, NY 14222

National Fuel Supply Corporation Dispatch Centers

Buffalo	800/833-1843	
Erie	800/458-0413	Ext. 4947

MOTT MACDONALD

National Fuel

FM100 Project

ESCGP-3 Permit Application Package

October 2019 (Revised September 2020)

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FM100 Project

ESCGP-3 Permit Application Package

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1 Introduction

This ESCGP-3 permit application package has been developed to address control of accelerated erosion and sedimentation resulting from earth disturbance associated with the proposed FM100 Project (Project). The permit application package consists of this written narrative and the attached appendices and plan drawings. It was developed to be in accordance with the requirements of 25 PA Administrative Code Chapters 78 and 102, as well as the Clean Streams Law (35 P. S. §§ 691.1001), as amended, utilizing guidelines and Best Management Practice (BMP) information provided in the Pennsylvania Department of Environmental Protection (PADEP) Erosion and Sediment Pollution Control Program Manual dated March 2012 (PADEP E&S Manual) and Pennsylvania Stormwater BMP Manual dated December 2006 (PADEP BMP Manual). The attached Erosion and Sediment Control and Agricultural Mitigation Plan (ESCAMP or Plan) has been developed by National Fuel Gas Supply Corporation (National Fuel) to address federal, state and local requirements. The ESCAMP complements the Site Restoration Plan (SR Plan) /Post Construction Stormwater Management Plan (PCSM Plan) prepared for this project and was planned and designed to be consistent with the SR/PCSM Plan under PA Code § 102.8. An up to date copy of the ESCAMP (Appendix G) (including this application package and all appendices, and any subsequently granted variances to the Plan) shall be maintained and available at the Project site during all stages of earth disturbance activity. This application package was prepared under the direct supervision of a Pennsylvania licensed Professional Engineer trained and experienced in erosion and sediment (E&S) control methods and techniques applicable to the size and scope of the proposed project.

1.1 Project Purpose and Description

The primary purpose of the Project, as initially designed and pre-filed with Federal Energy Regulatory Commission (FERC) Docket No. PF17-10-000), is to modernize a portion of National Fuel's existing pipeline system. The Project will allow for the removal from service and abandonment of approximately 44.9 miles of vintage steel pipe. National Fuel's risk analysis has prioritized the replacement of these aging facilities. In order to continue to provide the existing transportation and storage services provided by the facilities proposed to be abandoned, approximately 29.5 miles of new 20-inch-diameter coated steel pipeline, 0.4 miles of 12-inch-diameter coated steel pipeline to be used as a suction/discharge header, and 4,055 horsepower (hp) of compression and related facilities at the proposed Marvindale Compressor Station will be installed. The Project will enhance the reliability and safety of the National Fuel system for transportation services, local distribution market needs, storage management purposes and local production collection and transportation. Line FM100 is National Fuel's only connecting pipeline between its western and eastern operating systems.

In addition to modernizing its existing system, National Fuel also proposes to construct additional facilities designed to create 330,000 Dekatherm/day of incremental transportation capacity ("Transportation Capacity") from the Sergeant Township area to Transco at Leidy, PA. These additional facilities include 11,110 hp at the proposed Marvindale Compressor Station, 22,220 hp at the proposed Tamarack Compressor Station, an increase in the Line YM58 pipe diameter to 20-inch, and measurement upgrades at National's interconnection with Transco at Leidy.

The Transportation Capacity, which is fully subscribed to Transco under a proposed capacity lease, will provide upstream gas supply from shale producing areas in central PA to Transco's "Leidy South Project" (Docket No. PF19-1-000) on behalf of Transco's foundation shipper. The companion projects will allow abundant, reliable, and economic gas supply to access the

interstate pipeline system grid where it can reach key consuming market centers in the northeastern United States via the Transco pipeline system.

The Commission granted a certificate of convenience and necessity for the Project on August 6, 2020; should all other necessary permits be secured, it is anticipated that clearing and grading will commence in Q4 2020, with construction beginning in Q1 2021 and being complete by Q4 2021. Additional work will occur in 2022 supporting the abandonment of Line FM100. The proposed in-service date for the completed Project is December 2021. A detailed construction plan by Project segment will be submitted with the Implementation Plan. This plan will address timeframes for pre-construction activities (e.g., environmental clearance surveys, staking, clearing/grading, construction, restoration, and commissioning).

The Project includes:

- Installation of approximately 29.5 miles of 20-inch-diameter steel pipeline (Line YM58) from the proposed Marvindale Interconnect near the proposed Marvindale Compressor Station site in Sergeant Township, McKean County, PA and extending to the proposed Carpenter Hollow Over Pressure Protection (OPP) Station adjacent to existing Station HEP0 840T in Hebron Township, Potter County, PA. The proposed alignment generally parallels the existing Tennessee Gas Pipeline (TGP) 300 Lines.
- Installation of approximately 0.4 miles of 12-in-diameter steel pipeline (extension of existing Line KL).
- Installation of approximately 1.41 miles of 24-inch-diameter steel pipeline looping the existing National Fuel Line YM224 in Potter County, PA

Compressor Stations:

- Installation of the proposed 15,165 hp Marvindale Compressor Station in Sergeant Township, McKean County, PA
  - Install one natural gas fired Caterpillar G3516 (1,380 hp)
  - Install one natural gas fired Caterpillar G3608A4 (2,675 hp)
  - Install one natural gas fired Solar T-70 (11,110 hp)
- Installation of the proposed 22,220 hp Tamarack Compressor Station in Clinton County, PA
  - Install two natural gas fired Solar T-70 (11,110 hp each)

Interconnections/Stations:

- Proposed work at the existing Marvindale Interconnect/meter station near the new Marvindale Compressor Station (Sergeant Township, McKean County, PA);
- New OPP Station, Carpenter Hollow OPP Station, adjacent to existing Station HEP0 840T, between Line YM50 and Line YM224 (Hebron Township, Potter County, PA); and
- Modification of existing Leidy Interconnect LDC 2245 with Transco at the Leidy M&R Station (Clinton County, PA); evaluated under FERC Docket PF19-1-000.

Mainline Valves:

- KL Valve Set (Sergeant Township, McKean County, PA)
- MLV-1 (Norwich Township, McKean County, PA)
- MLV-2 (Liberty Township, McKean County, PA)

- MLV-3 (Hebron Township, Potter County, PA)
- MLV-4 (Allegany Township, Potter County, PA)

Abandonments:

- Abandonment and removal of Costello Compressor Station (Potter County, PA);
- Abandonment in place of approximately 44.9 miles of Line FM100 12-inch steel and appurtenances (Cameron, Clearfield, Elk and Potter Counties, PA); and
- Abandonment and removal of meter Station WHP-MS-4317X (Wharton Township, Potter County, PA).

Project Disturbance:

- McKean County: 333.5 acres
- Potter County: 167.9 acres
- Clinton County: 15.6 acres
- Clearfield County: 2.4 acres
- Cameron County: 17.4 acres
- Elk County: 1.3 acres

The following criteria were used to select the proposed route and aboveground facility locations:

- use of existing utility corridors;
- avoiding environmental resources (e.g., waterbodies, fisheries, wetlands, threatened and endangered species/significant habitats, etc.) and cultural resources, geologic/topographic hazards, and existing residential structures to the extent possible;
- the presence of existing access roads to accommodate construction along the proposed route;
- land uses (both existing and planned); potential impacts (both positive and negative) to local communities and landowners;
- engineering constraints, construction feasibility, topography and cost, including consideration of route length and opportunities to use existing corridors; and
- hydraulic design.

1.2 Purpose of this Plan

The ESCAMP has been prepared for use by National Fuel and its contractors as a guidance manual for minimizing erosion of disturbed soils and transportation of sediments off the right-of-way (ROW) and into sensitive resources (wetlands, streams, and residential areas) during natural gas pipeline construction. The procedures developed in the ESCAMP, which represent the National Fuel's BMPs, are designed to accommodate varying field conditions while maintaining rigid minimum standards for the protection of environmentally sensitive areas.

This application package is designed to provide specifications for the installation and implementation of soil erosion and sediment control measures while permitting adequate flexibility to use the most appropriate measures based on site-specific conditions. The intent of this application package is to provide general information on the pipeline construction process and to

describe specific measures that will be employed during and following construction to minimize impacts to the environment along the pipeline ROW.

The goal of these materials is to preserve the integrity of environmentally sensitive areas and to maintain existing water quality by implementing the following objectives:

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

1.3 Guidelines and Requirements

The ESCAMP incorporates the protocol and procedures contained within the Federal Energy Regulatory Commission's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan); and FERC's Wetland and Waterbody Construction and Mitigation Procedures (Procedures), collectively "FERC Plan and Procedures". The ESCAMP is also consistent with USACE guidelines, County Conservation Districts, and PADEP's published Erosion, Sediment and Pollution Control Manual. It is noted that the ESCAMP also contains decades worth of practical construction knowledge developed by National Fuel from previous pipeline construction projects in Pennsylvania. The ESCAMP is not intended to replace any of these published materials; only provide a singular location where all the information can be conveniently accessed. Care has been taken to prevent conflicting information between these documents and the ESCAMP; however, if there are any inadvertent conflicting standards the agency-published documents take precedence. In all cases National Fuel will implement the standard that provides the most stringent protection to property and the environment.

1.4 Surveys, Permits, and Notifications

National Fuel shall perform the required environmental field surveys, conduct appropriate agency coordination, and acquire the necessary environmental permits prior to start of construction of the Project. National Fuel shall notify the appropriate federal and state agencies prior to, during, and/or subsequent to the construction of the Project.

1.5 Inquiries

Inquiries regarding this application package should be addressed to:

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2 Existing Conditions

2.1 Existing Land Use and Land Cover

This section identifies land requirements for the Project and describes existing land use within the proposed Project areas. Land use data was calculated based on information obtained through field surveys, review of aerial photography and USDA National Agricultural Statistics Service (NASS) Cropland Data Layer (USDA-NASS, 2014). The land use characteristics are classified by primary vegetation cover type and/or predominant land use. For consistency, the land use and land cover classification system were derived from the FERC's *Guidance Manual for Environmental Report Preparation*, with the addition of a land use category for existing utility ROW. The Project will cross land use categories including agricultural pasture, cultivated cropland, forest and woodland areas, industrial/commercial land, open lands, open water, residential lands, and wetlands. Linear waterbodies less than 20-feet wide may have been classified within the adjacent land use categories. Land use types within the Project area classified into the following six categories:

- Agricultural Land - Pasture and/or hay fields, active cropland, orchards, and/or vineyards;
- Industrial/Commercial - Electric power or gas utility stations, manufacturing or industrial plants, landfills, mines, quarries, and commercial or retail facilities;
- Forest & Woodland - Tracts of upland or wetland forest or woodland that would be removed for the construction ROW or extra work or staging areas;
- Open Land - Non-forested lands, herbaceous and scrub-shrub wetlands, and maintained utility ROW;
- Open Water - Water crossings; and
- Residential Land - Residential yards and residential subdivisions.

National Fuel compared aerial photography from September 2013 available through Google Earth Pro and compared it to current aerial photography. There have been no significant changes to land use along the proposed pipeline alignment in the past five years.

Following construction, National Fuel will maintain a 50-foot-wide permanent ROW for operation and maintenance of the pipeline. Where the ROW crosses wetlands, National Fuel will maintain a 10-foot-wide permanent ROW for operation and maintenance. The construction footprint, excluding the above-ground facilities operational impacts and permanent access roads maintained for operations will be restored to pre-construction land use types.

Access to the Project will be achieved via maintained State and County roads, existing public and private access roads, and proposed new temporary and permanent access roads. National Fuel proposes to utilize 40 access roads for proposed construction activities and 18 existing access roads for abandonment activities (e.g., total of 58 project-wide). In general, only minor modifications are proposed at existing access roads which may include placement of gravel entry/exit pads at road junctures, and maintenance of the road throughout construction. On occasion, NFG may propose to widen discrete locations where necessary to allow for turning radius of equipment, passing lanes and pipe delivery. When widening is proposed, NFG will ensure that no sensitive environmental resources such as waterbodies, wetlands, cultural resources or sensitive species habitat will be impacted. It is not possible at this time to specifically identify all of these areas because the construction contractor has not been selected and the

identification of these sites is highly dependent upon the type of equipment available to the contractor. NFG has provided a typical drawing of how these areas would be handled if proposed for use within the Project LOD as presented on Drawing “DETAILS 001” (Figure 3B). Access roads that are non-public will require landowner agreements. Non-public access road impact calculations are based on a 30-foot-wide corridor. National Fuel surveyed a 50-foot-wide corridor based on the road centerline; ATWS required along access roads for turnouts, turnaround areas, parking, and general maneuverability of construction vehicles will be captured within LOD. Seventeen of the access roads will be maintained for operations and maintenance purpose.

Six contractor staging areas are proposed for use during construction.

There are no land uses fitting the following descriptions located within the Project area:

- Land for local historical or cultural significance (e.g., Native American religious sites, historic districts, etc.);
- Land used for landfills or hazardous waste sites; and
- National Scenic Rivers (i.e., designated or proposed candidate rivers on the Nationwide Rivers Inventory), state scenic rivers, and designated scenic areas or roads.

2.2 Receiving Waters

Field biologists conducted wetland and waterbody (e.g., streams, ponds, etc.) delineations were conducted from September and October 2017, as well as April and August 2018 along a 300-foot wide survey corridor centered on the pipeline and a 50-foot wide survey corridor centered on access roads. Additional surveys were conducted from July 28 through August 7, 2020 to address comments received by the Pennsylvania Department of Environmental Protection (PADEP) in their Technical Deficiency letter dated July 10, 2020. Revisions to this report include incorporating additional survey data collected in response to PADEP comments. In addition, PADEP and USACE representatives attended a field review of wetlands and waterbodies. All environmental resources identified during this investigation are shown in the ESCGP-3 drawings. A Wetland and Waterbody Delineation Report is included in the Section 404 / Chapter 105 General Permit submittal under separate cover for wetlands work completed in Pennsylvania.

Numerous waterbodies within various watersheds are crossed by the Project. Each watershed name and its associated PA Code, Title 25, Chapter 93 Designated or Existing Use crossed by the Project is shown in plan view on the application drawings.

Tables 2.2-1A thru 2.2-1D list waterbodies, wetlands, and floodways crossed by the Project, including information relevant to sensitive surface water resources, as shown in Appendix A. The table also identifies public wells and springs within 150 feet of the project work areas.

Pennsylvania Title 25 Chapter 93 sets forth water quality standards for surface waters. The provisions of Pennsylvania Title 25 Chapter 93 are issued under Sections 5 and 402 of the Clean Streams Law. Waterbodies in Pennsylvania are assigned one of the following aquatic life water quality classifications based upon Pennsylvania Title 25 Chapter 93: Cold Water Fishes (CWF), Warm Water Fishes (WWF), Migratory Fishes (MF), and Trout Stocked Fishery (TSF). Waterbodies in Pennsylvania may also be assigned one of the following special protection water quality classifications based upon Pennsylvania Title 25 Chapter 93: High Quality (HQ) or Exceptional Value (EV) waters. Waterbodies in Pennsylvania may also be assigned a water quality classification that combines aquatic life and special protection (i.e., HQ-WWF or HQ-CWF).

Pennsylvania Clean Streams Law (35 P.S. §691.1 et seq.) and regulations at Pennsylvania Code Title 25, including Chapters 91, 92, 93, 95, 96, 102, and 105 are also known as antidegradation

rules. The basic concept of antidegradation is to promote the maintenance and protection of existing water quality for HQ and EV waters, and protection of existing uses for surface waters because it recognizes that existing water quality and uses have inherent value worthy of protection and preservation. Existing uses are protected when PADEP makes a final decision on any permit or approval for an activity that may affect a protected use (PADEP, 2013b). Existing water quality is also protected for HQ and EV waters through the antidegradation rules and there are also additional requirements, such as antidegradation performance standards for erosion and sediment control. Sensitive surface waters with an existing use classification that is special protection (HQ or EV) can be found in Table 2.2-1A, in Appendix A.

All streams crossed by the Project are considered sensitive surface waters due to their being either listed by the PFBC as a stream section that supports the natural reproduction of trout (NRT) or are an UNT that contributes to the water quality of the naturally reproducing trout stream (PFBC 2019a). Pennsylvania Code Title 58, Chapters 57.4 and 57.11 defines Wild Trout Waters as: 1) Naturally Reproducing, 2) Class A, 3) Trout Stocked, or 4) Wilderness Trout waters. In-stream work restrictions for Wild Trout Waters follow:

- Naturally Reproducing Trout Waters: October 1 to December 31,
- Class A: October 1 to April 1, and
- Trout Stocked Waters (TSW): March 1 to June 15.

No streams crossed by the Project are listed on the PFBC website as being Class A wild trout streams or wilderness trout streams (PFBC, 2019c and 2019d). These listings can be found on Table 2.2-1A. National Fuel will abide by these in-stream work restrictions as well as FERC published instream restrictions for cold water fisheries, unless expressly permitted in writing by PAFBC. Specific PAFBC in-stream work restrictions or conditions places upon any stream crossed by the project will not be known until PADEP issues the ESCGP-3 and Chapter 105 permits. However, National Fuel will abide by any in-stream work time of year restrictions and anti-degradation performance standards for erosion and sediment control that are identified in those permits by the respective agencies.

The Project does not cross any scenic rivers (PADEP 2019f). Project waterbody crossings are not considered impaired (PADEP 2019f). No National Wild and Scenic Rivers have been identified within the USGS eight-digit HUC watershed where the Project facilities are located (USGS 2017).

National Fuel will follow the site-specific Erosion and Sedimentation Control Plans, Site Restoration Plans, PCSM Plans, ESCAMP; the Commission's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan), (2013a); and the Commission's Wetland and Waterbody Construction and Mitigation Procedures (Procedures), (2013b), to minimize impacts to streams during construction.

2.3 Waterbodies with Regulated Riparian Areas

The Project alignment will cross riparian buffers regulated under PA Chapter 102. Specifically, these regulated areas include 150 feet from the top of bank of perennial and intermittent waters located within Exceptional Value and High-Quality watersheds. Anticipated waterbodies which will be crossed are delineated on the E&SCP alignment sheets.

National Fuel intends to obtain and comply with the applicable Pennsylvania permits required to authorize these disturbances.

2.4 Soil Characteristics

Important attributes of the soils map units crossed by the pipeline are presented on Drawing "SOILS." The "SOILS" drawing includes the soil use limitations from the PADEP E&S Manual

Appendix E for all soils impacted by the Project in Pennsylvania. For all applicable soil use limitations, a resolution has been proposed. The locations of soil types crossed by the Project are shown on the E&SCP alignment sheets. These soil boundaries and associated information were obtained from the USDA SSURGO database.

The methods that will be utilized to minimize impacts on soils during construction include, but are not limited to:

- Minimize the area and duration of soil exposure;
- Protect critical areas by reducing the velocity of and controlling runoff;
- Install and maintain erosion and sediment control measures;
- Segregating and stockpiling topsoil on cultivated lands;
- Reestablish vegetation following final grading; and
- Inspect the ROW and maintain erosion and sediment controls, as necessary, until final stabilization is achieved.

2.5 Naturally Occurring Geologic Formations

This section provides a summary of the geological features present in the Project area, including physiography, topography, surficial and bedrock geology and mineral resources. The potential for geologic hazards to affect the Project is also discussed. In addition, National Fuel completed a geohazard review of the modernization portion of the project which specifically evaluated overall site conditions and potential risk levels posed by geotechnical conditions for construction and operation of the Project (see Appendix I). Where appropriate, mitigation measures intended to reduce the impact of the Project on geologic resources or reduce the impact of geologic hazards on the facilities are included.

2.5.1 Physiography

The Project and its associated facilities are within the Appalachian Plateaus physiographic province (PADCNR, 2016a). The Appalachian Plateaus province is a highland that has been eroded by streams which have created deep valleys and hilly topography (PADCNR, 2014). Further divided, the Project crosses the High Plateau Section, Pittsburgh Low Plateau Section and the Deep Valleys Section (PADCNR, 2016a).

The High Plateau section has a dominant topographic form characterized by broad, rounded to flat uplands having deep, angular valleys. The local relief is moderate to high (ranging from 300 to 1,000 feet) with approximate elevation ranges from 980 to 2,360 feet AMSL. This section is dominated by a dendritic drainage pattern (PADCNR, 2016b and 2016e).

The Pittsburgh Low Plateau section has a dominant topographic form characterized by a smooth to irregular, undulating surface with narrow, relatively shallow valleys and strip mines and reclaimed lands. The local relief is low to moderate (ranging from 100 to 600 feet) with approximate elevation ranges from 660 to 2,340 feet AMSL. The drainage pattern of this section is dendritic (PADCNR, 2016c and 2016e).

The Deep Valleys section has a dominant topographic form of very deep, angular valleys with some broad to narrow uplands. The local relief is moderate to very high (ranging from 300 to greater than 1,000 feet) with approximate elevation ranges from 560 to 2,560 feet AMSL. The drainage pattern of this section is angulate and rectangular (PADCNR, 2016d and 2016e).

2.5.2 Surficial Geology and Topography

The proposed pipelines are within a relatively simple geological location with generally near horizontally bedded sedimentary formations. The project intersects the following mapped geological formations (U.S. Geological Survey [USGS] descriptions quoted):

- Pottsville Formation – predominantly gray sandstone and conglomerate
- Catskill Formation – predominantly grayish-red sandstone, siltstone, shale and mudstone
- Senango and Oswayo Formation (Undivided) – predominantly greenish-gray, olive, and buff sandstone and siltstone, and gray shale in varying proportions
- Huntley Mountain Formation – predominantly greenish-gray and light-olive-gray, flaggy, fine-grained sandstone, siltstone and a few red shale interbeds
- Appendix E lists the geologic units crossed by the proposed pipeline routes (PADNCR, 2018d).
- Publicly available LiDAR data was processed to evaluate the site topography. The data set was obtained from Pennsylvania Spatial Data Access (PASDA) PAMAP Program – 3.2ft digital elevation model (Pennsylvania State University 2006-2008).

For the proposed Line YM58 pipeline alignment, 6.8 miles are between 15% and 30% gradient and 3.2 miles are >30% gradient. For the proposed Line YM224 pipeline alignment, 0.18 miles are between 15% and 30% gradient and 0.05 miles are >30% gradient.

2.5.3 Blasting

Based on surface appearance, lack of outcrops, and proximity to existing utility lines, National Fuel does not anticipate that the need for blasting will be widespread. In areas with potential shallow bedrock conditions which cannot be avoided, efforts will be taken to minimize potential impacts during construction. National Fuel will utilize other rock excavation techniques including rock trenchers, hydraulic hoe hammers and ripper teeth in areas of shallow bedrock. National Fuel will adhere to blasting permit requirements within the PAFBC's permit for in-stream blasting, if required. Table 6.2-2 in Appendix E lists the locations by milepost along the proposed pipeline routes where the depth to bedrock is predicted to be within 60 inches (5 feet) of the soil surface (USDA- Natural Resource Conservation Service (NRCS) 2018).

2.5.4 Mineral Resources

Three non-active and restored mines and one active mining operation was identified within 0.25-mile of the Project. Project cumulative impacts to geologic resources related to mining activities are anticipated to be minimal to non-existent due to the current status (non-operational) and spatial distance of the mines from the Project.

This area has had significant oil and gas activity in the past. There are 17 abandoned wells, 204 active wells, and 42 inactive wells within 0.25-mile of the Project. Other oil and gas related projects include the YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project and Dominion Energy LN16 and LN20 Project. The Proposed project will not be in construction during the same time period as these projects; however, the YM28 and FM120 Modernization Project and Dominion Energy LN16 and LN20 Project will likely be in service at the time of construction. Care will be taken to avoid impacting these operational pipelines, particularly if blasting is required in the vicinity of these facilities. Blasting is not anticipated for the Project; however, if blasting does occur National Fuel has detailed preventative measures in this report as well as the attached Blasting Plan to prevent damage to nearby oil and

gas resources; refer to Appendix H. The same measures would apply to water wells. Further, protection and minimization of impacts to geologic resources are anticipated through implementation of best management practices (BMP) outlined in the ESCAMP.

2.5.5 Potential Geologic Hazards and Mitigation

The Project alignment does not cross, nor are the proposed facilities located near active quaternary faults, or near seismically active areas according to the USGS fault map (USGS 2016a). Since 1970, there have been no earthquakes with a magnitude (M) of 2.0 or higher on the Richter scale that has occurred within 100 miles of the proposed Project (USGS 2016b).

The seismic hazard for Cameron, Clinton, Clearfield, Elk, McKean, and Potter Counties is between four and eight and is, therefore, generally regarded as low. This is based on a two percent probability of exceedance in 50 years of peak ground acceleration. The hazard rating system ranges from zero through 80+, where zero indicates the lowest hazard and 80+ indicates the highest hazard (USGS 2014). In addition, no known Quaternary faults (i.e., faults that are found at the Earth's surface and younger than 1.6 million years) have been found near the Project area (USGS 2016a).

The Project is located within an area with a less than one percent chance of damage from natural and induced earthquakes. Additionally, there are no mapped earthquake epicenters within the Project area (PADCNR 2004). Therefore, earthquakes are not anticipated to be a geologic hazard to the Project activities.

Karst features such as sinkholes, caves, and caverns can form as a result of the long-term action of groundwater on soluble carbonate rocks (e.g., limestone and dolostone). The Project is not located in an area with karst formations such as sinkholes or surface depressions (Kochanov 2015, PADCNR 2019); consistent with this analysis, no surficial karst features were identified during field surveys (e.g., sink holes, caves, surface depressions, etc.).

As part of National Fuel's pipeline integrity program, the pipeline ROW will be routinely inspected, including for subsidence activity. If subsidence is found, National Fuel will take the appropriate corrective measures to maintain the integrity of the pipeline. These measures include determining the allowable stresses on unsupported pipe spans, importing fill for pipe support, and evaluating whether recurrence is likely. If it is determined that recurrence is likely, National Fuel would evaluate the potential of implementing additional stabilization measures or, if necessary, relocating the pipelines, and/or facilities.

Due to the low incidence and likelihood of land subsidence and the absence of karst terrain within the Project area, there is no anticipated subsidence concerns related to construction and operation of the Project.

The presence of the existing adjacent pipelines provides a precedent that the construction and operation of a natural gas pipeline is feasible in this terrain. The project does not intersect any of the high hazard documented landslides on the USGS mapping such as Active landslide or Soil and rock susceptible to landsliding. The only USGS mapped landslide category which was intersected by project components was Old Landslides (4 locations) which are described as "…relatively stable…" by the USGS. Field inspections were performed which did not observe any recent, or actively occurring major slope movements. National Fuel has committed to providing a Professional Engineer specializing in geotechnical engineering and slope stability, or a Professional Geologist with experience in engineering geology and slope stability, during construction to perform part-time project observations. The part-time observations will not absolve the construction contractor of the prime responsibility for construction safety and compliance with U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration regulations. The observations will be performed at key events including; post vegetation clearing, first breaking ground, trenching, and final grade restoration.

Fossils are not common in Pennsylvania and are only found in Mesozoic-age rocks in the southeastern part of Pennsylvania. The Project area is underlain by Paleozoic sedimentary rocks which have low potential to contain fossils. Although fossil specimens may be encountered during construction activities, no impacts on sensitive paleontological resources are anticipated. Further, National Fuel will provide training to environmental inspection staff and the construction contractor prior to mobilizing to recognize sensitive paleontological resources. In the unlikely event that unique or significant fossil specimens are discovered during excavation activities, National Fuel would cease construction at the site and notify the appropriate landowner or state agency.

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3 Proposed Conditions

The amount of earth disturbed is to be minimized as much as possible. Planning of the construction sequencing is required to limit the amount and duration of open trench sections, as necessary, to prevent excessive erosion or sediment flow into environmental resource areas. Approximately 538.1 acres will be disturbed throughout the Project work limits in Pennsylvania. The disturbance along the pipeline ROW and within contractor staging yards is generally to be temporary; however, some permanent impacts will occur at aboveground facility locations, permanent access roads, and when some resources are converted from their existing condition to a maintained pipeline ROW. Disturbed areas are to be immediately seeded and mulched upon placement of the proposed pipeline and associated fill.

Earth disturbance is to be restricted to the Limit of Disturbance (LOD) delineated on the ESCGP-3 drawings. These drawings contain “Plan views” which depict proposed facilities and site features. This includes the limits of earth disturbance, the locations of existing roads, and the location of proposed BMPs.

3.1 Proposed Land Cover

During the initial construction stage of the project, much of the area will consist of exposed soils. Upon installation of the pipeline, the ROW is to be stabilized with vegetative cover as indicated on the E&SCP drawings. With the exception of long-term maintenance to trim woody vegetation and occasional mowing, no permanent topographic or land cover changes are proposed along the pipeline alignment aside from areas within the tree clearing limits.

Two compressor stations, one overpressure protection station, and five mainline valves will be constructed, described in Section 1.1, which will require minimal grading and cover change with the placement of stone. A post construction stormwater management (PCSM) design package is provided under separate cover.

3.2 Proposed Site Drainage Characteristics

An assessment of the Project site’s natural features was completed at the initial stage of Project planning. The proposed facilities have been sited to protect sensitive natural resources by avoiding these areas whenever possible. The site has also been planned and designed to maintain pre-development drainage patterns to the maximum extent practicable. A conscious effort has been made to maintain existing vegetation where possible and limit the extents of earth disturbance to the area necessary to construct the proposed facilities. Where possible, site drainage will be directed to previously established drainage features. No permanent changes to topography or drainage patterns are proposed for the pipeline aside from permanent waterbars to help prevent formation of rivulets and the PCSM control features designed where areas proposing new impervious surface are sited. The location of the proposed drainage features is referenced on the E&SCP alignment sheets. As mentioned above, the facility site has a separate PCSM report and drawing package, which includes proposed site drainage.

3.3 Proposed Riparian Buffer

The proposed Project is an oil and gas activity for which site reclamation or restoration is part of the permit authorization in PA Cod Chapters 78, 86-90 and 102. The proposed activities will leave existing riparian buffers undisturbed to the extent practicable. Riparian buffers within the Project

area will be protected and maintained according to Pennsylvania regulations discussed in Section 2.3.

A riparian buffer mix will be used to restore riparian buffers within 150 feet of HQ/EV waterbodies and within 100 feet of other waterbodies (non-HQ/EV waters). This seed mix will be used to revegetate the entire LOD in riparian areas where slopes are less than 10%. Tree and shrub plantings will also occur in forested riparian buffers, where workspace outside of the 10-foot maintained ROW will be planted.

Riparian buffers on Line FM100 (i.e., the Abandonment portion of the Project) will only be restored for workspaces within riparian buffers or as otherwise requested by the land management agency. The purpose for this is to avoid disturbing existing riparian vegetation that will recruit faster if left undisturbed after National Fuel no longer maintains the corridor. Riparian buffers within workspaces will be restored across the abandoned pipeline as needed, with no 10-foot maintained ROW.

As detailed in the Riparian Buffer Waiver Request (Section 8.1.5), National Fuel respectfully requests a riparian buffer waiver for impacts along the pipeline ROW in accordance with 25 PA Code §102.14(d)(2)(ii), for linear project impacts.

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4 Supervision and Inspection

To effectively mitigate Project-related impacts, the approved ESCAMP must be available on the site at all times and properly implemented in the field. Quick and appropriate decisions in the field regarding critical issues such as stream and wetland crossings, placement of erosion controls, trench dewatering, spoil containment, and other construction related items are essential.

The ESCAMP defines National Fuel's anticipated environmental inspection program (ESCAMP Section 2.1 & 2.2). The Environmental Inspector (EI) will have peer status with all other activity inspectors and will have the authority to stop activities that violate the environmental conditions of the FERC's Order (if applicable), other federal and state permits, or landowner requirements, and to order corrective action.

4.1 Responsibilities of the Environmental Inspectors

At a minimum, the EIs shall be responsible for the items addressed in Section 2.2 of the ESCAMP.

- Inspecting construction activities for compliance with the requirements of this E&SCP, the construction drawings, the environmental conditions of the FERC's Orders (if applicable), proposed mitigation measures, other federal or state environmental permits and approvals, and environmental requirements in landowner easement agreements;
- Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;
- Verifying that the limits of authorized construction work areas and locations of access roads are visibly marked before clearing, and maintained throughout construction;
- Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- Identifying erosion/sediment control and stabilization needs in all areas;
- Verifying that the location design of waterbars will not cause erosion or direct water into sensitive environmental resource areas, including cultural resources sites, wetlands, waterbodies, and sensitive species habitat;
- Verifying that dewatering activities are properly monitored and do not result in the deposition of sand, silt, and/or sediment into a sensitive environmental resource areas, including wetland or waterbody, cultural resource sites, and sensitive species habitats; stopping dewatering activities if such deposition is occurring and checking that the design of the discharge is changed to prevent reoccurrence; and verifying that dewatering structures are removed after completion of dewatering activities;
- Verifying that subsoil and topsoil are tested in agricultural areas to measure compaction and determine the need for corrective action;
- Advising the Chief Inspector when environmental conditions (such as wet weather or frozen soil) make it advisable to restrict or delay construction activities to avoid topsoil mixing or excessive compaction;
- Checking restoration of contours and topsoil;
- Verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

- Verifying that erosion controls are properly installed to prevent sediment flow into environmental resource (e.g., wetlands, waterbodies, cultural resource sites, and sensitive species habitats) and onto roads and determining the need for additional erosion control devices;
- Inspecting temporary erosion control measures at least:
  - On a daily basis in areas of active construction or equipment operation;
  - On a weekly basis in areas with no construction or equipment operation; and
  - Within 24 hours of each 0.25 inch of rainfall.
  - NOTE: This responsibility may be transferred to field operations after construction is complete but before restoration is successful;
- Checking the repair of all ineffective temporary erosion control measures within 24 hours of identification, or as soon as conditions allow if compliance with this timeframe would result in greater environmental impacts;
- Identifying areas that should be given special attention to verify stabilization and restoration after the construction phase;
- Keeping records of compliance with the environmental conditions of the FERC's Orders, proposed mitigation measures, and other Federal or state environmental permits during active construction and restoration; and
- Verifying that locations for any disposal of excess construction materials for beneficial reuse comply with Section 9.5.3.2 and 9.5.3.3 of this E&SCP.

4.2 Environmental Training for Construction

Environmental training will be given to both National Fuel personnel and contractor personnel whose activities will impact the environment during pipeline construction. The level of training will be commensurate with the type of duties of the personnel. All construction personnel from the chief inspectors, EIs, craft inspectors, contractor job superintendents to loggers, welders, equipment operators, and laborers will be given some form of environmental training. In addition to the EIs, all other construction personnel are expected to play an important role in maintaining strict compliance with all permit conditions to protect the environment during construction. Training will be given prior to the start of construction and throughout the construction process, as needed, and will cover the following issues:

- The specifics of the ESCAMP and the Spill Prevention and Response Plan (SPRP);
- Job or activity specific permit requirements;
- Company policies and commitments;
- Cultural resource procedures and restrictions;
- Threatened and endangered species restrictions; and
- Any other pertinent information related to the job.

Inspectors should be knowledgeable in the principles and practice of erosion and sediment controls and possess the skills to access conditions at the construction site that could impact stormwater quality and assess the effectiveness of any sediment and control measures selected to control the quality of stormwater discharges from the construction site.

5 Description of Erosion and Sediment Control BMPs

The erosion and sediment control BMPs for this earth disturbance activity have been planned to minimize the extent and duration of the proposed earth disturbance, to protect existing drainage features and vegetation, minimize soil compaction, and employ measures and controls that minimize the generation of increased runoff. Specific BMPs have been selected for the Project to achieve these broad goals. The location of each proposed BMP is shown on the E&SCP alignment sheets.

Rock Construction Entrances

Rock construction entrances to control sediment tracking from the construction site at egress points are depicted on the E&SCP alignment sheets. In HQ/EV watersheds, rock construction entrances will be extended to a minimum 100-foot length, as shown on Drawing “DETAILS 001” (Figure 1).

Sediment Barriers

Compost filter socks are specified on the E&SCP alignment sheets as a perimeter control to prevent silt-laden runoff from exiting the LOD. The compost filter sock detail and specifications are presented on Drawing “DETAILS 002” and “003” (Figures 4A, 4B, & 4C). Sizing calculations for each compost filter sock proposed are presented on Standard E&S Worksheet #1 in Appendix B.

In locations where failure of a sediment barrier occurs due to concentrated flow, a rock filter outlet shall be installed in accordance with the detail presented on Drawing “DETAILS 002” (Figure 6).

Waterbars/Slope Breakers

Earthen waterbars are specified on the E&SCP alignment sheets in hillside locations where it will be necessary to divert both upslope and disturbed area runoff to vegetated areas to help minimize accelerated erosion and sedimentation. A construction detail is provided on Drawing “DETAILS 002” (Figures 7 & 8). They are to be aligned such that runoff will be directed towards the downslope side of the disturbed area and avoid flowing back into the ROW. The construction detail calls for a sump with a compost filter sock barrier at the waterbar point of discharge.

Permanent waterbars within the ROW shall be left in place after permanent stabilization has been achieved. Waterbars will be removed from agricultural and residential areas. Maintenance of waterbars shall be provided until ROW has achieved permanent stabilization.

Trench Plugs

Trench plugs are specified on the E&SCP alignment sheets to inhibit channelized flow which may occur in the trench when open during construction. Trench plugs shall remain in place during and after backfilling to prevent the trench from draining wetlands and/or changing the hydrology along the pipeline. The construction details are presented on Drawing “DETAILS 003” (Figures 10 & 11).

Erosion Control Blanket

In accordance with the notes listed on Drawing “DETAILS 003” (Figures 12A, 12B, & 13), erosion control blanket is to be placed on disturbed areas within 50 feet of streams and on slopes steeper than 3H:1V. In HQ/EV watersheds, erosion control blanket is to be placed on disturbed areas within 100 feet of streams. Areas to be blanketed are indicated on the E&SCP alignment sheets.

Temporary Equipment Bridges

Temporary equipment bridges are specified on the E&SCP alignment sheets in locations where construction equipment will be crossing an existing stream channel (waterbody with a defined bed and bank). Temporary bridges shall be installed in accordance with the construction details provided on Drawing “DETAILS 004” (Figure 9B).

Timber Mats

Timber mats are specified on the E&SCP alignment sheets in locations where construction equipment will be traveling through an existing wetland. Timber mats shall be installed in accordance with the construction details provided on Drawing “DETAILS 005” (Figures 23 & 24).

Hydrostatic Dewatering Structures

Straw bale dewatering structures will be utilized after hydrostatic testing to minimize erosion of the surrounding area and prevent pollution due to silt-laden runoff. Hydrostatic dewatering structure locations shall be installed in accordance with the construction details provided on Drawing “DETAILS 006” (Figures 26A & 26B).

Pumped Water Filter Bags

In locations where the work area must be dewatered, filter bags may be used to filter water pumped from disturbed areas prior to discharging to surface waters. Compost filter sock shall be installed below filter bags located in HQ/EV watersheds, within 50 feet of any receiving surface water, or where a well-vegetated area is not available. Filter bags shall be installed in accordance with the construction detail provided on Drawing “DETAILS 006” (Figure 27).

Cleanwater Diversions

Temporary diversion channels are proposed to divert runoff from undisturbed upslope areas and convey the runoff around areas of earth disturbance within the pipeline ROW corridor. All temporary diversion channels will utilize a Filtrexx Diversion Sock (or approved equal). From the diversion sock, the channelized flow will outlet to a temporary pipe(s) (clean water) crossing, which is installed across the right-of-way, and discharge to a perforated HDPE pipe level spreader covered in stone. In this scenario, clean water leaving the level spreader will return to sheet flow downslope of the disturbed ROW.

All level spreaders are expected to meet the proposed 200-foot maximum length. All level spreader and slope pipe sizing is presented as part of the Clean Water Diversion summary table on E&SCP Drawing “DETAILS 008”.

A downstream analysis of clean water diversion discharge point to the receiving water is not required for the following reasons. Velocities at the discharge of the level spreader are near zero since the stormwater will be discharged through the perforated pipe and minimum 4-inches of stone surrounding the perforated pipe. Once the discharge exits the orifices in the perforated pipe and trickles through the surrounding stone, it loses all its velocity and transforms into sheet flow. The discharge will be to a vegetated area and will ultimately follow the same drainage path as before the clean water diversion installation.

The clean water diversions collect clean stormwater above the disturbance, the slope pipe transports the clean water across the disturbance, and the level spreader connected to the slope pipe outlet discharges the clean water below the disturbance. The clean water diversions are being limited to 5 acres in accordance with the PADEP E&S Manual.

The clean water diversions are temporary in nature and will remain in place from disturbance to after vegetation is established and BMPs are removed. The clean water diversions collect and discharge stormwater in the same drainage area and do not take stormwater from one drainage area and discharge to a different drainage area. The clean water diversions do not change cover types, resulting in no change to the calculated runoff rates or volumes, and the clean water diversion discharge is returned to sheet flow at the level spreader, a flow condition similar to or better than the existing flow condition.

The discharge areas of the clean water diversions will be monitored in accordance with the ESCGP-3 permit required inspection.

Conditions downslope of the level spreader have been checked for percent slope and cover type in order to verify no offsite erosion would occur at these locations. This has been documented in Appendix C utilizing the Figure 5.1 “Nomograph to Determine Shallow Concentrated Flow Velocity” from the E&S Manual.

All hydrologic calculations utilized to size the temporary diversion channels, slope pipes, and level spreaders were calculated using Standard E&S Worksheets #9 and #10, for time of concentration and rational equations respectively. The temporary diversion channels were sized utilizing flow rates and allowable shear stress.

Temporary diversion channels are designed using material specifications for North American Green (NAG) products. Shear stresses are analyzed for the proposed temporary diversion channels, which are expected to be in place for a maximum of 12 months. All NAG lining products specified in the Clean Water Diversion summary table meet a construction period of 12 months. It should be noted that published design shear strengths are valid for the design life of the lining. As a result, no decrease in shear strength is expected over the life of the proposed swale linings. Published design shear strengths and design lives for individual linings are provided in Appendix D. An iterative approach was used in the design of all proposed temporary diversion channels and liners, which was a function of Manning’s ‘n,’ slope, and depth of water within the channel.

Drainage area mapping as well as Standard E&S Worksheets #9, #10, and #11 are provided for each clean water diversion in Appendix C (by county). Clean water diversion locations are specified on the E&SCP plan view drawings. Clean water diversions shall be installed in accordance with the construction details presented on Drawing “DETAILS 007” (Figures 31, 31A, 31B, & 31C).

5.1 Temporary and Permanent Revegetation

Revegetation requirements and procedures are presented in Section 9.6.2 of this application. As indicated on the drawings, disturbed areas are to be temporarily stabilized in accordance with regulatory agency requirements. Upon completion of construction activity, disturbed areas are to be permanently stabilized.

5.2 Protection of Sensitive and Special Value Features

During Project planning, the pipeline layout was field viewed to identify wetlands and streams. Where possible, the alignment was adjusted to minimize impacts. The opportunity to avoid impacts, however, is constrained by landowner preferences and construction requirements.

5.3 Minimize Earth Disturbance

Limiting the extents and duration of earth disturbance to that absolutely necessary to construct the proposed facility is a simple and the most effective BMP available. The LOD delineated on the E&SCP alignment sheets has been established to restrict construction activities to the minimum area needed to effectively and efficiently construct the proposed facilities. In addition to limiting the extents of the proposed earth disturbance, construction activities have been planned to limit the duration of earth disturbance.

Installation of the pipeline will typically proceed from one end of the construction spread to the other in an assembly line or "mainline" fashion. The spacing between the individual crews responsible for each interdependent activity is based on anticipated rate of progress. Construction is sequenced to limit, to the extent possible, the amount and duration of open trench sections, to prevent excessive erosion or sediment flow into environmental resource areas.

5.4 General Erosion and Sediment Control Plan Requirements

The BMPs listed in this application package shall be installed and maintained in accordance with FERC requirements and the PADEP E&S Manual. These BMPs shall be installed as shown prior to earth disturbance (including clearing and grubbing) within the drainage area of the BMP in question. In certain situations, minor grubbing may need to occur in order install erosion control devices; in these situations, grubbing and E&S controls will be installed concurrently. Appropriate BMPs shall be provided for each stage of activity. Each BMP shall be kept functional until all earth disturbances within the drainage area are completed and a minimum vegetative cover (uniform 70% coverage of perennial vegetation over the entire disturbed area) has been achieved or other suitable permanent erosion protection has been installed.

At least seven days prior to starting any earth disturbance activities (including clearing and grubbing), the owner and/or operator shall invite all contractors, the ESCGP-3 permit preparer, the SR/PCSM Plan preparer, and a representative from the applicable PADEP regional office to an on-site preconstruction meeting.

Prior to commencement of any earth disturbance activity including clearing and grubbing, the owner and/or operator shall clearly delineate sensitive areas, riparian forest buffer boundaries, areas proposed for infiltration practices, the limits of clearing, and trees that are to be conserved within the Project site. These parties shall also install appropriate barriers and/or signage where equipment may not be parked, staged, operated, or located for any purpose.

E&SC measures and facilities shall be installed and operational as indicated in the construction schedule prior to any earth moving activities (see the “Installing Temporary BMPs” in Section 9.5.2 of this application and on the E&SCP drawings). Control measures must be in place and operational at the end of each workday. Where it is possible, the disturbed area will be permanently stabilized immediately after the final earthmoving has been completed. For disturbed areas not able to be permanently stabilized, interim stabilization in the form of temporary seeding and mulching will be implemented. Until the site is permanently stabilized, all E&SC measures must be maintained properly by the Contractor.

After permanent stabilization is achieved, temporary E&SC measures will be removed. Areas disturbed during removal of the controls must be stabilized immediately. For vegetated areas, permanent stabilization is defined as a uniform 70% perennial vegetative cover.

Minor modification to the approved ESCAMP shall be noted on the version that is available on-site and initialed by the appropriate reviewing entity staff from PADEP and/or the County Conservation District. Minor changes to the ESCAMP may include adjustments to BMPs and locations within the permitted boundary to improve environmental performance, prevent potential pollution,

change in ownership or address, typographical errors and on-site field adjustments such as the addition or deletion of BMPs, or alteration of earth disturbance activities to address unforeseen circumstances.

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6 Project Site Runoff Prior to Site Restoration

A primary component of the ESCAMP was the design of erosion and sediment control BMPs to minimize and control accelerated erosion and minimize the generation of increased runoff. The proposed E&SC facility has been designed per design guidance provided in the PADEP E&S Manual.

This linear Project traverses multiple watersheds and landcover types. Post construction site conditions will generally be restored to their previous condition and cover type. However, any project components (i.e., aboveground facilities) submitted as part of the PCSM package may be changing cover type to be impervious. There is a negligible increase in runoff in locations where forest cover is removed and, in these locations, runoff will be adequately attenuated with the effective implementation of sediment barriers, trenches, and waterbars.

The only exception where preexisting land cover will not be restored is the proposed 10-foot wide permanent maintained ROW over the pipeline corridor. In locations where upland forest is removed during construction beyond the permanent maintained ROW, natural succession will occur for development of woody vegetation transitioning to forest cover. Site restoration measures are identified and described in the Site Restoration Plan Narrative and drawings (submitted concurrently as a separate attachment).

Runoff volume and peak discharge estimates have not been evaluated for the entire linear pipeline but since the majority of the Project traverses meadow and agriculture field, there are generally no changes to post construction runoff resulting from the project and very insignificant and minor increase in locations where forest cover is converted to meadow.

Proposed BMPs were sized based on the maximum tributary drainage area anticipated during construction. Runoff volumes and rates for specific BMPs were calculated utilizing the methods recommended in the PADEP E&S Manual for that type of facility.

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7 Recycling/Disposal of Materials

Building materials and other construction site wastes must be properly managed and disposed of to reduce potential for pollution to surface and ground waters as per 25 PA Code § 102.4(b)(5)(xi). All building materials and wastes shall be removed from the site and recycled or disposed of in accordance with PADEP's Solid Waste Management Regulations at 25 PA Code 260.1 et seq., 271.1 and 287.1 et. seq. No building materials, wastes, or unused building materials shall be burned, buried, dumped, or discharged at the site. No off-site disposal area has been identified as part of this application. Construction waste will be disposed of properly by the Contractor at a state-approved facility or recycled.

The Contractor will develop and implement procedures which will detail the proper measures for disposal and recycling of materials associated with or from the Project site in accordance with PADEP regulations. Construction wastes include, but are not limited to, excess soil materials, building materials, concrete wash water, and sanitary wastes that could adversely impact water quality. The Contractor will inspect the Project area weekly and properly dispose of all construction wastes. Measures will be planned and implemented for housekeeping materials management and litter control. Wherever possible, re-useable wastes will be segregated from other waste and stored separately for recycling.

The Contractor shall be responsible for implementing the ESCAMP for any borrow or waste areas required to complete the work. Disposal locations for excess soil/rock waste will have appropriate BMPs implemented at the waste site. The disposal locations must be verified with the applicable state department to show compliance with wetland and floodplain regulations. If an off-site location is used for borrow or disposal, the contractor is responsible for developing site-specific E&SC drawings, implementing the ESCAMP and submitting the E&SC drawings to PADEP or the applicable County Conservation District for review and approval. The Contractor must immediately stabilize the waste site upon completion of any stage or phase of earth disturbance activity at the waste site.

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8 Antidegradation Analysis

As identified in Section 2.2 of this narrative, the pipeline crosses HQ/EV waterbodies. The following antidegradation analysis has been prepared in accordance with 25 PA Code, §102.4(b)(6).

8.1 Non-discharge Alternatives

The proposed Project has been evaluated for nondischarge alternatives for compliance with state regulatory agency antidegradation requirements. Nondischarge alternatives are defined as environmentally sound and cost effective BMPs that individually or collectively eliminate the net change in stormwater volume, rate and quality for storm events up to and including the 2-year design storm when compared to the stormwater rate, volume and quality prior to the earth disturbance activities.

Various BMPs identified as nondischarge alternatives in the PADEP E&S Manual were considered and evaluated for implementation as part of the proposed activities. These alternatives were evaluated individually, and in various combinations, for their ability to minimize accelerated erosion and sedimentation during the earth disturbance activity to achieve no net change from pre-development to post-development volume, rate and concentration of pollutants in stormwater runoff. The following non-discharge alternatives are utilized or considered for implementation on this Project.

8.1.1 Alternative Routes

With respect to route alternatives or variations, the proposed pipeline route achieves the stated purpose and need of the Project while minimizing impacts to the environment, accommodating engineering/construction demands and optimizing the Project's economics. To accomplish this National Fuel examined aerial photography, USFWS NWI maps, USGS quadrangle maps, pipeline and oil and gas well data, and county parcel data. In addition, field surveys and public input were used during routing. The intent of this effort was to identify the most environmentally sound, technically efficient, and cost-effective route for the Project.

The routing criteria used in creating the various proposed routes included:

- Potential impact to sensitive resources
- Land use issues
- Potential impacts to landowners
- Proximity to residential areas
- Proximity to industrial development areas
- Engineering/construction issues
- Operation and maintenance considerations
- Supporting infrastructure
- Overall cost effectiveness
- Public input

The use of existing corridors was prioritized in the routing evaluation. Existing corridors generally provide the best opportunity to minimize environmental impacts and construction costs. Parallel construction reduces the need for establishing new corridors and thus the involvement of

additional landowners; minimizes clearing of new ROW; and lessens potential environmental impacts. Similarly, operation and maintenance costs incurred during the life of the pipeline can be reduced when corridors are shared.

Several alignment alternatives were incorporated into the final design that deviated from the existing ROW. These alternatives were driven primarily due to:

- lack of available workspace around residential areas,
- requests by landowners to avoid certain areas on their property,
- avoidance of existing utility infrastructure or minimizing crossing distance of roads, and
- avoidance of environmental or cultural resources.

Table 8.1-1 compares the Alternative Route Characteristics to the proposed Project alignment.

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Table 8.1-1: Alternative Route Characteristics

Factor	Proposed Project	System Alternative	Alternative Alignment	Loop Alternative 1 – Northern Alignment	Loop Alternative 2 – Southern Alignment	Loop Alternative 3 – Increase MAOP on Line 224[10]
Length of Route (to be constructed)	Line YM58 – 29.5 miles Line KL Ext. – 0.4-mile Line YM224 Loop – 1.4 miles **Total: 31.3 miles**	Line FM100 Replacement – 44.9 miles **Total: 44.9 miles**	Line FM120 Replacement – 5.8 miles Line FM100 Replacement – 3.7 miles Line LF3 – 24.0 miles **Total: 33.5 miles**	Parallel Dominion ROW – 5.4 miles Line YM58 – 29.5 miles **Total: 34.9 miles**	Parallel TGP ROW – 5.9 miles Line YM58 – 29.5 miles **Total: 35.4 miles**	0 miles
ROW Type						
New ROW (miles)[1]	7.3	--	24.0	6.9	5.5	--
Length of co-location (miles)[1]	24.0	44.9	9.5	28.0	29.9	--
ROW Land Requirements						
Pipeline operation requirements (acres)[2]	188.1	267.8	203.0	210.4	204.9	--
Pipeline construction requirements (acres)[3]	282.5	401.8	305.1	315.7	307.4	--
Wetlands						
Total wetlands crossed (feet)[4]	2,611.9	2,635.2	1,116.8	2,817.3	2,654.1	--
Total wetlands crossed (number)[4]	32	20	34	35	34	--
Total wetlands crossed (acres)[4]	4.7	4.6	2.1	5.0	4.8	--
PFO wetland area in operational and construction limits (acres)[4,5]	2.4	2.2	0.6	2.4	2.4	--
PEM wetland area in operational and construction limits (acres)[4,5]	1.0	--	0.2	1.0	1.0	--
PUB wetland area in operational and construction limits (acres)[4,5]	--	--	--	0.2	--	--
Riverine area in operational and construction limits (acres)[4,5] (includes R3, R4 and R5 NWI mapped subsystems)	1.3	2.4	1.3	1.4	1.4	--
Waterbodies						
Waterbodies Crossed (number)[6]	33	35	35	38	36	--
Land Use[7]						
Agricultural Land (miles/acres)	3.6/32.6	<0.1/0.1	0.1/0.6	4.2/38.5	4.8/41.5	--

Factor	Proposed Project	System Alternative	Alternative Alignment	Loop Alternative 1 – Northern Alignment	Loop Alternative 2 – Southern Alignment	Loop Alternative 3 – Increase MAOP on Line 224[10]
Industrial/Commercial Land (miles/acres)	0.5/5.1	1.0/9.2	2.1/16.5	0.4/5.8	0.8/7.3	--
Forest & Woodland (miles/acres)	9.8/100.3	40.7/268.7	24.9/235.4	12.9/130.6	10.7/107.3	--
Open Land (miles/acres)	17.1/142.0	3.6/119.7	6.3/51.4	17.1/138.3	18.7/148.3	--
Open Water (miles/acres)	0.2/1.7	<0.1/0.1	<0.1/0.3	0.2/1.7	0.2/1.7	--
Residential Land (miles/acres)	0.1/0.8	0.5/4.0	0.1/0.9	0.1/0.8	0.2/1.3	--
Residences and Structures						
Residences or structures located within 50 ft of the construction workspace (number)[8]	16	2	4	16	21	--
Cultural Resources[9]						
National Historic Landmarks within 0.50 mile (number)	--	--	--	--	--	--
NRHP eligible or potentially eligible cultural resources sites within 0.50 mile (number)	17	14	9	19	21	--
Other Environmental Factors						
Landfills, quarries (count within 0.50 mile)	2	4	--	2	2	--
Active oil and gas wells (count within 0.50 mile)	240	43	187	281	254	--
Foreign pipeline crossings (number)	49	12	14	53	54	--
Public roads crossed (number)	18	43	25	23	24	--
Miles exceeding 26% slope	7.1	9.3	5.8	11.1	10.6	--
Cold Water Fisheries Crossed	27	27	29	30	30	--
State Lands Crossed (acres)[5]	27.6	328.0	200.0	27.6	27.6	--

NOTES:

1. Co-location was based on the centerline of an alternative being within 100 feet of existing pipeline centerlines or powerline facilities.
2. Operational ROW for the Project is based on a 50-foot-wide permanent ROW; and includes proposed Line YM58, Line KL, and YM224 Loop. The operational ROW for alternatives considered is based on a 50-foot-wide permanent ROW.
3. Construction ROW for the proposed project is a 75-foot-wide typical ROW that includes a 50-foot-wide permanent easement and 25-foot-wide temporary workspace (TWS) abutting the permanent easement. For comparative purposes, it does not account for access roads or additional temporary workspace (ATWS). The typical construction ROW for alternatives considered is based on a 75-foot-wide typical construction ROW.

4. Based on centerline crossing of USFWS NWI data.
5. Based on a 50-foot-wide Permanent ROW and 25-foot-wide temporary workspace (does not account for construction crossing technique, such as conventional trench or HDD; therefore, area reported may not equal actual wetland impact).
6. Based on PADEP Chapter 93 Designated Use Streams data.
7. Land Use classes determined through 2017 aerial photography interpretation and USFWS NWI data; reported in miles crossed by pipeline and acres of construction ROW.
8. Based on a 75-foot-wide construction ROW.
9. Sources used for cultural assessment include (1) Pennsylvania Historical & Museum Commission Cultural Resources Geographic Information System [07/09/2019]; (2) National Register of Historic Places public database (accessed [07/09/2019]); and (3) National Parks Services National Historic Landmark database (accessed [07/09/2019]).
10. Although this alternative appears to have less impacts as presented in this table, when construction logistics such as access and dig-out staging are considered impacts may be considerable.

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8.1.2 Alternative Compressor Station Sites

With respect to aboveground facility site alternatives, an extensive alternatives siting analysis is covered in National Fuel's JPA Environmental Assessment. In summary the sites for the compressor stations were evaluated based on environmental comparisons, the primary difference between the proposed Marvindale Compressor Station site and three alternatives sites is the presence of existing natural gas facilities at the proposed site which maximizes the ability to collocate facilities and minimizes potential environmental impacts. The alternative sites have less direct access from existing roads and would require the construction of new permanent access road(s). The alternative sites would also require the acquisition of land from a private landowner, whereas National Fuel currently owns the proposed compressor station site. Additionally, these sites would require the construction of additional looping and would incur their respective impacts. For these reasons, the proposed site was selected over the alternate sites for the new Marvindale Compressor Station, and the alternative compressor station sites were dismissed from further consideration.

The proposed Tamarack Compressor Station site was selected over the alternative sites based on multiple factors including a landowner that was willing to sell their property, the lack of cultural and environmental concerns, the relative isolation of the site (e.g., limited nearby residences), and the close proximity to both existing power and Line YM53. Although the Tamarack Compressor Station will require the construction of a new permanent access road, the road will be co-located with existing pipeline ROW whereas new and/or improved permanent access roads to the alternative sites would generally require additional environmental impacts through greenfield areas. The alternative sites would also require the acquisition of land from private landowners, whereas National Fuel has an Option Agreement to purchase the proposed compressor station site. For these reasons, the proposed site was selected over the alternate sites for the new Tamarack compressor station, and the alternative compressor station sites were dismissed from further consideration.

Table 8.1-2 compares the Alternative Sites to the proposed Marvindale and Tamarack Compressor Station Sites.

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Table 8.11-2: Proposed and Alternative Compressor Station Site Characteristics

Factor	Proposed Project	Electric Driven	Alternatives Considered		
Marvindale Compressor Station			Site 1	Site 2	Site 3
Construction impacts (acres)	20.5	20.5	15.1	21.1	29.7
Permanent impacts[1] (acres)	6.8	6.8	9.6	9.7	9.1
Prime farmland[2] (acres)	2.6	2.6	11.7	11.8	7.5
NSAs within 1 mile (number)/closest NSA (miles)	3/0.4	3/0.4	0/0	0/0	3/<0.5
Attainment Status for All Criteria Pollutants[3] (Y/N)	Y	Y	Y	Y	Y
Land availability	Available	Available	Unknown	Unknown	Unknown
Land uses (acres)	Forest and Woodland – 12.7 Industrial/Commercial Land – 2.2 Open Land - 5.6 Wetlands <0.1 Open Water <0.1	Forest and Woodland – 12.7 Industrial/Commercial Land – 2.2 Open Land - 5.6 Wetlands <0.1 Open Water <0.1	Forest and Woodland – 3.8 Industrial/Commercial Land – 11.4	Forest and Woodland – 7.5 Industrial/Commercial Land – 3.9 Open Land -2.2	Forest and Woodland – 23.7 Industrial/Commercial Land – 6.1
Access (miles/use)	0.5/Existing Permanent	0.5/Existing Permanent	1.3/Existing Permanent	1.2/Existing Permanent	1.3/Existing Permanent
Tamarack Compressor Station			Site 1T	Site 2T	Site 3T
Construction impacts (acres)	15.6	15.6	10.1	7.2	9.6
Permanent impacts[1] (acres)	5.2	5.2	4.7	4.0	5.4
Prime farmland[2] (acres)	5.2	5.2	0.0	4.0	5.4
NSAs within 1 mile (number)/closest NSA (miles)	7/0.2	7/0.2	0/0	3/<0.5	1/<0.5
Attainment Status for All Criteria Pollutants[3] (Y/N)	Y	Y	Y	Y	Y
Land availability	8.75-acre parcel under Option Agreement	8.75-acre parcel under Option Agreement	Landowner Not receptive to Selling Property	Unknown	Unknown
Land uses (acres)	Forest and Woodland – 13.2 Open Land – 2.4	Forest and Woodland – 6.6 Open Land – 2.4	Open Land -10.1	Forest and Woodland – 7.2	Open Land -9.1 Forest and Woodland – 0.5
Access (miles/use)	0.3/New Private Road	0.3/New Private Road	0.2/ New Private Road	0.0/Existing Public Road	0.6/ New Private Road

NOTES:

[1] Includes operational footprint of compressor station and permanent access road.

[2] Determined using NRCS SSURGO soils data for the operational footprint of the compressor station.

[3] County attainment status data (USEPA 2019e).

8.1.3 Other Aboveground Facility Alternative Locations

With respect to the siting of other additional aboveground facilities proposed for the Project, which include:

- The Marvindale Interconnect to be installed near the new Marvindale Compressor Station site;
- The Carpenter Hollow OPP Station HEP0 4639 at the interconnect between the proposed pipeline and existing Line YM224; and
- Modification of the existing Leidy Interconnect LDC2245 with Transco at the Leidy M&R Station.

The location of these facilities is entirely dependent upon the location and configuration of the proposed new Line YM58 and the location of the receipt point with Transco at Leidy; therefore, no alternative sites were evaluated. In addition, pig launcher/receiver sites are fixed at the beginning and end of the proposed Line YM58 pipeline.

In addition to these facilities, three mainline valve facilities are proposed along the new pipeline at locations to be determined. The location of these facilities was selected based on an evaluation of the valve spacing per USDOT regulations (49 CFR 192), and the need to locate the valves near access roads for accessibility; therefore, no alternative sites were evaluated.

8.1.4 Limited Disturbed Area

As discussed in Section 5.2, the LOD delineated on the E&SCP alignment sheets has been established to restrict construction activities to the minimum area needed to effectively and efficiently construct the proposed facilities. This BMP is very effective at reducing the runoff volume rate, volume and concentration of pollutants in stormwater runoff. This BMP is "self-crediting" in that it automatically reduces the area to be treated and provides a corresponding reduction in stormwater impacts. However, it is not capable of addressing the impacts of the change in land cover associated with the proposed earth disturbance.

8.1.5 Limiting Extent and Duration of the Disturbance

This non-discharge alternative will be utilized to the extent possible on this project. The majority of the proposed earth disturbance will occur in the early activities of the construction sequence of the Project, including clearing and grading, with a much smaller earth disturbance occurring during site restoration. As described in Section 9.5 of this application, and throughout the ESCAMP, the duration and extent of earth disturbances will be limited to the current construction activity to be completed. Temporary or permanent stabilization is to occur as soon as possible upon completion of each activity. This BMP is very effective at reducing the concentration of pollutants in stormwater runoff and reducing the impact of bare earth on runoff volume and rate. However, it is not capable of addressing the impacts of the long-term change in land cover associated with the proposed earth disturbance.

8.1.6 Riparian Buffers and Riparian Forest Buffers

The feasibility of protecting, converting, or establishing a riparian forest buffer meeting the requirements of 25 PA Code §102.14 was analyzed for the proposed Project. The riparian area is defined as the land bordering a watercourse. Certain riparian forest buffers in Pennsylvania are protected under Chapter 102.14 of the Pennsylvania Code (PADEP 2010). The PADEP defines riparian forest buffers as a type of best management practice that consists of permanent vegetation that is predominantly native trees and shrubs.

Per Chapter 102.14 of the Pennsylvania Code, earth disturbance activities are not permitted within 150 feet of a perennial or intermittent river, stream, or creek; or lake, pond, or reservoir when the Project site is located in an EV or HQ watershed (PADEP 2010b). However linear pipeline projects (the Project) may request a waiver from the Chapter 102.14 requirements, provided the existing riparian buffer is undisturbed to the extent practicable, and the activity will otherwise meet the requirements of the chapter. Given the linear nature of the proposed Project, temporary impacts within riparian buffers is unavoidable.

The Project will impact the special protection riparian areas in various locations along the project as detailed in Table 2.2-1A, in Appendix A. The E&S drawings list the watershed classifications to further detail where special protection riparian buffers are impacted by the Project.

National Fuel evaluated all riparian areas using a 100-foot buffer from the top of bank of non-HQ/EV waters, and a 150-foot buffer from the top of bank for HQ/EV waters. Below is a list of total riparian disturbance / total forested riparian disturbance by County:

- McKean County = 48.3 acres / 9.0 acres
- Potter County = 19.4 acres / 4.1 acres
- Elk County = 0.2 acres / <0.1 acres
- Clinton County = 0.0 acres / 0.0 acres
- Clearfield County = 1.1 acres / 0.2 acres
- Cameron County = 3.1 acres / 1.0 acres

The total riparian area and total forested riparian area impacted by the Project is 72.1 acres and 14.4 acres, respectively.

Sensitive surface waters with an existing use classification of EV include Whitney Creek and South Branch Oswayo Creek.

Table 2.2-1A, in Appendix A, provides a list of waterbodies crossed by the Project and their associated watershed classification.

8.1.7 Riparian Buffer Waiver

National Fuel requests a Riparian Buffer Waiver in accordance with 25 PA Code §102.14(d)(2)(ii) for linear project impacts. This section describes the existing land cover of the riparian areas in the Project workspace; provides an assessment and quantifies riparian area impacts resulting from the construction and operation of the Project and provides proposed measures to minimize impacts and restore the riparian resources.

National Fuel will perform an assessment of the existing riparian buffer prior to construction to determine suitability for restoring by evaluating site's physical locations including soil characteristics, hydrology and topography.

To mitigate for temporary disturbances within riparian buffers, National Fuel has reduced workspace within riparian buffers to the extent practicable and will implement the BMPs detailed in this application package. National Fuel will employ multiple measures to reduce the extent and duration of Project impacts to riparian communities which include, but are not limited to the following:

- National Fuel will cut vegetation just above ground level in workspace locations, leaving existing root systems in place and preserve 150- foot riparian area where possible

- National Fuel will limit the removal of stumps and grading in wetlands and along waterbodies to the trench line and what is necessary to safely install the equipment crossings to promote natural revegetation and surface stabilization;
- National Fuel will utilize a riparian buffer mix within 150 feet of HQ/EV waterbodies and within 100 feet of other waterbodies. This seed mix will be used to revegetate the entire LOD in riparian areas where slopes are less than 10%.
- Tree and shrub plantings will also occur in forested riparian buffers, within workspace outside of the 10-foot maintained ROW will be planted.
- National Fuel will reduce workspace in certain locations when crossing wetlands.
- National Fuel will install erosion control measure including sediment barriers such as filter socks, erosion control blankets, temporary bridges and timber mats.
- National Fuel will utilize ATWS greater than 50 feet from stream banks.
- National Fuel will restore portions of the disturbed riparian forest buffer with replanting in the riparian areas outside of its permanent maintained right of way. National Fuel will reduce the potential for risk for invasion or spreading of invasive species by cleaning construction equipment (e.g. in locations where a riparian area or wetland is identified as having predominant invasive species vegetation, equipment can be cleaned prior to entering the next areas).
- National Fuel will implement BMPs to minimize riparian impacts and protect existing forested riparian buffers to the extent practicable. However, to manage the pipeline's integrity during Project operation, National Fuel must maintain a 10-foot wide tree free corridor over the pipeline; therefore, the entire forested riparian buffer cannot be replanted. Furthermore, because National Fuel does not own the property on which the proposed earth disturbance will occur, National Fuel cannot, without landowner permission, place deed restrictions or conservation easements to protect, convert, or establish a riparian buffer or riparian forest buffer to satisfy the antidegradation requirements of §102.4(b)(6) for the proposed earth disturbances.

In locations where a riparian buffer waiver is requested, where forest riparian areas are converted to herbaceous cover, National Fuel will develop a replanting plan for the riparian forest buffer locations. Replanting will occur in the construction workspace outside of the 10-foot-wide permanently maintained corridor over the pipeline. Preliminary details related to the replanted species and planting specifications are outlined below. National Fuel will replant and stabilize all riparian buffers affected by the Project once construction is completed. National Fuel will implement erosion and sediment BMPs as outlined in the ESCAMP and the erosion and sediment control plans. The riparian areas at stream crossings within the 50-foot-wide permanent ROW will be reestablished by applying a native approved riparian seed mix, developed in conjunction with the agencies. The seed mix will be applied at a rate and density as directed by nursery specifications and recommendations.

Replanting in the riparian areas within the ROW will include stabilizing with the approved seed mix and incorporating a mix of native shrubs listed in Table 8.1-4 below. The selected shrub species were identified in vegetation plot data obtained during the wetland and waterbody delineations. The selected plant materials have been selected for compatibility with the landscape characteristics and blend with the surrounding and adjacent riparian areas.

Outside of the permanent ROW, and to edge of the construction workspace and within a regulated floodplain, National Fuel will reestablish the riparian buffer by planting trees and shrubs. Replanting of the riparian buffers includes a combination of native tree and shrub species selected for different hydrologic regimes and different vegetative cover types throughout the Project area.

Trees and shrubs selected for replanting will be taken from the PADEP's Riparian Forest Buffer Guidance (Document Number 394-5600-001 PADEP 2010) and will also include species listed in field delineation plots and stream forms. The trees and shrubs selected for the Project are listed in Table 8.1-4. This is a short list of preferred plant species which will be modified upon final plan development. Plants will be either bare root, live stake, or containerized species.

Replanting methods will include monocultures consisting of three to six plants of the species in random clumps spaced approximately six to eight feet on center (o.c.) for shrubs, 10 feet o.c. for small tree species, and 12-14 feet o.c. for tree species. Planting spacing will follow industry specifications. Trees and shrubs will be planted at a density determined by evaluation of both aerial assessment and current data collected in the field. Typical planting details will be developed and provided in the final planting schedule.

Table 8.1-4: List of Preliminary Species for Replanting

	Species	Height (feet)/caliper	Wildlife Functions	Flood Tolerance
Shrubs/Small Trees				
	Mountain Laurel (*Kalmia latifolia*)	4 - 6	high value- browse and cover	intolerant
	Hornbeam (*Carpinus caroliniana*)	35	food source- buds, seeds, leaves	intolerant
	Flowering Dogwood (*Cornus florida*)	35	food source	intolerant
	Witchhazel (*Hamamelis virginiana)*		Toxic to some	intolerant
	Winterberry (Ilex verticillata)	4 - 7	food source	intolerant
	Northern Arrowwood (*Viburnum recognitum)*	5-7	food source- fruit, flowers	tolerant
Trees				
	American beech (*Fagus grandifolia*)	75+/2-inch	food source- nuts	very intolerant
	Black birch (*Betula lenta*)	50+/2-inch	food source- buds, seeds, leaves	intolerant
	Red Maple (*Acer rubrum*)	75+/2-inch	food source and browse	tolerant
	Northern red oak (*Quercus rubra*)	75+/2-inch	nesting and food source- mast	medium tolerance
	Black willow (*Salix nigra*)	35 – 50/ 2-inch	food source- buds, fruit, twigs	very tolerant
	Elm (Ulmus spp.)	50 - 70+/ 2-inch	food source- seeds, twigs	tolerant

Source: Riparian Forest Buffer Guidance, Document Number 3945600-001

Planting Methods

All seeding will be applied and plantings installed according to acceptable standards of the trade under the supervision of a landscape professional. All seed and plant materials will be nursery grown and will be guaranteed to be true to name and healthy upon delivery.

Wildlife Damage Control

After planting is completed, appropriate tree and shrub shelters (i.e. fencing, plastic collars) will be installed. If necessary additional or alternative methods of wildlife damage control including the application of a rodenticide or installing bait boxes.

Invasive Species Management

National Fuel's ESCAMP specifies that National Fuel will consult with the appropriate agencies regarding invasive species and develop specific procedures in coordination with the appropriate agencies to prevent the introduction or spread of invasive specifies. National Fuel's Environmental Construction Plan will be followed in the riparian buffer replanting areas.

8.1.8 Treatment Train Combination of BMPs

A combination of cost-effective and environmentally sound BMPs were considered for installation in a "treatment train" that collectively eliminate the net change in stormwater volume, rate and quality from pre-development to post-development conditions. The primary metric prohibiting the proposed Project from achieving non-discharge alternatives is the additional runoff volume generated by the earth disturbance necessary for the proposed activities. Permanent removal of runoff volume from the design storm hydrograph during earth disturbance phases was excluded from the available design alternatives due to the elevated sediment loadings expected during this stage of site construction. The "treatment train" approach was determined to be infeasible as a non-discharge alternative.

As demonstrated above, there is no combination of non-discharge alternative BMPs that enable the earth disturbance activities to achieve no net change from pre-development to post-development volume, rate and concentration of pollutants in stormwater runoff up to and including the 2-year/24-hour storm. In the absence of feasible non-discharge alternatives, Antidegradation Best Available Combination of Technologies (ABACT) BMPs will be utilized to address antidegradation requirements for the Pennsylvania portion of the Project.

8.2 Antidegradation Best Available Combination of Technologies

As demonstrated in the previous section, non-discharge alternatives do not exist for the proposed Project. Environmentally sound and cost-effective ABACT BMPs will be utilized to demonstrate that any change in PA stormwater runoff rate, volume, or quality will maintain and protect the existing quality and water uses of receiving surface waters and preserve existing baseflow. The support drawings of this application package show the locations of all planned ABACT BMPs and details for construction of these facilities. The following is a summary of the combination of ABACT BMPs that have been incorporated into the site design and the features that make them ABACT:

8.2.1 Site Access

- 100-foot long Rock Construction Entrance(s)

8.2.2 Sediment Barriers

- Compost filter socks will be utilized for all perimeter control needs

8.2.3 Stabilization

- Disturbed areas immediately stabilized upon completion, or temporary cessation, of earth disturbance activity
- Disturbed areas stabilized with erosion control blanket within 100 feet of special protection surface waters, within 50 feet of all other receiving surface waters, and on slopes 3H:1V or steeper.

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9 Construction Techniques for Natural Gas Pipelines

9.1 Typical ROW Requirements

During Project review, conditions evaluated included topography, soils, bedrock, boulders, wetlands, and waterbodies, as well as proximity to existing roads, railroads, and residences. National Fuel has considered these noted conditions along with machinery requirements needed for safe pipeline and support facility installation. Minimum size and area requirements for worker safety involving construction activities established by the U.S. Department of Transportation (DOT) and Occupational Safety and Health Administration (OSHA) were also considered. Under certain conditions, additional workspace may be necessary to maintain safe practices in specific locations and would extend beyond the nominal 75-foot corridor.

The Project generally requires a 50-foot permanent ROW and an approximately 25-foot temporary construction workspace for a nominal 75-foot-wide construction corridor. This corridor width is based on construction conditions of similar projects within Pennsylvania. From the center of the pipe trench, the spoil side of the construction ROW is proposed to be 35 feet. This footprint will serve as the primary spoil storage area. Thus, the working side of the construction workspace will typically be 40 feet wide from the center of the pipe trench to the edge of the ROW and will serve to accommodate trench excavation, bank sloping, and safe equipment mobilization. Agricultural areas with full topsoil segregation will require an additional 25 feet, totaling a 100-foot-wide construction corridor.

9.2 Access Roads

To the extent practicable, existing roadways (public or private) will be used as the primary means to access the ROW. Access to the Project will be achieved via maintained State and County roads, existing public and private access roads, and proposed new temporary and permanent access roads. National Fuel proposes to utilize 40 access roads for proposed construction activities and 18 existing access roads for abandonment activities (e.g., total of 58 project-wide). In general, only minor modifications are proposed at existing non-public access roads which may include the placement of rock construction entrances at road junctures. in general, only minor improvements will occur at existing access roads beyond maintenance of the road throughout construction.

Maintenance activities during construction may include tree branch clearing, gravel placement, lengthening and/or widening. Moreover, ATWS will be located adjacent to several access roads for temporary vehicle parking, vehicle turn-out passing areas, and/or staging of minor supplies (e.g., hay bales for erosion control activities). Temporary access roads (TARs) for construction will be restored to original conditions following construction. Landowner permission and permanent rights will be obtained for the proposed permanent access roads (PARs).

9.3 Contractor Yards / Staging Areas

Contractor yards or staging areas are required for storing and staging equipment, pipe, fuel, oil, pipe fabrications, and other construction related materials. National Fuel has identified seven staging areas in Pennsylvania for use during construction of the Project. The total area of the Pennsylvania contractor yards/staging areas will be approximately 44.4 acres. A Highway

Occupancy Permit (HOP) will be acquired from the Pennsylvania Department of Transportation for access to the contractor yards if required.

The Contractor shall perform the following measures at contractor yards:

- Install erosion control structures as directed by the EI, outlined in this application, or identified on the construction drawings, and maintain them throughout construction and restoration activities;
- Implement and comply with the SPRP Plan; and
- Restore and revegetate all disturbed areas in accordance with the measures outlined in these application materials and as directed by the EI.

9.4 Off-ROW Disturbance

With certain exceptions, which are required in order to comply with FERC Plan and Procedures, all construction activities are restricted to within the limits identified on the construction drawings (exceptions include the installation of waterbars, installation of energy-dissipating devices, installation of dewatering structures, and drain tile repair which are subject to applicable survey requirements). However, as detailed in Section 4.1 of the ESCAMP, in the event that off-ROW disturbance occurs the following measures will be implemented:

- The EI will immediately report the occurrence to the Chief Inspector and ROW Agent;
- The conditions that caused the disturbance will be evaluated by the Chief Inspector and the EI, and they will determine whether work at the location can proceed under those conditions; and
- If deemed necessary by the Chief Inspector and EI, one or more of the following corrective actions will be taken: immediate restoration of the original contours, seeding and mulching of the disturbed area, and/or installation of erosion control devices. National Fuel's Environmental Compliance Coordinator will be notified as soon as practical.

9.5 Construction Sequence

Natural gas pipelines are installed using conventional overland buried pipeline construction techniques. These activities are necessary for the installation of a stable, safe, and reliable transmission facility consistent with DOT requirements and regulations. This section provides an overview of the equipment and operations necessary for the installation of a natural gas pipeline, describes potential impacts that may occur from each operation, and identifies the measures that will be implemented to control these potential impacts. This section also discusses in detail the erosion and sediment control techniques that apply to each construction activity including clearing, grading, trenching, lowering-in of pipe, backfilling, and hydrostatic testing. ROW restoration will be addressed in Section 9.6 of this application. The activities listed below are normally performed in the following sequence:

- Survey and flag the pipeline route, limits of disturbance, foreign line crossings, wetlands and other sensitive areas;
- Installing temporary erosion and sediment controls;
- Clearing the construction work area (CWA);
- Grading the CWA to establish safe workspace; installing additional erosion and sediment controls;
- Installing temporary waterbars/best management practices;

- Trenching/excavating the trench;
- Pipe stringing and bending;
- Welding, weld inspection and installing weld coating;
- Trench dewatering;
- Lowering the pipe into the trench; installing trench plugs;
- Backfilling the trench;
- Hydrostatic testing of pipe; and
- Permanent stabilization and restoration;
- Demobilization and site cleanup;
- Post-construction monitoring.

Obstacles to the mainline technique are often encountered and are not considered to be out of the ordinary. These obstacles, which include side hill crossings, rock, wetlands, streams, roads, and residential areas, do not normally interrupt the assembly line flow.

9.5.1 Clearing

Clearing operations will include the removal of vegetation within the CWA. Various clearing methods will be employed depending on tree size, contour of the land, and the ability of the ground to support clearing equipment. Vegetative clearing will either be accomplished by hand or by cutting equipment. The following procedures will be standard practice during clearing:

- Prior to beginning the removal of vegetation, the limits of clearing will be established and identified in accordance with the construction drawings;
- All construction activities and ground disturbance will be confined to within the limit of disturbance shown on the construction drawings;
- Clearly mark and protect trees to be saved as per landowner requests or as otherwise required;
- All brush and trees will be felled into the CWA to minimize damage to trees and structures adjacent to the CWA. Trees that inadvertently fall beyond the edge of the CWA will be immediately moved onto the CWA and disturbed areas will be immediately stabilized;
- Trees will be chipped or cut into lengths identified by the landowner and then stacked at the edge of the CWA or removed;
- Brush and limbs may be disposed of in one or more of the following ways depending on local restrictions, applicable permits, construction Line List stipulations, and landowner agreements:
  - Stockpiled along the edge of the CWA or in staging areas or;
  - Chipped, spread evenly across the CWA in upland areas; and plowed in; or
  - Hauled off site or;
  - Blown off-site with landowner approval.
- In no event will brush, ships, logs, or stumps be placed within stream or wetland areas.
- Existing surface drainage patterns will not be altered by the placement of timber or brush piles at the edge of the construction ROW.

9.5.1.1 Thermal Impacts

On this Project, the principal source of thermal impacts would be related to disturbance of vegetative cover. The following provisions are included in this application to avoid, minimize, or mitigate potential pollution from thermal impacts:

- Section 5 of the ESCAMP requires minimal disturbance within 50 feet of streams.
- Section 5 of the ESCAMP limits ROW width and vegetation removal through wetlands.
- Section 8 of the ESCAMP provides revegetation requirements.
- Section 9 of the ESAMP limits routine vegetation mowing or clearing.

The permanent pipeline ROW may be mowed periodically, and woody vegetation may be trimmed to allow safe pipeline operation. Some tree cover may be permanently removed in wooded areas. A 10-foot wide area will be maintained in an herbaceous state in wetland areas to comply with vegetative maintenance plan approved by FERC and the USDOT, Pipeline Hazardous Materials and Safety Administration (PHMSA) survey requirements.

9.5.2 Installing Temporary BMPs

BMPs, which are temporary erosion controls intended to minimize the flow of sediment and to prevent the deposition of sediments beyond approved workspaces or into sensitive resources, shall be installed following vegetative clearing operations. They may be constructed of materials such as compost filter socks, staked straw bales, compacted earth (e.g., drivable berms across travel lanes), riprap and stone, jute matting, timber mats, wood stakes, clay, bentonite, synthetic foam, concrete, or an equivalent material as identified by the EI. Where permitted by regulatory agencies, hay bales may be used in lieu of straw bales.

- Do not stake or trench in place straw bales used on equipment bridges or on mats across the travel lane.
- Inspect temporary BMPs daily in areas of active construction to verify proper functioning and maintenance. In other areas, BMPs will be inspected and maintained on a weekly basis throughout construction, and within 24 hours following storm events as detailed in Section 4.13 of the ESCAMP.
- Maintain all temporary BMPs in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies, or roads are stabilized.
- Remove temporary BMPs from an area when replaced by permanent erosion control measures or when the area has been successfully restored.

9.5.3 Grading

The construction ROW will be graded as needed to provide a level workspace for safe operation of heavy equipment used in pipeline construction. The following procedures will be standard practice during grading.

9.5.3.1 Topsoil Segregation

Topsoil segregation methods will be used in all residential areas and in cultivated or rotated croplands, managed pastures, hayfields, and other areas at the landowner's or land managing agency's request. As detailed in ESCAMP section 4.3.1:

- Prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench line and subsoil storage area (ditch plus spoil side method) as stipulated in the Construction Contract or Line List.
- Segregate at least 12 inches of topsoil in deep soils with more than 12 inches of topsoil. In soils with less than 12 inches of topsoil, make every effort to segregate the entire topsoil layer.
- Where topsoil segregation is required, maintain separation of salvaged topsoil and subsoil throughout all construction activities.
- For wetlands, segregate the top 12 inches of topsoil within the ditchline, except in areas where standing water is present, or soils are saturated.
- Leave gaps in the topsoil piles for the installation of temporary waterbars to allow water to be diverted off CWA.
- Topsoil replacement (i.e., importation of topsoil) may be used as an alternative to topsoil segregation if approved by the landowner and National Fuel.
- Never use topsoil for padding the pipe, constructing temporary waterbars or trench plugs, improving or maintaining roads, or as a fill material.
- Stabilize topsoil piles and minimize loss due to wind and water erosion with use of BMPs, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary.

9.5.3.2 Tree Stump Removal and Disposal

- Remove tree stumps in upland areas along the entire width of the permanent ROW to allow adequate clearance for the safe operation of vehicles and equipment. Stumps within the CWA will be removed or ground to a suitable height that will allow the safe passage of equipment, as stipulated by the Chief Inspector or EI.
- Dispose of stumps by one of the following methods, pending approval by the Chief Inspector and the landowner, and in accordance with regulatory requirements:
  - Moved to National Fuel-approved off-site location (except in wetlands and agricultural areas);
  - Chipped on-site. Removed from ROW and hauled off site or blown off-site with landowner approval. Chipped material not removed from the site may be spread across the upland areas of the CWA in a manner that will not inhibit revegetation or broadcast into off-ROW and stable areas. Wood chips will not be left within agricultural lands, wetlands, or within 50 feet of wetlands. Wood chips will not be stockpiled in a manner that they may be transported into a wetland.
  - Ground to grade in wetlands, excess chips must be removed from wetlands for reuse on-site or properly disposed of off-site.

9.5.3.3 Rock Disposal

When rock is encountered it will be broken up either by drilling, pneumatic hammer or blasting. If blasting is required National Fuel will conduct pre-blast surveys with landowner permission to assess the condition of structures, wells, springs and utilities within 150 feet. Blasting will follow all procedures and safety measures according to National Fuel's Blasting Plan (Appendix H).

Rock (including blast rock) will be disposed of in one or more of the following ways:

- Buried on the ROW or in approved construction work areas as fill during grade cut restoration in accordance with the construction specifications. In cultivated/agricultural

lands, wetlands, and residential areas, rock may only be backfilled to the top of the existing bedrock profile;

- Windrowed per written landowner agreement with National Fuel. If windrowed, National Fuel will test for presence of pyritic rock. Should significant quantities of pyritic rock remain after trench backfill, National Fuel will attempt to treat the rock on-site according to the recommendations in PADEP's publication, *How to Avoid and Handle Acid-Producing Rock Formations Encountered During Well Site Development*. Alternatively, if the volumes of rock are too large to effective treat, National Fuel will arrange to dispose of the rock at an approved facility; and/or
- Removed and disposed of at a National Fuel approved site.

9.5.4 Installing Temporary Waterbars

As discussed in Section 4.7 of the ESCAMP, temporary waterbars, which are temporary erosion control measures intended to reduce runoff velocity and divert water off the CWA, shall be installed following grading operations. The waterbars are to be installed on all disturbed areas as necessary to avoid excessive erosion. Temporary waterbars will be constructed of materials such as compacted soil and staked compost filter sock.

Waterbars must be installed on either side of waterbodies and wetlands and upslope of road crossings at the locations shown on the attached drawings or as determined by the EI (closer spacing should be used if necessary).

9.5.5 Trenching

The trench centerline will be staked after the CWA has been prepared. In general, a trench will be excavated to a depth that will permit burial of the pipe with a minimum of three feet of cover, four feet of cover in agricultural areas and five feet beneath waterbodies. Overland trenching may be accomplished using a conventional backhoe or a rotary wheel-ditching machine. In shale or rocky areas where the use of the wheel-ditching machine is limited, a tractor-drawn ripper will be employed to break and loosen hard substratum material. In areas where rock cannot be ripped, drilling and blasting may be required. A backhoe may then be used to remove rock and soil from the ditch.

The following procedures will be standard practice during ditching:

- Flag drainage tiles damaged during ditching activities for repair; and
- Place spoil at least 10 feet from the edge of waterbodies. Spoil will be contained with erosion and sediment control barriers (BMPs) to prevent spoil materials or heavily silt-laden water from transferring into waterbodies and wetlands or off the CWA.

9.5.6 Trench Dewatering

In accordance Section 4.10 of the ESCAMP, trench dewatering may be periodically required along portions of the proposed pipeline prior to and/or subsequent to installation of the pipeline to remove collected water from the trench.

- Trench dewatering will be conducted (on or off the CWA) in such a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody or wetland.
- The intakes of the hoses used to withdraw the water from the trench will be elevated and screened to minimize pumping of deposited sediments.

- Water may be discharged into areas where adequate vegetation is present adjacent to the CWA to function as a filter medium.
- Where vegetation is absent or in the vicinity of waterbody/ wetland areas, water will be pumped into a filter bag or through a structure composed of BMPs. When using filter bags, secure the discharge hose to the bag with a clamp.
- Remove dewatering structures as soon as practicable after the completion of dewatering activities.

9.5.7 Pipe Installation

The following sections describe how the pipe will be installed for the Project. In general, the pipeline installation process moves in an assembly line fashion and is limited to a week at any given location.

9.5.7.1 Stringing and Bending

Following trench excavation, pipe sections will be delivered to the construction site by truck or tracked vehicle and strung out along the trench. Individual pipe sections will be placed on temporary supports or wooden skids and staggered to allow room for work on the exposed ends. Certain pipe sections will be bent, as necessary, to conform to changes in slope and direction of the trench.

9.5.7.2 Welding and Weld Inspection

Once the bending operation is complete, the pipe sections will be welded together on supports using approved welding procedures that comply with Company welding specifications. After welding, the welds will be inspected radiographically or ultrasonically to check their structural integrity.

9.5.7.3 Lowering-in

Lowering-in consists of placing the completed pipeline sections into the trench where a tie-in weld will be made. Lowering-in is usually accomplished with two or more sideboom tractors acting in unison and spaced so as not to buckle or otherwise damage the pipe. The pipeline will be lifted from the supports, swung out over the trench, and lowered directly into the trench. The equipment uses a "leap frogging" technique requiring sufficient area to safely move around other tractors within the CWA to gain an advanced position on the pipe.

9.5.8 Backfilling

Backfilling consists of covering the pipe with the earth removed from the trench or with another fill material hauled to the site when the existing trench spoil is not adequate for backfill. Backfilling will follow lowering-in of the pipeline as close as is practical.

In areas where the trench bottom is irregularly shaped due to consolidated rock or where the excavated spoil materials are unacceptable for backfilling around the pipe, padding material may be required to prevent damage to the pipe. This padding material will generally consist of sand or screened spoil materials from trench excavation.

- Under no circumstances shall topsoil be used as padding material.
- Excess rock, including blast rock, may be used to backfill the trench to the top of the existing bedrock profile in accordance with Company specifications. Rock that is not used to backfill the trench will be treated as described in Section 9.5.3.3.
- Any excess material will be spread within the CWA in upland areas and land contours will be roughed-in to match adjacent topography.

- The trench may be backfilled with a crown over the pipe to compensate for compaction and settling. Openings will be left in the completed trench crown to restore pre-construction drainage patterns. Crowning shall not be used in wetland areas

9.5.8.1 Trench Plugs

As discussed in Section 7.2 of the ESCAMP, trench plugs are intended to slow subsurface water flow and erosion along the trench and around the pipe in sloping terrain. Trench plugs will be constructed with clay, bentonite, synthetic foam, or sand filled sacks. On severe slopes greater than 100 percent, bentonite used at the discretion of the Chief Inspector. Topsoil shall not be used to construct trench plugs. Trench plugs, which are used in conjunction with waterbars, shall be installed at the locations shown on the alignment sheet drawings or as determined by the EI. Trench plugs shall be installed at the base of slopes adjacent to waterbodies and wetlands, and where needed to avoid draining of a resource.

9.5.9 Hydrostatic Testing

Once the pipeline is completed and before it is placed into service, it will be hydrostatically tested for structural integrity in accordance with PHMSA regulations. Hydrostatic testing involves filling the pipeline with clean water and maintaining test pressure in excess of normal operating pressures. The testing procedure involves filling the pipeline with test water, performing the pressure test, and discharging the test water. Alternately the water may be hauled offsite. A Hydrostatic Discharge Permit will be obtained from the PADEP prior to hydrostatic testing. National Fuel anticipates withdrawing water for the hydrostatic testing from publicly and privately available water sources.

- The EI shall notify the agencies of the intent to use specific test water sources at least 48 hours before testing activities.
- Pumps used for hydrostatic testing within 100 feet of any waterbody or wetland shall be operated and refueled in accordance with the PPC Plan.
- Use only the approved water sources identified in the Clearance Package/Permit Book.
- Locate hydrostatic test manifolds outside wetlands and riparian areas to the greatest extent practical.
- For an overland discharge of test water, dewater into an energy dissipation device constructed of straw bales and absorbent booms.
- Dewater only at the locations shown on the construction drawings or locations identified in the Hydrostatic Test Package.
- Locate all dewatering structures in a well-vegetated and stabilized area, if practical, and attempt to maintain at least a 50-foot vegetated buffer from adjacent waterbody/wetland areas. If an adequate buffer is not available, BMPs or similar erosion control measure must be installed.
- Regulate discharge rate, use energy dissipation device(s), and install BMPs, as necessary, to prevent erosion, streambed scour to aquatic resources, suspension of sediments, flooding or excessive stream flow.
- The EI shall sample and test the source water and discharge water in accordance with the permit requirements

9.6 CWA Restoration and Final Cleanup

Restoration of the CWA will begin after pipeline construction activities have been completed. Restoration measures include the re-establishment of final grades and drainage patterns as well as the installation of permanent erosion and BMPs to minimize post-construction erosion.

In addition to the standard permanent restoration procedures set forth in Section 7.5 of the ESCAMP, residential areas will be restored in accordance with Section 10.3. Property shall be restored as close to its original condition as practical unless otherwise specified by the landowner.

- The Contractor shall make every reasonable effort to complete final cleanup of an area (including final grading and installation of permanent erosion control structures) within 20 days after backfilling the trench in that area (within 10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary waterbars, BMPs, and mulch) until conditions allow completion of cleanup.
- The disturbed CWA will be seeded within four working days of final grading, weather and soil conditions permitting.
- If final cleanup and seeding cannot be completed and is delayed until the next recommended growing season, the winter stabilization measures in Section 9.6.4 shall be followed.
- Grade the CWA to pre-construction contours.
- Spread segregated topsoil back across the graded CWA to its original profile.
- Remove excess rock from at least the top 12 inches of soil to the extent practical in all rotated and cultivated cropland, hayfields, managed pastures, residential areas, and other areas at the landowner's request. The size, density, and distribution of rock on the CWA should be similar to adjacent areas not disturbed by construction. The landowner or land management agency may approve other provisions in writing.
- A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed, regularly inspected and maintained. When access is no longer required, the travel lane must be removed and the CWA restored.
- Remove all construction debris from all construction work areas unless the landowner or land managing agency approves leaving materials onsite for beneficial reuse, stabilization, or habitat restoration.
- Remove temporary BMPs when replaced by permanent erosion control measures or when revegetation is successful per permit requirements.

9.6.1 Permanent Erosion Control

9.6.1.1 Permanent Waterbars

As detailed in Section 7.3 of the ESCAMP, permanent waterbars are intended to reduce runoff velocity, divert water off the CWA, and prevent sediment deposition into sensitive resources. Permanent waterbars will be constructed of compacted soil. A functional equivalent may be used when directed by the EI.

9.6.1.2 Erosion Control Blanket

- Install erosion control fabric at waterbar outlets and drainage swales as necessary or as directed by the EI.
- Install erosion control blanket or matting on slopes greater than 3H:1V, on disturbed areas within 50 feet of streams, and within 100 feet of streams in HQ and EV watersheds. Anchor the erosion control blanket or matting with staples or other appropriate devices in accordance with the manufacturers' recommendations.

- The EI will direct the installation of high-velocity erosion control blanket on the swale side of permanent waterbars
- Install erosion control blanket or matting in locations where temporary bridges were removed

9.6.2 Revegetation and Seeding

Successful revegetation of soils disturbed by Project-related activities is essential. Seeding will be conducted using the requirements as outlined in Section 8 of the ESCAMP.

9.6.3 Mulch

Mulch is intended to stabilize the soil surface and shall consist of weed-free straw or hay, wood fiber hydromulch, erosion control blanket, or some functional equivalent as approved by the EI and Chief Inspector. Mulch will be applied as directed in Section 4.9 of the ESCAMP.

9.6.4 Winter Stabilization

In the event that restoration occurs too late in the year for cleanup activities to adequately proceed, the following procedures will be implemented along the disturbed CWA at those locations until final restoration measures can be completed.

- Install permanent waterbars at specified intervals on all slopes, or as directed by the EI;
- Install temporary BMPs adjacent to stream and wetland crossings, as well as other critical areas;
- Seed and mulch the disturbed areas and seed segregated topsoil piles in accordance with these application materials; and
- Remove flumes from waterbody crossings to reestablish natural stream flow.

Refer to section 3.8 and Attachment 6 of the ESCAMP in Appendix G for additional information regarding winter stabilization.

9.7 Unauthorized Vehicle Access to ROW

National Fuel will offer to install and maintain measures to control unauthorized vehicle access to the ROW based on requests by the manager or owner of forested lands. National Fuel is currently working with individual state forests to determine specific needs. These measures may include:

- Signs;
- Highly visible construction fencing;
- Fences with locking gates;
- Slash and timber barriers, pipe barriers, or a line of boulders across the permanent ROW; or
- Conifers or other appropriate shrubs with a mature height of four feet or less across the permanent ROW.

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10 Special Construction Methods

National Fuel will utilize the following specialized construction procedures for agricultural areas, road crossings, and residential areas along the Project. The Project construction drawings, Line Lists, and Construction Contract will indicate the locations where specialized construction methods will be used.

10.1 Agricultural Areas

Section 4.3 of the ESCAMP, details National Fuels construction procedures in agricultural areas, including topsoil segregation, drain tiles, and maintaining irrigation during construction. Following construction National Fuel will test topsoil and subsoil for compaction at regular intervals in agricultural areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to identify approximate preconstruction conditions. Use penetrometers or other appropriate devices to conduct tests. If necessary, National Fuel will plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

10.2 Road Crossings

As detailed in Section 4.5 of the ESCAMP, unpaved private and public roads supporting minimal traffic volumes are usually crossed by boring or by means of an open cut, if this method is approved by the owner or appropriate road management agency. An open cut crossing may involve closing the road to all traffic and constructing an adequate detour around the crossing area or excavating one-half of the roadway at a time allowing through traffic to be maintained.

The trench for an open cut crossing is excavated with a backhoe or similar equipment, all backfill is compacted, and the road resurfaced. All state, national, and interstate highways as well as all railroads must be crossed by boring, unless the crossing permit allows an open cut crossing.

10.3 Residential Areas

Section 4.2 of the ESCAMP, details National Fuels construction procedures in residential areas.

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11 Waterbody and Wetland Crossings

Waterbody crossing procedures are addressed in Section 5 of the ESCAMP. Wetland crossing procedures are addressed in Section 6 of the ESCAMP. Specific restoration procedures for waterbodies and wetlands are addressed in Section 7.5 of the ESCAMP.

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12 Spill Prevention and Response Procedures

In addition to the requirements of the ESCAMP, the Contractor shall adhere to National Fuel's Spill Prevention and Response Procedures Plan at all times.

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13 Post Construction Activities

13.1 Post-Construction Monitoring

The Project shall adhere to the monitoring requirements set forth in this section and Section 9 of the ESCAMP. Company personnel shall perform the following:

13.1.1 Uplands

Routine maintenance of the ROW is required to allow continued access for routine pipeline patrols, maintaining access in the event of emergency repairs, and visibility during aerial patrols. In upland areas, maintenance of the ROW will involve clearing the entire ROW of woody vegetation.

- Routine vegetation mowing or clearing over a 50-foot wide corridor centered on the pipeline of the permanent ROW in uplands shall be conducted no more frequently than once every three years. However, to facilitate periodic corrosion and leak surveys, a 10-foot wide corridor centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot wide corridor in an herbaceous state.
- In no case shall routine vegetation mowing or clearing occur during the migratory bird nesting season between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency or the USFWS.

13.1.2 Waterbodies and Wetlands

Refer to Sections 9.1.1 and 9.1.2 of the ESCAMP for waterbody and wetland post-construction maintenance activities. These restoration practices are consistent with PFBC comments to this the Project Joint Permit 105 Application submitted on August 8, 2020.

13.2 Reporting

Refer to Section 9.2 of the ESCAMP for post-construction reporting procedures.

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Appendices

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A. Tables 2.2-1 (A thru D)

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A.1 Table 2.2-1A – Waterbodies Crossed by the Project

A.2 Table 2.2-1B – Wetlands Located within Project Work Areas

A.3 Table 2.2-1C – Floodways Crossed by the Project

A.4 Table 2.2-1D – Water Supply Wells and Springs within 150-feet of Project Work Areas

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Table 2.2-1A: Waterbodies Crossed by the Project

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
Line YM58										
McKean	Stream 006	0.9	3.0	Minor	UNT to Wernway Hollow	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 007	1.2	4.0	Minor	UNT to Wernway Hollow	P	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 008	1.4	6.5	Minor	Wernway Hollow	P	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 011	1.5	3.0	Minor	UNT to Wernway Hollow	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 012	1.6	6.5	Minor	UNT to Wernway Hollow	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 014	1.6	1.0	Minor	UNT to Wernway Hollow	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 017	1.8	3.0	Minor	UNT to Wernway Hollow	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 019	2.2	2.5	Minor	UNT to Browns Mill Hollow Run	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 020	2.2	2.5	Minor	UNT to Browns Mill Hollow Run	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 026	3.0	3.0	Minor	UNT to Robbins Brook	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 027	3.3	3.0	Minor	UNT to Robbins Brook	P	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Robbins Brook	3.4	27.0	Intermediate	Robbins Brook	P	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Donley Fork	3.6	7.0	Minor	Donley Fork	P	HQ-CWF	No	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 160	4.2	3.0	Minor	UNT to Robbins Brook	IT	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 030-1	4.9	3.0	Minor	UNT to Robbins Brook	E	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Ditch 02	6.1	3.0	Minor	--	D	--	--	Open Cut	None
McKean	Ditch 03	6.5	3.0	Minor	--	D	--	--	Open Cut	None
McKean	Ditch 05	6.5	5.0	Minor	--	D	--	--	Open Cut	None

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
McKean	Stream 037	6.6	26.2	Intermediate	UNT to Potato Creek	P	TSF	No/TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
McKean	Potato Creek	6.8	205.16	Major	Potato Creek	P	TSF	No/TSW	HDD	3/1 – 6/15
McKean	Stream 038	7.1	5.0	Minor	UNT to Potato Creek	P	TSF	No/TSW	Dam and Pump/Flume	3/1 – 6/15
McKean	Stream 039	7.1	4.0	Minor	UNT to Potato Creek	IT	CWF	No	Dam and Pump/Flume	3/1 – 6/15
McKean	Stream 159	7.2	30	Intermediate	UNT to Potato Creek	E	CWF	No	Dam and Pump/Flume	3/1 – 6/15
McKean	Stream 040	7.9	3.00	Minor	UNT to Walcott Brook	E	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 041	7.9	9.44	Minor	UNT to Walcott Brook	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 043	8.0	16.71	Intermediate	UNT to Walcott Brook	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 054	10.4	8.50	Minor	Coalbed Hollow	P	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 122	11.2	5.0	Minor	UNT to Bemis Hollow	E	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 055	11.2	20.18	Intermediate	Bemis Hollow	P	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 056	11.3	3.0	Minor	UNT to Bemis Hollow	P	HQ-CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Ditch 08	13.3	3.0	Minor	--	D	--	--	Open Cut	None
McKean	Ditch 09	13.3	6.5	Minor	--	D	--	--	Open Cut	None
McKean	Ditch 10	13.4	6.0	Minor	--	D	--	--	Open Cut	None
McKean	Stream 066	13.6	3.00	Minor	UNT to Allegheny Portage Creek	E	CWF	Yes[5] /NRT/ TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
McKean	Ditch 11	13.7	6.5	Minor	--	D	--	--	Open Cut	None
McKean	Ditch 12	13.7	3.0	Minor	--	D	--	--	Open Cut	None
McKean	Ditch 13	13.7	3.0	Minor	--	D	--	--	Open Cut	None
McKean	Allegheny Portage Creek	14.1	129.25	Major	Allegheny Portage Creek	P	TSF	Yes[5] /TSW	HDD	3/1 – 6/15

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
McKean	Stream 067	14.1	3.0	Minor	UNT to Allegheny Portage Creek	IT	CWF	Yes[5] /NRT /TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
McKean	Stream 068	14.2	6.5	Minor	UNT to Allegheny Portage Creek	E	CWF	Yes[5] /NRT /TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
McKean	Stream 070	14.3	6.5	Minor	UNT to Allegheny Portage Creek	IT	CWF	Yes[5] /NRT /TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
McKean	Stream 071	14.5	3.0	Minor	UNT to Allegheny River	E	CWF	No/TSW	Dam and Pump/Flume	3/1 – 6/15
McKean	Stream 073	14.6	3.0	Minor	UNT to Allegheny River	E	CWF	No/TSW	Dam and Pump/Flume	3/1 – 6/15
McKean	Stream 074	14.7	3.0	Minor	UNT to Allegheny River	E	CWF	No/TSW	Dam and Pump/Flume	3/1 – 6/15
McKean	Stream 075	14.7	2.0	Minor	UNT to Allegheny River	IT	CWF	No/TSW	Dam and Pump/Flume	3/1 – 6/15
McKean	Allegheny River	14.8	169.61	Major	Allegheny River	P	CWF	No/TSW	HDD	10/01 – 12/31 3/1 – 6/15
McKean	Ditch 16	14.9	10.0	Minor	--	D	--	--	Open Cut	None
McKean	Ditch 17	14.9	6.5	Minor	--	D	--	--	Open Cut	None
McKean	Stream 077	15.0	17.80	Intermediate	UNT to Benson Hollow	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Stream 078	15.4	3.50	Minor	UNT to Allegheny River	IT	CWF	No/TSW	Dam and Pump/Flume	3/1 – 6/15
McKean	Coleman Creek	15.7	16.15	Intermediate	Coleman Creek	IT	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
McKean	Ditch 18-1	17.5	3.0	Minor	--	D	--	--	Open Cut	None
McKean	Stream 089	18.1	3.0	Minor	UNT to Jordan Hollow	IT	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 091	18.1	3.0	Minor	UNT to Jordan Hollow	IT	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 092	18.1	1.0	Minor	UNT to Jordan Hollow	IT	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 090	18.1	18.14	Intermediate	Jordan Hollow	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 093	18.9	37.74	Intermediate	Ernst Hollow	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
Potter	Stream 094	19.1	27.98	Intermediate	UNT to Sartwell Creek	IT	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Sartwell Creek	19.2	28.49	Intermediate	Sartwell Creek	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 096	19.6	33.00	Intermediate	UNT to Sartwell Creek	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 098	19.7	6.0	Minor	UNT to Sartwell Creek	E	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 099	21.8	21.50	Intermediate	Baker Hollow	P	CWF	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 156	23.0	37.38	Intermediate	Fishing Creek	P	CWF	Yes[5] /NRT/TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
Potter	Stream 151	25.0	3.0	Minor	UNT to East Branch Fishing Creek	IT	HQ-CWF	Yes[5] /NRT/TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
Potter	Stream 116	26.7	3.0	Minor	East Branch Fishing Creek	P	HQ-CWF	Yes[5] /NRT/TSW	Dam and Pump/Flume	10/01 – 12/31 3/1 – 6/15
Potter	Whitney Creek	27.4	3.0	Minor	Whitney Creek	E	EV	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 102	27.8	3.0	Minor	UNT to Whitney Creek	E	EV	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Potter	Stream 103	28.7	4.0	Minor	UNT to Whitney Creek	E	EV	Yes[5] /NRT	Dam and Pump/Flume	10/01 – 12/31
Line YM58 Access Roads										
McKean	Stream 021	PAR-3	3.0	Minor	UNT to Red Mill Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 022	PAR-3	3.0	Minor	UNT to Red Mill Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 023	PAR-3	3.0	Minor	UNT to Red Mill Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 025	PAR-3	3.0	Minor	UNT to Red Mill Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 024	TAR-4	3.0	Minor	UNT to Red Mill Brook	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 109	PAR-5	3.0	Minor	UNT to Irons Hollow	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
McKean	Stream 110	PAR-5	3.0	Minor	UNT to Irons Hollow	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 111	PAR-5	3.0	Minor	UNT to Irons Hollow	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 112	PAR-5	1.0	Minor	UNT to Irons Hollow	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 113	PAR-5	3.5	Minor	UNT to Irons Hollow	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 114	PAR-5	3.5	Minor	UNT to Irons Hollow	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 030-2	TAR-6	3.0	Minor	UNT to Robbins Brook	E	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 032	TAR-6	3.0	Minor	UNT to Robbins Brook	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 033	TAR-6	3.0	Minor	UNT to Robbins Brook	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 034	TAR-6	3.0	Minor	UNT to Robbins Brook	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 035	TAR-6	3.0	Minor	UNT to Robbins Brook	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 036	TAR-6	3.0	Minor	UNT to Robbins Brook	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Ditch 01	TAR-6	3.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
McKean	Stream 044	TAR-10	3.0	Minor	UNT to Walcott Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 045	PAR-12	3.0	Minor	UNT to Walcott Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 198	TAR-10	3.0	Minor	UNT to Walcott Brook	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 046	PAR-12	3.0	Minor	UNT to Walcott Brook	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 047	PAR-12	9.00	Minor	UNT to Walcott Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 048	PAR-12	1.00	Minor	UNT to Walcott Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
McKean	Stream 049	PAR-12	3.0	Minor	UNT to Walcott Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 050	PAR-12	3.0	Minor	UNT to Walcott Brook	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Ditch 06 - JUR	PAR-12	2.5	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
McKean	Stream 051	TAR-13	3.0	Minor	UNT to Walcott Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 052	TAR-13	6.5	Minor	UNT to Walcott Brook	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 053	TAR-13	2.5	Minor	UNT to Walcott Brook	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 057	PAR-14	3.0	Minor	UNT to Bemis Hollow	E	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 058	PAR-14	3.0	Minor	UNT to Bemis Hollow	E	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 118	PAR-14	6.5	Minor	UNT to Bemis Hollow	P	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 059	PAR-14	3.0	Minor	UNT to Bemis Hollow	E	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 060	PAR-14	3.0	Minor	UNT to Bemis Hollow	P	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 061	PAR-14	3.0	Minor	UNT to Bemis Hollow	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 062	PAR-14	6.5	Minor	Bemis Hollow	P	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 063	PAR-14	3.0	Minor	UNT to Bemis Hollow	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 064	PAR-14	3.0	Minor	UNT to Bemis Hollow	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 080	PAR-25	3.0	Minor	UNT to Benson Hollow	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 081	PAR-25	10.0	Minor	UNT to Benson Hollow	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Coleman Creek	PAR-25	10.0	Minor	Coleman Creek	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
McKean	Stream 082	PAR-25	3.0	Minor	UNT to Coleman Creek	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 083	PAR-25	3.0	Minor	UNT to Coleman Creek	IT	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 084	PAR-25	3.0	Minor	UNT to Coleman Creek	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 085	PAR-25	3.0	Minor	UNT to Coleman Creek	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 196	PAR-25	3.0	Minor	UNT to Coleman Creek	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 086	TAR-28	3.0	Minor	UNT to Coleman Creek	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Ditch 18-2	TAR-28	3.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
McKean	Stream 085c	TAR-26	3.0	Minor	UNT to Jordan Hollow	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31 10/1 – 5/31
McKean	Stream 085b	TAR-26	3.0	Minor	UNT to Jordan Hollow	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 085a	TAR-26	3.0	Minor	UNT to Jordan Hollow	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Ditch 18-3	TAR-26	3.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
McKean	Stream 195	SA-7	7.0	Minor	UNT to Potato Creek	E	CWF	Yes[5] /NRT	Existing Road, install temporary bridge	10/01 – 12/31 3/1 – 6/15
Potter	Stream 155	PAR-31	13.5	Intermediate	UNT to Fishing Creek	P	CWF	Yes[5] /NRT/TSW	Existing Road, No Improvements Proposed	10/01 – 12/31 3/1 – 6/15
Potter	Stream 153	PAR-31	1.5	Minor	UNT to Fishing Creek	IT	CWF	Yes[5] /NRT/TSW	Existing Road, No Improvements Proposed	10/01 – 12/31 3/1 – 6/15
Potter	Stream 154	PAR-31	1.0	Minor	UNT to Fishing Creek	IT	CWF	Yes[5] /NRT/TSW	Existing Road, No Improvements Proposed	10/01 – 12/31 3/1 – 6/15
Potter	Ditch 29	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 30	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
Potter	Ditch 31	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 32	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 33	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 34	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 35	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 36	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 37	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 38	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 39	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 40	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 41	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 42	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 43	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 44	PAR-31	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 53	PAR-36	3.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
McKean	Ditch 58 – JUR	PAR-14	3.0	Minor	--	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Ditch 59 - JUR	TAR-11	3.0	Minor	--	E	CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
Potter	Ditch 28	PAR-32	1.5	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
Potter	Stream 150	PAR-33	3.0	Minor	UNT to Fishing Creek	IT	CWF	Yes[5] /NRT/TSW	Existing Road, No Improvements Proposed	10/01 – 12/31 3/1 – 6/15
Potter	Ditch 20	PAR-33	2.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 21	PAR-33	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 24	PAR-33	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 22	PAR-33	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 23	PAR-33	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 25	PAR-33	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 26	PAR-33	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 27	PAR-33	1.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Potter	Ditch 21a	PAR-36	3.0	Minor	--	D	--	--	Existing Road, No Improvements Proposed	None
Marvindale Compressor Station Access Roads										
McKean	Stream 001	PAR-31	4.0	Minor	UNT to Warner Brook	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
McKean	Stream 005	PAR-31	4.0	Minor	UNT to Warner Brook	IT	HQ-CWF	Yes[5] /NRT	Existing Road, No Improvements Proposed	10/01 – 12/31
Line FM100 Abandonment										
Clearfield	Stream 179	0.0	3.0	Minor	UNT to Bennett Branch Sinnemahoning Creek	IT	CWF	Yes[5] /NRT	Abandon in place	10/01 – 12/31
Clearfield	Stream 180	0.2	65.15	Intermediate	Bennett Branch Sinnemahoning Creek	P	CWF	Yes[5] /NRT	Abandon in place	10/01 – 12/31
Clearfield	Stream 181	0.4	3.0	Minor	UNT to Bennett Branch	E	CWF	Yes[5] /NRT	Abandon in place	10/01 – 12/31

County	Waterbody Project ID	MP	Crossing Length[1] (ft.)	FERC Waterbody Classification	Waterbody Name	Flow Regime[2]	Designated Use and Water Quality Criteria[3]	Wild Trout[4,5]	Crossing Method[6]	In-Stream Work Restrictions[7]
					Sinnemahoning Creek					
Clearfield	Stream 145	4.8	21.0	Intermediate	Laurel Run	IT	HQ-CWF	Yes[5] /NRT	Abandon in place	10/01 – 12/31
Elk	Stream 144	7.9	4.0	Minor	UNT to Medix Run	IT	HQ-CWF	Yes[5] /NRT	Abandon in place	10/01 – 12/31
Elk	Stream 143	7.9	1.0	Minor	Medix Run	P	HQ-CWF	Yes[5] /NRT	Abandon in place	10/01 – 12/31

Notes:

[1] Crossing length is the bank-to-bank width of the stream at the pipeline or access road centerline crossing.

[2] Flow regime based on onsite field review. IT – Intermittent; E – Ephemeral; and P – Perennial. As classified by PA Code Title 25 Chapter 93.

[3] As classified by PA Code Title 25 Chapter 93.9 Designated Use shapefile. WWF – Warm Water Fishes; CWF – Cold Water Fishes; MF – Migratory Fishes; TSF – Trout Stocked Fishery; HQ – High Quality; and EV – Exceptional Value.

[4] As classified by PA Code Title 25 Chapter 93 Existing Use and Existing Use Migratory Fish shapefiles. WWF – Warm Water Fishes; CWF – Cold Water Fishes; MF – Migratory Fishes; TSF – Trout Stocked Fishery; HQ – High Quality; EV – Exceptional Value, and NRT – Naturally Reproducing Trout Water.

[5] Regional listings of Approved Trout Waters are provided by the PFBC website: http://pfbc.pa.gov/fishpubs/summaryad/troutwaters.html. Accessed May 2018. Waterbodies within 0.5-mile of a confluence with an Approved Trout Water and within the upper and lower section(s) are also considered Approved Trout Waters.

[6] If it is determined in the field during construction that either dam or pump or flume pipe methods are not possible; a wet trench method may be utilized. Open-cut methods will be evaluated at the time of construction to be used for streams if no flow is present.

[7] As classified under PA Code Title 58, Chapters 57.4 and 57.11 as a Class A Wild Trout Water, Wild Trout Water, or Wilderness Trout Water. In-stream work restrictions for Wild Trout Waters are in effect between October 1 and December 31. All streams classified as Wilderness Trout Waters qualify as EV resources; consultation with PFBC is required to obtain information regarding in-stream construction restriction periods.

Table 2.2-1B (Rev2): Wetlands Located within Project Work Areas

Wetland Name[1]	County	MP Begin	MP End	Wetland Type Classification[2]	EV Status[5]	Wetland Construction Impact Dimensions (ft.)	Total Wetland Impacts (acres)[3]	Permanent Wetland Impacts (acres)[4]
Line YM58								
Wetland 005	McKean	0.5	0.6	PEM	Non-EV	291.52 - 85.02	0.381	0.011
Wetland 006	McKean	0.7	0.8	PEM	Non-EV	99.12 – 72.51	0.169	0.004
Wetland 007	McKean	0.9	1.0	PEM	EV	6,161.17 - 57.97	0.822	0.022
Wetland 007a	McKean	0.9	1.0	PFO	EV	433.91 - 17.68	0.176	--
Wetland 007b	McKean	1.1	1.1	PFO	Non-EV	56.26 - 15.15	0.020	--
Wetland 008	McKean	1.1	1.1	PEM	Non-EV	65.23 - 68.11	0.105	0.003
Wetland 009	McKean	1.2	1.3	PEM	Non-EV	799.23 – 57.55	1.087	0.031
Wetland 009a	McKean	1.2	1.2	PFO	EV	187.00 - 26.94	0.116	--
Pond 03	McKean	1.2	1.2	PUB	EV	37.52 - 23.74	0.020	--
Wetland 009b	McKean	1.3	1.3	PFO	Non-EV	99.81 - 21.86	0.050	--
Wetland 010	McKean	1.4	1.5	PEM	EV	826.46 – 62.51	1.218	0.032
Wetland 010a	McKean	1.4	1.5	PFO	EV	408.50 - 18.76	0.176	--
Wetland 010b	McKean	1.5	1.5	PFO	EV	164.66 - 11.09	0.042	--
Wetland 011	McKean	1.6	1.6	PEM	EV	60.00 - 22.51	0.032	0.001
Wetland 145	McKean	1.6	1.6	PEM	Non-EV	161.49 - 12.00	0.025	--
Wetland 012b	McKean	1.6	1.6	PEM	Non-EV	41.65 - 12.00	0.011	--
Wetland 014	McKean	1.8	1.8	PEM	EV	33.25 - 23.57	0.018	--
Wetland 015	McKean	1.8	1.8	PEM	EV	20.39 - 11.05	0.005	--
Wetland 016	McKean	2.2	2.2	PFO	EV	31.45 - 13.46	0.010	--
Wetland 016a	McKean	2.2	2.2	PEM	EV	103.77 – 71.78	0.175	0.004
Wetland 016b	McKean	2.2	2.2	PEM	EV	192.47 – 50.47	0.230	0.007
Pond 06	McKean	2.8	2.8	PUB	Non-EV	88.57 - 44.16	0.090	--
Wetland 018	McKean	3.0	3.0	PEM	EV	21.66 - 17.35	0.009	--

Wetland Name[1]	County	MP Begin	MP End	Wetland Type Classification[2]	EV Status[5]	Wetland Construction Impact Dimensions (ft.)	Total Wetland Impacts (acres)[3]	Permanent Wetland Impacts (acres)[4]
Wetland 020	McKean	3.3	3.4	PEM	EV	388.67 - 53.01	0.488	0.014
Wetland 020a	McKean	3.3	3.3	PFO	EV	107.42 - 92.05	0.227	0.0211
Wetland 023	McKean	3.4	3.6	PEM	Non-EV	727.41 - 47.79	0.815	0.028
Wetland 025	McKean	3.6	3.6	PEM	Non-EV	81.17 – 57.96	0.111	0.003
Wetland 026	McKean	3.6	3.7	PSS	EV	215.83 - 67.55	0.335	0.050
Wetland 026a	McKean	3.6	3.7	PEM	EV	254.40 - 36.13	0.221	0.009
Wetland 027	McKean	3.7	3.7	PEM	EV	139.53 – 60.25	0.198	0.005
Wetland 028	McKean	4.1	4.1	PEM	Non-EV	258.95 - 52.15	0.320	0.010
Wetland 029	McKean	4.3	4.3	PEM	Non-EV	123.51 – 56.43	0.165	0.005
Wetland 031	McKean	4.9	5.0	PFO	Non-EV	234.81 - 27.31	0.147	--
Wetland 031a	McKean	4.9	5.0	PEM	EV	182.80 – 41.94	0.183	0.007
Wetland 034	McKean	6.6	6.6	PSS	Non-EV	72.56 - 24.08	0.040	--
Wetland 035-1	McKean	6.6	6.6	PSS	Non-EV	80.00 - 15.50	0.027	--
Wetland 037b	McKean	6.8	6.8	PEM	Non-EV	35.68 - 17.57	0.014	--
Wetland 037c	McKean	6.8	6.8	PSS	Non-EV	104.83 - 65.99	0.159	0.015
Wetland 039	McKean	6.7	6.7	PEM	Non-EV	87.69 - 52.05	0.105	--
Wetland 041	McKean	6.8	6.8	PEM	Non-EV	8.85 - 6.02	0.001	--
Wetland 042	McKean	6.9	6.9	PEM	Non-EV	27.75 - 13.27	0.008	--
Wetland 045	McKean	7.2	7.2	PEM	Non-EV	107.08 - 20.63	0.051	--
Wetland 049	McKean	7.7	7.7	PEM	Non-EV	21.13 - 2.00	0.001	--
Wetland 051	McKean	7.8	7.8	PEM	Non-EV	247.36 - 50.01	0.293	0.009
Wetland 054	McKean	7.9	7.9	PEM	EV	55.12 - 36.35	0.047	0.001
Wetland 055	McKean	8.0	8.0	PEM	EV	170.07 - 37.65	0.148	0.001
Wetland 056	McKean	7.62	7.62	PEM	EV	9.79 - 3.00	0.001	--
Wetland 059a	McKean	9.3	9.3	PEM	Non-EV	92.76 - 56.82	0.105	0.002
Wetland 061	McKean	9.7	9.7	PEM	Non-EV	337.04 – 71.34	0.509	0.013

Wetland Name[1]	County	MP Begin	MP End	Wetland Type Classification[2]	EV Status[5]	Wetland Construction Impact Dimensions (ft.)	Total Wetland Impacts (acres)[3]	Permanent Wetland Impacts (acres)[4]
Wetland 066a	McKean	9.9	10.0	PEM	Non-EV	404.04 - 47.86	0.453	0.015
Wetland 127	McKean	9.9	10.0	PFO	Non-EV	265.54 - 23.47	0.143	--
Wetland 067	McKean	10.4	10.4	PEM	EV	59.45 - 15.89	0.022	--
Wetland 126c	McKean	11.2	11.2	PEM	EV	78.65 - 18.37	0.001	--
Wetland 070	McKean	11.2	11.2	PEM	EV	33.07 - 25.06	0.019	--
Wetland 071	McKean	11.2	11.2	PEM	EV	28.51 - 28.68	0.019	--
Wetland 075	McKean	13.9	13.9	PEM	EV	25.88 - 13.50	0.008	--
Wetland 076	McKean	14.0	14.0	PEM	EV	118.18 - 10.47	0.029	<0.001
Wetland 077	McKean	14.0	14.0	PEM	EV	74.80 - 32.03	0.056	0.001
Wetland 078	McKean	14.1	14.1	PEM	EV	39.59 - 13.21	0.012	--
Wetland 080	McKean	14.1	14.1	PEM	EV	150.48 - 16.50	0.058	0.001
Pond 07	McKean	14.1	14.1	PUB	EV	25.77 - 16.20	0.010	--
Wetland 082	McKean	14.1	14.1	PEM	Non-EV	2.56 - 7.00	<0.001	--
Wetland 083	McKean	14.3	14.3	PEM	EV	82.40 - 74.79	0.131	0.003
Wetland 086	McKean	14.5	14.5	PEM	Non-EV	108.61 - 26.26	0.065	--
Wetland 088	McKean	14.5	14.6	PEM	Non-EV	287.84 - 50.00	0.331	--
Wetland 091	McKean	15.1	15.2	PSS	Non-EV	615.12 - 56.72	0.801	0.141
Wetland 091a	McKean	15.2	15.2	PEM	Non-EV	233.71 - 71.20	0.385	0.003
Wetland 094	McKean	15.3	15.4	PEM	Non-EV	123.50 - 15.31	0.043	--
Wetland 096	Potter	18.0	18.0	PEM	EV	22.50 – 8.46	0.004	--
Wetland 101	Potter	19.0	19.0	PEM	EV	61.96 - 68.19	0.099	0.002
Wetland 143	Potter	19.2	19.2	PEM	EV	52.75 -44.59	0.056	0.002
Wetland 142	Potter	23.0	23.1	PSS	EV	142.08-95.04	0.241	0.033
Wetland 141a	Potter	23.2	23.2	PEM	EV	195.52 -62.83	0.289	0.007
Wetland 141	Potter	23.2	23.3	PSS	EV	129.43 -32.31	0.095	0.007
Wetland 125	Potter	26.6	26.6	PEM	Non-EV	66.24 -78.91	0.121	0.003

Wetland Name[1]	County	MP Begin	MP End	Wetland Type Classification[2]	EV Status[5]	Wetland Construction Impact Dimensions (ft.)	Total Wetland Impacts (acres)[3]	Permanent Wetland Impacts (acres)[4]
Wetland 124a	Potter	26.7	26.7	PEM	EV	94.43 -17.99	0.040	0.001
Wetland 124b	Potter	26.7	26.7	PEM	EV	47.13 -28.65	0.032	0.001
Line YM58 Access Roads								
Wetland 118	McKean	4.5	4.5	PEM	EV	83.64 – 1.26	0.002	--
Wetland 119a	McKean	4.5	4.5	PEM	Non-EV	415.00 – 3.43	0.033	--
Wetland 120	McKean	4.5	4.5	PEM	Non-EV	73.54 – 2.63	0.004	--
Wetland 121a	McKean	4.5	4.5	PEM	Non-EV	23.41 - 4.85	0.003	--
Wetland 122	McKean	4.5	4.5	PEM	Non-EV	265.39 – 3.47	0.021	--
Wetland 123a	McKean	4.5	4.5	PEM	Non-EV	167.83 – 6.57	0.025	--
Wetland 035-2	McKean	6.5	6.6	PSS	EV	25.70 – 2.60	0.001	--
Wetland 035a	McKean	6.6	6.6	PEM	Non-EV	43.44 – 0.98	0.001	--
Wetland 058	McKean	8.8	8.8	PEM	Non-EV	173.10 – 2.78	0.011	--
Wetland 058a	McKean	8.8	8.8	PEM	Non-EV	21.83 – 1.65	0.001	--
Wetland 060a	McKean	9.6	9.6	PEM	Non-EV	165.45 – 1.59	0.006	--
Wetland 060	McKean	9.6	9.6	PEM	Non-EV	66.83 – 0.97	0.001	--
Wetland 061b	McKean	9.8	9.8	PEM	Non-EV	88.57 - 3.63	0.007	--
Wetland 062	McKean	10.0	10.0	PEM	Non-EV	116.88 – 4.32	0.012	--
Wetland 063	McKean	10.0	10.0	PEM	Non-EV	23.40 – 0.26	<0.001	--
Wetland 065	McKean	10.1	10.1	PEM	Non-EV	4.39 – 90.59	0.009	--
Wetland 140	McKean	11.5	11.5	PEM	Non-EV	18.44 – 2.49	0.001	--
Wetland 265	McKean	11.8	11.8	PFO	EV	1.66 - 101.53	0.004	--
Wetland 276	McKean	11.8	11.8	PSS	EV	3.23 - 7.36	0.001	--
Wetland 276a	McKean	12.1	12.1	PEM	EV	1.14 - 30.91	0.001	--
Wetland 264	McKean	12.6	12.6	PEM	EV	27.22 - 12.00	0.007	--
Wetland 089	McKean	14.4	14.4	PEM	Non-EV	17.80 – 1.39	0.001	--
Wetland 258a	Potter	21.5	21.5	PEM	Non-EV	38.00 -2.28	0.002	--

Wetland Name[1]	County	MP Begin	MP End	Wetland Type Classification[2]	EV Status[5]	Wetland Construction Impact Dimensions (ft.)	Total Wetland Impacts (acres)[3]	Permanent Wetland Impacts (acres)[4]
Wetland 261	Potter	21.5	21.5	PEM	Non-EV	25.00 – 3.50	0.002	--
Line KL Extension								
Wetland 004b	McKean	0.2	0.2	PEM	EV	237.50 – 123.99	0.583	0.009
Marvindale Compressor Station Access Roads								
Wetland 004	McKean	0.1	0.1	PFO	EV	0.59 - 8.07	<0.001	--
Wetland 285b	McKean	0.3	0.3	PEM	Non-EV	2.21 - 23.62	0.001	--
Line YM224 Loop								
Wetland 112	Potter	1.1	1.1	PEM	Non-EV	142.31 -12.00	0.039	<0.001
Wetland 114	Potter	1.1	1.1	PEM	Non-EV	166.17 -12.00	0.046	--
Line FM100 Abandonment								
Wetland 149	Clearfield	0.0	0.1	PSS	Non-EV	49.00 – 42.00	0.055	0.008
Wetland 149b	Clearfield	0.1	0.1	PSS	Non-EV	34.00 – 0.30	<0.001	--
Wetland 149c	Clearfield	0.3	0.3	PEM	Non-EV	49.00 – 93.00	0.106	0.002
Wetland 149d	Clearfield	0.3	0.3	PSS	Non-EV	49.00 – 22.00	0.025	<0.001
Wetland 139a	Clearfield	4.7	4.7	PEM	EV	35.00 – 1.00	0.001	0.001
Wetland 139b	Clearfield	4.8	4.8	PEM	EV	196.00 – 1.00	0.004	0.004
Wetland 139	Clearfield	4.8	4.8	PEM	EV	50.00 – 17.00	0.020	--
Wetland 316a	Clearfield	6.3	6.3	PEM	Non-EV	4.00 – 1.00	<0.001	<0.001
Wetland 318	Clearfield	6.6	6.7	PEM	Non-EV	34.00 – 1.00	0.001	0.001
Wetland 320	Elk	7.4	7.4	PEM	Non-EV	155.00 – 1.00	0.004	0.004
Wetland 137	Elk	7.9	7.9	PEM	EV	3.00 – 2.75	<0.001	--
Wetland 138	Elk	8.0	8.0	PEM	Non-EV	49.00 – 13.00	0.015	<0.001
Wetland 136	Elk	9.6	9.6	PEM	EV	709.00 – 1.00	0.003	0.003
Wetland 136a	Elk	9.7	9.7	PEM	Non-EV	72.00 – 1.00	0.002	0.002
Wetland 136b	Elk	9.8	9.8	PEM	Non-EV	78.00 – 1.00	0.002	0.002
Wetland 135	Elk	11.0	11.1	PEM	Non-EV	36.00 – 28.00	0.040	0.016

Wetland Name[1]	County	MP Begin	MP End	Wetland Type Classification[2]	EV Status[5]	Wetland Construction Impact Dimensions (ft.)	Total Wetland Impacts (acres)[3]	Permanent Wetland Impacts (acres)[4]
Wetland 311	Elk	11.2	11.3	PEM	Non-EV	31.00 – 24.00	0.030	0.013
Wetland 313	Elk	11.5	11.5	PEM	Non-EV	128.00 – 1.00	0.003	0.003
Wetland 134a	Elk	11.6	12.0	PEM	Non-EV	54.00 -48.00	0.111	0.052
Wetland 134	Elk	12.0	12.1	PEM	Non-EV	435.00 – 1.00	0.010	0.010
Wetland 133	Elk	12.3	12.3	PEM	EV	58.00 – 1.00	0.001	0.001
Wetland 325	Elk	13.2	13.2	PEM	Non-EV	169.00 – 1.00	0.004	0.004
Wetland 327	Elk	13.7	13.7	PEM	Non-EV	351.00 – 1.00	0.008	0.008
Wetland 329a	Elk	14.9	14.9	PEM	Non-EV	20.00 – 1.00	<0.001	<0.001
Wetland 331	Elk	18.4	18.4	PEM	Non-EV	195.00 – 1.00	0.004	0.004
Wetland 333	Elk	19.1	19.1	PEM	Non-EV	44.00 – 1.00	0.001	0.001
Wetland 148	Cameron	22.1	22.1	PSS	EV	91.00 – 1.00	0.002	0.002
Wetland 303	Cameron	26.0	26.0	PSS	Non-EV	200.00 -15.00	0.069	--
Wetland 303b	Cameron	26.0	26.0	PSS	Non-EV	12.00 -15.00	0.004	--
Wetland 147a	Cameron	26.7	26.7	PEM	Non-EV	103.00 – 1.00	0.002	0.002
Wetland 147	Cameron	26.8	26.8	PEM	Non-EV	5.00 – 1.00	<0.001	<0.001
Wetland 305a	Cameron	26.9	26.9	PEM	Non-EV	13.00 – 1.00	<0.001	--
Wetland 305	Cameron	27.0	27.0	PEM	Non-EV	158.00 – 20.00	0.075	--
Wetland 297a	Cameron	28.9	28.9	PEM	Non-EV	28.00 -1.00	0.001	0.001
Wetland 297	Cameron	28.9	29.1	PEM	Non-EV	928.00 -1.00	0.021	0.021
Wetland 297b	Cameron	29.1	29.1	PEM	Non-EV	28.00 -1.00	0.001	0.001
Wetland 299	Cameron	29.3	29.3	PEM	Non-EV	145.00 – 1.00	0.003	0.003
Wetland 299a	Cameron	29.6	29.6	PEM	Non-EV	226.00 – 1.00	0.005	0.005
Wetland 294	Cameron	30.4	30.4	PEM	EV	11.00 -1.00	<0.001	<0.001
Wetland 292	Cameron	30.8	30.8	PEM	EV	106.00 – 17.00	0.042	--
Wetland 131	Potter	38.6	38.6	PEM	EV	168.00 – 1.00	0.007	0.007
Wetland 131	Cameron	38.6	38.6	PEM	EV	168.00 – 1.00	0.001	0.001

Wetland Name[1]	County	MP Begin	MP End	Wetland Type Classification[2]	EV Status[5]	Wetland Construction Impact Dimensions (ft.)	Total Wetland Impacts (acres)[3]	Permanent Wetland Impacts (acres)[4]
Wetland 131a	Potter	38.7	38.7	PEM	EV	1.00 – 3.00	<0.001	<0.001
Wetland 130b	Potter	39.3	39.3	PEM	Non-EV	1.00 – 22.00	0.001	0.001
Wetland 130	Potter	39.7	39.7	PEM	EV	1.00 – 28.00	0.001	0.001
Wetland 130a	Potter	39.7	39.7	PEM	EV	1.00 – 66.00	0.002	0.002
Wetland 129a	Potter	40.1	40.1	PEM	EV	1.00 – 78.00	0.002	0.002
Wetland 154	Potter	40.7	40.7	PEM	EV	1.00 – 30.00	0.001	0.001
Wetland 146	Potter	41.2	41.2	PEM	EV	1.00 – 4.00	<0.001	<0.001
Wetland 287	Potter	41.7	41.8	PEM	EV	1.00 – 348.00	0.008	0.008
Wetland 288a	Potter	41.8	41.8	PEM	EV	1.00 – 33.00	0.001	0.001
Wetland 288	Potter	41.8	41.9	PEM	EV	1.00 – 210.00	0.005	0.005
Wetland 290	Potter	42.5	42.5	PEM	EV	1.00 – 20.00	<0.001	<0.001
						PEM Subtotal[6]	**11.713**	**0.465**
						PSS Subtotal[6]	**1.855**	**0.257**
						PFO Subtotal[6]	**1.110**	**0.021**
						PUB Subtotal[6]	**0.120**	**0.000**
						Project Total[6]	**14.798**	**0.743**

[1] Field designations represent unique identifiers assigned to each wetland during field surveys.

[2] Wetland classifications are based on the Cowardin classification systems whereby P = Palustrine, EM = Emergent, FO = Forested, and SS = Scrub-Shrub.

[3] Total wetland impacts include all temporary and permanent impacts to wetlands.

[4] Permanent wetland impacts account for PFO and PSS wetlands that will be converted into a 10-foot-wide permanently maintained ROW. Permanent wetland impacts also include the length of a wetland crossing, multiplied by the width of the pipeline it is crossing.

[5] Exceptional Value (EV) wetlands include wetland areas that: A) serve as habitat for endangered/threated species; B) are located within 0.5 miles of wetlands that maintain the habitat of a threatened/endangered species; c) are located in or along the floodplain of a wild trout stream of waters listed as exceptional value under chapter 93 and the floodplain of streams tributary thereto; d) are located along existing public or private drinking water supplies (surface or groundwater); or e) are in natural/wild areas within state forest or parks or federal wilderness areas https://www.pacode.com/secure/data/025/chapter105/s105.17.html

[6] Differences between the sum of the individual records and the subtotals and total acres reported are due to rounding to the nearest tenth. The subtotals and total acres reported were derived from GIS analysis.

Table 2.2-1C: Floodways Crossed by the Project

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
Line YM58						
McKean	0.9	41.70952384	-78.4841501	Stream 006	UNT to Wernwag Hollow	HQ-CWF
McKean	1.2	41.71148123	-78.47999842	Stream 007	UNT to Wernwag Hollow	HQ-CWF
McKean	1.4	41.71328078	-78.47698812	Stream 008	Wernwag Hollow	HQ-CWF
McKean	1.5	41.71436376	-78.47474427	Stream 011	UNT to Wernwag Hollow	HQ-CWF
McKean	1.6	41.71464539	-78.47414846	Stream 012	UNT to Wernwag Hollow	HQ-CWF
McKean	1.6	41.71479147	-78.47411364	Stream 014	UNT to Wernwag Hollow	HQ-CWF
McKean	1.8	41.71685195	-78.47032115	Stream 017	UNT to Wernwag Hollow	HQ-CWF
McKean	2.2	41.71984324	-78.46531115	Stream 019	UNT to Browns Mill Hollow Run	HQ-CWF
McKean	2.2	41.7200442	-78.46492246	Stream 020	UNT to Browns Mill Hollow Run	HQ-CWF
McKean	3.0	41.72633739	-78.45228861	Stream 026	UNT to Robbins Brook	HQ-CWF
McKean	3.3	41.72975562	-78.44757736	Stream 027	UNT to Robbins Brook	HQ-CWF
McKean	3.4	41.73038108	-78.44719633	Robbins Brook	Robbins Brook	HQ-CWF
McKean	3.6	41.73307059	-78.44369357	Donley Fork	Donley Fork	HQ-CWF
McKean	4.6	41.74251833	-78.43158935	Stream 160	UNT to Robbins Brook	HQ-CWF
McKean	4.9	41.74315861	-78.42554339	Stream 030 -1	UNT to Robbins Brook	HQ-CWF
McKean	6.6	41.75293467	-78.39749265	Stream 037	UNT to Potato Creek	TSF
McKean	6.7	41.7544034	-78.39399173	Potato Creek	Potato Creek	TSF
McKean	7.1	41.7544615	-78.38972579	Stream 038	UNT to Potato Creek	TSF
McKean	7.1	41.75444543	-78.38935917	Stream 039	UNT to Potato Creek	CWF
McKean	7.2	41.75441042	-78.38743214	Stream 159	UNT to Potato Creek	CWF
McKean	7.9	41.75706657	-78.37493616	Stream 040	UNT to Walcott Brook	CWF
McKean	7.9	41.75697296	-78.37485919	Stream 041	UNT to Walcott Brook	CWF
McKean	8.0	41.75699609	-78.37249149	Stream 043	UNT to Walcott Brook	CWF

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
McKean	10.4	41.76355628	-78.32941825	Stream 054	Coalbed Hollow	HQ-CWF
McKean	11.2	41.76718262	-78.3146635	Stream 122	UNT to Bemis Hollow	HQ-CWF
McKean	11.2	41.76724807	-78.31686750	Stream 121	UNT to Bemis Hollow	HQ-CWF
McKean	11.3	41.76712779	-78.3145119	Stream 055	Bemis Hollow	HQ-CWF
McKean	11.3	41.76712281	-78.31426231	Stream 056	UNT to Bemis Hollow	HQ-CWF
McKean	11.3	41.76734102	-78.31398342	Stream 057	UNT to Bemis Hollow	HQ-CWF
McKean	13.6	41.78305035	-78.27729453	Stream 066	UNT to Alleghany Portage Creek	CWF
McKean	14.0	41.78829673	-78.27052216	Allegheny Portage Creek	Allegheny Portage Creek	TSF
McKean	14.1	41.7887135	-78.26995579	Stream 067	UNT to Alleghany Portage Creek	CWF
McKean	14.2	41.78988336	-78.26787878	Stream 068	UNT to Alleghany Portage Creek	CWF
McKean	14.3	41.79097787	-78.26622532	Stream 070	UNT to Alleghany Portage Creek	CWF
McKean	14.5	41.7925588	-78.26424459	Stream 071	UNT to Allegheny River	CWF
McKean	14.6	41.79351298	-78.26314877	Stream 073	UNT to Allegheny River	CWF
McKean	14.7	41.79421314	-78.26217648	Stream 074	UNT to Allegheny River	CWF
McKean	14.7	41.79442351	-78.2619073	Stream 075	UNT to Allegheny River	CWF
McKean	14.9	41.79592939	-78.26034516	Allegheny River	Allegheny River	CWF
McKean	15.4	41.795592	-78.248992	Stream 078	UNT to Allegheny River	CWF
McKean	15.7	41.80863178	-78.22251845	Coleman Creek-1	Coleman Creek	CWF
McKean	18.0	41.81016678	-78.20603292	Stream 086	UNT to Jordan Hollow	CWF
McKean	18.1	41.8110168	-78.20534566	Stream 089	UNT to Jordan Hollow	CWF
McKean	PAR-3	41.7178022	-78.45295649	Stream 022	UNT to Red Mill Brook	CWF
McKean	PAR-3	41.71663716	-78.45152507	Stream 023	UNT to Red Mill Brook	CWF
McKean	PAR-3	41.71277612	-78.44639801	Stream 025	UNT to Red Mill Brook	CWF
McKean	PAR-3	41.71380682	-78.44632243	Stream 024	UNT to Red Mill Brook	CWF
McKean	PAR-3	41.72249441	-78.45397676	Stream 021	UNT to Red Mill Brook	CWF

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
McKean	PAR-5	41.76275543	-78.47466734	Stream 109	UNT to Irons Hollow	CWF
McKean	PAR-5	41.76165361	-78.4739665	Stream 110	UNT to Irons Hollow	CWF
McKean	PAR-5	41.75557959	-78.47233415	Stream 111	UNT to Irons Hollow	CWF
McKean	PAR-5	41.75714654	-78.47049738	Stream 112	UNT to Irons Hollow	CWF
McKean	PAR-5	41.75778345	-78.46514879	Stream 113	UNT to Irons Hollow	CWF
McKean	PAR-5	41.74456085	-78.43976928	Stream 114	UNT to Irons Hollow	CWF
McKean	PAR-5	41.74315861	-78.42554339	Stream 030-2	UNT to Robbins Brook	HQ-CWF
McKean	TAR-6	41.73616244	-78.40797283	Stream 032	UNT to Robbins Brook	HQ-CWF
McKean	TAR-6	41.73596673	-78.40637594	Stream 033	UNT to Robbins Brook	HQ-CWF
McKean	TAR-6	41.73650956	-78.40428649	Stream 034	UNT to Robbins Brook	HQ-CWF
McKean	TAR-6	41.73702569	-78.40279245	Stream 035	UNT to Robbins Brook	HQ-CWF
McKean	TAR-6	41.737596	-78.40079208	Stream 036	UNT to Robbins Brook	HQ-CWF
McKean	TAR-10	41.74903927	-78.37653927	Stream 044	UNT to Walcott Brook	CWF
McKean	PAR-12	41.76034218	-78.36627787	Stream 045	UNT to Walcott Brook	CWF
McKean	TAR-10	41.75373402	-78.36461709	Stream 198	UNT to Walcott Brook	CWF
McKean	PAR-12	41.76108322	-78.3644886	Stream 046	UNT to Walcott Brook	CWF
McKean	PAR-12	41.76105066	-78.35817164	Stream 047	UNT to Walcott Brook	CWF
McKean	PAR-12	41.76093737	-78.3579907	Stream 048	UNT to Walcott Brook	CWF
McKean	PAR-12	41.76041497	-78.35498313	Stream 049	UNT to Walcott Brook	CWF
McKean	PAR-12	41.76322064	-78.3500265	Stream 050	UNT to Walcott Brook	CWF
McKean	TAR-13	41.74881982	-78.32859692	Stream 051	UNT to Walcott Brook	CWF
McKean	TAR-13	41.74802283	-78.32751972	Stream 052	UNT to Walcott Brook	CWF
McKean	TAR-13	41.74798343	-78.32602203	Stream 053	UNT to Walcott Brook	CWF
McKean	TAR-14	41.77139407	-78.31068016	Stream 058	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.76735896	-78.3083331	Stream 118	UNT to Bemis Hollow	HQ-CWF

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
McKean	TAR-14	41.78092323	-78.30711247	Stream 061	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.78404182	-78.30766374	Stream 062	Bemis Hollow	HQ-CWF
McKean	PAR-25	41.81054173	-78.2381618	Stream 080	UNT to Benson Hollow	CWF
McKean	PAR-25	41.81025457	-78.2337313	Stream 081	Benson Hollow	CWF
McKean	PAR-25	41.79599358	-78.24327073	Coleman Creek-2	Coleman Creek	CWF
McKean	PAR-25	41.80961941	-78.2212397	Stream 082	UNT to Coleman Creek	CWF
McKean	PAR-25	41.80998285	-78.22089958	Stream 083	UNT to Coleman Creek	CWF
McKean	PAR-25	41.81351769	-78.21890368	Stream 084	UNT to Coleman Creek	CWF
McKean	PAR-25	41.81661466	-78.2189201	Stream 085	UNT to Coleman Creek	CWF
McKean	PAR-25	41.75373402	-78.36461709	Stream 196	UNT to Coleman Creek	CWF
McKean	TAR-26	41.81393544	-78.20897827	Stream 085c	UNT to Jordan Hollow	CWF
McKean	TAR-26	41.81581804	-78.20923341	Stream 085b	UNT to Jordan Hollow	CWF
McKean	TAR-26	41.81744083	-78.20848581	Stream 085a	UNT to Jordan Hollow	CWF
McKean	SA-7	41.80948877	-78.42597083	Stream 195	UNT to Potato Creek	CWF
McKean	18.1	41.81101887	-78.20535037	Stream 089	UNT to Jordan Hollow	CWF
McKean	TAR-14	41.78418368	-78.30799893	Stream 064	UNT to Bemis Hollow	HQ-CWF
McKean	15.0	41.79601342	-78.2564689	Stream 077	UNT to Benson Hollow	CWF
McKean	15.4	41.795592	-78.248992	Stream 078	UNT to Allegheny River	CWF
McKean	PAR -25	41.80998285	-78.22089958	Stream 083	UNT to Coleman Creek	CWF
McKean	TAR-28	41.81016678	-78.20603292	Stream 086	UNT to Jordan Hollow	CWF
McKean	TAR-14	41.76735896	-78.3083331	Stream 118	UNT to Bemis Hollow	HQ-CWF
McKean	6.8	41.75450282	-78.38716425	Stream 158	UNT to Potato Creek	CWF
McKean	TAR-17	41.77632414	-78.29238775	Stream 320	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.77970306	-78.30801112	Stream 321	Bemis Hollow	HQ-CWF
McKean	TAR-14	41.77999917	-78.30779369	Stream 344	Bemis Hollow	HQ-CWF

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
McKean	TAR-14	41.78097151	-78.30710417	Stream 345	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.77652863	-78.30990042	Stream 347	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.77984563	-78.30790509	Stream 348	Bemis Hollow	HQ-CWF
McKean	TAR-14	41.78041799	-78.30748762	Stream 349	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.78082273	-78.30717015	Stream 350	UNT to Baker Hollow	CWF
McKean	TAR-14	41.78165366	-78.30687864	Stream 351	Bemis Hollow	HQ-CWF
McKean	TAR-14	41.78248135	-78.30673406	Stream 352	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.78344186	-78.30704705	Stream 353	UNT to Bemis Hollow	HQ-CWF
McKean	TAR-14	41.78392674	-78.30734922	Stream 354	UNT to Bemis Hollow	HQ-CWF
Potter	18.1	41.811187	-78.2051968	Stream 091	UNT to Jordan Hollow	CWF
Potter	18.1	41.8111918	-78.2050226	Stream 092	UNT to Jordan Hollow	CWF
Potter	18.1	41.8112494	-78.2051133	Stream 090	Jordan Hollow	CWF
Potter	18.9	41.8180475	-78.1947849	Stream 093	Ernst Hollow	CWF
Potter	19.1	41.8202685	-78.1930235	Stream 094	UNT to Sartwell Creek	CWF
Potter	19.2	41.8216804	-78.191606	Sartwell Creek	Sartwell Creek	CWF
Potter	19.6	41.8238897	-78.1841700	Stream 096	UNT to Sartwell Creek	CWF
Potter	19.7	41.8247684	-78.1828970	Stream 098	UNT to Sartwell Creek	CWF
Potter	19.9	41.82744521	-78.18129453	Stream 197	UNT to Sartwell Creek	CWF
Potter	21.4	41.84664819	-78.15703885	Stream 312	UNT to Baker Hollow	CWF
Potter	21.8	41.8370533	-78.14919817	Stream 099	Baker Hollow	CWF
Potter	23.0	41.8359036	-78.1282262	Stream 156	Fishing Creek	CWF
Potter	23.2	41.83548861	-78.12540536	Stream 152	UNT to Fishing Creek	CWF
Potter	25.0	41.8391466	-78.0965789	Stream 151	UNT to East Branch Fishing Creek	HQ-CWF
Potter	26.0	41.8448506	-78.0796395	Stream 117	UNT to Fishing Creek	CWF
Potter	26.8	41.8452839	-78.0647304	Stream 116	East Branch Fishing Creek	HQ-CWF

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
Potter	27.4	41.8447063	-78.0527711	Whitney Creek	Whitney Creek	EV
Potter	27.8	41.84510165	-78.0444320	Stream 102	UNT to Whitney Creek	EV
Potter	28.7	41.85001485	-78.02968847	Stream 103	UNT to Whitney Creek	EV
Potter	PAR-31	41.8374915	-78.1201519	Stream 155	UNT to Fishing Creek	CWF
Potter	PAR-31	41.8393374	-78.1087150	Stream 153	UNT to Fishing Creek	CWF
Potter	PAR-31	41.8396724	-78.1078149	Stream 154	UNT to Fishing Creek	CWF
Potter	PAR-33	41.8462215	-78.0841382	Stream 150	UNT to Fishing Creek	CWF
Line KL Extension						
McKean	0.0	41.70435834	-78.50000496	Stream 005	UNT to Warner Brook	HQ-CWF
McKean	0.0	41.70377389	-78.49992336	Stream 003	UNT to Warner Brook	HQ-CWF
McKean	0.0	41.70416085	-78.49996793	Stream 001	UNT to Warner Brook	HQ-CWF
FM100 Abandonment						
Clearfield	0.1	41.21946452	-78.55628583	Stream 180	Bennett Branch Sinnemahoning Creek	CWF
Clearfield	0.2	41.21912454	-78.55234646	Stream 181	UNT to Bennett Branch Sinnemahoning Creek	CWF
Clearfield	4.8	41.23290313	-78.47530799	Stream 145	Laurel Run	HQ-CWF
Clearfield	4.8	41.23284329	-78.47489421	Stream 146	UNT to Laurel Run	HQ-CWF
Clearfield	4.8	41.23277665	-78.47443993	Stream 147	Saunders Run	HQ-CWF
Clearfield	0.0	41.21983712	-78.5590388	Stream 179	UNT to Bennett Branch Sinnemahoning Creek	CWF
Clearfield	1.4	41.22173758	-78.53328573	Stream 182	UNT to Bennett Branch Sinnemahoning Creek	WWF
Clearfield	1.7	41.22174546	-78.52883081	Stream 183	UNT to Bennett Branch Sinnemahoning Creek	WWF
Clearfield	1.7	41.22174608	-78.52847668	Stream 184	UNT to Bennett Branch Sinnemahoning Creek	WWF
Clearfield	1.7	41.22174672	-78.52810906	Stream 185	UNT to Bennett Branch Sinnemahoning Creek	WWF
Clearfield	2.1	41.22176735	-78.52084423	Stream 186	UNT to Bennett Branch Sinnemahoning Creek	WWF
Clearfield	2.2	41.22177541	-78.51871262	Stream 187	UNT to Bennett Branch Sinnemahoning Creek	WWF
Clearfield	2.2	41.22177864	-78.51785314	Stream 188	UNT to Bennett Branch Sinnemahoning Creek	WWF

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
Clearfield	2.1	41.22177247	-78.519493	Stream 190	UNT to Bennett Branch Sinnemahoning Creek	WWF
Clearfield	7.0	41.23932616	-78.43524847	Stream 372	UNT to Little Medix Run	HQ-CWF
Elk	7.9	41.24112555	-78.41853688	Stream 144	UNT to Medix Run	HQ-CWF
Elk	7.9	41.24118949	-78.41821967	Stream 143	Medix Run	HQ-CWF
Elk	19.6	41.32348563	-78.24805042	Stream 137	UNT to Miller Run	HQ-CWF
Elk	19.5	41.32324776	-78.24953991	Stream 138	UNT to Miller Run	HQ-CWF
Elk	19.5	41.32317407	-78.25000128	Stream 139	UNT to Mix Run	EV
Elk	12.3	41.26481851	-78.34432451	Stream 140	UNT to Mix Run	EV
Elk	12.3	41.26463498	-78.34450821	Stream 141	Mix Run	EV
Elk	9.6	41.24466248	-78.38586605	Stream 142	UNT to Medix Run	HQ-CWF
Cameron	22.2	41.32919638	-78.2004463	Stream 175	Mix Run	HQ-CWF
Cameron	22.2	41.32891235	-78.20073939	Stream 176	UNT to Mix Run	HQ-CWF
Cameron	22.2	41.32864154	-78.20101884	Stream 177	UNT to Mix Run	HQ-CWF
Cameron	30.8	41.40719538	-78.11400061	Stream 360	UNT to Lick Island Run	HQ-CWF
Cameron	30.4	41.40179547	-78.1154495	Stream 361	UNT to Lick Island Run	HQ-CWF
Cameron	29.4	41.38741538	-78.11531008	Stream 362	UNT to Grove Run	HQ-CWF
Cameron	26.2	41.34961853	-78.13542578	Stream 363	UNT to Driftwood Branch Sinnemahoning Creek	TSF
Cameron	RR Access	41.34559433	-78.13782607	Stream 365	Driftwood Branch Sinnemahoning Creek	TSF
Cameron	RR Access	41.34586622	-78.13796536	Stream 366	UNT to Driftwood Branch Sinnemahoning Creek	TSF
Cameron	SR 120 North Access	41.35931752	-78.12852391	Stream 367	UNT to Johnson Run	HQ-CWF
Cameron	SR 120 North Access	41.3629155	-78.12481532	Stream 368	UNT to Johnson Run	HQ-CWF
Cameron	27.1	41.35797232	-78.12829363	Stream 369	UNT to Johnson Run	HQ-CWF
Cameron	27.0	41.35753809	-78.12856463	Stream 370	UNT to Johnson Run	HQ-CWF
Cameron	MLV GIC0-5042 Access	41.33115784	-78.19948779	Stream 371	UNT to Mix Run	HQ-CWF

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
Cameron	23.2	41.33125816	-78.18382838	Stream 174	Bennett Branch Sinnemahoning Creek	WWF
Cameron	26.8	41.35497482	-78.12688115	Stream 169	Driftwood Branch Sinnemahoning Creek	TSF
Cameron	38.7	41.51697746	-78.09557138	Stream 127	UNT to Hunts Run	HQ-CWF
Cameron	38.1	41.50905801	-78.09629892	Stream 130	UNT to Berge Run	HQ-CWF
Cameron	38.1	41.50933212	-78.09626708	Stream 131	UNT to Berge Run	HQ-CWF
Cameron	25.7	41.34590607	-78.1433577	Stream 132	UNT to Driftwood Branch Sinnemahoning Creek	TSF
Cameron	19.7	41.32385598	-78.24573111	Stream 134	UNT to Miller Run	HQ-CWF
Cameron	19.7	41.32380475	-78.24605197	Stream 136	UNT to Miller Run	HQ-CWF
Cameron	27.4	41.36211159	-78.12424703	Stream 166	UNT to Driftwood Branch Sinnemahoning Creek	TSF
Cameron	27.4	41.36226577	-78.12412207	Stream 167	UNT to Driftwood Branch Sinnemahoning Creek	TSF
Cameron	27.4	41.36223789	-78.12406492	Stream 168	UNT to Driftwood Branch Sinnemahoning Creek	TSF
Cameron	25.0	41.34031579	-78.1543003	Stream 170	UNT to Driftwood Branch Sinnemahoning Creek	TSF
Cameron	25.0	41.3403958	-78.15415735	Stream 171	UNT to Bennett Branch Sinnemahoning Creek	WWF
Cameron	24.9	41.33956728	-78.15562219	Stream 172	UNT to Bennett Branch Sinnemahoning Creek	WWF
Cameron	23.9	41.33232304	-78.17268958	Stream 173	UNT to Bennett Branch Sinnemahoning Creek	WWF
Potter	39.7	41.53325786	-78.09486496	Stream 126	UNT to Little Bailey Run	HQ-CWF
Potter	38.7	41.51864096	-78.09550196	Stream 128	UNT to Hunts Run	HQ-CWF
Potter	38.7	41.51800033	-78.09552869	Stream 129	UNT to Hunts Run	HQ-CWF
Potter	40.1	41.5383674	-78.09455677	Stream 133	UNT to Little Bailey Run	HQ-CWF
Potter	42.5	41.57005924	-78.07311992	Stream 161	West Darian Run	HQ-CWF
Potter	42.5	41.56999738	-78.07316261	Stream 162	UNT to West Darian Run	HQ-CWF
Potter	41.2	41.55280648	-78.08516977	Stream 163	UNT to Bailey Run	EV
Potter	41.2	41.55256454	-78.08533522	Stream 164	Bailey Run	EV
Potter	40.7	41.54603404	-78.08985339	Stream 165	UNT to Bailey Run	EV
Potter	41.1	41.55220421	-78.08558163	Stream 199	Bailey Run	EV

County	MP/ Access Road Name	Latitude	Longitude	Waterbody Project ID	Waterbody Name	Designated Use and Water Quality Criteria
Potter	41.8	41.56054858	-78.07968963	Stream 357	UNT to Bailey Run	EV
Potter	41.9	41.56134213	-78.07913577	Stream 358	UNT to Bailey Run	EV
Potter	40.7	41.53878274	-78.09453778	Stream 125	Little Bailey Run	HQ-CWF

Table 2.2-1D-1 (Rev2): Water Supply Wells and Springs within 150-feet of Project Work Areas

Facility[1]/ County	MP	Latitude	Longitude	Well Type	Well ID	Workspace Type	Approx. Distance from Construction Workspace (feet)	Current Use
Line YM58								
McKean	19.1	41.820862	-78.193240	Spring	N/A	ATWS	91.0	Not utilized as a source of potable water
Potter	23.8	41.835457	-78.125261	Spring	N/A	ATWS	114.5	Not utilized as a source of potable water
Potter	23.2	41.83570	-78.12474	Spring	N/A	TWS	75.1	Not utilized as a source of potable water
Line KL Extension								
McKean	0.0	41.70135	-78.49992	Agricultural Irrigation	594683	ATWS	0	Withdrawal
McKean	0.0	41.70167	-78.49972	Domestic	131079	ATWS	0	Withdrawal
Line FM100 Abandonment								
Elk	8.0	41.24098	-78.417066	Spring	N/A	TWS	28.4	Not utilized as a source of potable water
Potter	44.0	41.59083	-78.05917	Domestic	N/A	Access Road	53.2	Withdrawal

[1] Project components not addressed in table do not have water supply wells/springs within 150 feet of Project workspaces.

Table 2.2-1D-2 (Rev2): Water Supply Wells within 400-feet of Project HDDs

Facility/ County	MP	Latitude	Longitude	Well Type	Parcel ID	Workspace Type	Approx. Distance from Construction Workspace (feet)	Current Use
Line YM58								
McKean	~6.9	41.75516	-78.39358	Domestic	27-002-101.24	ATWS	262	Withdrawal
McKean	~6.9	41.75308	-78.39197	Domestic	27-002-101	ATWS	199	Withdrawal
McKean	~14.9	41.79504	-78.25973	Domestic	26-006-157	TWS	277	Withdrawal
McKean	~15.0	41.79709	-78.25756	Domestic	26-006-171a	ATWS	276	Withdrawal
McKean	~15.0	41.79678	-78.25708	Domestic	26-006-171b	ATWS	189	Withdrawal
McKean	~15.0	41.79589	-78.25685	Domestic	26-006-171.3	TWS	29	Withdrawal

Source: PAGWIS 2018, landowner coordination and Project environmental survey.

B. PADEP Standard E&S Worksheet 1 (Compost Filter Sock)

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B.1 McKean County (Modernization)

B.2 Potter County (Modernization)

B.3 Potter County (Abandonment)

B.4 Elk County (Abandonment)

B.5 Clearfield County (Abandonment)

B.6 Cameron County (Abandonment)

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Modernization Worksheet

Not Applicable to this County

C. Clean Water Diversions: Drainage Area Mapping & PADEP Standard E&S Worksheets 9, 10, & 11

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C.1 McKean County

C.2 Potter County

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02-01-02_Appx_C

Modernization Worksheet

Not Applicable to this County

D. North American Green Product Specifications

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ROLLMAX™
ROLLED EROSION CONTROL

ROLLED
EROSION CONTROL

SYSTEMS BROCHURE

Tensar®

When It Rains (or Blows, Flows or Washes), It Pours

Erosion not only wears away slopes, degrades shorelines and steals precious topsoil, it can also threaten water sources, damage man-made structures, reconfigure landscapes and disrupt wildlife habitats. Add the stiff penalties at stake for violating Environmental Protection Agency (EPA) or local enforcement agency regulations, and the costs of erosion can quickly climb out of control.

WE ROLL AGAINST THE FLOW

Tensar International Corporation (Tensar) is the world's leading provider of performance-guaranteed erosion control solutions. For more than 25 years, the Tensar® North American Green® line of erosion and sediment control products has kept our customers on solid ground.

The RollMax™ Systems' family of Rolled Erosion Control Products (RECPs) is solid evidence of Tensar's ongoing investment in innovation. Our short-term and long-term erosion control blankets and turf reinforcement mats keep you one step ahead of just about any erosion challenge.

ALL THE HELP YOU NEED

Of all the RECP manufacturers out there, none can match Tensar's customer service and technical knowhow. Our support team will assist with project design and product specification or, if you'd rather do it yourself, use our Erosion Control Materials Design Software (ECMDS®) (the industry's first) for selecting material, and planning your project.

Tensar products are sold exclusively through nearly 200 Tensar Erosion Control authorized distributors worldwide. The Tensar Erosion Solutions Specialist program certifies our distributors and their sales representatives to design erosion control measures that comply with the EPA's National Pollutant Discharge Elimination System (NPDES) and other industry regulations.

Tensar is a proud member of the Erosion Control Technology Council (ECTC) and the International Erosion Control Association (IECA).

NEW NAME – SAME GREAT PERFORMANCE AND SERVICE

Tensar International Corporation acquired North American Green (NAG) in 2004 to enhance our position as the premier provider of technology-driven site solutions. We are proud to continue offering the same NAG level of service, quality and high-performance erosion control products under the name of Tensar.

Site erosion can be costly, with the RollMax Systems full line of rolled erosion control products we can keep you in compliance.

For more than 25 years, our Tensar North American Green line of products has kept our customers on solid ground.

Applications Welcome

For nearly every erosion application, there's a RollMax™ Systems solution. Permanent turf reinforcement mats provide long-term protection and vegetation establishment; temporary Erosion Control Blankets (ECBs) give immediate protection and assist with vegetation establishment before degrading naturally. Tensar's extensive selection of RollMax products almost guarantees you'll find the answer to your erosion problems.

Typical erosion control applications include these and many more:

- Highway and other DOT projects
- Commercial and residential developments
- Shorelines and waterways
- Golf course turf management
- Oil and gas pipeline restoration
- Mine and fire reclamation
- Military base construction

AND SPEAKING OF GUARANTEES . . .

Tensar's Ultimate Assurance Guarantee is the most comprehensive in the industry. It says if any properly specified and installed Tensar® North American Green® rolled erosion control product designed by a qualified engineer or Tensar technical representative in accordance with our Erosion Control Materials Design Software (ECMDS®) fails to perform under the conditions in the Guarantee, then we will replace the failed product with our next higher-performance RECP product, along with the cost of seed, fertilizer, topsoil and other amendments lost due to such product failure. Our Guarantee warrants in accordance with its terms and conditions all registered projects designed with the latest version of our ECMDS and properly installed.

Tensar turf reinforcement mats are also guaranteed to reinforce vegetation for five years after installation, and the functional longevity of these products' permanent structures is warranted for a minimum of 10 years after installation, subject to the terms and conditions set forth in the Guarantee.

From challenging roadway improvements to concentrated flow channels, there is a RollMax product ready to handle the job – and it's guaranteed.

Permanent RollMax™ Solutions

Back in the day, rock riprap, articulated concrete blocks and poured concrete were the only way to deal with erosion in high-flow channels, on shorelines and other areas where water and/or wind exceed the shear limits of unreinforced vegetation.

Not anymore. Tensar's permanent Turf Reinforcement Mats (TRMs) use 100% synthetic components or a composite of synthetic and natural materials for long-term erosion protection and vegetation establishment. Whether compared to rock riprap or concrete, the RollMax™ Systems' permanent TRMs offer a number of significant advantages:

- Prevent loss of precious topsoil to wind and water erosion
- Permanently reinforce vegetation root and stem structures
- Provide excellent conditions for quick, healthy vegetation growth
- Stabilize slopes from erosion to keep roadways safe and clean
- Protect water quality in lakes, rivers and streams
- Protect dormant seeding during winter months
- Easily conform to landscape features
- Lightweight for easy handling and transportation

VMAX® COMPOSITE TURF REINFORCEMENT MATS

VMax® C-TRMs combine three-dimensional matting with fiber matrix material for permanent erosion control on severe slopes, spillways, stream banks, shorelines and in high- to extreme-flow channels. These extensively tested products provide maximum performance through all three phases of reinforced vegetative lining development: unvegetated, establishment, and maturity. Incorporating the best performance features of temporary and permanent Tensar erosion control products, VMax C-TRMs deliver these tangible benefits:

- Surface-applied for the highest level of immediate soil protection
- Less than one third of the installed cost of rock or concrete
- No heavy equipment needed to install
- More attractive and effective "Green" alternative than rock riprap or concrete
- Exceeds FHWA and ECTC standards for TRMs
- An EPA Best Management Practice (BMP) for National Pollutant Discharge Elimination System (NPDES) regulations
- No threat to pedestrians or automobiles when used near travel routes
- Naturally filters runoff water

The TRMs easily conform to various landscape features to prevent the loss of precious topsoil.

The RollMax TRMs are installed in a one-step operation directly over the prepared seedbed saving time and money and ensuring the highest level of erosion control and vegetation reinforcement.

VMax® P550® Permanent TRM

Our top of the line P550® TRM has a polypropylene fiber matrix augmenting the permanent netting structure with permanent mulching and erosion control performance. Unvegetated, the P550 TRM reduces soil loss to less than 0.5 in. (12.7 mm) under shear stress up to 4.0 lbs/ft^2 (191 Pa). The ultra-strong structure drives the vegetated shear resistance up to 14 lbs/ft^2 (672 Pa), establishing a new maximum for vegetation reinforcement. The P550 TRM may be used as an alternative for poured concrete or articulated concrete blocks in extreme erosion control projects.

VMax® C350® Permanent TRM

A 100% coconut fiber matrix supplements the C350's permanent three-dimensional netting structure with initial mulching and erosion control performance for up to 36 months. Unvegetated, the C350® TRM reduces soil loss to less than 0.5 in. (12.7 mm) under shear stress up to 3.2 lbs/ft^2 (153 Pa) and boosts permanent vegetation performance up to 12 lbs/ft^2 (576 Pa). This environmentally friendly alternative to 30 in. (76 cm) or larger rock riprap is ideal for severe erosion control projects.

VMax® SC250® Permanent TRM

The SC250® permanent TRM has a 70% straw/30% coconut fiber matrix to enhance initial mulching and erosion control performance for up to 24 months. Unvegetated, SC250 TRMs reduce soil loss to less than 0.5 in. (12.7 mm) under shear stress up to 3.0 lbs/ft^2, and increases permanent vegetation performance up to 10 lbs/ft^2 (480 Pa) for a green alternative to rock riprap.

ERONET™ PERMANENT EROSION CONTROL BLANKETS

The EroNet™ Permanent ECB provides immediate erosion protection and vegetation establishment assistance until vegetation roots and stems mature.

EroNet™ P300® Permanent Erosion Control Blankets

The P300® permanent erosion control blanket consists of UV-stabilized polypropylene fiber stitched between heavy-weight UV-stabilized polypropylene top and bottom nets. These mats reduce soil loss and protect vegetation from being washed away or uprooted, even under high stress. Unvegetated, they reduce soil loss to less than 0.5 in. (12.7 mm) under shear stress up to 3.0 lbs/ft^2 (144 Pa), and protect vegetation from being washed away or uprooted when exposed to shear stresses up to 8 lbs/ft^2 (383 Pa).

To boost performance of the VMax turf reinforcement mats in critical applications, combine with our ShoreMax® flexible transition mat to create a system that can dramatically elevate the permissible shear stress and velocity protection beyond many hard armor solutions.

VMax Mats are perfect for pipe outlets, channel bottoms, shoreline transition zones, and other areas subjected to highly turbulent water flows.

Temporary RollMax™ Solutions

Erosion control has never been so simple yet effective. Tensar's RollMax™ temporary Erosion Control Blankets (ECBs) provide immediate erosion protection and vegetation establishment assistance, then degrade once the vegetation's root and stem systems are mature enough to stabilize the soil.

Our high-quality temporary solutions are available in varying functional longevities and materials:

- Short-term photodegradable blankets with a functional longevity of 45 days up to 12 months
- Extended-term and long-term photodegradable blankets for protection up to 36 months
- Short-term biodegradable blankets for protection up to 12 months
- Extended-term and long-term biodegradable products for protection and mulching from 18 to 24 months

ERONET™ EROSION CONTROL BLANKETS

Tensar's EroNet™ ECBs incorporate photodegradable nettings, which means they are broken down by the ultraviolet rays in sunlight. These temporary products can be used in a variety of scenarios, including moderate to steep slopes, medium- to high-flow channels, shorelines and other areas needing protection until permanent vegetation establishment.

EroNet™ C125® Long-Term Photodegradable Double-Net Coconut Blanket

The C125® ECB is made of 100% coconut fiber stitched between heavyweight UV-stabilized polypropylene nets. It offers excellent durability, erosion control and longevity for severe slopes, steep embankments, high-flow channels and other areas where vegetation may take up to 36 months to grow in.

The EroNet temporary ECBs are designed to provide immediate erosion protection and vegetation establishment assistance, and then degrade after the vegetation is mature enough to permanently stabilize the underlying soil. Both short-term and extended-term ECBs are available.

EroNet™ SC150® Extended-Term Photodegradable Double-Net Straw/Coconut Blanket

With a layer of 70% straw and 30% coconut fiber stitched between a heavyweight UV-stabilized polypropylene top net and a lightweight photodegradable polypropylene bottom net, the SC150® ECB has increased durability, erosion control capabilities and longevity. It is suitable for steeper slopes, medium-flow channels and other areas where it may take vegetation up to 24 months to grow in.

EroNet™ S150® Short-Term Photodegradable Double-Net Straw Blanket

The S150 ECB is made with a 100% straw fiber matrix stitched between lightweight photodegradable polypropylene top and bottom nets. The S150 ECB's double-net construction has greater structural integrity than single net blankets for use on steeper slopes and in channels with moderate water flow. It provides erosion protection and mulching for up to 12 months.

EroNet™ DS150™ Ultra Short-Term Photodegradable Double-Net Straw Blanket

The DS150™ ECB is suitable for high maintenance areas where close mowing will occur soon after installation. Special additives in the thread and top and bottom net ensure it degrades in adequate sunlight within 60 days.

EroNet™ S75® Short-Term Photodegradable Single-Net Straw Blanket

The S75® ECB protects and mulches moderate slopes and low-flow channels in low maintenance areas for up to 12 months. It is constructed of 100% straw fiber stitched with degradable thread to a lightweight photodegradable polypropylene top net.

EroNet™ DS75™ Ultra Short-Term Photodegradable Single-Net Straw Blanket

Designed for high maintenance areas where close mowing will occur soon after installation, the DS75™ ECB degrades within 45 days because of special additives in the thread and top net that facilitate rapid breakdown in adequate sunlight.

Every site has its own unique characteristics and challenges. EroNet Erosion Control Blankets are available in varying longevities to suit a variety of scenarios and conditions.

With our Erosion Control Materials Design Software (ECMDS), you can select either short-term, extended-term or long-term EroNet blankets based on your specific design needs.

Temporary RollMax™ Solutions

BIONET® EROSION CONTROL BLANKETS

BioNet® 100% biodegradable ECBs provide effective and all-natural erosion control and vegetation establishment in an environmentally and wildlife friendly manner. All products in the line are made of organic, biodegradable materials perfect for bioengineering applications, environmentally sensitive sites, shaded areas, stream banks and shorelines. Other advantages are:

- Little to no risk of wildlife entrapment
- Easy to sprig or plant through
- High durability, fiber retention and mechanical stability with Leno weave technology
- Increased water absorption with jute netting vs. polypropylene netting
- Improved blanket conformance and adherence to soil vs. polypropylene netting
- Enhanced erosion protection and mulching capabilities vs. polypropylene netting
- Durable, flexible and 100% biodegradable
- Lightweight jute netting requires no direct sunlight exposure to initiate degradation

BioNet® C125BN™ Long-Term Biodegradable Double-Net Coconut Blanket

A dense layer of coconut fiber stitched between jute nettings allows the C125BN™ ECB to provide more effective erosion protection and mulch than open weave coir nettings. This product performs in critical applications for up to 24 months.

BioNet® SC150BN™ Extended-Term Biodegradable Double-Net Straw/Coconut Blanket

The SC150BN™ ECB features a layer of 70% straw and 30% coconut fiber stitched between biodegradable jute top and bottom nettings. It provides erosion protection and mulching for up to 18 months in applications requiring extra strength and erosion control properties.

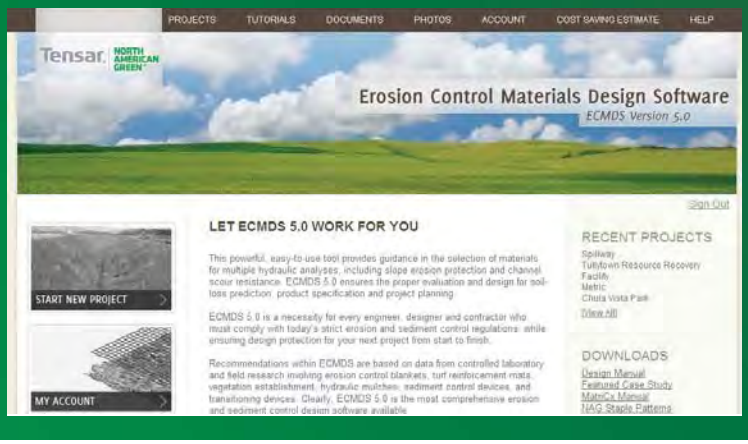
BioNet® S150BN™ Short-Term Biodegradable Double-Net Straw Blanket

The S150BN™ ECB is used for applications requiring greater durability and performance than a single-net biodegradable ECB can provide. Made with a 100% straw fiber matrix stitched between biodegradable jute top and bottom nettings, it offers up to 12 months of erosion protection and mulching action.

BioNet® S75BN™ Short-Term Biodegradable Single-Net Straw Blanket

Consisting of a 100% straw fiber matrix stitched to a biodegradable jute top nettings, the S75BN™ ECB provides better erosion protection and mulching action than conventional open weave jute nettings alone. The S75BN ECB provides up to 12 months of erosion control and vegetation growth support.

Design and Installation Tools



SHIFT, CONTROL, ENTER

Professional guidance on RECP selection, design and project planning is at your fingertips with Tensar's proprietary Erosion Control Materials Design Software (ECMDS®). This web-based program incorporates design methodologies from the Federal Highway Administration and United States Department of Agriculture to analyze your specific site conditions, and make quantified recommendations based on data from controlled laboratory and field research. ECMDS is a must-have if you face tough erosion and sediment control regulations. Best of all, it's free of charge, compliments of Tensar. To learn more and access the software directly, go to **www.ECMDS.com**.

INSTRUCTIONS INCLUDED

Proper anchoring patterns and rates must be used to achieve optimal results in RECP installation. View our installation guides for stapling patterns. Site specific staple pattern recommendations based on soil type and severity of application may be acquired through our ECMDS.

HOLD ON TIGHT

When under the pressure of severe conditions, even the best erosion control products can't function to their full potential without proper installation and anchoring. Tensar supplies a wide variety of fastener options for nearly every application and soil type.

For use in cohesive soils, wire staples are a cost-effective means to fasten RECPs. Available in 6 in., 8 in., 10 in. and 12 in. lengths, our U-shaped staples can reach to various depths to ensure adequate pull-out resistance. For installation using our handy Pin Pounder installation tool, 6 in. V-top staples or 6 in. circle top pins are available.

Our biodegradable BioStakes® are available in 4 in. and 6 in. lengths and provide an environmentally friendly alternative to metal staples. For an even more durable, deeper reaching yet all-natural anchoring option, our wood EcoStakes® are available in 6 in., 12 in., 18 in. and 24 in. lengths.

For severe applications needing the ultimate, long-lasting hold, try our 12 and 18 in. rebar staples, our 12 in. plastic ShoreMax® stakes, or our complete line of percussion earth anchors. The Tensar earth anchors reach deep into the soil strata to offer enhanced anchoring in the worst conditions. Our variety of earth anchors are designed for durability and holding power under extreme hydraulic stresses and adverse soil conditions *(Table 1)*.

For more information on the RollMax Systems or other systems within the Tensar Erosion Control Solutions, call **800-TENSAR-1** or visit **www.tensarcorp.com**.

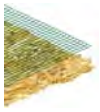
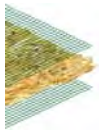
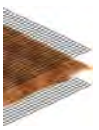
Earth Anchor Options

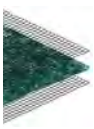
					EA 400		EA 680	
	Tendon Type (3/32 in. x 36 in.)	**Assembly Description**	**Fast Install**	**Economic Anchor**	**Stainless**	**Galvanized**	**Stainless**	**Galvanized**
End Piece Options with a PVC Face Plate	**Copper Stop Sleeve** with Stainless Steel Washer	Manually crimped to the stainless steel cable to secure the face plate.		X	X		X	
	Grip End Piece with Stainless Steel Washer	Three-dimensional, self-securing metal end piece that does not require manual crimping for tendon tensioning.	X	X	X	X	X	X
	Wedge Grip Piece	Self-securing end piece that installs flush to the face plate. Does not require manual crimping for tendon tensioning.	X		X	X	X	X
	Aluminum Stop Sleeve with Stainless Steel Washer	Manually crimped to the galvanized cable to secure the face plate.		X		X		X

TABLE 1

The complete line of RollMax™ products offers a variety of options for both short-term and permanent erosion control needs. Reference the RollMax Products Chart below to find the right solution for your next project.

RollMax Product Selection Chart

	TEMPORARY						
	ERONET						BIONET
							
	DS75	**DS150**	**S75**	**S150**	**SC150**	**C125**	**S75BN**
Longevity	45 days	60 days	12 mo.	12 mo.	24 mo.	36 mo.	12 mo.
Applications	Low Flow Channels 4:1-3:1 Slopes	Moderate Flow Channels 3:1-2:1 Slopes	Low Flow Channels 4:1-3:1 Slopes	Moderate Flow Channels 3:1-2:1 Slopes	Medium Flow Channels 2:1-1:1 Slopes	High-Flow Channels 1:1 and Greater Slopes	Low Flow Channels 4:1-3:1 Slopes
Design Permissible Shear Stress lbs/ft² (Pa)	Unvegetated 1.55 (74)	Unvegetated 1.75 (84)	Unvegetated 1.55 (74)	Unvegetated 1.75 (84)	Unvegetated 2.00 (96)	Unvegetated 2.25 (108)	Unvegetated 1.60 (76)
Design Permissible Velocity ft/s (m/s)	Unvegetated 5.00 (1.52)	Unvegetated 6.00 (1.52)	Unvegetated 5.00 (1.2)	Unvegetated 6.00 (1.83)	Unvegetated 8.00 (2.44)	Unvegetated 10.00 (3.05)	Unvegetated 5.00 (1.52)
Top Net	Lightweight accelerated photodegradable polypropylene 1.50 lbs/1000 ft² (0.73 kg/100 m²) approx wt	Lightweight accelerated photodegradable polypropylene 1.50 lbs/1000 ft² (0.73 kg/100 m²) approx wt	Lightweight photodegradable polypropylene 1.50 lbs/1000 ft² (0.73 kg/100 m²) approx wt	Lightweight photodegradable polypropylene 1.50 lbs/1000 ft² (0.73 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 2.9 lbs/1000 ft² (1.47 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 2.9 lbs/1000 ft² (1.47 kg/100 m²) approx wt	Leno woven. 100% biodegradable jute fiber 9.30 lbs/1000 ft² (4.53 kg/100 m²) approx wt
Center Net	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fiber Matrix	Straw fiber 0.50 lbs/yd² (0.27 kg/m²)	Straw fiber 0.50 lbs/yd² (0.27 kg/m²)	Straw fiber 0.50 lbs/yd² (0.27 kg/m²)	Straw fiber 0.50 lbs/yd² (0.27 kg/m²)	Straw/coconut matrix 70% Straw 0.35 lbs/yd² (0.19 kg/m²) 30% Coconut 0.15 lbs/yd² (0.08 kg/m²)	Coconut fiber 0.50 lbs/yd² (0.27 kg/m²)	Straw fiber 0.50 lbs/yd² (0.27 kg/m²)
Bottom Net	N/A	Lightweight accelerated photodegradable polypropylene 1.50 lbs/1000 ft² (0.73 kg/100 m²) approx wt	N/A	Lightweight photodegradable polypropylene 1.50 lbs/1000 ft² (0.73 kg/100 m²) approx wt	Lightweight photodegradable polypropylene 1.50 lbs/1000 ft² (0.73 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 2.9 lbs/1000 ft² (1.47 kg/100 m²) approx wt	N/A
Thread	Accelerated degradable	Accelerated degradable	Degradable	Degradable	Degradable	UV-stabilized polypropylene	Biodegradable

	TEMPORARY			PERMANENT			
	BIONET			ERONET	VMAX		
							
	S150BN	**SC150BN**	**C125BN**	**P300**	**SC250**	**C350**	**P550**
Longevity	12 mo.	18 mo.	24 mo.	Permanent	Permanent	Permanent	Permanent
Applications	Moderate Flow Channels 3:1-2:1 Slopes	Medium Flow Channels 2:1-1:1 Slopes	High-Flow Channels 1:1 and Greater Slopes	High-Flow Channels 1:1 Slopes	High-Flow Channels 1:1 and Greater Slopes	High-Flow Channels 1:1 and Greater Slopes	Extreme High-Flow Channels 1:1 and Greater Slopes
Design Permissible Shear Stress lbs/ft² (Pa)	Unvegetated 1.85 (88)	Unvegetated 2.10 (100)	Unvegetated 2.35 (112)	Unvegetated 3.0 (144) Vegetated 8.0 (383)	Unvegetated 3.0 (144) Vegetated 10.0 (480)	Unvegetated 3.2 (153) Vegetated 12.0 (576)	Unvegetated 4.0 (191) Vegetated 14.0 (672)
Design Permissible Velocity ft/s (m/s)	Unvegetated 6.00 (1.83)	Unvegetated 8.00 (2.44)	Unvegetated 10.00 (3.05)	Unvegetated 9.00 (2.7) Vegetated 16.0 (4.9)	Unvegetated 9.5 (2.9) Vegetated 15.0 (4.6)	Unvegetated 10.5 (3.2) Vegetated 20.0 (6.0)	Unvegetated 12.5 (3.8) Vegetated 25.0 (7.6)
Top Net	Leno woven. 100% biodegradable jute fiber 9.30 lbs/1000 ft² (4.53 kg/100 m²) approx wt	Leno woven. 100% biodegradable jute fiber 9.30 lbs/1000 ft² (4.53 kg/100 m²) approx wt	Leno woven. 100% biodegradable jute fiber 9.30 lbs/1000 ft² (4.53 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 5.0 lbs/1000 ft² (2.44 kg/100 m²) approx wt	Heavyweight polypropylene 5.0 lbs/1000 ft² (2.44 kg/100 m²) approx wt	Extra heavyweight polypropylene 8.0 lbs/1000 ft² (3.91 kg/100 m²) approx wt	Ultra heavyweight polypropylene 24.0 lbs/1000 ft² (11.7 kg/100 m²) approx wt
Center Net	N/A	N/A	N/A	N/A	Ultra heavyweight polypropylene – corrugated 24.0 lbs/1000 ft² (11.7 kg/100 m²)	Ultra heavyweight polypropylene – corrugated 24.0 lbs/1000 ft² (11.7 kg/100 m²)	Ultra heavyweight polypropylene – corrugated 24.0 lbs/1000 ft² (11.7 kg/100 m²)
Fiber Matrix	Straw fiber 0.50 lbs/yd² (0.27 kg/m²)	Straw/coconut matrix 70% Straw 0.35 lbs/yd² (0.19 kg/m²) 30% Coconut 0.15 lbs/yd² (0.08 kg/m²)	Coconut fiber 0.50 lbs/yd² (0.27 kg/m²)	UV-stabilized polypropylene fiber 0.70 lbs/yd² (0.38 kg/m²)	Straw/coconut matrix 70% Straw 0.35 lbs/yd² (0.19 kg/m²) 30% Coconut 0.15 lbs/yd² (0.08 kg/m²)	Coconut fiber 0.50 lbs/yd² (0.27 kg/m²)	UV-stabilized polypropylene fiber 0.50 lbs/yd² (0.27 kg/m²)
Bottom Net	Woven. 100% biodegradable jute fiber 7.70 lbs/1000 ft² (3.76 kg/100 m²) approx wt	Woven. 100% biodegradable jute fiber 7.70 lbs/1000 ft² (3.76 kg/100 m²) approx wt	Woven. 100% biodegradable jute fiber 7.70 lbs/1000 ft² (3.76 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 3.0 lbs/1000 ft² (1.47 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 5.0 lbs/1000 ft² (2.44 kg/100 m²) approx wt	Extra heavyweight polypropylene 8.0 lbs/1000 ft² (3.91 kg/100 m²) approx wt	Ultra heavyweight polypropylene 24.0 lbs/1000 ft² (11.7 kg/100 m²) approx wt
Thread	Biodegradable	Biodegradable	Biodegradable	UV-stabilized polypropylene	UV-stabilized polypropylene	UV-stabilized polypropylene fiber	UV-stabilized polypropylene

Tensar® | NORTH AMERICAN GREEN®

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E. Geologic Units Crossed by the Proposed Pipeline Routes

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Table 6.2-1 Project Area Geologic Units

MP Begin[1,2]	MP End[1,2]	Crossing Length[1] (mi)	Acres	Geologic Unit Symbol	Formation Name	Lithology (primary/secondary)
Line YM58 Pipeline Construction ROW						
0.0	3.0	3.0	25.5	Pp	Pottsville Formation	Sandstone/Conglomerate
3.0	4.0	1.0	9.5	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
4.0	6.1	2.1	20.0	Pp	Pottsville Formation	Sandstone/Conglomerate
6.1	6.5	0.4	4.0	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
6.5	7.1	0.6	11.4	Dck	Catskill Formation	Sandstone/Siltstone
7.1	7.5	0.4	3.8	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
7.5	7.6	0.1	0.9	Pp	Pottsville Formation	Sandstone/Conglomerate
7.6	8.0	0.4	3.5	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
8.0	8.1	0.1	0.5	Dck	Catskill Formation	Sandstone/Siltstone
8.1	8.6	0.5	4.9	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
8.6	10.9	2.3	21.9	Pp	Pottsville Formation	Sandstone/Conglomerate
10.9	11.7	0.8	8.0	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
11.7	13.0	1.3	14.0	Pp	Pottsville Formation	Sandstone/Conglomerate
13.0	13.5	0.5	5.5	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
13.5	16.0	2.5	34.2	Dck	Catskill Formation	Sandstone/Siltstone
16.0	16.3	0.3	3.5	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
16.3	17.6	1.3	12.6	Pp	Pottsville Formation	Sandstone/Conglomerate
17.6	17.7	0.1	1.2	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
17.7	18.0	0.3	1.9	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
18.0	18.2	0.2	2.2	Dck	Catskill Formation	Sandstone/Siltstone
18.2	18.6	0.4	3.4	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
18.6	19.9	1.3	14.0	Dck	Catskill Formation	Sandstone/Siltstone
19.9	20.1	0.2	1.9	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
20.1	20.6	0.5	3.7	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
20.6	20.7	0.1	1.9	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
20.7	21.6	0.9	8.2	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
21.6	21.7	0.1	0.9	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
21.7	22.0	0.3	2.5	Dck	Catskill Formation	Sandstone/Siltstone
22.0	22.1	0.1	1.0	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
22.1	22.7	0.5	5.3	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
22.7	22.8	0.1	0.7	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
22.8	29.5	6.7	63.3	Dck	Catskill Formation	Sandstone/Siltstone
Subtotal		**29.5**	**295.8**			
Line YM58 Staging Areas						
SA 2	2.7	N/A	2.3	Pp	Pottsville Formation	Sandstone/Conglomerate

MP Begin[1,2]	MP End[1,2]	Crossing Length[1] (mi)	Acres	Geologic Unit Symbol	Formation Name	Lithology (primary/secondary)
SA 3	8.1	N/A	<0.1	Dck	Catskill Formation	Sandstone/Siltstone
SA 3	8.1	N/A	0.6	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
SA 6	14.1	N/A	8.1	Dck	Catskill Formation	Sandstone/Siltstone
SA 5	29.5	N/A	13.9	Dck	Catskill Formation	Sandstone/Siltstone
SA 7	Off-Line	N/A	11.7	Dch	Chadakoin Formation	Siltstone/Shale
Subtotal		--	**39.0**			
Line YM58 Access Roads						
PAR #03	2.6	0.9	2.9	Pp	Pottsville Formation	Sandstone/Conglomerate
PAR #03	2.6	0.4	1.5	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
PAR #05	4.5	3.0	9.5	Pp	Pottsville Formation	Sandstone/Conglomerate
PAR #05	4.5	0.4	2.0	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
PAR #05	4.5	0.1	0.3	Dck	Catskill Formation	Sandstone/Siltstone
PAR #09	8.1	<0.1	0.1	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
PAR #12	9.6	1.2	3.9	Pp	Pottsville Formation	Sandstone/Conglomerate
PAR #12	9.6	1.0	3.6	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
PAR #21	14.1	<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
PAR #37	15.6	<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
PAR #25	17.7	1.4	4.7	Dck	Catskill Formation	Sandstone/Siltstone
PAR #25	17.7	1.6	6.1	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
PAR #25	17.7	0.9	3.0	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
PAR #25	17.7	0.4	1.7	Pp	Pottsville Formation	Sandstone/Conglomerate
PAR #30	21.2	1.8	5.2	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
PAR #30	21.2	1.8	5.2	Pp	Pottsville Formation	Sandstone/Conglomerate
PAR #31	23.6	1.2	3.6	Dck	Catskill Formation	Sandstone/Siltstone
PAR #33	25.2	1.0	3.5	Dck	Catskill Formation	Sandstone/Siltstone
PAR #35	29.5	0.2	0.6	Dck	Catskill Formation	Sandstone/Siltstone
TAR #04	2.6	0.2	0.5	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #06	4.9	0.4	1.3	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #06	4.9	1.1	4.1	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #06	4.9	0.6	2.1	Dck	Catskill Formation	Sandstone/Siltstone
TAR #07	6.5	0.1	0.2	Dck	Catskill Formation	Sandstone/Siltstone
TAR #08	6.9	<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
TAR #35	6.9	<0.1	<0.1	Dck	Catskill Formation	Sandstone/Siltstone
TAR #10	9.1	0.1	0.2	Dck	Catskill Formation	Sandstone/Siltstone
TAR #10	9.1	1.0	3.6	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #10	9.1	0.6	2.1	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #11	9.1	0.5	1.7	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #13	9.6	2.1	7.1	Pp	Pottsville Formation	Sandstone/Conglomerate

MP Begin[1,2]	MP End[1,2]	Crossing Length[1] (mi)	Acres	Geologic Unit Symbol	Formation Name	Lithology (primary/secondary)
TAR #14	11.3	1.0	3.2	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #14	11.3	0.4	1.3	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #14	11.3	1.0	2.5	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #15	12.0	0.3	1.0	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #16	12.2	0.3	1.2	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #17	12.6	0.4	1.1	Dck	Catskill Formation	Sandstone/Siltstone
TAR #17	12.6	0.7	2.6	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #17	12.6	0.7	2.7	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #18	12.6	0.4	1.3	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #19	12.7	<0.1	<0.1	Dck	Catskill Formation	Sandstone/Siltstone
TAR #20	12.9	0.1	0.4	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #20	12.9	0.1	0.3	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #22	14.8	0.5	1.8	Dck	Catskill Formation	Sandstone/Siltstone
TAR #23	14.4	0.3	1.2	Dck	Catskill Formation	Sandstone/Siltstone
TAR #24	17.0	0.4	1.5	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #24	17.0	0.2	0.9	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
TAR #26	18.0	0.3	1.0	Dck	Catskill Formation	Sandstone/Siltstone
TAR #26	18.0	1.0	3.6	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR #26	18.0	0.1	0.3	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
TAR #28	18.0	<0.1	<0.1	Dck	Catskill Formation	Sandstone/Siltstone
TAR #27	18.4	0.3	1.0	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
TAR #29	18.4	<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
TAR #32	24.0	1.0	4.0	Dck	Catskill Formation	Sandstone/Siltstone
TAR #34	25.2	0.6	2.3	Dck	Catskill Formation	Sandstone/Siltstone
Subtotal		**34.2**	**115.9**			
Line YM58 Aboveground Facilities						
MLV-01	8.1	--	0.1	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
MLV-02	15.6	--	0.1	Dck	Catskill Formation	Sandstone/Siltstone
Subtotal		--	**0.2**			
Line YM58 Totals		**63.7**	**448.5**			
Line KL Extension Construction ROW						
0.0	0.4	0.4	5.3	Pp	Pottsville Formation	Sandstone/Conglomerate
Subtotal		**0.4**	**5.3**			
Line KL Extension Aboveground Facilities						
KL Valve Set	0.1	--	0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
Subtotal		**-**	**0.1**			
Line KL Extension Total		**0.4**	**5.4**			
Line YM224 Loop Construction ROW						

MP Begin[1,2]	MP End[1,2]	Crossing Length[1] (mi)	Acres	Geologic Unit Symbol	Formation Name	Lithology (primary/secondary)
0.0	1.4	1.4	14.0	Dck	Catskill Formation	Sandstone/Siltstone
Subtotal		**1.4**	**14.0**			
Line YM224 Loop Access Roads						
PAR #36	0.0	0.2	1.4	Dck	Catskill Formation	Sandstone/Siltstone
PAR #340	1.4	<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
Subtotal		**0.2**	**1.5**			
Line YM224 Loop Aboveground Facilities						
MLV-03	0.0	--	0.1	Dck	Catskill Formation	Sandstone/Siltstone
MLV-04	1.4	--	0.1	Dck	Catskill Formation	Sandstone/Siltstone
Subtotal		**--**	**0.2**			
Line YM224 Loop Totals		**1.6**	**15.7**			
Line FM100 Abandonment Construction ROW						
0.0	0.4	0.4	1.5	Pa	Allegheny Formation	Sandstone/Shale
1.8	1.8	<0.1	0.1	Pa	Allegheny Formation	Sandstone/Shale
4.8	4.9	0.1	0.2	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
7.8	7.8	<0.1	<0.1	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
7.9	8.0	0.1	0.1	MDso	Shenango Formation through Oswayo Formation, undivided	Sandstone/Siltstone
10.0	10.0	<0.1	0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
11.1	11.1	<0.1	0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
11.3	11.3	<0.1	<0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
12.0	12.0	<0.1	0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
12.8	12.8	<0.1	<0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
15.8	15.8	<0.1	0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
22.1	22.1	<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
22.3	22.3	<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
22.9	23.0	0.1	1.2	Dck	Catskill Formation	Sandstone/Siltstone
23.1	23.6	0.4	1.3	Dck	Catskill Formation	Sandstone/Siltstone
23.5	23.5	<0.1	<0.1	Dck	Catskill Formation	Sandstone/Siltstone
26.1	26.7	0.6	3.0	Dck	Catskill Formation	Sandstone/Siltstone
26.7	27.0	0.3	0.7	Dck	Catskill Formation	Sandstone/Siltstone
27.0	27.0	<0.1	<0.1	Dck	Catskill Formation	Sandstone/Siltstone
27.1	27.5	0.4	2.3	Dck	Catskill Formation	Sandstone/Siltstone
29.6	29.7	0.1	1.8	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
30.6	31.0	0.4	1.7	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
33.4	33.4	0.1	0.1	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
38.2	38.2	<0.1	<0.1	Pp	Pottsville Formation	Sandstone/Conglomerate
40.1	40.1	<0.1	0.1	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
Subtotal		**3.0**	**14.6**			

MP Begin[1,2]	MP End[1,2]	Crossing Length[1] (mi)	Acres	Geologic Unit Symbol	Formation Name	Lithology (primary/secondary)
FM100 Abandonment Access Roads						
HSC-832-Access	0.0	<0.1	0.1	Pa	Allegheny Formation	Sandstone/Shale
RR Access	0.1	0.3	0.6	Pa	Allegheny Formation	Sandstone/Shale
ABAN AC 4		<0.1	<0.1	Pa	Allegheny Formation	Sandstone/Shale
Rectifier 167, 168 Access	11.4	0.3	0.5	Pp	Pottsville Formation	Sandstone/Conglomerate
MLV BZE0-5810 Access	12.0	0.1	0.2	Pp	Pottsville Formation	Sandstone/Conglomerate
MLV GIC0-5042 Access	22.3	0.6	1.1	Dck	Catskill Formation	Sandstone/Siltstone
ABAN AC 3		0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
RR South Access	23.1	<0.1	<0.1	Dck	Catskill Formation	Sandstone/Siltstone
Rectifier 171 Access	23.5	0.1	0.2	Dck	Catskill Formation	Sandstone/Siltstone
SR 555 North Access	23.6	0.3	0.4	Dck	Catskill Formation	Sandstone/Siltstone
RR Access	26.2	0.6	1.1	Dck	Catskill Formation	Sandstone/Siltstone
ABAN AC 1		<0.1	0.1	Dck	Catskill Formation	Sandstone/Siltstone
SR 120 North Access	27.4	0.5	0.9	Dck	Catskill Formation	Sandstone/Siltstone
Rectifier 873, 872 Access	29.7	0.3	0.5	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
ABAN AC 2		0.3	0.5	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
MLV LUC0-5039 Access	33.4	0.1	0.3	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
Subtotal		**3.6**	**6.6**			
Line FM100 Abandonment Total		**6.6**	**27.4**			
Carpenter Hollow OPP Station Aboveground Facilities						
Carpenter Hollow OPP Station	29.5	--	0.4	Dck	Catskill Formation	Sandstone/Siltstone
Carpenter Hollow OPP Station Total		**--**	**0.4**			
Marvindale Compressor Station Aboveground Facilities						
Marvindale Compressor Station	0.4	--	11.9	Pp	Pottsville Formation	Sandstone/Conglomerate
Marvindale Compressor Station Access Roads						
PAR-1	0.0	0.5	3.1	Pp	Pottsville Formation	Sandstone/Conglomerate
TAR-2	0.2	0.2	0.5	Pp	Pottsville Formation	Sandstone/Conglomerate
Subtotal		**0.7**	**3.6**			
Marvindale Compressor Station Staging Areas						

MP Begin[1,2]	MP End[1,2]	Crossing Length[1] (mi)	Acres	Geologic Unit Symbol	Formation Name	Lithology (primary/secondary)
SA 1	0.0	--	5.0	Pp	Pottsville Formation	Sandstone/Conglomerate
Marvindale Compressor Station Total		**0.7**	**20.5**			
Marvindale Interconnect Aboveground Facilities						
Marvindale Interconnect	0.0	--	8.1	Pp	Pottsville Formation	Sandstone/Conglomerate
Marvindale Interconnect Total		**--**	**8.1**			
WHP-MS_4317X Abandonment Aboveground Facilities						
WHP-MS_4317X	40.2	--	0.5	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
WHP-MS_4317X Abandonment Access Road						
POP0 4317 Access	40.3	0.5	0.9	MDhm	Huntley Mountain Formation	Sandstone/Siltstone
WHP-MS_4317X Total		**0.5**	**1.4**			
Costello Compressor Station Abandonment Aboveground Facilities						
Costello Compressor Station	44.1	--	1.1	Dck	Catskill Formation	Sandstone/Siltstone
Costello Compressor Station Abandonment Access Road						
POP0 1370 Access	44.1	0.1	0.2	Dck	Catskill Formation	Sandstone/Siltstone
Costello Compressor Station Abandonment Total		**0.1**	**1.3**			
Tamarack Compressor Station Aboveground Facilities						
Construction Workspace	Off-line	--	12.2	Dck	Catskill Formation	Sandstone/Siltstone
Tamarack Compressor Station Staging Area						
Staging Area	Off-line	--	2.8	Dck	Catskill Formation	Sandstone/Siltstone
Tamarack Compressor Station Access Roads						
Access Road	Off-line	0.3	0.6	Dck	Catskill Formation	Sandstone/Siltstone
Tamarack Compressor Station Total		**0.3**	**16.6**			
Project Totals		**76.9**	**538.1**			

[1] Crossing length of the pipeline or access road centerline where applicable; or crossing length of workspace where centerline does not cross geology.
[2] Mileposts for contractor yards/staging areas and access roads represent the approximate location of the feature along the pipeline centerline.

Table 6.2-2 (Rev2): Shallow Depth to Bedrock as Predicted by USDA NRCS Soils Data

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
Line YM58					
McKean	0.6	0.7	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	0.7	0.7	HbC	<0.1	Hazleton channery loam, 8 to 15 percent slopes
McKean	0.8	1.0	HbC	0.2	Hazleton channery loam, 8 to 15 percent slopes
McKean	1.6	1.7	HbC	0.1	Hazleton channery loam, 8 to 15 percent slopes
McKean	1.7	1.8	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	1.8	1.8	HeF	<0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	1.8	1.8	HaD	<0.1	Hartleton channery silt loam, 15 to 25 percent slopes
McKean	1.9	1.9	HaD	<0.1	Hartleton channery silt loam, 15 to 25 percent slopes
McKean	1.9	2.0	HbC	0.1	Hazleton channery loam, 8 to 15 percent slopes
McKean	2.1	2.1	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	2.1	2.1	HeF	<0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	2.4	2.6	HbB	0.2	Hazleton channery loam, 3 to 8 percent slopes
McKean	2.8	2.9	HbC	0.1	Hazleton channery loam, 8 to 15 percent slopes
McKean	3.0	3.1	HbC	0.1	Hazleton channery loam, 8 to 15 percent slopes
McKean	3.1	3.1	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	3.1	3.2	HeF	0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	3.7	3.9	HeF	0.2	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	3.9	4.1	HbB	0.2	Hazleton channery loam, 3 to 8 percent slopes
McKean	4.2	4.3	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	4.4	4.6	HdB	0.2	Hazleton channery loam, 3 to 8 percent slopes
McKean	4.6	4.6	HdD	<0.1	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	4.7	4.7	HdD	<0.1	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	4.7	4.8	HdB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	4.8	4.9	HdD	0.1	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	5.0	5.2	HdB	0.2	Hazleton channery loam, 3 to 8 percent slopes
McKean	5.5	5.7	HdB	0.2	Hazleton channery loam, 3 to 8 percent slopes
McKean	5.9	6.3	HdB	0.4	Hazleton channery loam, 3 to 8 percent slopes
McKean	6.3	6.4	HdD	0.1	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	6.4	6.5	HeF	0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	7.3	7.5	HeF	0.2	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	7.5	7.6	HdB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	7.6	7.6	HdD	<0.1	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	7.6	7.7	HeF	0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	8.2	8.3	HeF	0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	8.3	8.5	HdD	0.2	Hazleton channery loam, 8 to 25 percent slopes, very stony

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
McKean	8.5	8.6	HdB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	8.6	8.9	HbB	0.3	Hazleton channery loam, 3 to 8 percent slopes
McKean	8.9	8.9	HdB	<0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	8.9	9.0	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	10.5	10.5	HeF	<0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	10.5	10.7	HdD	0.2	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	10.7	11.0	HdB	0.3	Hazleton channery loam, 3 to 8 percent slopes
McKean	11.0	11.2	HeF	0.2	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	11.3	11.5	HeF	0.2	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	11.5	11.6	HdD	0.1	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	11.6	12.0	HbB	0.5	Hazleton channery loam, 3 to 8 percent slopes
McKean	12.0	12.1	HdB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	12.2	12.3	HdB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	12.5	12.6	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	12.6	12.7	HdD	0.1	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	12.7	12.9	HdB	0.2	Hazleton channery loam, 3 to 8 percent slopes
McKean	12.9	13.3	HdD	0.4	Hazleton channery loam, 8 to 25 percent slopes, very stony
McKean	13.3	13.5	HeF	0.2	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	13.5	13.6	LeF	0.1	Leck Kill channery silt loam, 25 to 50 percent slopes
McKean	13.6	13.6	LeD	<0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
McKean	15.8	15.9	LeD	0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
McKean	15.9	16.0	LeF	0.1	Leck Kill channery silt loam, 25 to 50 percent slopes
McKean	16.0	16.2	HeF	0.2	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	16.2	16.3	HbB	0.1	Hazleton channery loam, 3 to 8 percent slopes
McKean	16.3	16.3	HeF	<0.1	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	16.3	17.7	HbB	1.4	Hazleton channery loam, 3 to 8 percent slopes
McKean	17.7	17.9	HeF	0.2	Hartleton and Buchanan soils, 25 to 60 percent slopes
McKean	17.9	18.1	LeF	0.2	Leck Kill channery silt loam, 25 to 50 percent slopes
Potter	18.4	18.4	HcfC	<0.1	Hazleton channery loam, 3 to 15 percent slopes, extremely stony
Potter	18.7	18.8	LeD	0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Potter	19.0	19.0	LeD	<0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Potter	19.8	19.8	LeD	<0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Potter	19.9	19.9	LeD	<0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Potter	20.1	20.2	BlC	0.1	Blandburg stony sandy loam, 8 to 15 percent slopes, extremely stony
Potter	20.2	20.3	CmfC	0.1	Clymer channery loam, frigid, 8 to 15 percent slopes, extremely stony
Potter	20.3	20.5	CmfB	0.2	Clymer channery loam, frigid, 0 to 8 percent slopes, extremely stony
Potter	20.5	20.5	CmfD	<0.1	Clymer channery loam, frigid, 15 to 25 percent slopes, extremely stony
Potter	20.8	21.4	BlB	0.6	Blandburg stony sandy loam, 3 to 8 percent slopes, extremely stony

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
Potter	21.4	21.6	BlC	0.2	Blandburg stony sandy loam, 8 to 15 percent slopes, extremely stony
Potter	22.1	22.1	CmfB	<0.1	Clymer channery loam, frigid, 0 to 8 percent slopes, extremely stony
Potter	22.3	22.6	CmfB	0.3	Clymer channery loam, frigid, 0 to 8 percent slopes, extremely stony
Potter	23.9	24.5	CeC	0.6	Ceres channery silt loam, 8 to 15 percent slopes, stony
Potter	24.7	24.8	CeC	0.1	Ceres channery silt loam, 8 to 15 percent slopes, stony
Potter	24.8	25.0	CeD	0.2	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	25.1	25.1	CeD	<0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	25.3	25.4	CeC	0.1	Ceres channery silt loam, 8 to 15 percent slopes, stony
Potter	25.4	25.5	HafD	0.1	Hartleton channery silt loam, frigid, 15 to 25 percent slopes
Potter	25.5	25.7	HafD	0.12	Hartleton channery silt loam, frigid, 15 to 25 percent slopes
Potter	25.7	26.0	CeB	0.3	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	26.0	26.4	CeB	0.4	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	26.4	26.4	CeD	<0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	26.4	26.5	CeB	0.1	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	26.5	26.6	CeD	0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	27.1	27.1	CeB	<0.1	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	27.3	27.3	CeD	<0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	27.4	27.4	CeC	<0.1	Ceres channery silt loam, 8 to 15 percent slopes, stony
Potter	27.4	27.5	CeD	<0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	27.5	27.7	CeB	0.2	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	27.8	27.9	CeD	0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	28.0	28.2	CeC	0.2	Ceres channery silt loam, 8 to 15 percent slopes, stony
Potter	28.2	28.3	CeB	0.1	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	28.3	28.5	CeC	0.2	Ceres channery silt loam, 8 to 15 percent slopes, stony
Potter	28.7	28.8	CeD	0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	28.9	29.2	CeB	0.3	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	29.3	29.5	CeB	0.2	Ceres channery silt loam, 3 to 8 percent slopes, stony
Line YM224 Loop					
Potter	0.0	0.2	CeC	0.2	Ceres channery silt loam, 8 to 15 percent slopes, stony
Potter	0.2	0.4	CeB	0.2	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	0.5	0.6	CeB	0.1	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	0.8	0.9	CeB	0.1	Ceres channery silt loam, 3 to 8 percent slopes, stony
Potter	0.9	1.0	CeD	0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Potter	1.3	1.4	CeD	0.1	Ceres channery silt loam, 15 to 25 percent slopes, stony
Line FM100 Abandonment					
Clearfield	0.4	0.6	RbF	0.2	Rayne channery silt loam, 25 to 65 percent slopes

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
Clearfield	0.6	0.7	BeD	0.1	Berks channery silt loam, 15 to 25 percent slopes
Clearfield	0.8	0.8	CaB	<0.1	Cavode silt loam, 3 to 8 percent slopes
Clearfield	0.8	0.9	BeC	0.1	Berks channery silt loam, 8 to 15 percent slopes
Clearfield	0.9	0.9	WhC	<0.1	Wharton silt loam, 8 to 15 percent slopes
Clearfield	0.9	1.0	BeC	0.1	Berks channery silt loam, 8 to 15 percent slopes
Clearfield	1.0	1.0	BeC	<0.1	Berks channery silt loam, 8 to 15 percent slopes
Clearfield	1.0	1.1	WhC	0.1	Wharton silt loam, 8 to 15 percent slopes
Clearfield	1.1	1.2	GIB	0.1	Gilpin channery silt loam, 3 to 8 percent slopes
Clearfield	1.2	1.2	RbF	<0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	1.2	1.3	CaC	0.1	Cavode silt loam, 8 to 15 percent slopes
Clearfield	1.3	1.3	RbF	<0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	1.3	1.3	CaC	<0.1	Cavode silt loam, 8 to 15 percent slopes
Clearfield	1.3	1.5	RbF	0.2	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	1.6	1.6	RbF	<0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	1.7	2.0	RbF	0.3	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	2.2	2.4	RbF	0.2	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	2.4	2.4	RcD	<0.1	Rayne-Gilpin complex, 15 to 25 percent slopes
Clearfield	2.4	2.7	GIC	0.3	Gilpin channery silt loam, 8 to 15 percent slopes, extremely stony
Clearfield	2.7	2.8	RbF	0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	2.8	2.8	GIB	<0.1	Gilpin channery silt loam, 3 to 8 percent slopes
Clearfield	2.8	2.9	WhD	0.1	Wharton silt loam, 15 to 12 percent slopes
Clearfield	2.9	3.0	GIB	0.1	Gilpin channery silt loam, 3 to 8 percent slopes
Clearfield	3.0	3.0	RbF	<0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	3.1	3.1	RcD	<0.1	Rayne-Gilpin complex, 15 to 25 percent slopes
Clearfield	3.2	3.3	RbF	0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	3.3	3.4	RbF	<0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	3.4	3.5	RbF	0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	3.5	3.5	CIC	<0.1	Clymer channery loam, 8 to 15 percent slopes
Clearfield	3.5	3.6	CIB	0.1	Clymer channery loam, 3 to 8 percent slopes
Clearfield	3.6	3.7	RbF	0.1	Rayne channery silt loam, 25 to 65 percent slopes
Clearfield	3.7	3.7	DeC	<0.1	Dekalb channery loam, 8 to 15 percent slopes
Clearfield	3.7	3.9	DeB	0.2	Dekalb channery loam, 3 to 8 percent slopes
Clearfield	3.9	4.0	CmB	0.1	Clymer very stony loam, 0 to 8 percent slopes
Clearfield	4.0	4.1	RcD	0.1	Rayne-Gilpin complex, 15 to 25 percent slopes
Clearfield	4.2	4.3	CaB	0.1	Cavode silt loam, 3 to 8 percent slopes
Clearfield	4.4	4.5	CmC	0.1	Clymer very stony loam, 8 to 15 percent slopes
Clearfield	4.5	4.7	HbF	0.2	Hazleton channery loam, 25 to 65 percent slopes
Clearfield	4.7	4.8	CxB	0.1	Colfax loamy sand, 1 to 4 percent slopes
Clearfield	4.8	4.9	HbF	0.1	Hazleton channery loam, 25 to 65 percent slopes
Clearfield	4.9	5.0	HbD	0.1	Hazleton very stony loam, 8 to 25 percent slopes
Clearfield	5.0	5.2	HdB	0.2	Hazleton-Clymer very stony loams, 0 to 8 percent slopes

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
Clearfield	5.2	5.2	CmB	<0.1	Clymer very stony loam, 0 to 8 percent slopes
Clearfield	5.2	5.5	HdB	0.3	Hazleton-Clymer very stony loams, 0 to 8 percent slopes
Clearfield	5.5	5.7	CxB	0.2	Colfax loamy sand, 1 to 4 percent slopes
Clearfield	5.7	6.4	HdB	0.7	Hazleton-Clymer very stony loams, 0 to 8 percent slopes
Clearfield	6.4	6.6	CIB	0.2	Clymer channery loam, 3 to 8 percent slopes
Clearfield	6.8	6.9	CmB	0.1	Clymer very stony loam, 0 to 8 percent slopes
Clearfield	6.9	6.9	HbD	<0.1	Hazleton very stony loam, 8 to 25 percent slopes
Clearfield	6.9	7.0	CxD	0.1	Colfax loamy sand, 1 to 4 percent slopes
Clearfield	7.0	7.1	HbD	0.1	Hazleton very stony loam, 8 to 25 percent slopes
Clearfield	7.1	7.2	HdB	0.1	Hazleton-Clymer very stony loams, 0 to 8 percent slopes
Elk	7.3	7.6	HxB	0.3	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	8.3	8.5	HxD	0.2	Hazleton channery loam 8 to 25 percent slopes, very stony
Elk	8.5	9.2	CeC	0.7	Clymer channery loam, 8 to 15 percent slopes
Elk	9.5	9.7	CoA	0.2	Cookport channery loam, 0 to 3 percent slopes
Elk	9.7	10.8	HoB	1.1	Hazleston channery loam, 3 to 8 percent slopes
Elk	11.1	11.4	HoC	0.3	Hazleston channery loam, 8 to 15 percent slopes
Elk	12.0	12.3	CoA	0.3	Cookport channery loam, 0 to 3 percent slopes
Elk	12.3	12.4	HoC	0.1	Hazleston channery loam, 8 to 15 percent slopes
Elk	12.6	12.8	HoC	0.2	Hazleston channery loam, 8 to 15 percent slopes
Elk	14.0	14.7	HxB	0.7	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	15.9	16.0	HxD	0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Elk	16.0	16.0	HoB	<0.1	Hazleston channery loam, 3 to 8 percent slopes
Elk	16.0	16.2	HxB	0.2	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	16.2	16.5	HoB	0.3	Hazleston channery loam, 3 to 8 percent slopes
Elk	16.8	17.0	HxB	0.2	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	17.0	17.0	HxD	<0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Elk	17.5	17.6	HxD	0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Elk	17.6	17.9	HxB	0.3	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	17.9	17.9	HxD	<0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Elk	18.4	18.5	HxB	0.1	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	18.5	18.5	HxD	<0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Elk	18.5	18.7	HxB	0.2	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	18.7	18.7	HxD	<0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Elk	18.7	18.8	HoB	0.1	Hazleston channery loam, 3 to 8 percent slopes
Elk	18.8	18.8	HxD	<0.1	Hazleton channery loam 8 to 25 percent slopes, very stony

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
Elk	19.0	19.4	HxB	0.4	Hazleton channery loam 0 to 8 percent slopes, very stony
Elk	19.4	19.4	HxD	<0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Cameron	19.6	19.7	HxD	0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Cameron	19.9	20.1	HxD	0.2	Hazleton channery loam 8 to 25 percent slopes, very stony
Cameron	20.5	20.9	HxD	0.4	Hazleton channery loam 8 to 25 percent slopes, very stony
Cameron	21.1	21.2	HxB	0.1	Hazleton channery loam 0 to 8 percent slopes, very stony
Cameron	21.3	21.7	LeF	0.4	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	21.7	21.7	LeD	<0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Cameron	22.4	22.9	LeF	0.5	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	22.9	23.1	LeD	0.2	Leck Kill channery silt loam, 15 to 25 percent slopes
Cameron	23.4	23.6	LeB	0.2	Leck Kill channery silt loam, 3 to 8 percent slopes
Cameron	23.6	23.7	LeF	0.1	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	23.7	23.9	LeB	0.2	Leck Kill channery silt loam, 3 to 8 percent slopes
Cameron	23.9	24.9	LeF	1.0	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	24.9	25.1	LeD	0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Cameron	25.1	25.3	LeF	0.2	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	25.5	25.7	LeF	0.2	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	25.7	25.8	LeD	0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Cameron	25.8	25.8	LeF	<0.1	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	25.8	26.2	LeD	0.4	Leck Kill channery silt loam, 15 to 25 percent slopes
Cameron	26.5	26.7	LeD	0.2	Leck Kill channery silt loam, 15 to 25 percent slopes
Cameron	26.8	26.9	LeF	0.1	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	26.9	27.7	LeF	0.8	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	28.1	28.2	HxD	0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Cameron	28.2	28.3	HxB	0.1	Hazleton channery loam 0 to 8 percent slopes, very stony
Cameron	28.4	28.5	HxB	0.1	Hazleton channery loam 0 to 8 percent slopes, very stony
Cameron	28.5	28.9	HxD	0.4	Hazleton channery loam 8 to 25 percent slopes, very stony
Cameron	28.9	29.1	HxB	0.2	Hazleton channery loam 0 to 8 percent slopes, very stony
Cameron	29.1	29.4	CoA	0.3	Cookport channery loam, 0 to 3 percent slopes
Cameron	29.4	29.6	HoB	0.2	Hazleton channery loam, 3 to 8 percent slopes
Cameron	29.6	29.6	HxD	<0.1	Hazleton channery loam 8 to 25 percent slopes, very stony
Cameron	30.0	30.4	CoA	0.4	Cookport channery loam, 0 to 3 percent slopes
Cameron	30.4	30.6	HoB	0.2	Hazleston channery loam, 3 to 8 percent slopes
Cameron	31.0	31.3	HoB	0.3	Hazleston channery loam, 3 to 8 percent slopes
Cameron	31.3	31.4	HoD	0.1	Hazleton channery loam, 15 to 25 percent slopes
Cameron	31.4	31.5	HaF	0.1	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	31.7	31.8	HoD	0.1	Hazleton channery loam, 15 to 25 percent slopes

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
Cameron	31.8	31.9	HoB	0.1	Hazleston channery loam, 3 to 8 percent slopes
Cameron	31.9	31.9	HoD	<0.1	Hazleton channery loam, 15 to 25 percent slopes
Cameron	32.1	32.1	HoD	<0.1	Hazleton channery loam, 15 to 25 percent slopes
Cameron	32.1	32.2	HoC	0.1	Hazleston channery loam, 8 to 15 percent slopes
Cameron	32.2	32.5	HaF	0.3	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	32.5	32.5	HoC	<0.1	Hazleston channery loam, 8 to 15 percent slopes
Cameron	32.5	32.6	HoB	0.1	Hazleston channery loam, 3 to 8 percent slopes
Cameron	32.6	32.7	HaF	0.1	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	32.7	33.0	HoD	0.3	Hazleton channery loam, 15 to 25 percent slopes
Cameron	33.0	33.0	HaF	<0.1	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	33.0	33.1	HoD	0.1	Hazleton channery loam, 15 to 25 percent slopes
Cameron	33.1	33.2	HoB	0.1	Hazleston channery loam, 3 to 8 percent slopes
Cameron	33.2	33.3	HoD	0.1	Hazleton channery loam, 15 to 25 percent slopes
Cameron	33.4	33.5	HaF	0.1	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	33.5	33.6	HoB	0.1	Hazleston channery loam, 3 to 8 percent slopes
Cameron	33.6	33.7	HaF	0.1	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	33.7	33.9	HoB	0.2	Hazleston channery loam, 3 to 8 percent slopes
Cameron	33.9	34.0	HoD	0.1	Hazleton channery loam, 15 to 25 percent slopes
Cameron	34.0	34.3	HaF	0.3	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	34.3	34.5	HaD	0.2	Hartleton channery silt loam, 15 to 25 percent slopes
Cameron	34.5	34.6	HaC	0.1	Hartleton channery silt loam, 8 to 15 percent slopes
Cameron	34.6	34.8	HaF	0.2	Hartleton channery silt loam, 25 to 60 percent slopes
Cameron	34.8	34.9	HaB	0.1	Hartleton channery silt loam, 3 to 8 percent slopes
Cameron	35.0	35.2	HaC	0.2	Hartleton channery silt loam, 8 to 15 percent slopes
Cameron	35.3	35.4	HaD	0.1	Hartleton channery silt loam, 15 to 25 percent slopes
Cameron	35.4	35.5	HaB	0.1	Hartleton channery silt loam, 3 to 8 percent slopes
Cameron	35.5	35.6	LeF	0.1	Leck Kill channery silt loam, 25 to 50 percent slopes
Cameron	35.6	35.6	HaB	<0.1	Hartleton channery silt loam, 3 to 8 percent slopes
Cameron	35.6	35.8	HaC	0.2	Hartleton channery silt loam, 8 to 15 percent slopes
Cameron	35.8	36.1	HaD	0.3	Hartleton channery silt loam, 15 to 25 percent slopes
Cameron	36.1	36.2	HaC	0.1	Hartleton channery silt loam, 8 to 15 percent slopes
Cameron	36.2	36.3	LeD	0.1	Leck Kill channery silt loam, 15 to 25 percent slopes
Cameron	36.3	36.4	HaD	0.1	Hartleton channery silt loam, 15 to 25 percent slopes
Cameron	36.6	36.7	HaD	0.1	Hartleton channery silt loam, 15 to 25 percent slopes
Cameron	36.7	37.0	HoB	0.3	Hazleston channery loam, 3 to 8 percent slopes
Cameron	37.0	37.3	HoC	0.3	Hazleston channery loam, 8 to 15 percent slopes
Cameron	37.5	37.6	HxB	0.1	Hazleton channery loam 0 to 8 percent slopes, very stony
Cameron	37.8	38.0	HxB	0.2	Hazleton channery loam 0 to 8 percent slopes, very stony
Cameron	38.4	38.5	HoB	0.1	Hazleston channery loam, 3 to 8 percent slopes
Potter	38.8	38.8	CoC	<0.1	Cookport channery loam, 8 to 15 percent slopes
Potter	38.9	39.0	CoC	0.1	Cookport channery loam, 8 to 15 percent slopes

County	MP Begin	MP End	Map Unit Symbol[1]	Crossing Length (miles)	Soil Name
Potter	39.0	39.5	CncB	0.5	Clymer-Cookport channery loams, 0 to 8 percent slopes, extremely stony
Potter	39.5	39.8	CoC	0.3	Cookport channery loam, 8 to 15 percent slopes
Potter	39.8	39.9	HcD	0.1	Hazleton channery loam, 15 to 25 percent slopes, extremely stony
Potter	39.9	39.9	CoC	<0.1	Cookport channery loam, 8 to 15 percent slopes
Potter	39.9	40.0	CncB	0.1	Clymer-Cookport channery loams, 0 to 8 percent slopes, extremely stony
Potter	40.0	40.1	HcD	0.1	Hazleton channery loam, 15 to 25 percent slopes, extremely stony
Potter	40.1	40.3	CosD	0.2	Cookport channery loam, 15 to 25 percent slopes, extremely stony
Potter	40.3	40.3	HcD	<0.1	Hazleton channery loam, 15 to 25 percent slopes, extremely stony
Potter	40.3	40.4	HcC	0.1	Hazleton channery loam, 8 to 15 percent slopes, extremely stony
Potter	40.4	40.6	CncB	0.2	Clymer-Cookport channery loams, 0 to 8 percent slopes, extremely stony
Potter	40.6	40.7	CosD	0.1	Cookport channery loam, 15 to 25 percent slopes, extremely stony
Potter	40.7	40.9	CncB	0.2	Clymer-Cookport channery loams, 0 to 8 percent slopes, extremely stony
Potter	40.9	41.0	HcD	0.1	Hazleton channery loam, 15 to 25 percent slopes, extremely stony
Potter	41.3	41.5	WhD	0.2	Wharton channery silt loam, 8 to 25 percent slopes
Potter	41.7	41.8	HaD	0.1	Hartleton channery silt loam, 15 to 25 percent slopes
Potter	41.8	41.9	CosC	0.1	Cookport channery loam, 0 to 15 percent slopes, extremely stony
Potter	42.0	42.2	HcsD	0.2	Hazleton channery loam, 15 to 25 percent slopes, rubbly
Potter	42.2	42.3	HaB	0.1	Hartleton channery silt loam, 0 to 8 percent slopes
Potter	42.7	43.1	HaC	0.4	Hartleton channery silt loam, 8 to 15 percent slopes
Potter	43.2	43.5	HafD	0.3	Hartleton channery silt loam, frigid, 15 to 25 percent slopes
Potter	43.5	43.5	CoC	<0.1	Cookport channery loam, 8 to 15 percent slopes
Potter	43.6	43.6	HasD	<0.1	Hazleton channery loam, 15 to 25 percent slopes, rubbly
Potter	43.6	43.6	HafB	<0.1	Hartleton channery silt loam, frigid, 8 to 15 percent slopes
Potter	43.6	43.6	HaD	<0.1	Hartleton channery silt loam, 15 to 25 percent slopes
Potter	43.6	43.7	HafB	0.1	Hartleton channery silt loam, frigid, 8 to 15 percent slopes
Potter	43.8	43.8	HcfD	<0.1	Hazleton channery loam, frigid, 15 to 25 percent slopes, extremely stony

Table 6.4-1 Oil and Gas Wells within 0.5-mile of Project Construction Work Area

County/ Facility	Well Type	Status	Latitude (dd)	Longitude (dd)	Distance from Centerline (ft)
Line YM58/Carpenter Hollow OPP					
McKean	Gas Well	Abandoned	41.761617	-78.339197	586
McKean	Gas Well	Abandoned	41.766010	-78.310706	755
McKean	Gas Well	Abandoned	41.765981	-78.312561	545
McKean	Gas Well	Active	41.715532	-78.457421	2,549
McKean	Gas Well	Active	41.744882	-78.431753	666
McKean	Gas Well	Active	41.75375	-78.348106	811
McKean	Gas Well	Active	41.783573	-78.281239	919
McKean	Gas Well	Active	41.757815	-78.331747	1,652
McKean	Gas Well	Active	41.795495	-78.268008	1,476
McKean	Gas Well	Active	41.733482	-78.455643	2,555
McKean	Gas Well	Active	41.781623	-78.285612	1,377
McKean	Gas Well	Active	41.792253	-78.271417	1,233
McKean	Gas Well	Active	41.726571	-78.449062	364
McKean	Gas Well	Active	41.747137	-78.433539	1,619
McKean	Gas Well	Active	41.722266	-78.463421	396
McKean	Gas Well	Active	41.777698	-78.293482	1,157
McKean	Gas Well	Active	41.772106	-78.279698	2,209
McKean	Gas Well	Active	41.778362	-78.282151	113
McKean	Gas Well	Active	41.724416	-78.449059	1,046
McKean	Gas Well	Active	41.744768	-78.443106	2,555
McKean	Gas Well	Active	41.759607	-78.329019	1,374
McKean	Gas Well	Active	41.755254	-78.411263	2,612
McKean	Gas Well	Active	41.779184	-78.272092	2,003
McKean	Gas Well	Active	41.769129	-78.291909	1,969
McKean	Gas Well	Active	41.782173	-78.277862	106
McKean	Gas Well	Active	41.782192	-78.274195	842
McKean	Gas Well	Active	41.762618	-78.329377	303
McKean	Gas Well	Active	41.751161	-78.346483	1,815
McKean	Gas Well	Active	41.781548	-78.282198	616
McKean	Gas Well	Active	41.779079	-78.285201	686
McKean	Gas Well	Active	41.770045	-78.288379	1,860
McKean	Gas Well	Active	41.717868	-78.460529	1,357
McKean	Gas Well	Active	41.723116	-78.477466	3,002
McKean	Gas Well	Active	41.726468	-78.457682	772
McKean	Gas Well	Active	41.762584	-78.325694	634
McKean	Gas Well	Active	41.773831	-78.276923	2,271
McKean	Gas Well	Active	41.799145	-78.263233	1,281
McKean	Gas Well	Active	41.784317	-78.271545	856
McKean	Gas Well	Active	41.726535	-78.45189	7
McKean	Gas Well	Active	41.720091	-78.460535	712
McKean	Gas Well	Active	41.750610	-78.342045	2,441
McKean	Gas Well	Active	41.773640	-78.310918	1,765
McKean	Gas Well	Active	41.776970	-78.296746	1,149

County/ Facility	Well Type	Status	Latitude (dd)	Longitude (dd)	Distance from Centerline (ft)
McKean	Gas Well	Active	41.717896	-78.466349	386
McKean	Gas Well	Active	41.758667	-78.325778	1,980
McKean	Gas Well	Active	41.772940	-78.288837	812
McKean	Gas Well	Active	41.770309	-78.282653	2,348
McKean	Gas Well	Active	41.755247	-78.333994	2,135
McKean	Gas Well	Active	41.776170	-78.279609	1,159
McKean	Gas Well	Active	41.776898	-78.276073	1,739
McKean	Gas Well	Active	41.744821	-78.439553	2,048
McKean	Gas Well	Active	41.779253	-78.279126	560
McKean	Gas Well	Active	41.720093	-78.454726	1,647
McKean	Gas Well	Active	41.788192	-78.2683	451
McKean	Gas Well	Active	41.758767	-78.333883	1,054
McKean	Gas Well	Active	41.802987	-78.262378	2,594
McKean	Gas Well	Active	41.775342	-78.28774	111
McKean	Gas Well	Active	41.729274	-78.46231	2,284
McKean	Gas Well	Active	41.785715	-78.2793	1,052
McKean	Gas Well	Active	41.771312	-78.285062	1,749
McKean	Gas Well	Active	41.779462	-78.291270	1,645
McKean	Gas Well	Active	41.774579	-78.295346	204
McKean	Gas Well	Active	41.747532	-78.314640	6,816
McKean	Gas Well	Active	41.757917	-78.320889	2,667
McKean	Gas Well	Active	41.756328	-78.333928	1,807
McKean	Gas Well	Active	41.790328	-78.270895	601
McKean	Gas Well	Active	41.77349	-78.28554	969
McKean	Gas Well	Active	41.787059	-78.271753	104
McKean	Gas Well	Active	41.790256	-78.277117	1,748
McKean	Gas Well	Active	41.717935	-78.457637	1,817
McKean	Gas Well	Active	41.769669	-78.303589	584
McKean	Gas Well	Active	41.793356	-78.264564	258
McKean	Gas Well	Active	41.751161	-78.346483	1,815
McKean	Gas Well	Active	41.798495	-78.266797	1,732
McKean	Gas Well	Active	41.793017	-78.275048	2,091
McKean	Gas Well	Active	41.750610	-78.342045	2,441
McKean	Gas Well	Active	41.722260	-78.466338	877
McKean	Gas Well	Active	41.740235	-78.449290	2,501
McKean	Gas Well	Active	41.797392	-78.270495	2,443
McKean	Gas Well	Active	41.784737	-78.274742	108
McKean	Gas Well	Active	41.749482	-78.435442	2,594
McKean	Gas Well	Active	41.756979	-78.328202	2,353
McKean	Gas Well	Active	41.726510	-78.454804	396
McKean	Gas Well	Active	41.773898	-78.281781	1,346
McKean	Gas Well	Active	41.760417	-78.341167	491
McKean	Gas Well	Active	41.776183	-78.300683	1,068
McKean	Gas Well	Active	41.775067	-78.291554	110
McKean	Gas Well	Active	41.776165	-78.283873	343
McKean	Gas Well	Active	41.794764	-78.271547	1,998

County/ Facility	Well Type	Status	Latitude (dd)	Longitude (dd)	Distance from Centerline (ft)
McKean	Gas Well	Active	41.771804	-78.292379	999
McKean	Gas Well	Active	41.761348	-78.32643	997
McKean	Gas Well	Active	41.744863	-78.435500	1,127
McKean	Gas Well	Active	41.753750	-78.344397	1,129
McKean	Gas Well	Active	41.724404	-78.451856	670
McKean	Gas Well	Active	41.793089	-78.268325	940
McKean	Gas Well	Active	41.765079	-78.322195	179
McKean	Gas Well	Active	41.720091	-78.457623	1,194
McKean	Gas Well	Active	41.781606	-78.289559	2,174
McKean	Gas Well	Active	41.800759	-78.266203	2,199
McKean	Gas Well	Active	41.780042	-78.295279	2,103
McKean	Gas Well	Active	41.707205	-78.4924	564
McKean	Gas Well	Active	41.789842	-78.265731	387
McKean	Gas Well	Active	41.798495	-78.266797	1,732
McKean	Gas Well	Active	41.731835	-78.458582	2,592
McKean	Gas Well	Active	41.724354	-78.466365	1488
McKean	Gas Well	Active	41.779184	-78.272092	2,003
McKean	Gas Well	Active	41.781323	-78.27045	1,811
McKean	Gas Well	Active	41.747001	-78.437545	2,080
McKean	Gas Well	Active	41.760912	-78.329922	845
McKean	Gas Well	Active	41.797242	-78.25975	468
McKean	Gas Well	Active	41.790317	-78.274103	1,199
McKean	Gas Well	Active	41.779653	-78.281853	126
McKean	Gas Well	Active	41.761361	-78.346194	1,497
McKean	Gas Well	Active	41.717943	-78.454718	2,297
McKean	Gas Well	Active	41.779587	-78.275348	1,247
McKean	Gas Well	Active	41.802023	-78.258933	2,181
McKean	Gas Well	Active	41.795012	-78.261886	87
McKean	Gas Well	Active	41.777962	-78.288612	860
McKean	Gas Well	Active	41.754133	-78.333892	2,496
McKean	Gas Well	Active	41.787617	-78.275911	834
McKean	Gas Well	Inactive	41.761953	-78.354329	1,860
McKean	Gas Well	Inactive	41.753350	-78.381250	1,094
McKean	Gas Well	Inactive	41.758112	-78.348464	764
McKean	Gas Well	Inactive	41.755639	-78.363673	459
McKean	Gas Well	Inactive	41.760032	-78.357994	1,002
McKean	Gas Well	Inactive	41.760994	-78.348648	1,731
McKean	Gas Well	Inactive	41.748049	-78.383753	2,556
McKean	Gas Well	Inactive	41.750456	-78.344339	2,244
McKean	Gas Well	Inactive	41.757976	-78.344432	193
McKean	Gas Well	Inactive	41.750838	-78.35744	2,276
McKean	Gas Well	Inactive	41.761979	-78.361385	1,699
McKean	Gas Well	Inactive	41.758442	-78.340547	212
McKean	Gas Well	Inactive	41.725227	-78.441903	2,197
McKean	Gas Well	Inactive	41.750856	-78.383867	1,630
McKean	Gas Well	Inactive	41.758249	-78.351762	789

County/ Facility	Well Type	Status	Latitude (dd)	Longitude (dd)	Distance from Centerline (ft)
McKean	Gas Well	Inactive	41.760852	-78.327835	1,047
McKean	Gas Well	Inactive	41.755640	-78.360466	619
Potter	Gas Well	Abandoned	41.845780	-78.045400	111
Potter	Gas Well	Abandoned	41.832240	-78.092800	2,532
Potter	Gas Well	Abandoned	41.831870	-78.097100	2,150
Potter	Gas Well	Abandoned	41.83333	-78.0893	2,416
Potter	Gas Well	Abandoned	41.83676	-78.0847	1,977
Potter	Gas Well	Abandoned	41.83713	-78.0825	2,172
Potter	Gas Well	Abandoned	41.83333	-78.0893	2,416
Potter	Gas Well	Abandoned	41.83224	-78.0928	2,532
Potter	Gas Well	Abandoned	41.83676	-78.0847	1,977
Potter	Gas Well	Active	41.86003	-78.0146	1,081
Potter	Gas Well	Active	41.84499	-78.0839	417
Potter	Gas Well	Active	41.81951	-78.1887	1,086
Potter	Gas Well	Active	41.84434	-78.0867	390
Potter	Gas Well	Active	41.8567	-78.014	868
Potter	Gas Well	Active	41.848724	-78.022833	1,467
Potter	Gas Well	Active	41.850597	-78.042772	1,840
Potter	Gas Well	Active	41.856697	-78.014027	868
Potter	Gas Well	Active	41.858919	-78.007999	2,479
Potter	Gas Well	Active	41.852634	-78.068065	2,591
Potter	Gas Well	Active	41.830439	-78.156181	1,710
Potter	Gas Well	Active	41.851391	-78.023889	531
Potter	Gas Well	Active	41.845019	-78.080811	258
Potter	Gas Well	Active	41.848697	-78.024278	1,235
Potter	Gas Well	Active	41.830383	-78.156144	1,731
Potter	Gas Well	Active	41.847091	-78.083613	1,154
Potter	Gas Well	Active	41.835965	-78.095323	1,179
Potter	Gas Well	Active	41.841523	-78.091287	380
Potter	Gas Well	Active	41.853113	-78.019861	730
Potter	Gas Well	Active	41.838687	-78.079243	2,088
Potter	Gas Well	Active	41.844983	-78.081025	257
Potter	Gas Well	Active	41.838345	-78.084306	1,523
Potter	Gas Well	Active	41.853586	-78.015444	1,348
Potter	Gas Well	Active	41.830433	-78.156136	1,713
Potter	Gas Well	Active	41.818017	-78.188506	1,455
Potter	Gas Well	Active	41.855974	-78.009833	2,032
Potter	Gas Well	Active	41.861474	-78.010694	2,198
Potter	Gas Well	Active	41.855974	-78.009833	2,032
Potter	Gas Well	Active	41.830494	-78.156219	1,689
Potter	Gas Well	Active	41.849697	-78.074752	1,591
Potter	Gas Well	Active	41.830489	-78.156172	1,692
Potter	Gas Well	Active	41.835965	-78.095323	1,179
Potter	Gas Well	Active	41.838971	-78.087525	912
Potter	Gas Well	Active	41.833333	-78.101102	1,096
Potter	Gas Well	Active	41.851391	-78.023889	531

County/ Facility	Well Type	Status	Latitude (dd)	Longitude (dd)	Distance from Centerline (ft)
Potter	Gas Well	Active	41.830544	-78.156211	1,671
Potter	Gas Well	Active	41.816322	-78.190831	1,184
Potter	Gas Well	Active	41.849069	-78.083602	1,859
Potter	Gas Well	Active	41.845000	-78.080917	257
Potter	Gas Well	Active	41.856419	-78.019305	115
Potter	Gas Well	Active	41.841523	-78.091287	380
Potter	Gas Well	Active	41.844983	-78.081025	257
Potter	Gas Well	Active	41.844336	-78.086700	390
Potter	Gas Well	Active	41.861474	-78.010694	2,198
Potter	Gas Well	Active	41.823676	-78.187046	290
Potter	Gas Well	Active	41.845019	-78.080811	258
Potter	Gas Well	Active	41.833333	-78.101102	1,096
Potter	Gas Well	Inactive	41.836091	-78.087619	1,834
Potter	Gas Well	Inactive	41.845086	-78.037167	480
Potter	Gas Well	Inactive	41.842957	-78.13574	2,119
Potter	Gas Well	Inactive	41.847286	-78.087251	1,409
Potter	Gas Well	Inactive	41.836091	-78.087619	1,834
Potter	Gas Well	Inactive	41.851425	-78.054278	2,257
Potter	Gas Well	Inactive	41.841672	-78.055889	1,277
Potter	Gas Well	Inactive	41.835787	-78.091378	1,367
Potter	Gas Well	Inactive	41.850122	-78.082536	2,175
Potter	Gas Well	Inactive	41.846116	-78.032369	728
Potter	Gas Well	Inactive	41.838929	-78.091319	413
Potter	Gas Well	Inactive	41.849531	-78.045661	1,481
Potter	Gas Well	Inactive	41.859909	-78.014381	1,077
Potter	Gas Well	Inactive	41.840837	-78.084314	869
Potter	Gas Well	Inactive	41.835787	-78.091378	1,367
Potter	Gas Well	Inactive	41.840837	-78.084314	869
Potter	Gas Well	Inactive	41.847286	-78.087251	1,409
Potter	Gas Well	Inactive	41.847158	-78.081986	1,087
Potter	Gas Well	Inactive	41.839115	-78.134730	951
Line KL Extension/Marvindale Compressor Station/Marvindale Interconnect					
McKean	Gas Well	Active	41.696321	-78.499539	2,168
McKean	Gas Well	Active	41.701210	-78.498472	434
McKean	Gas Well	Active	41.707958	-78.496508	1,278
McKean	Gas Well	Active	41.706960	-78.499055	1,380
McKean	Gas Well	Active	41.707096	-78.495955	933
Line YM224 Loop					
Potter	Gas Well	Active	41.87753	-77.963609	1,334
Potter	Gas Well	Active	41.876141	-77.972248	876
Potter	Gas Well	Active	41.878319	-77.968681	527
Potter	Gas Well	Active	41.878057	-77.980637	1,470
Potter	Gas Well	Active	41.872532	-77.978512	2,114
Potter	Gas Well	Active	41.875252	-77.966387	1801
Potter	Gas Well	Active	41.883446	-77.955609	208
Potter	Gas Well	Active	41.876585	-77.976776	606

County/ Facility	Well Type	Status	Latitude (dd)	Longitude (dd)	Distance from Centerline (ft)
Potter	Gas Well	Active	41.872532	-77.978512	2,114
Potter	Gas Well	Active	41.873002	-77.968748	2,302
Potter	Gas Well	Active	41.873002	-77.968748	2,302
Potter	Gas Well	Active	41.873863	-77.974026	1,472
Potter	Gas Well	Active	41.875613	-77.983499	2,383
Potter	Gas Well	Plugged	41.875335	-77.967081	1,699
Potter	Gas Well	Plugged	41.874057	-77.979387	1,768
Line FM100 Abandonment/Costello Compressor Station					
Cameron	Gas Well	Abandoned	41.339329	-78.194059	2,307
Cameron	Gas Well	Abandoned	41.332517	-78.186213	166
Cameron	Gas Well	Abandoned	41.329636	-78.186759	877
Cameron	Gas Well	Abandoned	41.342622	-78.141096	1,347
Cameron	Gas Well	Abandoned	41.333481	-78.188789	436
Cameron	Gas Well	Abandoned	41.342073	-78.139274	1,780
Cameron	Gas Well	Abandoned	41.331458	-78.18713	252
Cameron	Gas Well	Abandoned	41.335212	-78.193301	845
Cameron	Gas Well	Abandoned	41.338780	-78.192146	2,575
Cameron	Gas Well	Abandoned	41.331831	-78.189439	187
Cameron	Gas Well	Abandoned	41.336637	-78.188244	1,584
Cameron	Gas Well	Abandoned	41.331145	-78.170009	713
Cameron	Gas Well	Abandoned	41.331968	-78.195133	179
Cameron	Gas Well	Abandoned	41.336584	-78.182764	1,866
Cameron	Gas Well	Active	41.328535	-78.191286	1,457
Cameron	Gas Well	Active	41.331603	-78.180933	326
Cameron	Gas Well	Active	41.328948	-78.181478	623
Cameron	Gas Well	Active	41.324627	-78.208401	243
Cameron	Gas Well	Active	41.322632	-78.201318	1,515
Cameron	Gas Well	Active	41.336853	-78.202054	2,393
Cameron	Gas Well	Active	41.333591	-78.180869	908
Cameron	Gas Well	Active	41.337542	-78.189855	1,843
Cameron	Gas Well	Active	41.334661	-78.187305	897
Cameron	Gas Well	Active	41.331413	-78.203507	1,157
Cameron	Gas Well	Active	41.331968	-78.175212	11
Cameron	Gas Well	Active	41.326889	-78.187485	1,763
Cameron	Gas Well	Active	41.328125	-78.184209	1,056
Cameron	Gas Well	Active	41.328003	-78.188476	1,540
Cameron	Gas Well	Active	41.333674	-78.172896	471
Cameron	Gas Well	Active	41.325104	-78.194766	2,149
Cameron	Gas Well	Inactive	41.337866	-78.196086	1,831
Cameron	Gas Well	Inactive	41.330183	-78.184027	308
Cameron	Gas Well	Inactive	41.338368	-78.190041	2,131
Cameron	Gas Well	Inactive	41.403358	-78.113560	1,560
Cameron	Gas Well	Inactive	41.512575	-78092736	627
Clearfield	Gas Well	Abandoned	41.239030	-78.418559	778
Clearfield	Gas Well	Abandoned	41.237658	-78.420013	1,405
Clearfield	Gas Well	Abandoned	41.235188	-78.414893	2,212

County/ Facility	Well Type	Status	Latitude (dd)	Longitude (dd)	Distance from Centerline (ft)
Clearfield	Gas Well	Active	41.227363	-78.527341	2,000
Clearfield	Gas Well	Active	41.213644	-78.546106	1,979
Clearfield	Gas Well	Active	41.218584	-78.542653	185
Clearfield	Gas Well	Active	41.223639	-78.566639	2,520
Elk	Gas Well	Active	41.246716	-78.416741	2,026
Elk	Gas Well	Active	41.246708	-78.416163	2,000
Elk	Gas Well	Active	41.245343	-78.381618	840
Elk	Gas Well	Inactive	41.244512	-78.415798	1,200
Elk	Gas Well	Inactive	41.307541	-78.309207	628
Elk	Gas Well	Inactive	41.308637	-78.319763	2,129
Elk	Gas Well	Inactive	41.302050	-78.319760	400
Potter	Gas Well	Inactive	41.588502	-78.066769	1,894
Potter	Gas Well	Inactive	41.542786	-78.093862	424
Tamarack Compressor Station					
Clinton	Gas Well	Abandoned	41.439125	-77.836981	653
Clinton	Gas Well	Active	41.442695	-77.841597	2,413
Clinton	Gas Well	Active	41.439814	-77.83886	1,162
Clinton	Gas Well	Active	41.436658	-77.846157	2,426
Clinton	Gas Well	Active	41.439676	-77.842509	1,929
Clinton	Gas Well	Active	41.438469	-77.842509	1,663
Clinton	Gas Well	Active	41.440911	-77.836672	920
Clinton	Gas Well	Active	41.436658	-77.846157	2,426
Clinton	Gas Well	Active	41.440911	-77.836672	920
Clinton	Gas Well	Active	41.442695	-77.841597	2,413
Clinton	Gas Well	Active	41.438469	-77.842509	1,663
Clinton	Gas Well	Inactive	41.438853	-77.836124	446

F. PADEP Standard E&S Worksheet 22 (Plan Preparer Record of Training and Experience in Erosion and Sediment Pollution Control Methods and Techniques)

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STANDARD E&S WORKSHEET # 22
PLAN PREPARER RECORD OF TRAINING AND EXPERIENCE IN EROSION AND SEDIMENT POLLUTION CONTROL METHODS AND TECHNIQUES

NAME OF PLAN PREPARER: MICHAEL DENICHILO

FORMAL EDUCATION:

Name of College or Technical Institute: VILLANOVA UNIVERSITY

Curriculum or Program: CIVIL AND ENVIRONMENTAL ENGINEERING (BS)
WATER RESOURCES AND ENVIRONMENTAL ENGINEERING (MS)

Dates of Attendance: **From:** 2004 / 2009 **To:** 2008 / 2011

Degree Received BACHELOR OF SCIENCE / MASTER OF SCIENCE

OTHER TRAINING:

Name of Training:	FEDERAL ENERGY REGULATORY COMMISSION (FERC) - ENVIRONMENTAL REVIEW AND COMPLIANCE FOR NATURAL GAS FACILITIES	GAS TECHNOLOGY INSTITUTE (GTI) - TRANSMISSION PIPELINE DESIGN & CONSTRUCTION PRACTICES
Presented By:	DAVID HANOBIC / DANNY LAFFOON / MAGGIE SUTER / LARRY BROWN / TIM DRAKE / JENNIFER LEE / MIKE TIMPSON / JANELLE RIELAND / JOE HOLLER	GUS / BILL
Date:	MARCH 7-9, 2017	NOVEMBER 6-10, 2017

EMPLOYMENT HISTORY:

Current Employer: MOTT MACDONALD

Telephone: (973) 379-3400

Former Employer: N/A

Telephone: N/A

RECENT E&S PLANS PREPARED:

Name of Project:	Rahway River Pipe Replacement	Rivervale to Market Project	
County:	Union County, NJ	Bergen County, NJ	
Municipality:	Linden	Carlstadt / River Vale / Emerson / Paramus	
Permit Number:	2017-2960	18-1148	
Approving Agency:	Somerset - Union Soil Conservation District	Bergen County Soil Conservation District	

G. ESCAMP

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NATIONAL FUEL GAS COMPANY

Erosion and Sediment Control
&
Agricultural Mitigation Plan
(ESCAMP)

18 November 2013

Revised: October 3, 2019

Revised: September 2020

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1 INTRODUCTION

1.1 Plan Objectives

The primary objective of this Erosion and Sedimentation Control & Agricultural Mitigation Plan (ESCAMP or "Plan") is to reduce potential impacts from construction and maintenance of the project and outline mitigation, monitoring and maintenance procedures.

This Plan describes basic environmental construction and agricultural mitigation techniques that National (or its contractors) will use to construct and maintain pipelines. Best Management Practices (BMPs) will be implemented throughout construction to protect the environment and to minimize potential effects to the pipeline project. This document references BMPs that may be National Fuel Gas's (National) BMPs, Pennsylvania Department of Environmental Protection's (PADEP) BMPs, ~~New York State Department of Environmental Conservation (NYSDEC) BMPs~~ or varying combinations of listed references.

This ESCAMP has been modified and may be subject to further revision, as needed prior to construction, to include any additional requirements recommended by Federal, State, or Local agencies during the process of issuing permits. This document will be included as part of the Contractor's construction specifications.

1.2 Format

The content of this Plan is derived from the Federal Energy Regulatory Commission's (FERC) Wetland and Waterbody Construction and Mitigation Procedure; Upland Erosion Control, Revegetation, and Maintenance Plan; and Agricultural Mitigation Through the Stages of Pipeline Planning, Construction/Restoration and Follow Up Monitoring. Additional project specific input has been integrated from consultation with the United State Army Corps of Engineering, the Pennsylvania Department of Environmental Protection~~, the New York State Department of Environmental Conservation,~~ the United States Fish & Wildlife Service, the United States Department of Agriculture, ~~New York State Department of Agriculture & Markets~~, and the County Soil & Water Conservation Districts.

This ESCAMP provides information regarding the project construction and restoration, including the following:

- Agricultural Mitigation, as described herein and provided in the attached Soil Protection and Subsoil Decompaction Plan (Attachment 1);
- Wetland/Waterbody Construction, Erosion and Sedimentation Controls as described herein and as detailed in attached Best Management Practices (BMP) drawings (Attachment 2);
- Stormwater Pollution Prevention project information; and
- Revegetation and Maintenance details.
- Reference information used to develop this Plan is identified in the Section 11. Supplemental information is provided in the project Spill Prevention and Response Procedures (SPRP) document, Hydrostatic Test Plan, and Site Specific Residential Mitigation Plans (not included in this document).

2 SUPERVISION AND INSPECTION

2.1 Environmental Inspection

- At least one Environmental Inspector having knowledge of the wetland and waterbody conditions in the project area is required for each construction spread during construction and restoration. The number and experience of Environmental Inspectors assigned to each construction spread should be appropriate for the length of the construction spread and the number/significance of resources affected.
- Environmental Inspectors shall have peer status with all other activity inspectors.
- Environmental Inspectors shall have the authority to stop activities that violate the environmental conditions of the FERC's Orders, stipulations of other environmental permits or approvals, or landowner easement agreements; and to order appropriate corrective action. Corrective actions (and their status) will be documented in daily forms and, at a minimum, maintained in project files for the duration of construction activities.

The Project's Environmental Manager will be the primary liaison between the Project and agency representatives. Environmental Inspectors may be directed by the Environmental Manager to coordinate with agency field staff during project inspection activities. Agencies will be notified of project activities in accordance with permit and FERC's Orders requirements or as required by law (e.g., spill of hazardous material to a water source). Additional notifications will be made on a case-by-case situation (e.g., requests for agency guidance or existing requirement variances).

2.2 Responsibilities of Environmental Inspectors

At a minimum, the Environmental Inspector(s) shall be responsible for:

- Inspecting construction activities for compliance with the requirements of this Plan, FERC Procedures, the environmental conditions of the FERC's orders, the mitigation measures proposed by the project sponsor (as approved and/or modified by the order), other environmental permits and approvals, and environmental requirements in landowner easement agreements.
- Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance.
- Verifying that the limits of authorized construction work areas and locations of access roads are visibly marked before clearing, and maintained throughout construction.
- Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area.
- Identifying erosion/sediment control and soil stabilization needs in all areas.
- Coordinate activities with agricultural inspectors and drainage specialists in farmland areas (see Section 2.4 – Responsibilities/Qualifications of Agriculture Inspectors).
- Ensuring that the design of slope breakers will not cause erosion or direct water into sensitive environmental resource areas including known cultural resources sites, wetlands, waterbodies and sensitive species habitats.
- Verifying that dewatering activities are properly monitored and do not result in the deposition of sand, silt, and/or sediment into sensitive environmental resource areas, including wetlands, waterbodies, cultural resource sites, and sensitive species habitats; stopping dewatering activities if such deposition is occurring and ensuring

the design of the discharge shall be changed to prevent reoccurrence; and verifying that dewatering structures are removed after completion of dewatering activities. (See Trench Dewatering section of this Plan).

- Ensuring that subsoil and topsoil are tested in residential areas to measure compaction and determine the need for corrective action.
- Advising the Chief Inspector when environmental conditions (such as wet weather or frozen soils) make it advisable to restrict or delay construction activities to avoid topsoil mixing or excessive compaction. .
- Ensuring restoration of contours and topsoil.
- Verifying that the soils imported for agricultural or residential use have been certified (if available) as free of noxious weeds and soil pests, unless otherwise approved by the landowner.
- Ensuring that erosion control devices are properly installed, to prevent sediment flow into sensitive environmental resource areas (e.g., wetlands, waterbodies, cultural resource sites, and sensitive species habitats) beyond approved workspace limits and onto roads, and determining the need for additional erosion control devices.
- ~~When working in New York State (NY), ensuring compliance with New York State Department of Environmental Conservation (DEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from construction activities where applicable (NY DEC SPDES permit required for NY Projects resulting in 1 acre disturbance or greater). See Stormwater Pollution Prevention section of this plan.~~
- When working in Pennsylvania (PA), ensuring compliance with either the PA Department of Environmental Protection's (DEP's) Erosion and Sediment Control General Permit (ESCGP-3) or their National Pollution Discharge Elimination System (NPDES) Permit for Stormwater Discharges Associated with Construction Activities where applicable (PA DEP ESCGP-3 permit required for PA Oil & Gas Related (non-distribution) Projects resulting in 5 acres disturbance or greater; PA DEP NPDES permit required for PA Distribution Projects resulting in 1 acre disturbance or greater). See Stormwater Pollution Prevention section of this plan.
- Inspecting and ensuring the maintenance of temporary erosion control measures at least:
    - On a daily basis in areas of active construction or equipment operation.
    - On a weekly basis in areas with no construction or equipment operation.
    - Within 24 hours of ~~0.5~~ 0.25 inch of rainfall.
- Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification, or as soon as conditions allow if compliance with this time frame would result in greater environmental impacts.
- Keeping records of compliance with the environmental conditions of the FERC's orders, and the mitigation measures proposed by the project sponsor in the application submitted to the FERC, and other Federal or state environmental permits during active construction and restoration.
- Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.
- Verifying that locations for any disposal of excess construction materials for beneficial reuse comply with all applicable local, state, and federal regulations/permits and do not result in adverse environmental impacts or violate applicable landowner/land management agency agreements. These locations must also comply with Section 3.3.

2.3 Agricultural Inspection

The Agricultural Inspection for the project will include a combination of agricultural and drainage specialists to ensure aspects of the project that affect farmland meet or exceed: the project-specific conditions or orders of certification, relevant to agricultural resources, which are incorporated by the lead/certifying agency.

National's level of agriculture-related staffing will be dependent on the workload requirements including but not limited to: technical, pre-construction planning; construction/restoration inspection and; monitoring and follow-up remediation including drainage mitigation activities (e.g.: less staff during the pre-construction planning phase and the monitoring and the follow-up remediation phase), but will include the project's commitment to agricultural inspectors and agricultural drainage specialists on a full-time basis through pipeline construction/restoration, which make up the peak work load phase of pipeline right-of-way activity.

Based on the project's anticipated number of construction work spreads, there may be one agricultural drainage specialist and two agricultural inspectors assigned full-time, per spread. However, a practical degree of flexibility will be available: should agricultural construction/restoration activity within one work spread be temporarily light enough for the agricultural inspector to fully and effectively supervise, at a time when the activities are heavy in the other work spread, then the agricultural inspector in the former spread may temporarily assist the staff in the latter spread. For periods of peak construction/restoration activities in agricultural lands that exceed the effective capability of the full-time staff, the project will provide additional temporary agricultural inspectors.

During phases of less intensive project activity (e.g., pre-construction planning, or dormant right-of-way winterization without construction, follow-up crop monitoring, etc.), fewer staff may be employed, as appropriate, relative to the level of activity. Regardless, the project sponsor will provide an adequate number of qualified personnel (per the responsibilities/qualifications herein) to meet the level of effort required by this plan or conditions of FERC's Orders.

To the extent practicably feasible, the project will strive to utilize the same agricultural and drainage specialist staff during the planning, construction restoration and monitoring phases of work to allow for maximum technical continuity.

2.4 Responsibilities/Qualifications of Agriculture Inspectors

Agricultural Inspector

The work of a qualified Agricultural Inspector, with the ability and the authority required to perform independently, assumes the pipeline right-of-way project aspects listed below:

- Training and education of other project sponsor staff (e.g.: land agents, craft inspectors, assistant agricultural compliance inspectors, environmental inspectors, etc.), and construction personnel, in the proper use and application of the agricultural right-of-way standards and case-specific orders of certification.
- Technical field supervision over all aspects of the project that affects agricultural resources, through each stage of on-site work: right-of-way clearing, construction stages (including compliance with trench dewatering procedures), clean-up stage and initial restoration stages.
- Technical field supervision (after the satisfactory completion of initial restoration), over the on-site monitoring of, and the follow-up restoration in, agricultural lands.

- Communication in conjunction with other project staff with affected farmland owners and operators over the project's duration: planning through construction/initial restoration, to completion of monitoring and follow-up restoration.

The key mission of each Agricultural Inspector is ensuring the project's full compliance in meeting (or exceeding) standards and case-specific conditions or orders pertaining to the affected agricultural resources.
The following are recommended qualifications for Agricultural Inspectors:

- Earned a bachelor degree or associate in applied science diploma in: agronomy or environmental sciences, with concentration in: agriculture, soils, horticulture, forestry, or closely allied science, and been employed in the respective field, regionally, not less than five years (i.e.: not directly out of college); or-
- Advanced steadily in a career through on-the-job training and performance, regionally, for a minimum of ten years as a soil and water conservation field technician with a practical working knowledge of soil conservation, farming, surveying, land excavation and drainage, or similar types of work: from the land review, field planning and design/layout phase through construction inspection and site completion; or-
- Advanced steadily in a career through on-the-job training and field performance for a minimum of five years in pipeline construction/restoration right-of-way work, with at least two full years serving as an assistant to either a qualified agricultural or environmental compliance inspector, and have earned, and currently hold certification as, either a Professional in Erosion and Sediment Control (CPESC) or Professional in Storm Water Quality (CPSWQ); or-
- Combination of the above qualifications.

Drainage Specialist (where appropriate)

The Agricultural Drainage Specialist is responsible for the detailed, on-site data consolidation of all surface and subsurface drainage characteristics and facilities for affected farmlands; and planning and technically supervising all drainage-related mitigation, through the planning and construction, initial restoration, post-construction monitoring and follow up restoration stages. The drainage specialist provides the specialized technical direction that enables the project to fully restore all disturbed land and all facility components of surface and subsurface drainage on affected farmland; including the effective mitigation of new or exacerbated conditions of water boils or field saturation

The drainage specialist serves as a specialized arm of the Agricultural Inspectors working in close technical coordination with them over a project's full duration, as required. The drainage specialist will provide primary technical direction of on-site drainage mitigation and follow up for all affected agricultural lands. In addition the drainage specialist may provide both technical field direction and oversight of the subcontractors specializing in agricultural drainage.

The work of a qualified drainage specialist, with the ability and technical authority to work both jointly and independently, assumes the pipeline right-of-way project aspects listed below:

- On-site inventory of all surface and subsurface drainage-related characteristics of affected farmlands, in the pre-construction planning phase. This includes location referencing for drainage such as:
    - existing features of surface runoff such as small but defined swales, up to large and broad swales;
    - existing farm features of water control such as diversion terraces, field ditches, main outlet ditches;
    - existing buried water lines (farmstead consumptive use);

  - existing water source (developed springs, etc.) or unnamed water flow areas;
  - subsurface drain line systems ranging from clay tile to modern perforated polyethylene tubing; or, approximated locations of earlier stone drain systems; key drainage features which are outside of the directly affected farm field[s], but may serve to receive the respective surface or subsurface drainage, e.g.: ditches and culverts of active or abandoned railroads, road ditches, etc.
- Estimating portions of farms, based on soil, terrain, and drainage/water table characteristics, where new or exacerbated conditions of water boils or field saturation should be anticipated for follow up mitigation.
- In farm lands, assisting other Agricultural and Environmental Inspectors in the advance selection of acceptable trench de- watering measures and respective locations of water discharge to avoid agricultural impacts and estimating the pumping/associated hose length requirements necessary to ensure such avoidance of impacts.
- Ensuring the project's prompt marking/staking of all disturbed drainage facilities. Assisting the Agricultural Inspectors, as needed, in ensuring compliance with trench de-watering standards and dry backfilling (as defined in Section 4.10) of the trenches in affected farmland.
- Planning and laying out interceptor drain line systems including their safe, gravity-flow discharge to predetermined outlet locations.
- Providing on-site design, general material estimates and technical field supervision over:
  - Drain line repairs and system replacements;
  - The effective engineering re-construction of un-avoided surface drainage facilities such as diversion terraces or farm waterways;
  - The installation and outlet of interceptor drain line systems.

3 PRECONSTRUCTION PLANNING

This Section presents the pre-construction planning efforts, further details regarding the construction activities are presented in Section 4 – Construction Activities and general sequencing of planning, installation, cleanup and restoration is presented in Section 10 – General Pipeline Construction Sequencing.

3.1 Construction Work Areas

Construction activities shall be confined to the approved work areas.

- Identify all construction work areas (e.g., construction right-of-way, extra work space areas, pipe storage and contractor yards, borrow and disposal areas, access roads, etc.) that would be needed for safe construction. The project sponsor must ensure that appropriate cultural resources and biological surveys are conducted, as determined necessary by the appropriate federal and state agencies.
- Project sponsors are encouraged to consider expanding any cultural resources and endangered species surveys in anticipation of the need for activities outside of authorized work areas.
- Plan construction sequencing to limit the amount and duration of open trench sections, as necessary, to prevent excessive erosion or sediment flow into sensitive environmental resource areas.

3.1.1 ROW & Staging Areas

Before construction begins, the right-of-way (ROW) will be surveyed and staked. Other utility lines will be located and marked to prevent accidental damage during pipeline construction.

Staging areas will be set up when the contractor starts work. Proper BMP controls will be erected prior to any sustained heavy traffic. If vehicles enter or exit the staging area onto a paved road, an entrance pad will be installed as per *BMP Drawing No. 1.*

3.1.2 Access Roads

The project will make use of the ROW for access along the pipeline. Where additional access is necessary for pick-up trucks and other vehicles, existing access roads may be used upon agreement with the landowner. Appropriate BMP controls will be installed and maintained on these roads, and they will be reclaimed to a condition at least equal to their pre-construction condition.

In agricultural lands topsoil will be stripped and segregated for expansion (widening or lengthening) or installation access roads (if necessary). National will work with landowners, and if requested by the landowner, access roads will remain in place for landowner use following construction. Alternatively, if access roads are restored to original use (e.g., tillable land) they will be fully restored using the same scope of agricultural mitigation and restoration measures that apply to pipeline construction right-of-way.

3.1.3 Pipe yards

During project planning efforts have been made to site pipe yards in previously disturbed non-agricultural areas. If agricultural lands are utilized for yards, the Contractor shall strip and segregate topsoil in agricultural lands used as pipe yards. However, if any such area is used as a pipeyard it will be fully restored using the same scope of agricultural mitigation and restoration measures that apply to pipeline construction right-of-way.

3.1.4 Wetland/Waterbody Crossings

The pre-construction activities include survey of topographic surface elevations, in addition to the identification of wetlands and waterbodies. This survey will include elevations at the top and bottom of banks, location of the greatest stream depth, and edge water edge of the crossing for both pre- and post-construction. This topographic survey of conditions will be used, in conjunction with pre-construction photograph of the crossing locations from downstream and parallel to the pipeline centerline to document the pre-existing conditions of the crossing and to confirm that existing topography and profiles are re-established during restoration. All construction plans will be prepared in accordance with the FERC guidance, National standards, and the BMPs.

Stream crossings will be inspected daily during active construction and weekly during inactive construction. Following the restoration of the stream crossing, the crossings will be inspected after major rain events. This inspection program will continue through several high water events to ensure that the stream channel is stable.

The following should be filed with the Secretary of the FERC (Secretary) prior to the beginning of construction, for the review and written approval by the Director:

- Site-specific justifications for extra workspace areas that would be closer than 50 feet from a waterbody or wetland
- Site-specific justifications for the use of a construction right-of-way greater than 75- feet-wide in wetlands.

The following information must be filed with the Secretary prior to the beginning of construction. These filing requirements do not apply to projects constructed under the automatic authorization previsions in the FERC's regulations:

- Spill Prevention and Response Procedures specified in section 3.5
- A schedule identifying when trenching or blasting will occur within each waterbody greater than 10 feet wide, within any designated coldwater fishery, and within any waterbody identified as habitat for federally-listed threatened or endangered species. The project sponsor will revise the schedule as necessary to provide FERC staff at least 14 days advanced notice. Changes within this last 14-day period must provide for at least 48 hours advanced notice.
- Plans for horizontal directional drilling (HDD) under wetlands or waterbodies
- A wetland delineation report if applicable
- The hydrostatic testing information

3.2 Agricultural Area Planning

3.2.1 Drain Tile and Irrigation Systems

Supplementing the details of pre-construction activities, in agricultural areas, as identified in the responsibilities of the Drainage Specialist (Section 2.4), planning will include the following:

- Attempt to locate existing drain tiles and irrigation systems.
- Contact landowners and County Conservation Districts to determine the locations of future drain tiles that are likely to be installed within 3 years of the authorized construction.
- If working in New York State, develop procedures (with NYS DA&M and/or the Soil and Water Conservation District) for constructing through drain tile areas, maintaining irrigation systems during construction, and repairing drain tiles and irrigation systems after construction.
- Engage qualified drain tile specialists, as needed to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialists from the project area, if available.
- Assist in identification of the dewatering outlets and favorable locations, including off ROW, for the protected day lighting of gravity flow drain outlets for new interceptors or replaced drain lines.
- For new pipelines in areas where drain tiles exist or are planned, ensure that the depth of cover over the pipeline is sufficient to avoid interference with drain tile systems.

3.2.2 Grazing Deferment

Develop grazing deferment plans with willing landowners, grazing permittees, and land management agencies to minimize grazing disturbance of revegetation efforts.

3.3 Disposal Planning

Determine methods and locations for the regular collection, containment, and disposal of excess construction materials and debris (e.g., timber, slash, mats, garbage, drilling cuttings and fluids, excess rock, etc.) throughout the construction process. Disposal of materials for beneficial reuse must not result in adverse environmental impact and is subject to compliance with all applicable survey, landowner or land management agency approval, and permit requirements.

3.4 Agency Coordination

During the planning the project sponsor must coordinate with the appropriate local, state, and federal agencies as outlined in this Plan and /or required by the FERC's Orders.:

- Obtain written recommendations from the local soil conservation authorities or land management agencies regarding permanent erosion control and revegetation specifications.
- National will consult with the appropriate technical and/or regulatory agencies regarding invasive species, noxious weeds and soil-borne pathogens. National agrees to consult with the appropriate agencies regarding agricultural bio security (noxious weeds and soil-borne pathogens). If necessary, based on this consultation, National will develop specific practical cost-effective procedures to mitigate significant agricultural bio security risks, if they are determined to exist in the project area.
- Develop specific procedures in coordination with the appropriate agencies to prevent the introduction or spread of invasive species, noxious weeds, and soil pests resulting from construction and restoration activities.
- Develop specific procedures in coordination with the appropriate agencies and landowners, as necessary, to allow for livestock and wildlife movement and protection during construction.
- Develop specific blasting procedures in coordination with the appropriate agencies that address pre- and post-blast inspections; advanced public notification; and mitigation measures for building foundations, groundwater wells, and springs. Use appropriate methods (e.g., blasting mats) to prevent damage to nearby structures and to prevent debris from entering sensitive environmental resource areas.

3.5 Spill Prevention and Response Procedures

The project sponsor shall develop project-specific Spill Prevention and Response Procedures, as specified in section IV of the staff's procedures. A copy must be files with the Secretary of the FERC (Secretary) prior to construction and made available in the field on each construction spread. The filing requirement does not apply to projects under the automatic authorization provisions in the FERC's regulations.

3.6 Stormwater Pollution Prevention Plan

Make available on each construction spread in Pennsylvania, the Stormwater Pollution Prevention Plan prepared for compliance with the National Pollution Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activities or the Pennsylvania Department of Environmental Protection's Erosion & Sedimentation Control General Permit (ESCGP-3).

~~Make available on each construction spread in New York, the Stormwater Pollution Prevention Plan prepared for compliance with the New York State Department of Environmental Conservation, State Pollution Discharge~~

Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities (GP-0-15-002).

3.7 Residential Construction

For all properties with residences located within 50 feet of construction work areas, project sponsors shall; avoid removal of mature trees and landscaping within the construction work area unless necessary for safe operation of construction equipment, or as specified on landowner agreements; fence the edge of the construction work area for a distance of 100 feet on either side of the residence; and restore all lawn areas and landscaping immediately following clean-up operations, or as specified in landowner agreements. If season or weather conditions prevent compliance with these time frames, maintain and monitor temporary erosion controls (sediment barriers and mulch) until conditions allow completion of restoration.

3.8 Winter Construction Plans

If construction is planned to occur during winter weather conditions, project sponsors shall develop and file a project-specific winter construction plan with the FERC application. This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations. (See Attachment 6 of this manual).

The plan shall address:

- Winter construction procedures (e.g., snow handling and removal, access road construction and maintenance, soil handling under saturated or frozen conditions, topsoil stripping).
- Stabilization and monitoring procedures if ground conditions will delay restoration until the following spring (e.g., mulching and erosion controls, inspecting and reporting, stormwater control during spring thaw conditions); and
- Final restoration procedures (e.g., subsidence and compaction repair, topsoil replacement, seeding).

4 CONSTRUCTION ACTIVITIES

This Section presents the details regarding specific construction activities while additional general sequencing of planning; installation, cleanup and restoration are presented in Section 10 – General Pipeline Construction Sequencing.

4.1 Approved Areas of Disturbance

Project-related ground disturbance shall be limited to the construction right-of-way, extra workspace areas, pipe storage yards, borrow and disposal areas, access roads, and other areas approved in the FERC's Orders. Any project-related ground disturbing activities outside these areas will require Director approval. This requirement does not apply to activities needed to comply with the Plan and Procedures (i.e., slope breakers, energy-dissipating devices, dewatering structures, drain tile system repairs) or minor field realignments and workspace shifts per landowner needs and requirements that do not affect other landowners or sensitive environmental resource areas. All construction or restoration activities outside of the authorized areas are subject to all applicable survey, permit requirements, and landowner easement agreements.

The construction right-of-way width for a project shall not exceed 75 feet or that described in the FERC application unless otherwise modified by a FERC Order.

Project use of any additional areas is subject to landowner or land management agency approval and compliance with all applicable survey and permit requirements. When additional areas are used, each one should be identified and the need explained in the weekly or biweekly construction reports to the FERC, if required. The following material should be included in the reports:

- The location of each additional area by station number and reference to a previously filed alignment sheet, or updated alignment sheets showing the additional areas;
- Identification of the filing at FERC containing evidence that the additional areas were previously surveyed; and
- A statement that landowner approval has been obtained and is available in project files.

Prior written approval of the Director is required when the authorized construction right-of-way width would be expanded by more than 25 feet.

4.2 Residential Area Construction

The care exercised by construction crews and the qualities of cleanup following construction are paramount concerns of homeowners. National will make every effort to ensure that all construction activities minimize adverse impacts to residences and that cleanup is quick and thorough.
Throughout construction, traffic lanes and access to homes will be maintained except for the brief periods essential for laying the new pipeline. The Contractor will erect temporary safety fences in the vicinity of streets and homes to keep the public away from the construction zone. National may use techniques such as stovepipe and drag section construction in order to minimize the impacts of construction in residential areas on a site-specific basis. Site-specific residential mitigation plans will be utilized in areas with residences within 25 feet from the edge of construction right-of-way.

Homeowners will be notified in advance of any scheduled disruption of household utilities and the duration of the interruption will be kept as brief as possible. Representatives of the local utility companies will be on-site during construction when necessary. In addition, National will strive to accommodate any special concerns regarding ornamental shrubs, trees, or structures by avoiding them as long as such avoidance will not unduly interfere with construction and operation of the pipeline.

National will take measures to ensure that construction activities will not prevent access to residential areas by fire and emergency vehicles. At least one lane of traffic will be kept open for emergency vehicles when constructing on or across residential streets. During the brief period of road closure, steel plates will be available on site to cover the open area to permit travel by emergency vehicles.

In residential areas, topsoil replacement (i.e., importation of topsoil) is an acceptable alternative to topsoil segregation. Where topsoil segregation is conducted, maintain separation of salvaged topsoil and subsoil throughout all construction activities. Segregated topsoil may not be used for padding the pipe or filling sandbags.

Immediately after backfilling, residential areas will be cleaned up, and all construction debris will be removed. Lawns will be raked, topsoil added as necessary, and lawns restored per agreements with landowners. Ornamental shrubs will be replaced where possible. Contractors will restore fences, mailboxes, and other structures removed during construction. Sidewalks, driveways, and roads will be restored as soon as practical.

4.3 Agricultural Area Construction

In predominantly agricultural areas, National will have Agricultural Inspectors/Specialists on site during construction in accordance with the Agricultural Inspection section of this Plan. In addition, prior to construction, National's Drainage Specialists (in coordination with National land agents) will contact farm landowners and operators and the local agencies for planning purposes described in previous section.

4.3.1 Topsoil Segregation

Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus spoil side method) in:

- Cultivated or rotated croplands, and managed pastures;
- Residential areas;
- Hayfields; and
- Other areas at the landowner's or land managing agency's request.

In residential areas, importation of topsoil is an acceptable alternative to topsoil segregation.
Where topsoil segregation is required, the project sponsor must:

- Segregate at least 12 inches of topsoil in deep soils (more than 12 inches of topsoil); and
- Make every effort to segregate the entire topsoil layer in soils with less than 12 inches of topsoil. Remove subsoil to a depth of 12 inches or to the top of the bedrock, whichever is shallower
- For specialty soils, topsoil removal up to 16 inches will be required.

Maintain separation of salvaged topsoil and subsoil throughout all construction activities.

Segregated topsoil may not be used for padding the pipe, constructing temporary slope breakers or trench plugs, improving or maintaining roads, or as a fill material.

Stabilize topsoil piles and minimize loss due to wind and erosion with use of sediment barriers, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary.

4.3.2 Drain Tiles

All drainage tiles encountered shall be marked, maintained during construction, and restored to as good or better condition upon completion of construction. *BMP Drawing Nos. 30, 30A and 42* provide typical information for drain tiles where encountered. Specific details on drain tile monitoring activities are provided in Section 7.6.1.

- Mark locations of drain tiles damaged during construction. Encountered drain tiles shall be referenced and flagged with stakes located adjacent to the ditch, and the right-of-way edge (outer perimeters).
- When it is necessary to maintain flow in the drainage system during construction, a temporary pipe bridge shall be installed across the trench. Smaller feeder drains shall be capped so that flows are diverted to the primary drain on which the Pipe Bridge has been installed.
- Open ends of tile shall be covered to prevent ingress of dirt, rock, or wildlife.

- All drainage systems shall be probed to determine if damage has occurred. All tiles damaged during construction shall be flagged by the trenching inspector.
- Repair or replace all damaged drain tiles to their original or better condition under the supervision of the Drainage Specialist. Do not use filter-covered drain tiles unless the local soil conservation authorities or land management agencies and landowner agree. Use Qualified Drainage specialists for testing and repairs to ensure proper repairs and adequate probing/testing of the repaired or replaced drainage systems.
- For new pipelines in areas where drain tiles exist or are planned, ensure that the depth of cover over the pipeline is sufficient to avoid interference with drain tile systems. For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).
- Other drainage-related impacts such as water boils and right-of-way saturation that are created or exacerbated by the pipeline project will be mitigated during monitoring and follow-up remediation (see Section 9.1 - Monitoring and Maintenance).
- Detailed records of drainage system repairs shall be maintained and upon request given to the landowner and the local soil conservation authority or land management agency offices for future reference.

4.3.3 Irrigation

- Maintain water flow in crop irrigation systems, unless shutoff is coordinated with the affected parties.

4.4 Equipment Crossings

Construction of equipment crossings will occur during the clearing or grading process. Protective measures will include the use of timber mats laid adjacent to and across streambeds if banks are high enough, flume pipe covered by fill material (clean gravel or crushed stone) or portable bridges approved by the Environmental Inspector. The size and number of flume pipes will be sufficient for maximum anticipated flows. Typical crossing method information is presented on *BMP Drawing Nos. 2, 9, 12, 13 and 21.*

Flume pipes will conform to waterbody crossing dimensions and alignments. Stream channels will not be permanently straightened or realigned to conform with flume pipe dimensions or for any other reasons, unless a permit has been acquired to do so.

4.5 Road Crossings and Access Points

An entrance pad *(BMP Drawing No. 1)* is a temporary entrance/exit located where construction traffic enters or leaves the right-of-way onto or from a roadway or other paved surface. This access pad is typically constructed of stone or gravel. Strip topsoil and segregate for access areas and roads in agricultural and residential lands.A stabilized entrance pad is intended to reduce off-site sedimentation by eliminating the tracking of excess soil onto paved public roadways. The entrance pad serves as the designated point at which all construction traffic can access and exit the right-of-way. If crushed stone access pads are used in residential or active agricultural areas, place the stone on durable synthetic fabric to facilitate removal.

The Grading Crew will install rock entrances at public roads. If the job kicks off at a point where an entrance pad is required, the entrance pad will be installed as soon as the immediate area required for the pad is stumped and

rock can be brought in. This shall be within forty-eight (48) hours from the time the Grading Crew move onto the location.

For other locations along the pipeline where entrance pads are required, the pads will be installed as the Grading Crew progresses to these locations, but no later than forty-eight (48) hours from the time they reach these locations. Also;

- Maintain safe and accessible conditions at all road crossings and access points during construction.
- If crushed stone access pads are used in residential or agricultural areas, place the stone on synthetic fabric to facilitate removal.
- Minimize the use of tracked equipment on public roadways. Remove any soil or gravel spilled or tracked onto roadways daily or more frequent as necessary to maintain safe road conditions. Repair any damages to roadway surfaces, shoulders, and bar ditches.

4.6 Interim Stabilization

Where activity ceases for 4 days or more, or as soon as any graded area reaches final grade, temporary stabilization is required.
~~Where activity ceases for 20 or more days or~~ jobs not cleaned up by October 15 will be final graded and seeded with Aroostook (if available) winter rye at a rate of 170 pounds per acre. One hundred percent (100%) mulch will be spread on non-stabilized slopes of 10% or steeper. Only weed-free straw mulch, not hay mulch, will be used where mulch is needed on agricultural land. Before permanent seeding is planted in spring, the right-of-way will be inspected and any grade or water control structures that have been damaged over the winter will be repaired.

4.7 Slope Breakers

Install erosion controls immediately after initial disturbance of the soil. Erosion controls must be properly maintained throughout construction (on a daily basis) and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration is compete.

- Slope breakers (waterbars) are intended to reduce runoff velocity and divert water off the construction ROW. Slope breakers may be constructed of materials such as soil, silt fence; staked hay or straw bales (straw only in agricultural lands), sand bags, or filter socks.

- Install slope breakers on all disturbed areas, as necessary to avoid excessive erosion. Slope breakers must be installed on slopes greater than 5 percent where the base of the slope is less than 50 feet from waterbody, wetland, road crossings and the following spacing (closer spacing if necessary): (See *BMP Drawing No.* 8A)

Table 1: Slope Breaker Installation: Slope and Distance

PENNSYLVANIA Installation	
Slope	Distance
<5%	250 Feet
5 - 15%	150 Feet
>15 - 30%	100 Feet
>30%	50 Feet

NEW YORK Installation	
Slope	Distance
<5%	125 Feet
5 - 10%	100 Feet
>10 – 20%	75 Feet
>20 – 35%	50 Feet
>35%	25 Feet

- Direct the outfall of each slope breaker to a stable, well-vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction ROW (*See BMP Drawing No. 31*).
- Position the outfall of each slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive environmental resource areas.
- Inspect and maintain slope breakers throughout the construction project.

4.8 Sediment Barriers

Sediment barriers are intended to stop the flow of sediments and prevent the deposition of sediments beyond approved workspaces or into sensitive resources. They may be constructed of materials such as silt fence, staked hay or straw bales (straw only in agricultural lands), compacted earth (e.g., drivable berms across travel ways), sand bags, filter socks, or other appropriate materials. Typical sediment barrier information is presented on *BMP Drawing Nos. 5 and 22*.

- At a minimum, install and maintain temporary sediment barriers across the entire 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 a waterbody, wetland, or road crossing until revegetation is successful as defined in this Plan. Leave adequate room between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.
- Where wetlands or waterbodies are adjacent to and down slope of construction work areas, install sediment barriers along the edge of these areas, as necessary to prevent sediment flow into the wetland or waterbody.
- Install temporary sediment barriers at the base of slopes adjacent to road crossings until disturbed vegetation has been reestablished.
- Inspect and maintain all temporary sediment barriers throughout the construction project and after ~~.5~~ 0.25 inches of rainfall within a 24-hour period.
- Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies, or roads are stabilized.
- Contractor shall incorporate appropriate erosion/sediment control measures in pipe yards.
- Remove temporary sediment barriers from areas that are successfully revegetated. In agricultural lands, if access to restored farmlands is required to remove sediment barriers, access will be limited to light-weight wide tired vehicles.

4.9 Mulch

- Apply mulch on all slopes (except in cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the area to cover at least 75 percent of the ground surface at a rate of 2 tons/acre of straw unless the local soil conservation authorities, landowner, or land managing agency approves otherwise in writing. In agricultural lands, straw mulch application will be conducted at the discretion of the Agricultural inspector.
- Mulch can consist of weed-free straw, hay, wood fiber hydro-mulch, erosion control fabric, or some functional equivalent. Hay will not be utilized in agricultural lands.
- If mulching <u>before</u> seeding: increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.

- Mulch all disturbed upland areas (except cultivated croplands) before seeding if: Final cleanup, including final grading and installation of permanent erosion control measures, is not completed in an area within 4 days after the trench in that area is backfilled ~~(10 days in residential areas)~~; or, Construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.
- If mulching before seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.
- If wood chips are used as mulch, do not use more than 1 ton/acre and add the equivalent of 11 lbs/acre available nitrogen (at least 50 percent of which is slow release).
- On all dry, sandy sites and slopes greater than 8%, spread mulch uniformly over the area to cover at least 75% of the ground surface at a rate of 3 tons/acre of straw or hay or its equivalent, unless the local soil conservation authority or land management agency makes other recommendations in writing. Hay will not be utilized in agricultural lands.
- If a mulch blower is used, the strands of the mulching material shall be at least 8 inches long to allow anchoring.
- Ensure that mulch is adequately anchored to minimize loss due to wind and water.
- When anchoring by mechanical means, use a mulch-anchoring tool to properly crimp the mulch to a depth of 2 to 3 inches. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.
- Do not use synthetic monofilament mesh/ netted erosion control materials in areas designated as sensitive wildlife habitat, unless the product is specifically designed to minimize harm to wildlife. Anchor the erosion control fabric with staples or other appropriate devices.

4.10 Trench Dewatering

Trench dewatering is the removal of excess runoff and groundwater (that has accumulated and is occupying the ditch line) to allow for the installation of the pipe or the completion of a pipeline tie-in, and the dry backfilling (as defined below) of the ditch. The removal of any excess water within the ditch line prior to backfilling is critical in agricultural lands; and permits ditch inspection and allows for a drier ditch to backfill the spoil material. This enables the right-of-way to be effectively restored sooner, by the relatively faster return of workable conditions, as opposed to extended waiting until spoil material backfilled in a wet ditchline dries enough to be able to have the heavy equipment work over. Typically, the trench is dewatered, and is maintained in a dewatered state not higher in water level than six inches above the top of the trench bottom sand bagpipe supports, during the backfilling activity ("dry backfilling").

Trench dewatering management will be accomplished by using a combination of efforts or BMPs (See *BMP Drawing Nos. 5, 22, 28, 31, 35 and 39*) dependent upon the specific site conditions and may include the following:

- Sediment filtering bags *(BMP Drawing No. 28)* and/or other equivalent sediment control structures for pumped water should be used whenever water is pumped from the pipeline trench. Sediment filter bags (use only Non-woven Geotextile filter bags), when implemented and maintained properly, prevent the discharge of heavily silt-laden water - effectively trapping particles larger than approximately 150 microns. Filter bags shall be used in well-vegetated areas, providing additional filtration upon discharge. Discharge to agricultural lands will not

be conducted in active crop areas unless dry conditions are present and with landowner permission. The pumping rate should not exceed the maximum recommended by the Manufacturer (for example: Pumping rate through the filter bags shall be no greater than 750 gpm or ½ the maximum specified by the manufacturer, whichever is less). The filter bags will be changed when they become half full. Their silt contents will not be deposited on agricultural lands.

- Discharge into approved upland vegetated (grassy) areas onto stable erosion resistant areas, located such that it does not allow the water to return to the right-of-way ditch line.
- Based on previous experience, filter bags have provided successful means in controlling the discharge of turbid waters If the water being discharged from the filter bag appears "milky" or excessively cloudy, then sediment corrals can be utilized to augment filter bag use, positioned at least 25 feet from any waterbody and closely monitored to ensure proper function to prevent turbid water from entering a waterbody.
- Trench dewatering using floating pump or supporting pump intakes to reduce sediments suspended in water.
- Use a splashboard or dissipation device at the point of discharge to prevent scouring of the ground.
- Filtration bags, a straw bale basin, filter cloth basins or a combination of these devices are acceptable methods of filtration for discharge of water in an insufficiently vegetated or wetland area.
- Pumping water to temporary holding areas (e.g., other sections of pipeline trench, nearby or crossed ditches, external portable tanks).
- Planning dewatering into construction sequencing to minimize amount of dewatering required. For example, during the lowering-in phase, dewatering should be accomplished before requisite construction activity occurs (such as in the morning) and backfill activity should be initiated as soon as possible following pipe installation to prevent the ditch from refilling with water when a high ground water table is present. In agricultural lands, dewatering level will be maintained, throughout backfilling operations, to no more than six inches above the top of the trench-bottom pipe support sand bags to ensure dry backfilling.
- In agricultural lands trench-dewatering activities will be coordinated with the Environmental Inspector by the Agricultural Inspector/Drainage Specialists.

4.11 Temporary Trench Breakers

- Trench breakers are intended to slow the flow of subsurface water along the trench. Trench breakers may be constructed of materials such as bentonite, clay, sand bags or polyurethane foam, subsoil earth filled bags or equivalent (refer to permit or permitting agency for acceptable materials). Topsoil shall not be used for filling trench breaker bags. In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the spacing in the following table. (See BMP Drawing Nos. 6Aand 8A).
- At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody or wetland and where needed to avoid draining a waterbody or wetland. Install trench breakers at wetland boundaries, as specified (See BMP Drawing No. 6A).
- Trench breakers will be installed at intervals according to the table below and at additional locations, if necessary, in agricultural lands as recommended by the Agricultural Inspector. The base level of each breaker is established on the trench floor, prior to pipe laying, to ensure the completed breaker's control against significant water-piping and internal erosion. The bulk remainder of each trench breaker will be installed after the pipe is laid in the ditch and prior to backfill. *(See BMP Drawing No. 6A*)

- An Engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, trench breakers shall be installed at intervals as per the following table and upslope of slope breakers and/or the site specific SWPPP or E&S Plan (See BMP Drawing Nos. 6A and 8A).

Table 2: Temporary Trench Breakers: Hard / Soft Plug Spacing

Slope	Hard Plug Spacing	or	Soft Plug Spacing
<5%	N/A		1000 Feet
5 - 15%	900 Feet		600 Feet
>15 - 30%	600 Feet		400 Feet
>30%	300 Feet		200 Feet

In agricultural lands, at the direction of the Environmental/Agricultural Inspector trench breaker heights may be adjusted to full, one-half, two-thirds, or alternating heights based on field conditions.

4.13 Maintenance of Erosion Control Devices

Inspecting and ensuring the maintenance of temporary erosion control measures will be conducted at least:

- On a daily basis in areas of active construction or equipment operation.
- On a weekly basis in areas with no construction or equipment operation.
- Within 24 hours of ~~0.5~~ 0.25 inch of rainfall.

Slope breakers will be checked and repaired at the end of each day where construction traffic has disturbed them.

5 WATERBODY CROSSINGS

A summary of the waterbody crossings and locations are included in the waterbody tables.

5.1 Construction Restrictions

No construction may take place in or affecting banks of any streams:

Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows:

Coldwater fisheries - June 1 through September 30

Coolwater and warmwater fisheries - June 1 through November 30.

5.2 Stream Buffer Area

Stream buffer areas must be maintained at all times. The buffer area is that area 50 feet from the top of banks on both sides of stream. Activities such as stacking cut logs, burning cleared brush, discharging water from trenches, welding pipe sections, refueling and maintaining equipment should be done outside of buffer areas. These areas

should also be seeded and mulched immediately after pipeline installation. Stream crossings will be treated as a special construction crossing in order to minimize the amount of time required to complete construction. Construction equipment will not be parked or stored in the buffer area. No fuel storage, fuel transfer, oil change or hydraulic fluid additions shall occur within 100 feet of any waterway. Please see Table 3 below with guidelines.

PA Stream	A, B, C, D, E, J, K
PA Stream (HQ/EV)	A, B, C, D, E, J, L, M, N
PA Wetland	A, B, C, F, G, H, I
~~NY Stream~~	~~A, B, C, D, E, O~~
~~NY Wetland~~	~~A, B, C, F, G, H, I, P~~

Table 3: Stream & Wetland Crossing Guidelines

Note: Table above assumes ALL scenarios involve FERC jurisdiction

A. No hydrocarbon refueling, hazardous material storage, overnight equipment parking, or concrete coating activities within 100' of streams/wetlands (FERC).
B. Pumps & fuel vessels operating within 100' of streams/wetlands require secondary containment (FERC).
C. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50' away from wetland/stream (FERC, PADEP).
D. All spoil must be placed in the ROW at least 10 feet from the water's edge (FERC).
E. Maintain 15' Undisturbed Riparian area when pipeline parallels a stream (FERC).
F. Limit ROW width to no more than 75' through wetland areas (FERC).
G. Cut vegetation just above ground level and leave root systems in wetlands (FERC).
H. Limit pulling of stumps and grading activities in wetlands to directly over the trenchline unless these activities are required on the ROW for safety purposes (FERC).

I. Segregate the top 1' of topsoil from the area disturbed by trenching in wetlands unless standing water is present or soils are saturated (FERC).
J. No Grubbing within 50' of top of bank of stream until all materials required to complete the crossing are on site and pipe is ready for installation (PADEP).
K. Immediately stabilize area 50' from top of stream bank with erosion control blanket (PADEP).
L. Immediately stabilize area 100' from top of HQ/EV stream bank with erosion control blanket (PADEP).
M. Preserve 150' riparian area of HQ/EV stream wherever possible (PADEP).
N. No hydrocarbon refueling, hazardous material storage, overnight equipment parking, or concrete coating activities within 150' of HQ/EV stream (PADEP).
~~O. Minimize disturbance to 50' riparian area. Use 100' for cold water lakes (NYSDEC).~~
~~P. Pay close attention to DEC 100' wetland buffer requirements in NY permits (NYSDEC).~~

Note: The above is not an exhaustive list of requirements but a guideline. All project specific permits and plans must be reviewed prior to construction activities through stream and wetland areas. Any contradictions or inconsistencies between this table and relevant permit documents or regulatory guidance should be addressed by deferring to the most stringent procedures, unless directed by National Fuel or Empire Pipeline.

5.3 Maintenance of Stream Crossing Control Devices

Construction erosion control devices will be installed prior to earth disturbance of the area. They will be maintained at all times. Inspecting and ensuring the maintenance of temporary erosion control measures will be conducted at least:

- On a daily basis in areas of active construction or equipment operation.
- On a weekly basis in areas with no construction or equipment operation.
- Within 24 hours of ~~0.5~~ 0.25 inch of rainfall.

5.4 Additional Work Space Areas

Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

The project sponsor shall file with the Secretary for review and written approval by the Director, a site-specific justification for each extra work area with a less than 50-foot setback from the water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the conditions that will not permit a 50-foot setback and measures to ensure the waterbody is adequately protected.

Limit the size of extra work areas to the minimum needed to construct the waterbody crossing.

5.5 Spoil Pile Placement/Control

All spoil from minor and intermediate waterbody crossing, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas.

Use sediment barriers to prevent the flow of spoil or silt-laden water into any waterbody.

5.6 Waterbody Crossing Procedures

Comply with all FERC, Army Corps of Engineers state, or other applicable regulatory agency's permit terms and conditions.

Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.

Leave at least 25 feet of ground on either side of the waterbody (top of bank) as a natural, vegetative strip (except for the trench and equipment crossing). All woody species will be cut flush to grade and only the stumps in the trench line will be removed. When necessary, stumps at the bridge crossing area may be removed to accommodate the safe installation of the construction bridge.
Where pipelines parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right of way, except where maintaining this offset will result in greater environmental impact.
Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.

Maintain adequate waterbody flow rates to protect aquatic life, and prevent the interruption of existing downstream uses

Waterbody buffers (e.g., extra work area setbacks, refueling restrictions) must be clearly marked in the field with signs and/or highly visible flagging until construction-regulated ground disturbing activities are complete.

Crossing of waterbodies when they are dry or frozen and not flowing may proceed using standard upland construction techniques in accordance with the Plan, provided that the Environmental Inspector verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. In the event of perceptible flow, the project sponsor must comply with all applicable Procedure requirements for "waterbodies", as defined in 5.11 Waterbody Size Classification.

5.7 Pipeline Construction at Streams

- Install filter fence across the right-of-way prior to construction. (See *BMP Drawing No.* 5 for proper fence installation) Make any repairs to fence as necessary after each working day. Replace filter fence across the travel area with straw bales during construction. (See *BMP Drawing No.* 22 for proper installation of straw bales)
- The stream is not to be diverted or the flow restricted. No filter fence or straw bales are to be placed directly into stream flow.
- The pipe is to be readied outside the stream buffer area prior to trenching and then installed immediately.

- Install trench breakers at the edge of stream during construction as per *BMP Drawing No. 6A*. Ditching is to be performed from stream banks where possible.

5.8 Equipment Bridges

Only clearing equipment and equipment necessary for installation of equipment bridges may cross waterbodies prior to bridge installation. Limit the number of such crossings of each waterbody to one per piece of clearing equipment.

Construct and maintain equipment bridges to allow unrestricted flow and to prevent soil from entering the waterbody. Examples of such bridges include:

- Timber mat bridges as per *BMP Drawing No. 9*
- equipment pads and culvert(s)
- equipment pads or railroad car bridges without culverts
- clean rock fill and culvert(s)
- flexi-float or portable bridges as per *BMP Drawing No. 52, 53, & 54.*

Additional options for equipment bridges may be utilized that achieve the performance objectives noted above. Do not use soil to construct or stabilize equipment bridges.
Design and maintain each equipment bridge to withstand and pass the highest flow expected to occur while the bridge is in place. Align culverts to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of the culverts.

Design and maintain equipment bridges to prevent soil from entering the waterbody.

Remove temporary equipment bridges as soon as practicable after permanent seeding.

If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the right-of-way is available, remove temporary equipment bridges as soon as practicable after final cleanup.

All bridges must be removed after use unless necessary approvals from the Army Corps or the appropriate state agency for permanent use has been obtained.

5.9 Dry-Ditch Crossing Methods

Unless approved otherwise by the appropriate federal or state agency, install the pipeline using one of the dry-ditch methods outlined below for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally-designated as critical habitat.

5.9.1 Dam and Pump

The dam-and-pump method may be used without prior approval for crossings of waterbodies where pumps can adequately transfer streamflow volumes around the work area, and there are no concerns about sensitive species passage.

Implementation of the dam-and-pump crossing method must meet the following performance criteria:

- use sufficient pumps, including on-site backup pumps, to maintain downstream flows
- construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner)
- screen pump intakes to minimize entrainment of fish
- prevent streambed scour at pump discharge
- continuously monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

5.9.2 Flume Crossing

The flume crossing method requires implementation of the following steps:

- install flume pipe after blasting (if necessary), but before any trenching
- use sand bag or sand bag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required to achieve an effective seal
- properly align flume pipe(s) to prevent bank erosion and streambed scour
- do not remove flume pipe during trenching, pipelaying, or backfilling activities, or initial streambed restoration efforts
- remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

5.9.3 Section Intentionally Left Blank

5.10 Section Intentionally Left Blank

5.11 Waterbody Size Classification

- “Minor waterbody” includes all waterbodies less than or equal to 10 feet wide at the water’s edge at the time of crossing.
- “Intermediate waterbody” includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water’s edge at the time of crossing.
- “Major waterbody” includes all waterbodies greater than 100 feet wide at the water’s edge at the time of crossing.

5.12 Crossing of Minor Waterbodies

Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

- Except for blasting and other rock breaking measures, complete instream construction activities (including trenching, pipe installation, backfill, and restoration of the streambed contours) within 24 hours. Streambanks and unconsolidated streambeds may require additional restoration after this period.
- Limit use of equipment operating in the waterbody to that needed to construct the crossing.
- Equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification or protected status (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used it must be constructed as described in section 5.8.

5.13 Crossing of Intermediate Waterbodies

Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

- Complete instream construction activities (not including blasting and other rock breaking measures) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible.
- Limit use of equipment in the waterbody to that needed to construct the crossing.
- All other construction equipment must cross on an equipment must cross on an equipment bridge as specified in section 5.8.

5.14 Crossing of Major Waterbodies

Before construction, the project sponsor shall file with the Secretary for the review and written approval by the Director a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing (the scaled drawings are not required for any offshore portions of pipeline projects). This plan must be developed in consultation with the appropriate state and federal agencies and shall include extra work areas, spoil storage areas, sediment control structures, etc., as well as mitigation for navigational issues. The requirement to file major waterbody crossing plans does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

The Environmental Inspector may adjust the final placement of the erosion and sediment control structures in the field to maximize effectiveness.

5.15 Temporary Erosion and Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan; however, the following specific measures must be implemented at stream crossings:

- Install sediment barriers across the entire construction right-of-way at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody. Removable sediment barriers (or driveable berms) must be installed across the travel lane. These removable sediment barriers can be removed during

the construction day, but must be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent;

- Where waterbodies are adjacent to the construction right-of-way and the right-of-way slopes toward the waterbody, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the waterbody; and
- Use temporary trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody.

5.16 Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

6. WETLAND CROSSINGS

A summary of the wetland crossings and locations are included in the wetland tables. Refer to Table 3 for wetland crossing guidelines.

6.1 General Guidelines

National will insure that all construction personnel are informed that impacts on all vegetation will be kept to a minimum. Wide tracked equipment will be used and standing water will be maintained at normal levels to insure that water level and flow are kept at pre-construction levels. Where water levels are temporarily high, as a result of a recent heavy rainfall, the Company Representative may direct that the construction be postponed until after the water levels subside.

Comply with the Army Corps of Engineers , or it's delegated agency, permit terms and conditions.

Vehicular traffic in wetlands and wet areas will be restricted to a minimum and access avoided to the extent possible. Wetland crossings will be treated as a special construction crossing in order to minimize the amount of time required to complete construction. Construction equipment will not be parked or stored in the wetland. No fuel storage, fuel transfer, oil change or hydraulic fluid additions shall occur within 100 feet of any wetland. The project sponsor shall conduct a wetland delineation using the current federal methodology and file a wetland delineation report with the Secretary before construction. The requirement to file a wetlands delineation report does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

This report shall identify:

- By milepost all wetlands that would be affected
- The National Wetlands Inventory (NWI) classification for each wetland
- The cross length of each wetland in feet

- The area of permanent and temporary disturbance that would occur in each wetland by NWI classification type

The requirements outlined in this section do not apply to wetlands in cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoiling requirements, apply to these agricultural wetlands.

Route the pipeline to avoid wetland areas to the maximum extent possible. If a wetland cannot be avoided or crossed by following an existing right-of-way, route the new pipeline in a manner that minimizes disturbance to wetlands. Where looping an existing pipeline, overlap the existing pipeline right-of-way with the new construction right-of-way. In addition, locate the loop line no more than 25 feet away from the existing pipeline unless site-specific constraints would adversely affect the stability of the existing pipeline.

Limit the width of the construction right-of-way to 75 feet or less. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet. Early in the planning process the project sponsor is encouraged to identify site-specific areas where excessively wide trenches could occur and/or where spoil piles could be difficult to maintain because existing soils lack adequate unconfined compressive strength.

Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

Implement the measures of sections 5 and 6 in the event a waterbody crossing is located within or adjacent to a wetland crossing. If all measures of sections 5 and 6 cannot be met, the project sponsor must file with the Secretary a site-specific crossing plan for review and written approval by the Director before construction. This crossing plan shall address at a minimum:

- Spoil control
- Equipment bridges
- Restoration of waterbody banks and wetland hydrology
- Timing of the waterbody crossing
- Method of crossing
- Size and location of all extra work areas

Do not locate aboveground facilities in any wetland, except where the location of such facilities outside of wetlands would prohibit compliance with U.S. Department of Transportation regulations. The following describes the proposed wetland crossing techniques to reduce construction-related impacts. Typical wetland crossing information is shown in *BMP Drawing Nos. 4 and 4A*. Modification to this plan may be made as dictated by soil moisture conditions at the time of construction.

6.1.1 Construction in Dry Wetlands

Dry Wetland: No standing water or saturated soil at time of construction.

- Standard pipeline construction methods can be used in wetlands where soils are dry enough at the time of construction to support equipment.
- In dry wetlands topsoil segregation must be used (as long as there is sufficient topsoil present to allow for mechanical separation by equipment).

- Install filter fence across ROW at edge of wetland.
- If spoil and silt cannot be contained within the ROW (i.e., approved working limits), install filter fence at the edge of the construction ROW; remove during cleanup.
- Minimize vegetation clearing and stump removal within the wetland, only remove cut vegetation and stumps in trench line.
- Segregate topsoil over trench-line.
- Install trench breakers at each wetland boundary (on upland side).
- Restore topsoil and seed with Annual Ryegrass (see Revegetation section of this Plan).

6.1.2 Construction in Saturated Wetlands

Saturated Wetland: Standing water or highly saturated soil at time of construction.

- Wetlands topsoil segregation is not required.
- Minimize vegetation clearing and stump removal, only remove cut vegetation and stumps in trench line.
- Permanent slope breakers will be installed at the base of all slopes adjacent to wetlands.
- Clean rock with Geo-textile or timber mats can be used for the temporary road.
- Timber mats can only be two (2) layers deep.
- Remove any timber mats used during construction in wetlands.
- Weld pipe outside the wetlands and carry in or use the push pull method.
- Install trench breaker at each wetland boundary (on upland side).
- Do not use brush mats.
- Do not use upland soils for temporary roads.

6.2 Standard Pipeline Construction

Standard pipeline construction can be used in wetlands where soils are dry enough at the time of construction to support equipment. This crossing method requires the segregation of topsoil from subsoil (as long as there is sufficient topsoil present to allow for mechanical separation by equipment).

The construction procedures that will be used to cross small wetlands will be similar to those used on dry land areas. However, if the trench contains water, trench breakers will be left in the trench prior to entering the wetland. This procedure will minimize silt discharges into the wetland. If construction activities breach a permeable layer, the bottom of the trench will be sealed.

In addition, the point at which the trench enters and exits a wetland will be sealed with impervious trench breakers (clay or bentonite) to insure the wetlands hydrologic integrity. Concrete bags/sakrete shall not be used as impervious trench breakers at wetland limits. Backfill will be well compacted, especially at the edges of the wetland. Original topographic conditions will be restored after the completion of construction.

Construction in larger wetland areas may use the "push technique". Board mats will be used to provide a working surface for the movement of equipment, personnel, and materials. The trench may be excavated using a dragline or clamshell dredge. The excavated material will be stored adjacent to the trench.

The pipe will be stored and joined at staging areas located outside the wetland. As necessary, the pipe will be weighted to provide negative buoyancy and temporary floats may be attached to the pipe to provide short-term positive buoyancy. After floating the pipe into place, these floats will be cut and the pipe will settle to the bottom of the trench. This operation will be repeated, with pipe sections fabricated, pushed into place, and subsequent sections welded together until the wetland crossing is complete. The excavated material will then be placed over the pipe to backfill the trench. To maintain flow patterns within the wetland, excess soil will be removed or redistributed within the right-of-way in such a manner that the flow patterns are not impacted.

Wetland revegetation shall be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If revegetation is not successful at the end of 3 years, develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively re-vegetate the wetland. Continue revegetation efforts until wetland revegetation is successful.

Do not conduct vegetation maintenance over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be maintained in an herbaceous state. In addition, trees within 15 feet of the pipeline that is greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.

Do not use herbicides or pesticides in or within 100 feet of a wetland, except as allowed by the appropriate land management agency or state agency.

Do not use rock, soil imported from outside the wetland, tree stumps, or brush to support equipment on the construction right-of-way.

If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of topsoil and subsoil in wetlands, use low-ground–weight construction equipment, or operate normal equipment on timber rip rap, prefabricated equipment mats, or terra mats.

6.3 Extra Work Areas and Access Roads

Locate all extra work areas and access roads (such as staging areas and additional spoil storage areas) at least 50 feet away from all wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land

The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50 foot setback from the wetland boundaries, except where adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the site-specific conditions that will not permit a 50-foot setback and measures to ensure the wetland is adequately protected.

The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats).

In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction right-of-way.

The only access roads, other than the construction right-of-way, that can be used in wetlands are those existing roads that can be used with no modifications or improvements, other than routine repair, and no impact on the wetland.

6.4 Equipment Pads / Timber Mats

In wetlands with standing water the National representatives may direct that equipment pads be used to prevent unnecessary damage to the soil structure. Generally several equipment pads will be laid side by side in the construction travel area.

6.5 Clearing

- 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.
- Rubber tired equipment will be allowed to work in wetlands unless the equipment will not damage existing root systems and is approved by the Chief Environmental Inspector (CEI). Bulldozers will not be used to remove timber, trees, or brush. Trees and brush will be cut at ground level by tree shears, grinders, or chain saws.
- Tree stumps will be left in place, except within the trench line or unless their removal is necessary to ensure the safety of workers. Tree stumps may only be removed from outside the trench line if specifically authorized by the Chief Inspector. Leaving stumps in place will facilitate rapid vegetation of the wetland by indigenous tree species following construction. Stumps may be ground to a suitable height for safety reasons.
- All timber, brush, and grindings will be removed from the wetland.
- Debris and stumps will not be buried within wetlands but may be buried in the ROW outside of wetlands (in non-agricultural lands), where permitted.
- Trees located outside of the ROW will not be cut.
- The Environmental Inspector will photo document areas before and after clearing for use in later revegetation/restoration.
- The project sponsor can burn woody debris in wetlands, if approved by the Army Corps of Engineers and in accordance with state and local regulations, ensuring that all remaining woody debris is removed for disposal.

6.6 Grading

Extensive grading will normally be unnecessary because the topography of most wetlands is level. Grading will be limited to the areas directly over the trench line, except where topography, such as side slopes, requires additional grading for safety reasons. Where grading is required, topsoil will be segregated and returned as an even layer to all graded areas.

6.7 Trenching

- The topsoil in wetlands will be stripped from the ditch line and segregated if: it is not saturated and of sufficient depth to allow mechanical separation. Topsoil stripping (in non-saturated conditions) will be performed up to a depth of 12 inches. The segregated topsoil will be stockpiled separately from subsoil for later restoration of the ROW. Immediately after backfilling is complete, restore the segregated topsoil to it's original location.
- Spoil will be contained with straw bales, filter socks, or silt fences to prevent the spoil from flowing off of the ROW or into waterbodies.
- Minimize the length of time that topsoil is segregated and the trench is open. Do not trench the wetland until the pipeline is assembled and ready for lowering in.

6.8 Temporary Sediment Control

Install sediment barriers immediately after initial disturbance of the wetland or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench). Except as noted below, maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan.

Install sediment barriers across the entire construction right-of-way immediately upslope of the wetland boundary at all wetland crossings where necessary to prevent sediment flow into the wetland.

Where wetlands are adjacent to the construction right-of-way and the right-of-way slopes toward the wetland, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the wetland.

Install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way through wetlands. Remove these sediment barriers during right-of-way cleanup.

6.9 Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any wetland. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

6.10 Backfilling

- The trench will be backfilled with subsoil first. After the subsoil has been rough graded, topsoil will be replaced in an even layer. The topsoil contains seeds, rhizomes, and other plant propagules, which will aid rapid re-colonization by indigenous wetland species.
- Where rock (boulders, etc.) was part of the surface features prior to construction of the pipeline, rock will be placed back in the wetland in approximately the same configuration, as had been the pre-construction situation. Photos will be taken of the ROW in these situations, both before and after, in order to document the nature of the situation.

7 RESTORATION

7.1 Cleanup

- Commence cleanup operations immediately following backfill operations.* ~~Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas).~~ In agricultural lands, deep ripping of the exposed right-of-way, rock cleanup, and disposal prior to topsoil replacement and deep sub-soiling are part of the restoration process prior to grading (for details on agricultural land decompaction refer to Attachment 1). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary slope breakers, sediment barriers, and mulch) until conditions allow completion of cleanup. If construction or restoration unexpectedly continues into the winter season when conditions could delay successful decompaction, topsoil replacement, or permanent seeding until the following spring, file with the Secretary for the review and written approval of the Director, a winter construction plan (as specified in section 3.7). this filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.
- A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed and inspected and maintained. When access is no longer required the travel lane must be removed and the right-of-way restored.
- Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Generally, in agricultural lands, rock will not be returned to the trench any higher than 24 inches below the exposed (topsoil-stripped) construction surface. However, if extensive areas of shallow bedrock (within 24 to 30 inches from native surface) are encountered, National will limit backfill of rock to a depth of not less than 30" below pre-existing grade. Rock that is not returned to the trench should be considered construction debris, unless approved for use as cover/surface stabilization or for some other use on the construction work areas by the landowner or land managing agency.
- Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields, and residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. The landowner or land management agency may approve other provisions in writing.
- Grade the construction right-of-way to restore pre-construction contours and leave the soil in the proper condition for planting.
- Remove construction debris from all construction work areas unless the landowner or land management agency approves leaving materials onsite for beneficial reuse, stabilization, or habitat restoration.
- Remove temporary sediment barriers when replaced by permanent erosion control measures or when revegetation is successful.
- Contractor shall restore and re-vegetate all disturbed pipe yard areas, including lime, fertilizer, seed and mulch or restore equivalent to pre-construction conditions.

PERMANENT EROSION CONTROL DEVICES

7.2 Permanent Trench Breakers

*The time period between trench excavation and the start of site stabilization shall not exceed 30 calendar days. Restoration will be completed as soon as possible after grading. Cessation of activity for 4 days or longer requires temporary stabilization.

- An Engineer or similarly qualified professional shall determine the need for and spacing of trench breakers, including agricultural fields. Otherwise, trench breakers shall be installed at intervals as per the following table and upslope of slope breakers and/or the site specific SWPPP or E&S Plan (See BMP Drawing Nos. 6A and 8A).
- Trench breakers are intended to slow the flow of subsurface water along the trench. Trench breakers may be constructed of materials such as bentonite, clay, sand bags or polyurethane foam (refer to permit or permitting agency for acceptable materials). Do not use topsoil in trench breakers.
- At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody or wetland and where needed to avoid draining a waterbody or wetland. Install trench breakers at wetland boundaries, as specified in the procedures.

Table 4: Permanent Trench Breaker Spacing

Slope	Spacing
<5%	1000 Feet
5 - 15%	500 Feet
>15 - 25%	300 Feet
>25-35%	200 Feet
>35-100%	100 Feet
>100%	50 Feet

7.3 Permanent Slope Breakers

- Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction ROW, and prevent sediment deposition into sensitive resources. Permanent slope breakers may be constructed of materials such as soil, stone, or some functional equivalent.
- Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, unless requested by the landowner, using the spacing recommendations obtained from the local soil conservation authority or land managing agency.
- In the absence of written recommendations, use the following spacing unless closer spacing is necessary to avoid excessive erosion on the construction right-of-way: (See *BMP Drawing No.* 8A)
- Construct slope breakers to divert surface flow to a stable area without causing water to pool or erode behind the breaker. In the absence of a stable area, construct appropriate energy-dissipating devices at the end of the breaker.
- Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction right-of-way, they are subject to compliance with all applicable survey requirements.
- Please see Table 1 for correct slope breaker installation methods using percent slope and distance.

7.4 Soil Compaction Mitigation

- Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to approximate preconstruction conditions. Use penetrometers or other appropriate devices to conduct tests.
- Plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.
- If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.
- Perform appropriate soil compaction mitigation in severely compacted residential areas.

7.5 Permanent Restoration Measures

Permanent restoration and revegetation measures serve to control erosion and sedimentation by establishing a vegetative cover, which protects the soil, and by using structures which can divert or slow runoff and trap sediment. The Contractor shall restore all disturbed portions of the construction ROW and supplemental work areas, as approved by Company.

- Final grading shall be completed within 10 days after the ditch is backfilled, weather and soil moisture permitting.*
- All construction debris shall be removed from the ROW and the ROW shall be graded so that the soil is left in the proper condition for planting.
- Where trench compaction has not been done, the ROW shall be graded to pre-construction contours, as practical, with a small crown of soil left over the ditch to compensate for settling, but not to interfere with natural drainage. Openings shall be left in the trench-line crown to allow for lateral surface drainage, as approved by National inspectors.
- Where topsoil has been segregated, the topsoil shall be spread back along the ROW in an even layer (as further described in Attachment 1 - Soil Protection and Subsoil Decompaction Plan).
- The Environmental Inspector may direct construction of permanent slope breakers to replace temporary erosion control barriers at road, waterbody and wetland crossings, as specified/approved. In addition, in agricultural lands, construction of permanent slope breakers at these areas will be reviewed and coordinated with the Agricultural Inspector.

Wetland and Waterbody Crossing Restoration

7.6.1 Wetlands Crossings

- All project related material used to support equipment on the right-of-way, including, but not limited to: work mats, timber temporary riprap, and other construction debris shall be removed during the final grading of the right-of-way.
- 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.

*The time period between trench excavation and the start of site stabilization shall not exceed 30 calendar days. Restoration will be completed as soon as possible after grading.

- Once backfilling is complete, affected areas original contours and flow regimes will be restored to maintain original wetland hydrology.
- 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.
- Ensure that all disturbed areas successfully revegetate with wetland herbaceous and/or woody plant species.
- During final grading, wetlands (including areas within the 100-foot buffer) will be restored to original contours and the buffer areas seeded and mulched as soon after backfilling as practicable (preferably within 48 hours but not longer than one week) with the exception of the travel portion of the ROW, which will also be restored using these procedures after the travel way is no longer need.
- If necessary or required; to reduce the potential for risk for invasion or spreading of invasive species (such as purple loosestrife, phragmites, or Japanese knotweed), an elevated wash rack station will be used for equipment – see *BMP Drawing No. 44*. This wash rack equipment will be used in cases where:
    - the construction equipment exits a wetland having predominant invasive species vegetation, and
    - it enters another wetland without the invasive species within the next 1000 feet along the alignment
- The ROW will be seeded with annual rye grass or native perennial seed mix (see Revegetation section of this Plan) at a rate of 40 pounds/acre (unless standing water is present) to stabilize the area until indigenous wetland species can re-establish themselves. If the affected wetland is within an active agricultural parcel, reseeding will be performed according to landowner agreements.
- If bad weather limits the effectiveness of reseeding efforts, at the discretion of the Environmental Inspector and as allowed by all applicable permits, the ROW should be mulched (with straw only) to minimize erosion until conditions are suitable for reseeding. This temporary mulch cover should be monitored and maintained until conditions are suitable for completing restoration.
- No fertilizer, mulch, or lime shall be used in wetlands unless required in writing by the appropriate federal or state agency.
- 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.
- Consult with the appropriate federal or state agencies to develop a project-specific wetland restoration plan. The restoration plan shall include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of invasive species and noxious weeds (e.g., purple loosestrife and phragmites), and monitoring the success of the revegetation and weed control efforts. Provide this plan to the FERC staff upon request.
- During forested wetland restoration, the following measures will be undertaken to maximize or monitor success of revegetation:
    - Minimizing removal of stumps – to the extent practicable (while still allowing for safe working conditions) stumps will be left in place within the construction ROW to re-sprout following construction and restoration;

- As indicated in the Clearing section of the plan, tree stumps may only be removed from the trench line unless specifically authorized by the Chief Inspector (stumps may be removed or ground to a suitable height for safety reasons);
- If practicable, any stumps or root wads removed from the trench line, may be maintained within the ROW (e.g., staged and mulched during construction) to improve viability and replaced during restoration;
- As necessary, or to supplement revegetation of forested wetlands (if stumps have been too damaged to survive), locally native tree species will be planted during the restoration or monitoring phases;
- Locally native tree species stock or cuttings will be planted in a random pattern to promote natural distribution, although minimum species-appropriate average planting densities will be observed;
- Following construction, ROW maintenance in wetlands will be limited to clearing of 10 feet, centered on the pipeline. In addition, trees within 15 feet of the pipeline that is greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.

7.6.2 Waterbody Crossings

- Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the Environmental Inspector. Native rock from the construction right-of-way will be used to stabilize the banks where available. Do not use stream material for stabilization.
- Use clean gravel or native cobbles for the upper 1 foot of trench backfill in all waterbodies that contain coldwater fisheries.
- For open cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.
- Install erosion control fabric or a functional equivalent on waterbody banks at the time of final bank re-contouring. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.
- Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.
- Unless otherwise specified by state permit, limit the use of riprap to areas where flow conditions preclude effective vegetation stabilization techniques such as seeding and erosion control fabric.
- Install permanent slope breakers across the construction right-of-way at the base of slopes greater than 5 percent that are less than 50 feet from the waterbody, or as needed to prevent sediment transport into the waterbody, install sediment barriers as outlined in the Plan as per *BMP Drawing No.* 8 prior to seeding and mulching (as described above in Section 7.3). in some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the waterbody.
- Seed and mulch the area immediately after pipeline installation. Revegetate disturbed riparian areas with native species of conservation grasses, legumes, and woody species, similar in density to adjacent undisturbed lands. At locations with existing (pre-construction) wooded conditions along stream banks and riparian areas, the following measures will be followed to minimize the potential for erosion and to provide for overhanging vegetation:

- During clearing, existing stream bank vegetation will be maintained, except within the trench line– a setback of 50 feet from the stream bank will be utilized for additional temporary work space.
- To the extent practicable (while still allowing for safe working conditions) stumps may be left in place along these riparian areas to re-sprout following construction and restoration.
- If practicable, any stumps or root wads removed from the trench line, may be maintained within the ROW (e.g., staged and mulched during construction) to improve viability and replaced during restoration

7.6 Residential Areas Restoration

Cleanup and restoration measures in residential areas will commence upon completion of the pipeline lowering in and backfilling. The restoration and mitigation efforts in residential areas will be completed in accordance with FERC requirements and include site-specific residential mitigation plans for residences located within 25 feet from the edge of construction right-of-way.

In residential areas topsoil replacement (i.e., importation of topsoil) is an acceptable alternative to topsoil segregation.

7.7 Agricultural Mitigation

The subsoil shall be de-compacted prior to replacement of the segregated topsoil. Decompaction activities shall be conducted only during periods of relatively low soil moisture to ensure the desired mitigation and prevent additional subsurface compaction. Specific additional details are included in Attachment 1 to this Plan - Soil Protection and Subsoil Decompaction Plan.

The project sponsor will file with the Secretary for the review and written approval of the Director, a winterization plan if construction will continue into the late autumn or winter season, or if restoration will not have been completed on agricultural lands by October when moisture or temperature conditions could delay successful restoration until the following year in agricultural lands – including subsoil decompaction, topsoil replacement, or permanent seeding.

7.8.1 Subsurface Drainage Systems

Subsurface drainage systems may include a collection of subsurface pipes, such as perforated tubing or tile, that intercepts, collects and transports excess groundwater, within the soil, from a section of land. Systems may also include older emplacements of “stone drains” installed in the late 1800s and early 1900s. Subsurface drainage systems have a number of functions depending on the location and the conditions under which the tile has been installed. Drain tile can have the following impacts:

- Improvement of the seasonal soil condition in an area by regulating the seasonal water table and ground water flow serving to maintain the parcel or area for farming or similar use;
- Providing the ability to control the amount of surface water and groundwater in an existing wet area that is used for agriculture production;

- Intercepting and removing surface runoff through the ground as opposed to allowing the flow across the surface (which would increase the potential for erosion and loss of valuable topsoil):
- Serves as an outlet for an existing system or an area that may have an increase in ground saturation related to pipeline excavation activity;
- Collects groundwater for other uses such as: spring fed, shallow wells for domestic supply; irrigation; watering ponds for livestock or similar activity.

During the pre-construction planning (see Pre-Construction Planning section of this Plan) verification should be obtained from the land department files, the landowner and/or the County Conservation or USDA-NRCS office, as to the existing or future tile system that will be crossed. A detailed drainage line repair procedure for the repair of clay tile and plastic drain line will be developed by the Ag Specialist in consultation with the local Soil and Water Conservation District (where appropriate). It is important to verify that all tiles have been distinctly marked on both sides of the excavated area and right-of-way edges (outer perimeter), for later reference. If necessary, make provisions to be able to maintain the system in working order, so as to limit impacts to existing crops from the excess groundwater for the duration of the construction activities.

During construction, drain tiles shall be identified, marked and information recorded by the drainage specialist (see Agricultural Inspection section of this Plan). If damaged during construction, a qualified drain tile repair specialist will conduct repair or replacement to equivalent or better condition. Typical repairs are shown on *BMP Drawing Nos. 30, 30A, and 42*, and generally include the following:

- Tile repairs should be designed with substantial support placed beneath the replaced section of tile to prevent the sagging of the tile line when the backfill material placed back in the trench settles, as shown on the attached repair detail.
- It is important to adequately size the repairs to match the existing tile system. Inadequately sized tile can negatively affect the entire system and render it non-functional.
- Should additional tile be necessary due to evident soil saturation, verify that the existing tile system can accommodate the additional amount of flow prior to connecting into that system. If necessary, a new system should be installed to facilitate the new lines or the existing system should be increased in size to accommodate the increase in flow amounts.
- At the time a tile is cut, the exposed ends of the drainpipe should be plugged or covered to prevent the tile from becoming clogged with dirt or rocks.
- The trenching crew or inspector shall carefully and immediately mark the location of cut or damaged tile in a prominent manner with lath, staking or flagging securely placed in the backfill or at the edge of the right-of-way.
- General tile replacement or repairs shall be performed in accordance with the requirements identified in this document including the material engineering details noted in BMP Drawing No. 30, and/or local ordinances or standards which may be higher, but not lower, in their level of requirements.
- The Drainage Specialist must approve any tile that may be proposed for reuse.
- The original gradient of the tile line shall be re-established with the replacement tile. As an alternative, the tile line can be re-routed and/or replaced, but must function as well as the original line.

8 REVEGETATION

8.1 General

- The project sponsor is responsible for ensuring successful revegetation of soils disturbed by project-related activities, except as noted as follows:
- Restore all turf, ornamental shrubs, and specialized landscaping in accordance with the landowners request, or compensate the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.
- Restore agricultural lands based on site-specific soil data.

8.2 Revegetation Operations

In general, rough grading will occur 0-3 days after backfilling. The right-of-way will then be limed and fertilized (no fertilizer or lime shall be used in wetlands). The lime and fertilizer will then be disked or blended into the worked soil. If necessary, a rock rake will then be run or stones will be hand-picked by laborers. The right-of-way will then be finished with a final grade. Then seed and mulch will be applied at specified rates.

In agricultural areas, additional procedures for restoration and revegetation will be performed in accordance with those outlined in the Soil Protection and Subsoil Decompaction Plan (Attachment 1)

8.3 Soil Additives

The respective project representative within the appropriate time frame will interview each affected farmland operator, during planning prior to construction, for data on the most recent preconstruction application of soil additives per field. If necessary within the appropriate time frame, site-referenced soil testing of all affected agricultural land along the project at appropriate intervals to determine the respective soil's pH, percent of organic material, cation exchange capacity, and NPK (nitrogen, phosphorus, potassium) will be implemented. This information will be used to help establish the specific rate of lime and nutrients to be applied per field for: temporary seed cover applications; permanent seed mixtures; and (depending on time of restoration and other seasonal factors), row crop production the same season as restoration. Additional written data concerning soil modifiers will be obtained from the County Conservation District, or land management agencies. Based on the results of the site testing and other information, the site-specific fertilizer and soil pH modifiers will be incorporated into the top two inches of soil during or as soon as practicable after application.

8.4 Seeding Requirements

- Prepare a seedbed in disturbed areas to a depth of 3 to 4 inches using appropriate equipment to provide a firm seedbed. When hydro seeding, scarify the seedbed to facilitate lodging and germination of seed.
- Seed disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or the request of the landowner or land management agency. Seeding is not required in cultivated croplands unless requested by the landowner
- Perform seeding of permanent vegetation within the recommended seeding dates. If seeding cannot be done within those dates, use appropriate temporary erosion control measures and perform seeding of permanent

vegetation at the appropriate time within the next recommended seeding season based on ROW soil workability (further described in Attachment 4 – Seeding, Fertilizing, and Lime Recommendation for Gas Pipeline Right-of-Way Restoration in Farmlands).Dormant seeding or temporary seeding of annual species may also be used, if necessary, to establish cover, as approved by the Environmental Inspector. Lawns may be seeded on a schedule established with the landowner.

- In the absence of written recommendations from the local soil conservation authorities, seed all disturbed soils within 4 working days of final grading in Pennsylvania ~~and 7 days in New York~~, weather and soil conditions permitting, subject to specifications in the first three (3) bullets of this section (8.4 Seeding Requirements). Upon completion or temporary cessation of the earth disturbance activity in a special protection watershed, immediate stabilization should occur.
- Base seeding rates on Pure Live Seed. Use seed within 12 months of seed testing.
- Treat legume seed with an inoculant specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydro).
- In the absence of written recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary, a seed drill equipped with a cultipacker is preferred for seed application.
- Broadcast or hydro seeding can be used in lieu of drilling at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker or roller after seeding. In rocky soils or where site conditions may limit the effectiveness of this equipment, other alternatives may be appropriate (e.g., use of a chain drag) to lightly cover seed after application, as approved by the Environmental Inspector.
- Seed slopes steeper than 33% immediately after final grading, weather permitting.
- For two-year project timelines, the topsoil berm will be seeded when the soil in the pile is loose and fresh. The top of the berm will be flattened to allow for lightweight broadcast seeding over the entire berm.

8.5 Temporary Mixtures - October 15 through March 31

General site preparation, lime and fertilizer application rates and temporary seed mixtures are detailed in Attachment 4 – Seeding, Fertilizing, and Lime Recommendation for Gas Pipeline Right-of-Way Restoration in Farmlands.

8.6 Permanent Mixtures - April 1 through October 14

General site preparation, lime and fertilizer application rates and permanent seed mixtures are detailed in Attachment 4 – Seeding, Fertilizing, and Lime Recommendation for Gas Pipeline Right-of-Way Restoration in Farmlands.

In agricultural lands soils will be tested prior to construction by the Agricultural Inspector to determine appropriate site-specific lime and fertilizer application rates (modifying the general rates in Attachment 4 up or down accordingly).

9 POST CONSTRUCTION ACTIVITIES AND REPORTING

9.1 Monitoring and Maintenance

- Conduct follow-up inspections of all disturbed areas, as necessary, to determine the success of revegetation and address landowners concerns. At a minimum, conduct inspections after the first and second growing seasons.
- Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation (or crops in cultivated cropland) is similar in density and cover to adjacent undisturbed lands.
- In agricultural areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise. Monitoring will be performed by the Agricultural Inspector as necessary during the growing season for a period of no less than two years immediately following full-length activation of pipeline or completion of successful yield, whichever occurs first. The monitoring shall include an assessment of plant populations, general appearance, and yields appropriate to the crops being monitored – as outlined in the Special Crop Productivity Monitoring Procedures Paper (February 1993), included as Attachment 3 to this document.
- In wetland areas, revegetation and restoration progress will be recorded annually for three years post construction or until restoration is deemed successful.
- Continue revegetation efforts until revegetation is successful.
- Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in agricultural areas until restoration is successful.
- Restoration shall be considered successful if the ROW surface condition, including the topsoil and the horizon of the upper subsoil is similar to adjacent undisturbed lands, construction debris is removed (unless otherwise approved by the landowner or land managing agency), revegetation is successful, and proper drainage for agriculture, including the mitigation of right-of-way water boils and saturation, has been restored.
- Routine vegetation mowing or clearing over the full width of the permanent right-of-way in uplands shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in a herbaceous state. In no case shall routine vegetation mowing or clearing occur during the migratory bird nesting season between April 15th and August 1st of any year unless specifically approved in writing by the responsible land management agency or the U.S. Fish and Wildlife Service.
- Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and permanent access roads as necessary.

9.1.1 Waterbody Post-Construction Maintenance

Limit routine vegetation mowing or clearing adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire construction right-of-way. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating may be removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in riparian areas that are between HDD entry and exit points.

Do not use herbicides or pesticides in or within 100 feet of a waterbody except as allowed by the appropriate land management or state agency.

Time of year restrictions specified in the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of riparian areas.

9.1.2 Wetland Post-Construction Maintenance

Do not conduct routine vegetation mowing or clearing over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in a herbaceous state. In addition, trees within 15 feet of the pipeline with roots that could compromise the integrity of pipeline coating may be selectively cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in wetlands that are between HDD entry and exit points.

Do not use herbicides or pesticides in or within 100 feet of a wetland, except as allowed by the appropriate federal or state agency.

Time of the year restrictions specified in the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of wetland areas.
Monitor and record the success of wetland revegetation annually until wetland revegetation is successful.

Wetland revegetation shall be considered successful if all of the following criteria are satisfied:

- The affected wetland satisfies the current federal definition for a wetland (i.e., soils, hydrology, and vegetation).
- Vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction.
- If natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion.
- Invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

9.2 Reporting

The project sponsor shall maintain records that identify by milepost:

- Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used.
- Acreage treated
- Dates of backfilling and seeding
- Names of landowners requesting special seeding treatment and a description of the follow-up actions
- The location of any subsurface drainage repairs or improvements made during restoration; and
- Any problem areas and how they were addressed

The project sponsor shall file with the Secretary quarterly activity reports documenting the results of follow-up inspections required by section 9.1; any problem areas, including those identified by the landowner; and corrective actions taken for at least 2 years following construction.

The requirement to file quarterly activity reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advanced notice provisions in the FERC's regulations.

9.2.1 Wetland Reporting

Within 3 years after construction, file a report with the Secretary identifying the status of the wetland revegetation efforts and documenting success as defined in 9.1.2 above. The requirements to file wetland restoration reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advanced notice provisions in the FERC's regulations.

For any wetland where revegetation is not successful at the end of 3 years after construction, develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively revegetate wetlands. Continue revegetation efforts and file a report annually documenting progress in these wetlands until wetland revegetation is successful.

9.3 Off Road Vehicle Control

To each owner or manager of forested lands, offer to install and maintain measures to control unauthorized vehicle access to the right-of-way. These measures may include:

- Signs
- Fences with locking gates
- Slash and timber barriers, pipe barriers, or a line of boulders across the ROW
- Conifers or other appropriate trees or shrubs across the ROW

10 GENERAL PIPELINE CONSTRUCTION SEQUENCING

10.1 Pre-Construction

Prior to mobilization, the Drainage Specialist/Agricultural Inspector will review drain tile systems, potential dewatering outlets, and potential outlets for interceptor systems to mitigate subsequent ROW water boils and saturation (see Pre-Construction Planning section of this Plan). In conjunction with the Environmental Inspector and the Project's construction management, the Drainage Specialist/Agricultural Inspector will review nearby or crossed ditches (see Section 4.10), for their adequacy as temporary holding areas for trench dewatering, at a minimum covering those segments of the Project's ROW through agricultural lands that are identified with high water table (HWT) soil. The staff will review the construction ROW plan, concerning agricultural lands for: a) the topsoil stockpiling locations being consistent with the upslope side of the ROW; b) the "extra work space areas" for their sufficiency of size to accommodate effective soil segregation and protection, for various special construction related activities (e.g., bore set ups and corresponding spoil areas; staging sites for waterway or road crossings, etc.); and c) location of all natural drainage swales on affected farms, where adequate surface drainage gaps (through soil berms) are to be left as openings during topsoil stripping and spoil excavation management.

Before construction begins, the R.O.W. will be surveyed and staked. Other utility lines will be located and marked to prevent accidental damage during pipeline construction. Additionally, mark stream buffers and wetland

boundaries. Post environmental signs as it relates to No Fueling areas, Access Roads, Not an Access Road, Streams and Wetlands.

10.2 Staging Area; Typical BMP's 1, 5, 17, 23A, 45ABC

Staging areas will be set up when the contractor moves in to begin work. Install proper BMPs as required. Examples of BMP's are rock construction entrances, silt fence or sock, rock channel filters, topsoil segregation. Proper access BMPs will be implemented prior to any sustained heavy traffic. If vehicles enter or exit the staging area onto a paved road, an entrance pad will be installed as per *BMP Drawing No.1.* Strip topsoil and segregate for staging areas (if any) residential or agricultural lands.

10.3 Handling of Hazardous Materials

All fuels, oils, chemicals, or other hazardous materials will be maintained in tightly sealed containers during transportation and storage. Fuels will be stored in equipment staging areas in stationary tanks. The tanks will be diked at the time of their placement in the staging area. Refueling will be performed in accordance with Section IV.A.1 of the FERC's Wetland and Waterbody Construction and Mitigation Procedures (Procedures); this includes storage of hazardous materials and the application of concrete coating. The FERC procedure is to store fuels and perform refueling at distances no less than 100 feet from a stream or wetland. In addition to the FERC's procedures, the project will not allow the maintenance of equipment within 100 feet of streams and wetlands unless not doing so may create a greater hazard if not corrected before moving equipment (e.g., patching an oil leak from a stranded backhoe). This is also shown on *BMP Drawing Nos. 4 and 4A*, note 2.

In the event of a spill or leakage, the contents will be transferred to another tank. The empty tank will be removed as well as all standing liquids caught by the dike. All obviously contaminated soils will be removed and photo-ionization meters will be used to identify any further contaminated soils. The excavated area will be backfilled with clean soil.

10.4 Access Roads

The project will make use of the existing ROW for access along the pipeline. ~~Where additional access is necessary, existing access roads may be used upon agreement with the landowner.~~ Expansion of existing access roads or creation of new access roads is subject to routine construction requirements (e.g., topsoil stripping in residential or agricultural areas). BMPs will be installed and maintained on these roads, and they will be reclaimed to a condition at least equal to their pre-construction condition unless otherwise agreed to with a landowner.

10.5 Rock Entrances; BMP 1

The Grading Crew will install rock entrances at public roads in accordance with BMP Drawing No. 1, Entrance Pad. If the job kicks off at a point where an entrance pad is required, the entrance pad will be installed as soon as the immediate area required for the pad is stumped and rock can be brought in. This shall be within forty-eight (48) hours from the time the Grading Crew move onto the location.

For other locations along the pipeline where entrance pads are required, the pads will be installed as the Grading Crew progresses to these locations, but no later than forty-eight (48) hours from the time they reach these locations.

Rock construction entrances should be installed wherever it is anticipated that construction traffic will exit the project site onto any roadway, public or private. Access to the site should be limited to the stabilized construction entrance(s). Rock construction entrances should be maintained to the specified dimensions and the capacity to remove sediment from tires by adding rock when necessary. A stockpile of rock material should be maintained on site. Sediment deposited on public roadways should be removed and returned to the construction site immediately. Note: Washing roadway or sweeping the deposits into roadway ditches, sewers, culverts, or other drainage courses is not acceptable.

10.6 Clearing; Typical BMP's 1, 5, 37, 45ABC

Clear and grub vegetation as needed within the clearing limits as shown on the plans. Minimize vegetation clearing at stream crossings to maintain existing riparian buffers. Temporary stream and wetland crossings must be provided by the Clearing Crew wherever equipment crosses an existing stream channel and/or wetland. Mats are to be placed within designated travel area. Wherever such crossings are installed, an appropriate permit must be obtained from DEP, DEC, and/or Army Corps of Engineers.

This consists of the removal of trees and other obstructions from the ROW Clearing will be restricted to only that portion of the ROW necessary for actual construction. Trees, brush, and other obstructions will be cleared to permit safe and efficient use of machinery and other construction equipment. Permission will be obtained from landowners for use of access roads across their property to the ROW, for cutting trees and erecting temporary gates where necessary.

Various clearing methods will be employed, depending on tree size, contours of the land, and the ability of the ground to support clearing equipment. Marketable timber will be cut to specified lengths and stacked. All brush may be disposed of in one of several ways, depending on local restrictions and the terms of applicable permits and/or easement agreements: piled on the edge of the R.O.W. to provide cover for wildlife, burned, or chipped. Chipped wood may be removed from or scattered along the edge of the ROW. After the removal of ROW vegetation temporary ECDs will be installed as necessary to prevent erosion.

10.7 Grading; Typical BMP's 1, 4A, 5, 8A, 9, 17, 19, 22, 23A, 37, 45ABC, 51

Rock outcrops, ridges, boulders, and tree stumps will be removed from the working area, and sharp topographical irregularities will be graded to ensure rapid and safe passage of the work crews. Backhoes and bulldozers will be employed for removal of tree stumps, rocks, and boulders. Burying them or setting them outside the construction area will serve to dispose of tree stumps in an approved manner, typically. No tree stumps will be buried or placed in agricultural lands. In agricultural lands as identified in Section 4.3.1 Topsoil Segregation, topsoil will be carefully stripped from the full work area (spoil stockpiling zone, trench area, pipe stringing/welding, and traffic areas) segregated from the subsoil, and preserved for later restoration of the ROW. Leveling the ROW may entail rock blasting in certain areas. Qualified, experienced personnel will conduct blasting operations. Licensed blasting experts will be employed, and blasting permits will be obtained when required by government authorities. Disposal of excess rock will be in accordance with the terms of any applicable permit and/or easement agreements.

Install waterbars at each location specified on the plans. Strip topsoil within designated areas (Ag land, pasture, etc.) as needed and stockpile within the LOD. Apply seed (rye grass) and mulch to topsoil stockpile. Install compost filter sock or filter fence at all locations specified in the plans. In areas with concentrated flow, install limestone rock filters (do not use silt sock) as indicated on the plans. Grading Crew will typically make improvements to clearing crew's temporary stream and wetland crossings.

10.8 Temporary Diversions; Typical BMP's 11, 14, 17, 25

Diversion ditches will be installed by the Grading Crew each time the crew progresses to a location where an additional diversion ditch is required according to this Plan. Example information on diversion ditches and controls are included on *BMP Drawing Nos. 11, 14, 17 and 25*. The Rough Grading Crew (at the leading edge of the grading process) will install rough diversions each day for that section of the ROW, which has been rough graded. The Finish Grade Crew (at the trailing edge of the grading process) will finalize the construction of the temporary diversion ditches. After that, each succeeding crew will be responsible for maintaining the diversion ditches on a daily basis.

10.9 Ditching; Typical BMP's 4, 6A, 10A, 12, 13, 18, 21, 28, 30, 38, 47

Begin pipeline construction. Minimize earth disturbance to the maximum extent possible to install pipeline and windrow spoil within the LOD. Apply seed (rye grass) and mulch to all areas of the spoil pile (4 day for PA ~~and 7 day in NY requirement~~). The proposed steel pipeline with welded joints will require a relatively long time frame for open trench. Wherever water is pumped from the trench, it must be treated for sediment removal prior to discharging. Sediment bags should be distributed at low lying areas along the pipeline corridor. The excavated trench will remain open for the minimum time necessary to efficiently excavate the trench, install pipeline, backfill the trench, install trench plugs at locations indicated on the plan and begin stabilization of the disturbed areas. For most installations, this time period should not exceed 30 calendar days. Re-establishment of water bars, silt fence or sock must be completed by the end of each day.

The ditch centerline will be staked following completion of grading. The ditch will be excavated by mechanical backhoe to a depth that provides at least three (3) feet of cover on top of the pipe, except in bedrock areas, where a minimum cover of two (2) feet will be provided. In areas where the depth of soil over bedrock is less than (4) feet, the pipe should be buried below the top of the bedrock at the depth required for the land use, whichever is less. In agricultural lands a minimum of (4) feet of cover will be maintained, except where the new pipeline is located parallel and adjacent to an older existing pipeline that was buried with less than 40 inches of cover. In this situation, a minimum depth of 40 inches is required. In areas where temporary filling has been utilized, the depth will be measured from the original ground surface. During construction, excavated material is typically stored along one side of the trench while the other side is used as a work area.

The method of excavation used will depend on the specific soil conditions encountered, however, it is expected that track excavators will be required. Ditch-line breakers, usually composed of sandbags or staked straw bales, will be installed on steep slopes. Where bedrock is encountered, attempt to rip the ditch with a backhoe. Only if this technique proves unsuccessful will blasting be used.

Landowners will be contacted sufficiently in advance of construction, regarding access ways across the trench. The owner, as well as the operator (if different from the owner), of affected agricultural land will be met with by one of the respective project representative to designate farming related access ways across the trench. Where requested by either by landowners or farmland operators, access ways across the trench will be spaced at convenient intervals to allow landowners and land operators, all sizes of farming equipment requiring access, domestic livestock, and wildlife to cross the construction area.

Drainage Specialists in coordination with National land agents will contact landowners to locate drainage systems installed along the pipeline. If drainage tile is present, excavation of the trench will be to a depth sufficient to meet drainage tile clearance requirements. Damaged drain tiles will be promptly repaired or replaced (see Restoration section of this Plan).

10.10 Lowering In

Prior to lowering in, the ditch will be cleaned of all debris; the bottom smoothed and sand bags placed at a spacing of 15 feet or less, along the ditch bottom. The pipe string will be lifted from the skid supports and lowered directly into the ditch by using a sufficient number of side-boom tractors equipped with rubber-tired cradles and/or slings and belts to prevent damage to the pipe and pipe coating.
In areas where the ditch bottom is irregularly shaped due to consolidated rock and/or where the excavated spoil materials are unacceptable for backfilling around the pipe, padding materials may be required. Sand or screened subsoil material from the ditch excavation, or a combination of each, will be used for padding. This padding material will be placed on the bottom of the ditch, at a depth of six (6) inches, just prior to lowering in the pipe.

10.11 Backfilling; Typical BMP's 4, 6A, 10A, 12, 13, 18, 21, 28, 30, 38, 47

Before backfilling begins, a final inspection will be made to assure that all debris has been removed from the ditch and that the pipe and pipe coating are undamaged.

Where rock, gravel, or other materials are encountered of a size and shape that could cause damage to the pipe or pipe coating, select padding material will be placed around the pipe to a thickness of six (6) inches, or rock shield will be applied.

While the ditch is open the Drainage Specialist will supervise the repair or replacement of drain lines. During backfilling, the Drainage Specialist or Agricultural Inspector (in conjunction with backfill inspector) will supervise the application of the necessary measures to ensure protection from damage and permanent drain line support for gravity flow. Prior to backfilling the trench, any drain tiles across the working side of the ROW will be inspected to ensure its integrity. Tiles crushed or otherwise damaged by construction activity will be repaired or replaced to pre-construction or better condition.

In the event dewatering is required for pipe installation and backfilling additional efforts described in Section 4.10 will be employed.

On steep slopes, trench breakers consisting of sandbags, gravel, cement, or cement-filled sacks will be installed in the trench over and around the pipe to provide full protection against wash-away in areas that are vulnerable. Compacted earth or other suitable low-permeability material will be used on gentler slopes and wet areas to minimize channeling of groundwater along the ditch line.

The ditch will be backfilled using either subsoil excavated from the pipeline ditch or fill from a remote source. Multiple passes of heavy equipment will be used to compact the fill material.

Restoration and cleanup activities will occur following the pipe installation and backfill as described in Section 7.

10.12 Stream Crossing; Typical BMP's 2, 5, 6A, 13, 21, 24, 28, 31, 37, 45ABC, 47, 51

As pipeline construction progresses to stream crossings, install temporary dam and pump bypass system or flumed crossing as shown on the plans and dewater excavations as needed. Once crossing is complete, remove pump and bypass system and restore normal stream flow. Place erosion control blankets on banks. Replace all temporary sediment controls (silt fence or sock). Apply soil additives, seed and mulch all disturbed areas within 50-feet of stream on both sides of stream (within 24-hrs of completion). Temporary equipment crossings will be removed when no longer needed.

10.13 Hydrostatic Testing

Before any segment of new pipeline is placed in-service, it will be hydrostatically tested to ensure it conforms to ESP SC and D.O.T. specifications. Test water will be withdrawn from nearby hydrants, ponds, streams, or trucked in from an off-site location. This water will be pumped into the pipeline behind a fill pig. A high-pressure pump will be used to pressurize the pipeline to designed test pressure. The test pressure will be maintained for eight (8) hours. After test, the pipe section is depressurized and test water is discharged to an approved location where it is released back into the environment (in accordance with the project Hydrostatic Test Plan). (Reference *BMP Drawing No. 3*.)

10.13.1 Notification Procedures and Permits

Apply for state-issued water withdrawal permits, as required.

Apply for National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.

Notify appropriate state agencies of intent to use specific sources at least 48 hours before testing activities unless they waive this requirement in writing.

10.13.2 General

Perform 100 percent radiographic inspection of all pipeline section welds or hydrotest the pipeline sections, before installation under waterbodies or wetlands.

If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, address secondary containment and refueling of these pumps in the project's Spill Prevention and Response Procedures.

The project sponsor shall file with the Secretary before construction a list identifying the location of all waterbodies proposed for use as a hydrostatic test water or discharge location. This filing requirement does not apply to projects constructed under the automatic authorization provisions of FERC's regulations.

10.13.3 Intake source and Rate

Screen the intake hose to minimize the potential for entrainment of fish.

Do not use state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and/or local permitting agencies grant written permission.
Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users

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

10.13.4 Discharge Location, Method, and Rate

Regulate discharge rate, use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive stream flow.

Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

10.14 Restoration and Re-vegetation; Typical BMP's 5, 8A, 24, 45ABC

As pipeline construction is completed, re-grade the site to pre-project contours. Apply soil additives according to plan requirements. Seed and mulch disturbed areas immediately upon final grading operations. Place erosion control blankets within 100-feet from any stream, drainage, wetland, or other body of water in Special Protected Watersheds and non-agricultural areas. Place hydraulically applied blanket or erosion control blanket on all slopes equal to or greater than 3:1.

The time period between trench excavation and the start of site stabilization shall not exceed 30 calendar days. Restoration will be completed as soon as possible after grading. Cessation of activity for 4 days or longer requires temporary stabilization.

~~Final grading, topsoil replacement, and installation of permanent erosion control structures will be completed within 20 days after backfilling the trench (10 days in residential areas).~~ If soil moisture, seasonal or other weather conditions prevent compliance with these time frames, temporary erosion controls (temporary slope breakers and sediment barriers) will be maintained until conditions allow completion of cleanup.

The pipeline ROW will be carefully cleaned up and restored following construction. When the backfilling is completed, excess rock and similar materials will be removed from the ROW along with accumulated construction debris, and the ROW will be re-graded.

Topsoil will be re-spread over the ROW in areas where it had been segregated prior to ditching. Drainage ditches, terraces, roads, and fences will be restored to their former condition. Permanent slope breakers will be installed to divert runoff away from disturbed areas. Agricultural lands will be restored to equal or better condition (see the Restoration section and attached Soil Protection and Subsoil De-compaction Plan).

Construction equipment, surplus materials, and debris will be removed from the ROW. Pipeline markers and warning signs will be erected at roads and interspersed at points along the ROW. The ROW will be re-seeded, fertilized, and mulched unless the landowner stipulates otherwise. Re-vegetation will be monitored periodically. If excessive erosion occurs, these areas will be stabilized and re-vegetated.

10.15 Maintenance /Reporting

All BMPs must remain in place and FUNCTIONAL until all areas within the limit of disturbance are completed and permanently stabilized. Maintenance must include inspection of all erosion and sediment controls after each runoff event and also on a weekly basis.

10.16 ECD Removal and Close Out

Upon achieving permanent stabilization (a minimum uniform, perennial 70% vegetative cover) remove compost filter sock/filter fence and any other temporary erosion and sediment pollution control BMP. Seed, mulch, and permanently stabilize any disturbed areas caused by the removal of the temporary BMPs.

REFERENCES

- Federal Energy Regulatory Commission. Upland Erosion Control, Revegetation, and Maintenance Plan, May 2013.
- Federal Energy Regulatory Commission. Wetland and Waterbody Construction and Mitigation Procedures, May 2013.
- New York State Department of Agriculture & Markets. Pipeline Construction Projects- Agricultural Mitigation through Stages of Project Planning, Construction/Restoration and Follow-Up Monitoring, November 1997.
- New York State Department of Agriculture & Markets – Special Crop Productivity Monitoring Procedures, February 1993.
- New York State Department of Agriculture & Markets – New York State Farmlands Seeding, Fertilizer, and Lime Recommendations for Gas Pipeline Right-of-Way Restoration in Farmlands, undated.
- Pennsylvania Department of Environmental Protection. ESCGP-2 permit for Stormwater Discharges from Construction Activity.
- Pennsylvania Department of Environmental Protection. Erosion and Sediment Pollution Control Manual. Technical Guidance Number 363-2134-008; March 2012
- New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activities (GP-0-15-002).

Attachment 1

Soil Protection and Subsoil Decompaction Plan

SOIL PROTECTION
and
SUBSOIL DECOMPACTION MITIGATION PLAN

May 2006
Revised January 2019

OVERVIEW OF PROCEDURES

Successful soil protection and subsoil decompaction includes procedures generally associated with the following steps, with the detailed technical process outlined in the following Detailed Procedures Section:

Agency Coordination

During project planning, construction, restoration and monitoring, agency coordination will be conducted at levels appropriate to meet the objectives in this Plan, including:

1. Coordinate with the appropriate agencies regarding:
    - Drain Tile and Irrigation Systems
    - Grazing Deferment
    - Soils
    - Agricultural Biological Security
2. Obtain written recommendations from the County Conservation District regarding erosion control and revegetation specifications, both temporary and permanent. Have available all written recommendations from these or other agencies for erosion control and revegetation specifications at the project location.
3. The project sponsor agrees to consult with the appropriate agencies regarding agricultural bio-security (noxious weeds and soil-borne pathogens). If necessary, based on this consultation, Empire will develop specific practical cost-effective procedures to mitigate significant agricultural bio-security risks, if they are determined to exist in the project area.

Topsoil Segregation

1. Use topsoil segregation (or topsoil replacement) methods in all of the following areas:
    - Annually cultivated or rotated agricultural lands
    - Hayfields, improved pastures[1], and rotation hay land/pastures
    - Other areas at the landowners' request
    - Residential areas
2. Prevent the mixing of topsoil with subsoil in agricultural lands by stripping all topsoil from the full work area.
3. In deep agricultural soils strip topsoil in accordance with detailed procedures outlined in the following section.
4. At stream crossings, segregate topsoil from pipe trench on stream banks to facilitate re-stabilization.

[1] Improved pastures: land of generally tillable quality, used predominantly for grazing but largely open (free of trees, brush, and boulders)

Drain Tiles

All drainage tiles encountered shall be marked, maintained during construction, and restored or replaced to as good or better condition upon completion of construction. Tiles shall be referenced and flagged with stakes located adjacent to the ditch and the temporary construction right-of-way edges (outer perimeter).

Additional details regarding drain tile maintenance, repair and/or replacement are provided in Section 4.3.2 and along with the associated BMP drawings.

Soil Compaction Mitigation

Subsoil compaction of all agricultural lands shall be relieved in two phases. First the subsoil shall be deep ripped (at times of appropriately low soil moisture) with uplifted stone removal (using standard rock-picking equipment) occurring prior or replacement of the segregated topsoil. Following topsoil replacement a second phase of decompaction will occur, that includes Paratill® deep sub-soiling, and supplemental excess stone removal, of the right-of-way (including the topsoil storage area). Subsoil and topsoil replacement activities shall not be performed after October 1st, unless this act is approved by a qualified environmental inspector and/or a certifying agency along with Ag and Markets.

DETAILED PROCEDURES

Topsoil Segregation

1.0 Use topsoil segregation methods in all the following areas:
- Annually cultivated or rotated agricultural lands.
- Hayfields, improved pastures[2], and rotation hay land/pastures.
- Other areas at the landowners' request

2.0 Prevent the mixing of topsoil with subsoil by stripping topsoil from the full work area and limit all excavating, spoil stockpiling, and traffic/equipment to the area cleared of topsoil.
- Note: Less than full available width of construction right-of-way may be used, provided that the topsoil and subsoil are segregated and all traffic/equipment and subsoil storage are limited to the area cleared of topsoil.

3.0 Stockpile both the spoil and topsoil in a manner that prevents pooling of water behind the soil piles (prevents excessive saturation of the soil), e.g.: cut a surface drainage gap through the segregated soil piles (lineal berms), and across the right-of-way, at swale crossings, and protect outlet points.

4.0 In deep agricultural soils (more than 12 inches of topsoil), segregate the topsoil to a minimum depth of at least 12-incheIn shallow soils, the entire topsoil will be stripped. The subsoil will be segregated to a depth of 12 inches or to the top of bedrock, whichever is shallower In soils with less than 12 inches of topsoil the entire topsoil layer and 1-2 inches of friable subsoil (as approved by the Agricultural Inspector) will be segregated. Topsoil removal up to a depth of 16 inches will be required in specially designated soils.

5.0 At stream crossings, only segregate topsoil from pipe trench on stream banks to facilitate re-stabilization. Don't disturb the remainder of the actual bank. Agricultural topsoil stripping shall proceed out to the field's fringe, near, but not beyond the edge of the stream's riparian strip.

[2] Improved pastures: land of generally tillable quality, used predominantly for grazing but largely open (free of trees, brush, and boulders).

Soil Compaction Mitigation: Two Phases

1.0 First phase, deep-ripping the exposed subsoil. In all agricultural sections of the right-of-way where topsoil is stripped, the Contractor shall deep rip the exposed, construction surface subsoil with deep tillage devices such as a heavy duty ripping chisel or ripping chisel-plow, e.g.: V-frame or straight-frame ripper; or a heavy duty Paratill®.

The subsoil shall be thoroughly deep-ripped and rock picked prior to the replacement of segregated topsoil. The subsoil shall be deep-ripped to a depth of 18 to 22 inches as determined by the Agricultural Inspector. At least 40 hp of pull should be available per leg of implement, e.g.: 4 legs / 160 hp tractor.

Note: Due to the spacing between ripping legs (about 24 to 30 inches) a series of staggered, overlapping, "parallel rips" is employed to help ensure thorough breakup of the compacted mass of subsoil material. "Kittering" or a broad "S" series of cross rips will immediately follow for sites where the former "parallel" technique is inadequate for breakup of larger chunks into smaller clods.

1.1. All rocks, which are brought to the surface during the de-compaction process, shall be removed, as necessary, so that the size, density and distribution is similar to adjacent areas not disturbed by construction, during alternating passes of the deep ripper, rock rake, wind rower, and mechanical rock picker.

1.2. Upon approval by the Agricultural Inspector of the subsoil deep ripping and the stone removal, the topsoil that has been temporarily removed for the period of construction shall then be uniformly replaced, preferably using a light to moderate weight, LGP (low ground pressure), wide-track bulldozer.

1.3. All of the first phase deep-ripping and rock picking activities, as well as topsoil replacement and second phase de-compaction activities shall be conducted only during periods of relatively low soil moisture (i.e., not in a state of plastic consistency), as verified by the Atterberg field test, to ensure the desired mitigation and prevent additional soil profile compaction. Further technical details are provided in the Soil Moisture (Workability) section below.

1.4. Once the deep-ripping phase begins, further use of the right-of-way for any traffic is prohibited.

2.0 Second phase: Following topsoil replacement - Paratill® the right-of-way preferably with a deep angled-leg sub-soiler so the soil profile will be loosened to a depth of 20 to 22 inches achieving the necessary shattering of the subsoil and remove any large size uplifted rocks.

2.1. Deep soil profile shattering (by Paratill® or other approved deep tillage implement) includes the entire width of the temporary construction right-of-way: all areas that where the topsoil was stripped and replaced plus the area where the topsoil berm had been stored.

2.2. Deep soil profile shattering tools with angled legs include the 3 to 5 leg Paratill ®.

2.3. Alternative deep sub-soiling tools include such implements as but not limited to the straight leg Unverferth Zone Builder ® with 5 legs and (for narrower right-of-ways or limited hp tractors) 3 leg parabolic shanks, heavy duty sub-soiler (either straight frame or V-frame). Manufacturers' such as but not limited to John Deere ® and Brillion ®.

2.4. As noted for deep ripping (above) at least 40 hp of pull should be available per leg of implement for full depth effectiveness in right-of-way conditions.

2.5. If subsequent construction and cleanup activities result in further compaction, conduct additional deep sub-soiling of the agricultural soil profile, as needed.

3.0 After the completion of deep, soil profile shattering the right-of-way is lightly to moderately disked and then limed, fertilized and seeded during friable (workable) soil moisture conditions to minimize re-compaction.

Trench Crowning and Mitigation of Trench Settling

Prior to trench crowning and during the trench backfilling, ripped or blasted bedrock or concentrated volumes of excavated stone or rock material (excavated from the trench) may be used to backfill the trench only to the top of the existing bedrock profile. Generally, in agricultural lands, rock will not be returned to the trench any higher than 24 inches below the exposed (topsoil-stripped) construction surface in mesic soils nor 30 inches in frigid soils from the exposed working construction surface right-of-way

All excess rock not utilized, as trench backfill, will be hauled away. The remaining backfill materials will consist of suitable subsoil over the rock fill material.

1.0 Rough trench crowning will occur during the backfill operation of the construction phase, using subsoil materials over the trench to allow, and compensate, for trench settling to the extent possible prior to restoration. Right-of-way crowning is the placement of a small berm or crown using two distinct layers of soil materials over the trench line in agricultural areas. Installing a berm or crown along the trench line compensates for the settling of backfilled soils following pipeline restoration. Typically, when backfilling, air pockets or voids will remain below grade. Eventually, the below grade soils will move into the voids and creates depressions at the surface. The crown material will compensate for this settling and can be used to fill in the area that would have otherwise been a depression. *BMP No. Drawing No. 38* shows typifies the procedure.

   Note: If construction backfilling occurs between early autumn through winter Agricultural restoration will not be initiated until relatively drier soil conditions in late spring or early summer. Nearly all the trench settling will have occurred by mid-spring, giving the opportunity to compensate for trench settling using surplus, on site subsoil material immediately before restoration

   Note: The stockpiled topsoil (with the proper low moisture content) will be uniformly spread over the stripped portion of the affected right-of-way, after the initial deep ripping of the exposed subsoil and the rock cleanup has been completed, in late spring or early summer.

2.0 In areas where trench settling occurs after topsoil spreading, imported topsoil will be used to fill each depression. Attempts will be made to identify sources of topsoil free of weeds, including soliciting input from landowners of potential sources.

3.0 Topsoil from the right-of-way or from adjacent agricultural land will not be used to backfill depressions.

Soil Moisture (Workability) during Restoration, Compaction Testing during Monitoring and Remedial Action

1.0 Soil Moisture – During restoration activities check the soils for not exceeding friable (workable) moisture content using the following procedures (Atterberg field test for plastic soil consistency):

   1.1 Exposed construction surface subsoil

      1.1.1 Take a sample with a soil auger at a depth of 16 inches.

1.1.2 Roll the soil in your hand (Worm Method), to the diameter of an earthworm (1/8" diameter), and if the soil remains intact, in increments beyond 3/8" long, the soil is too wet (or "plastic"). If it breaks (crumbles) apart into 3/8" or shorter sections, the moisture content is correct (workable for deep ripping).

1.2 Topsoil stockpile (berm)

1.2.1 Take samples from vicinity of the berms' lower outside and inside slopes, 9 inches deep, and from the berms' inner core (at least 24 inches inside of the berm).

1.2.2 Administer the same test for each individual sample of topsoil material, as above in 1.1.2 (worm method). If all samples test friable (workable) topsoil replacement may proceed as long as favorable soil conditions remain.

1.2.3 If the topsoil is too wet, break open the topsoil stockpile (berm) and rough spread the soil partially across the right-of-way, allow it to air dry, and then conduct re-tests, until friable (usually about 2 days minimum of clear, dry weather) and then complete the topsoil replacement.

2.0 Compaction Testing during the Post Restoration Monitoring and Maintenance - Once the moisture of the restored, full soil profile on the affected right-of-way is at or near equilibrium with the adjacent off right-of-way land, soil profile compaction testing will be conducted by the Agricultural Inspector using an appropriate soil penetrometer or other soil compaction-measuring device (in the early spring following the year of initial restoration).

2.1 Cone-type soil penetrometer, using the 3/4 inch diameter cone, or similar cone-type soil compaction measuring tool, capable of withstanding applications of at least 400 pounds-per-square-inch (psi). When the readings inside the right-of-way are less than, equal with, or no more than twenty percent greater than the subsoil density readings outside the right-of-way, the subsoil de-compaction/shattering restoration is satisfactory.

2.2 Test for soil compaction, obtaining readings at every 3-inch vertical interval from surface to 21 inches, or to the point of resistance (300 psi), through the topsoil and subsoil, across the project right-of-way in agricultural areas. These cross section tests shall be conducted at right-of-way inter-spacing (not to exceed 200 feet) sufficient to determine the need for remedial measures.

2.3 Tests shall be done on the same soil type under the similar moisture conditions and should include the following areas

2.3.1 Temporary stockpile areas

2.3.2 The trenched zone

2.3.3 Soil from undisturbed areas

2.3.4 The work area

2.3.5 Any traffic areas related to the project

2.4 It is standard to test each sampling site of a multi-site cross section at five to eight separate points of measurement of the soil profile's density, all taken in roughly the area of a thirty-inch diameter circle. The single highest and single lowest mechanical samples of the complete soil profile, per test site, are "thrown out". The remainder of the complete test samples recorded in 3-inch increments is used to calculate the soil profile's average density per 3-inch increment.

2.5 The soil profile compaction test results within the right-of-way will be compared with those of the adjacent off right-of-way portion of the affected farm field/soil unit.

2.6 If the “higher-than-threshold” measurements occur (for instance) in one out of six representative cross-sections of one long field and no similar excesses are measured in its neighboring croplands along the right-of-way, this should be viewed as an “isolated anomaly” and the soil restoration work on the subject field is generally considered adequate.

3.0 Where representative subsoil density on the right-of-way, or a repetitive zone within the right-of-way, exceeds the representative subsoil density outside the right-of-way, follow-up shattering of the soil profile will be performed using a deep, angled-leg subsoil tool in the respective areas of the right-of-way.

4.0 Follow-up deep shattering will be applied during periods of relatively low soil moisture to ensure the desired mitigation and to prevent additional subsoil compaction. (Refer to Soil Moisture section 1.0, above)

5.0 Oversized stone/rock material, which is uplifted to the surface as a result of the deep shattering, will be removed.

General Monitoring and Remediation

1.0 General right-of-way conditions to be monitored include topsoil thickness, relative soil density (compaction), relative content of rock and large stones, trench settling, crop development, drainage and repair of severed fences, etc, for not less than two years following the full-length activation of the pipeline or completion of initial ROW restoration, whichever occurs last.

Topsoil deficiency and trench settling shall be mitigated with imported topsoil that is of "equal or greater quality" than topsoil on the affected site. Crop development/production problems maybe the result of right-of-way trench saturation or residual compaction, in which case appropriate interceptor drainage and/or de-compaction mitigation will be implemented. Results will be compared to portions of the same field located outside of the right-of-way.

Attachment 2

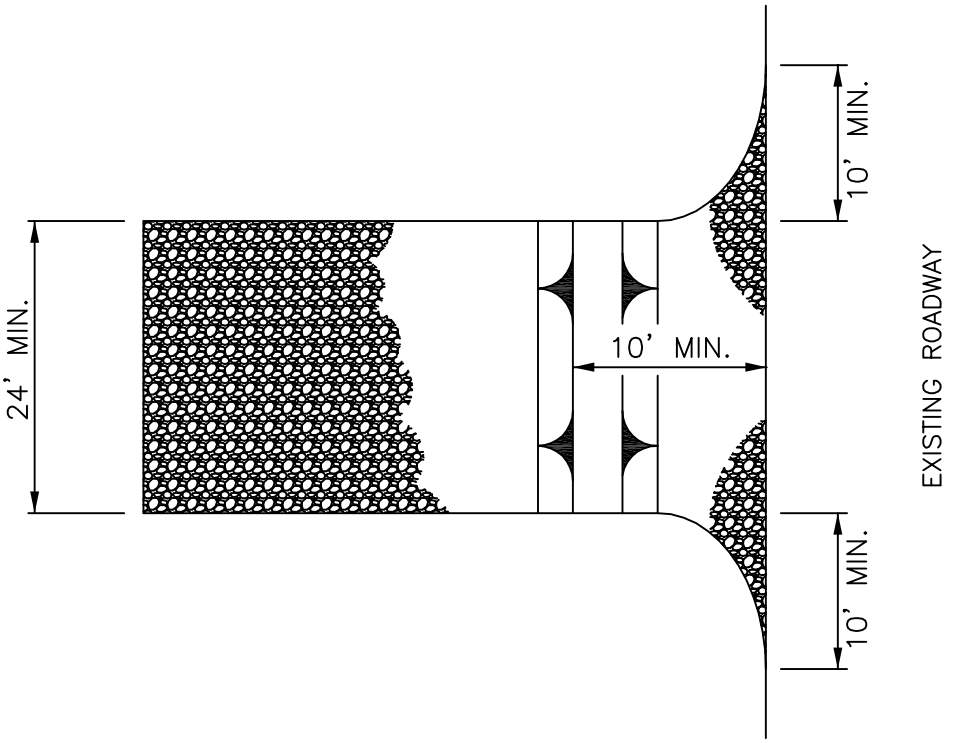
Best Management Practices (BMP) Drawings

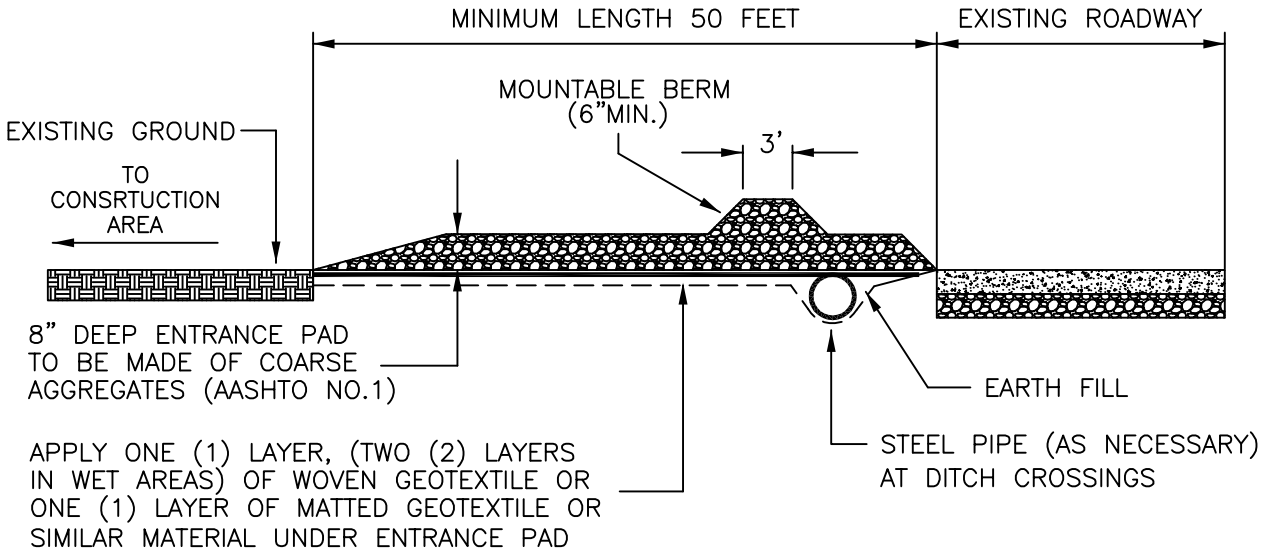
BMP Drawing Index

BMP Description	Drawing Number	Drawing Date
Entrance Pad	1	1/17/2014
Stream Crossing – Dam & Pump Energy Dissipater	2	5/16/2002
Pipe Test Energy Dissipater	3	12/9/2013
Wetland Crossing	4	1/17/2014
Wetland Travel Area	4A	1/17/2014
Filter Fence	5	6/2/2010
Trench Breaker	6A	1/17/2014
Stream Bank Stabilization	7	1/7/1997
Slope Breakers	8A	1/17/2014
Stream Mat	9	1/17/2014
Stream Mat at Undefined Channel	9A	1/17/2014
Temporary Equipment Timber Mat Stream Crossing	9B	8/24/2016
Road Crossing (Open Cut)	10	1/17/2014
Diversion Ditch	11	1/8/1997
Road Crossing (Bore)	12	1/17/2014
Stream Crossing (Bore)	12A	3/22/2019
Flume (Dry Ditch) Stream	13	1/17/2014
Run Off Ditch	14	6/27/2007
Erosion Blankets Channel Installation	15	1/9/1997
Specifications Erosion Blankets Channel Installation	15A	1/9/1997
Block and Gravel Drop Inlet Sediment Barrier Rock	16	3/27/2017
Channel Filter	17	1/10/1997
Road Culvert Extension Across Pipeline Trench	18	9/9/2003
Temporary Culvert With Clean Rock Fill Temporary	19	1/17/2014
Culvert Across Open Trench	20	1/10/1997
Dam And Pump Stream Crossing	21	1/17/2014
Straw Bale Installation	22	3/10/2000
Topsoil Segregation	23	1/17/2014
Topsoil Segregation	23A	1/17/2014
Topsoil Segregation	23B	1/17/2014
Erosion Blankets Slope Installation	24	1/13/1997
Specifications Erosion Blankets Slope Installation	24A	1/13/1997
Catch Basin Sediment Sack	25	3/5/2008
Cathodic Protection Anode Installation	26	1/17/2014
Storm Water Channel	27	6/27/2007
Dewatering Filter Bag	28	1/17/2014
Road Culvert	29	9/14/2001
Typical Drain Tile Repair Across Trench	30	6/24/2005

BMP Drawing Index

BMP Description	Drawing Number	Drawing Date
Typical Drain Tile Repair Across Trench	30A	6/29/2005
Energy Dissipater	31	6/27/2007
Wooden Mat Bridge Pipeline Crossing	32	1/17/2014
Stone Bridge Pipeline Crossing (Without Mats)	32A	1/17/2014
Bell Hole Next To Waterbody	33	1/17/2014
Bell Hole Next To Wetland	34	1/17/2014
Bell Hole Agricultural Field	35	1/17/2014
Bell Hole Adjacent To Paved Road	36	1/17/2014
Extra Work Spaces	37	1/17/2014
Right-Of-Way Crowning	38	4/4/2005
Discharge Method For Trench Dewatering	39	1/17/2014
Parallel/New Submain Tile Installation	40	5/11/2006
Lateral Intercept Drain	41	4/8/2005
Typical Drain Tile Outlet	42	6/24/2005
Stone Pipeline Crossing with Timber Matting	43	1/17/2014
Elevated Washrack	44	5/3/2007
Compost Filter Sock	45A	12/9/2013
Compost Filter Sock	45B	3/11/2010
Compost Filter Sock	45C	3/11/2010
(No BMP Drawing)	46	-----
Trench Dewatering Sediment Corral	47	9/13/2010
Hydrotest Water Discharge Device	48	1/17/2014
Large Volume Hydrotest Water Discharge Device	48A	1/17/2014
Concrete Slab Pipe Protection Detail	49	1/17/2014
Diversion Terrace Protection and Mat	50	1/17/2014
Sediment Filter Sock (New York)	51	1/23/2014
30’-0” Portable Bridge	52	2/9/2017
35’-0” Portable Bridge	53	2/9/2017
40’-0” Portable Bridge	54	2/9/2017





MOUNTABLE BERMS SHOULD BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED. PIPE TO BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.

MAINTENANCE:

ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON THE SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPSOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION BY 50 FEET INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWER, CULVERTS, OR OTHER DRAINSGEWAYS IS NOT ACCEPTABLE.

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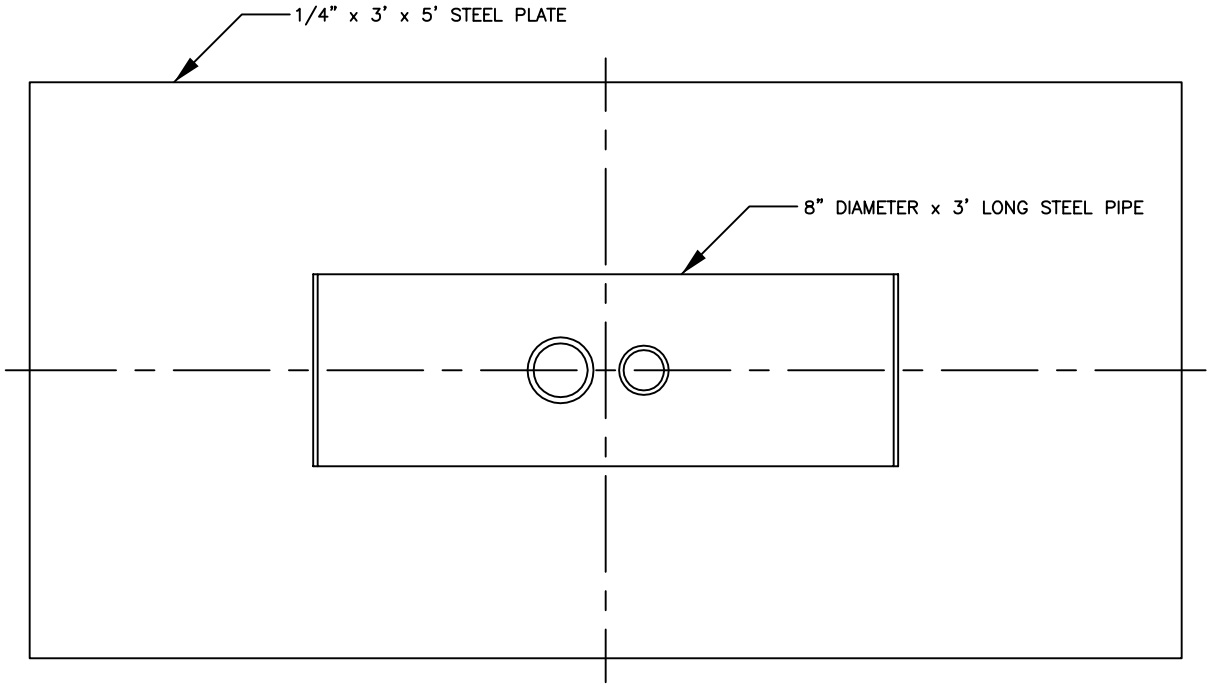
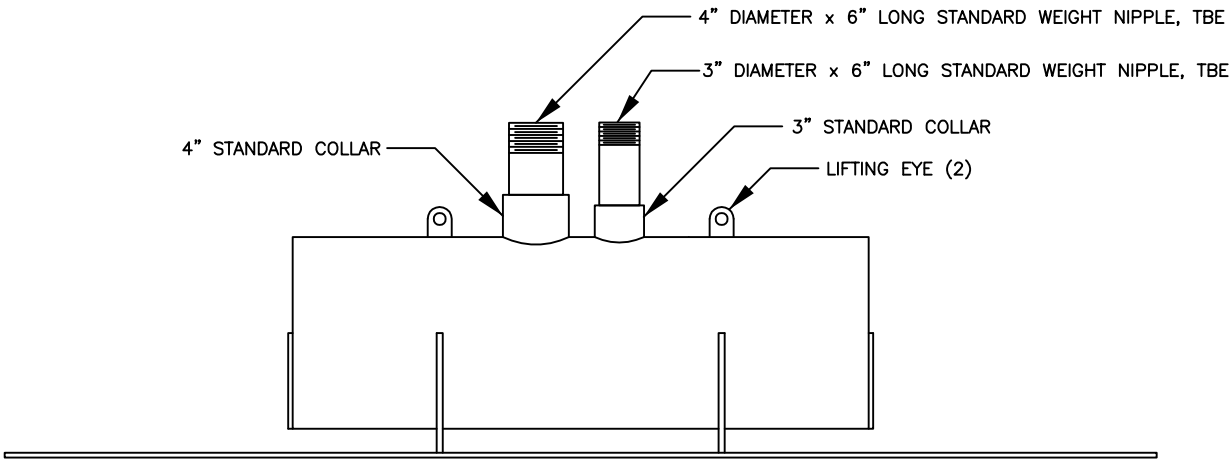
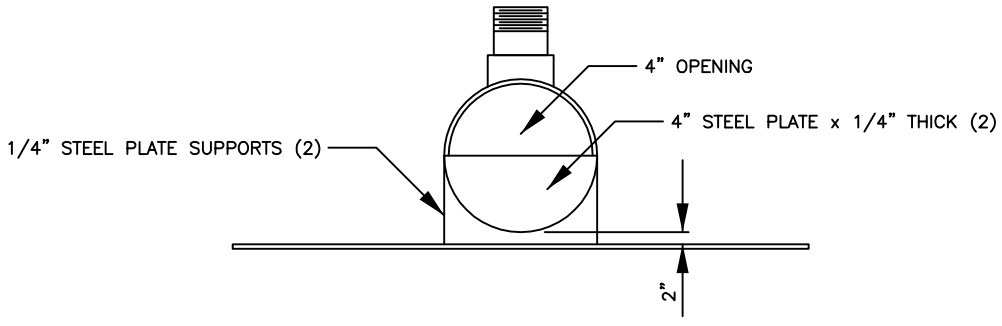
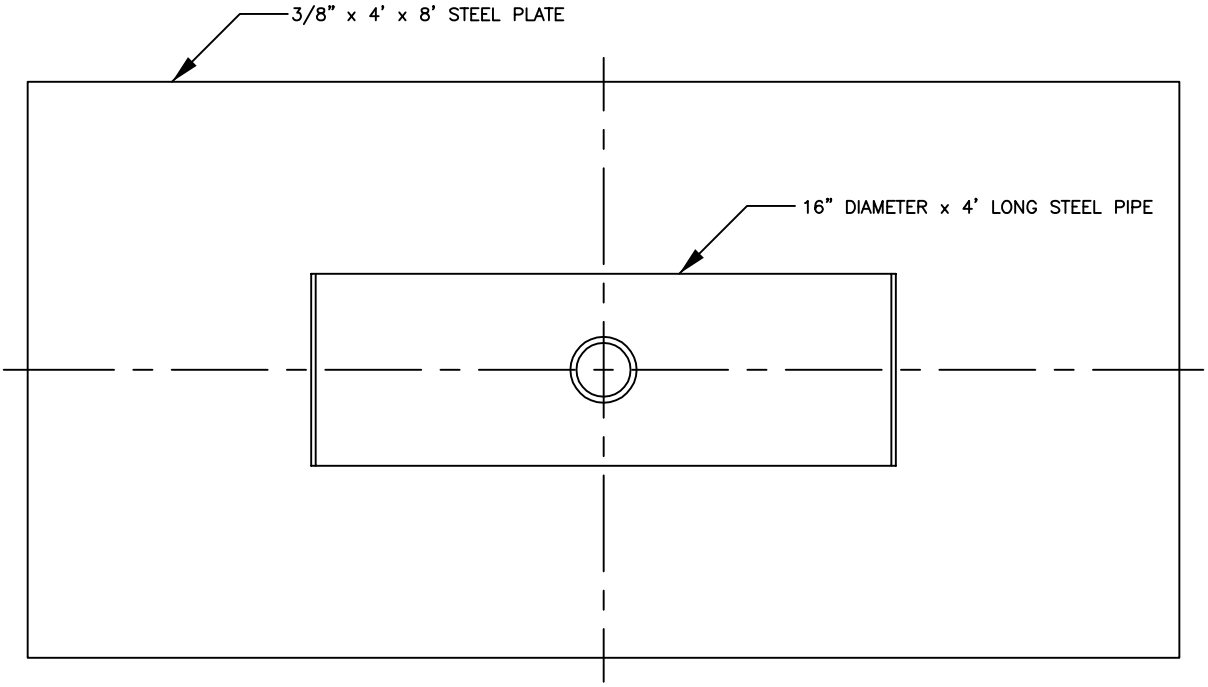
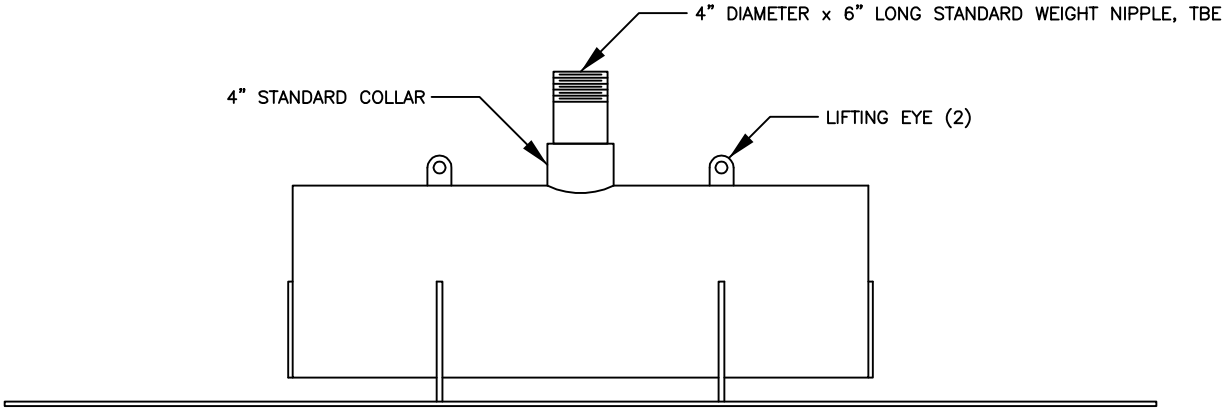


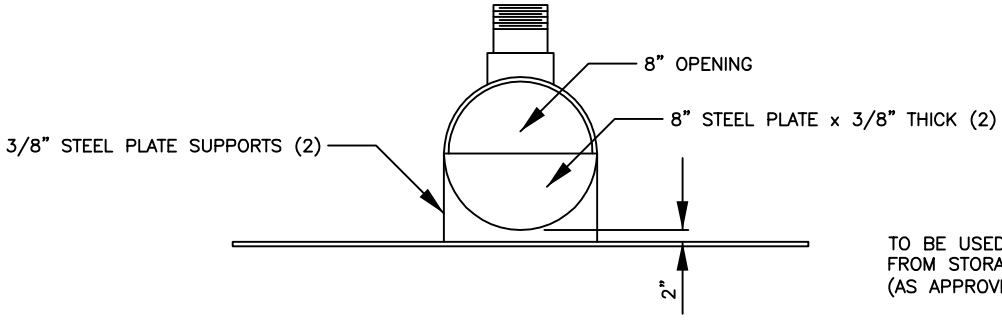




National Fuel Supply Corporation	ENGINEERING DEPT. 1100 STATE STREET P.O. BOX 2081 ERIE, PA. 16512 (814) 871-8676	DRAWN BY: L.A.P./P.A.B. FILENAME: NFGSC\BMP02.dwg DATE: 05/16/2002	STREAM CROSSING - DAM & PUMP ENERGY DISSIPATER	DRAWING NUMBER: 2







TO BE USED FOR DISCHARGING FROM STORAGE TANK TO STREAM (AS APPROVED BY PERMITTING)

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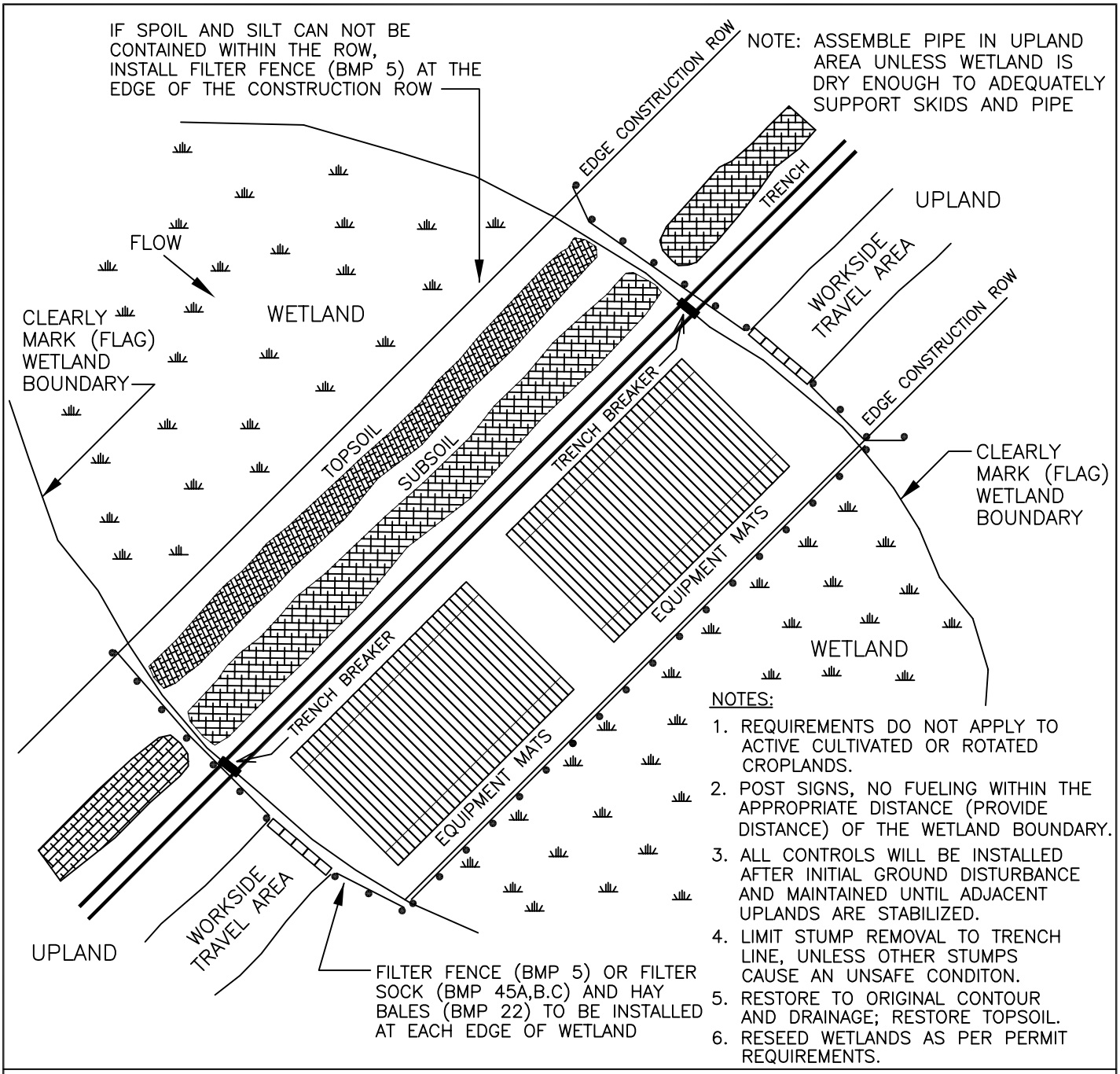
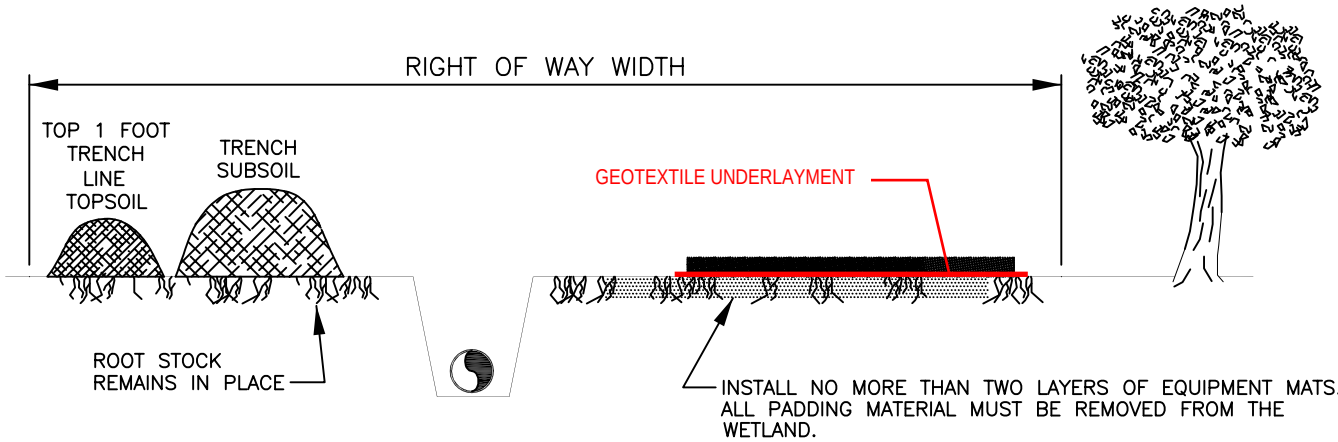


NOTES:

1. REQUIREMENTS DO NOT APPLY TO ACTIVE CULTIVATED OR ROTATED CROPLANDS.
2. POST SIGNS, NO FUELING WITHIN THE APPROPRIATE DISTANCE (PROVIDE DISTANCE) OF THE WETLAND BOUNDARY.
3. ALL CONTROLS WILL BE INSTALLED AFTER INITIAL GROUND DISTURBANCE AND MAINTAINED UNTIL ADJACENT UPLANDS ARE STABILIZED.
4. LIMIT STUMP REMOVAL TO TRENCH LINE, UNLESS OTHER STUMPS CAUSE AN UNSAFE CONDITON.
5. RESTORE TO ORIGINAL CONTOUR AND DRAINAGE; RESTORE TOPSOIL.
6. RESEED WETLANDS AS PER PERMIT REQUIREMENTS.



RESTORE TO ORIGINAL CONTOUR AND DRAINAGE; RESTORE TOPSOIL

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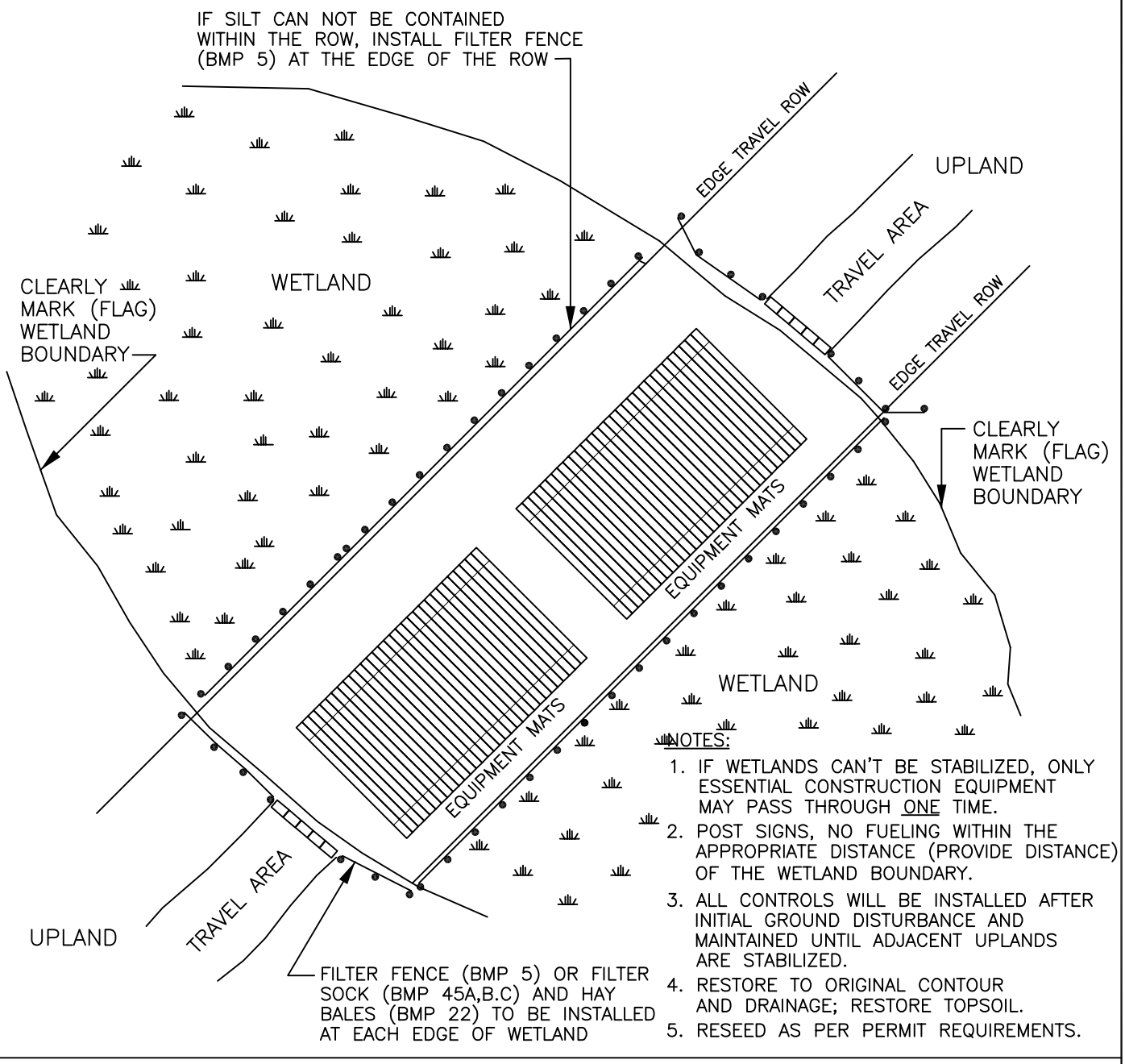
LAST REVISION DATE: 01/17/2014

WETLAND CROSSING

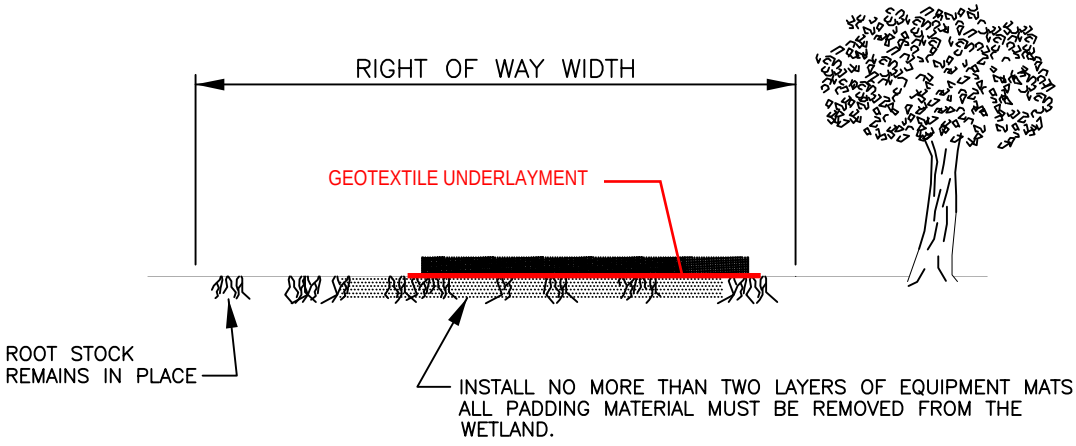
DRAWING NUMBER: 4

REVIEWED: 01/2014



NOTES:

1. IF WETLANDS CAN'T BE STABILIZED, ONLY ESSENTIAL CONSTRUCTION EQUIPMENT MAY PASS THROUGH ONE TIME.
2. POST SIGNS, NO FUELING WITHIN THE APPROPRIATE DISTANCE (PROVIDE DISTANCE) OF THE WETLAND BOUNDARY.
3. ALL CONTROLS WILL BE INSTALLED AFTER INITIAL GROUND DISTURBANCE AND MAINTAINED UNTIL ADJACENT UPLANDS ARE STABILIZED.
4. RESTORE TO ORIGINAL CONTOUR AND DRAINAGE; RESTORE TOPSOIL.
5. RESEED AS PER PERMIT REQUIREMENTS.



RESTORE TO ORIGINAL CONTOUR AND DRAINAGE; RESTORE TOPSOIL

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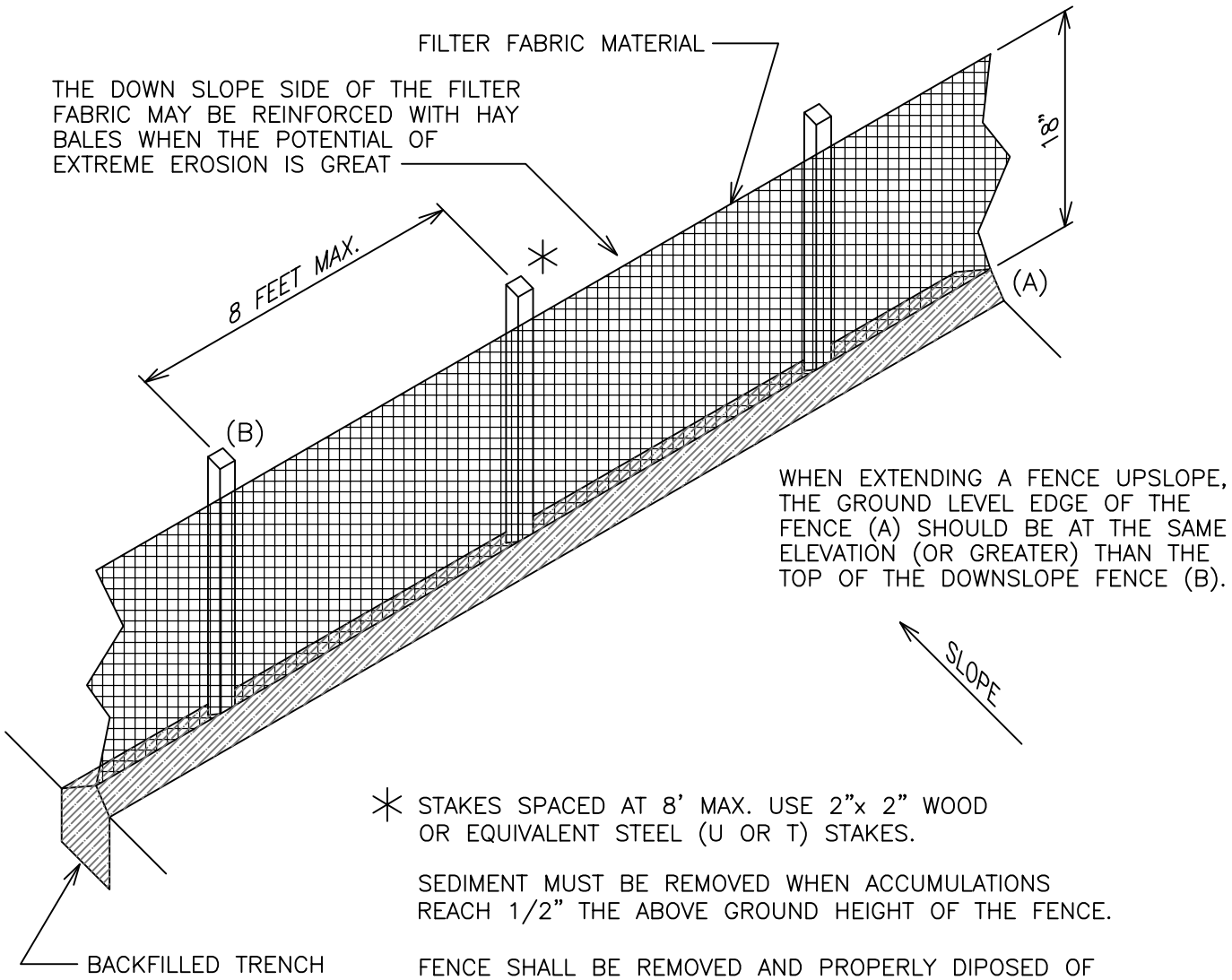
LAST REVISION DATE: 01/17/2014

WETLAND TRAVEL AREA

DRAWING NUMBER: 4A

REVIEWED: 01/2014

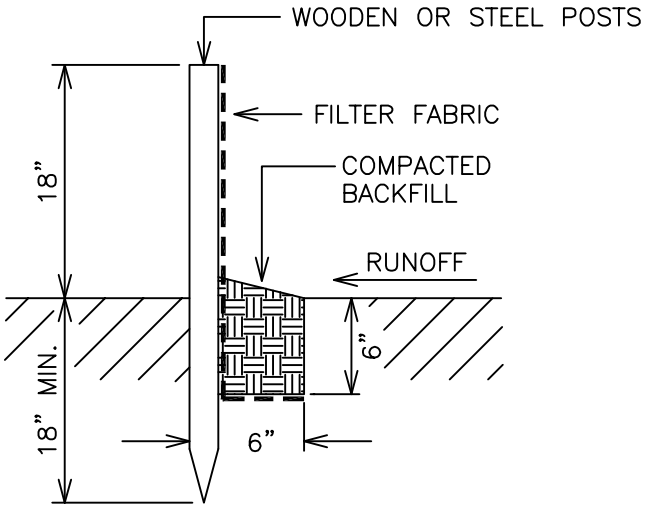


✳ STAKES SPACED AT 8' MAX. USE 2"x 2" WOOD OR EQUIVALENT STEEL (U OR T) STAKES.

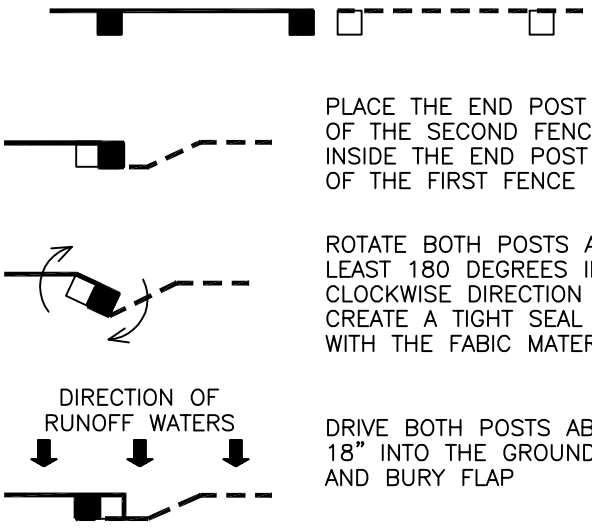
SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2" THE ABOVE GROUND HEIGHT OF THE FENCE.

FENCE SHALL BE REMOVED AND PROPERLY DIPOSED OF WHEN DISTURBED AREA IS PERMANENTLY STABILIZED.

FENCE DETAIL



ATTACHING TWO SILT FENCES



PLACE THE END POST OF THE SECOND FENCE INSIDE THE END POST OF THE FIRST FENCE

ROTATE BOTH POSTS AT LEAST 180 DEGREES IN A CLOCKWISE DIRECTION TO CREATE A TIGHT SEAL WITH THE FABIC MATERIAL

DRIVE BOTH POSTS ABOUT 18" INTO THE GROUND AND BURY FLAP

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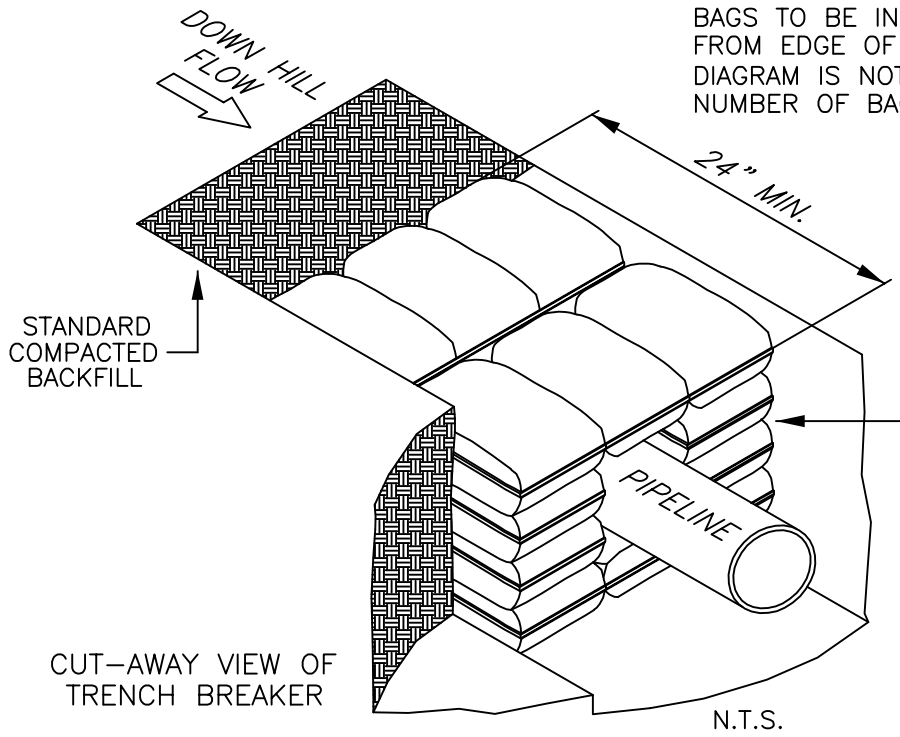
REVIEWED: 01/2014



CUT–AWAY VIEW OF TRENCH BREAKER

N.T.S.

BAGS TO BE INSTALLED TO FILL ENTIRE VOID FROM EDGE OF DITCH TO EDGE OF DITCH. THE DIAGRAM IS NOT A REPRESENTATION OF THE TOTAL NUMBER OF BAGS REQUIRED.

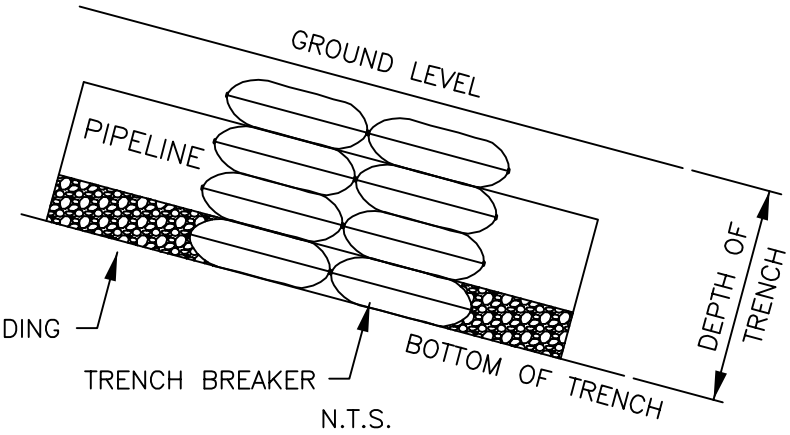
STACKED CLAY, BENTONITE, SYNTHETIC FOAM, OR SAND FILLED SACKS

IMPERVIOUS TRENCH BREAKERS (CLAY OR BENTONITE) ARE REQUIRED FOR ALL STREAM, RIVER, WETLAND OR OTHER WATER BODY CROSSINGS.

TEMPORARY TRENCH BREAKERS:

HARD/SOFT PLUG SPACING			
SLOPE	HARD PLUG	(OR)	SOFT PLUG
< 5%	N/A	(OR)	1000'
5–15%	900'		600'
15–30%	600'		400'
>30%	300'		200'

* SEE BMP #8A FOR ADDITIONAL DETAILS



N.T.S.

TRENCH BREAKER SLOPE SPACING

- AT THE SPACING LISTED IN THE CHART SHOWN BELOW ON THIS DRAWING.

ADDITIONAL LOCATIONS

AS A MINIMUM, INSTALL A TRENCH BREAKER AT THE BASE OF SLOPES GREATER THAN 5% WHERE THE BASE OF SLOPE IS LESS THAN 50' FROM A WATERBODY OR WETLAND AND WHERE NEEDED TO AVOID DRAINING A WATERBODY OR WETLAND.

* SYNTHETIC FOAM,

PERMANENT TRENCH BREAKERS		
TRENCH SLOPE (%)	SPACING (FT)	PLUG MATERIAL
<5	1,000	* CLAY, BENTONITE,* ~~SOIL~~ OR SAND FILLED SACKS
5–15	500	* CLAY, BENTONITE,* ~~SOIL~~ OR SAND FILLED SACKS
15–25	300	* CLAY, BENTONITE,* ~~SOIL~~ OR SAND FILLED SACKS
25–35	200	* CLAY, BENTONITE,* ~~SOIL~~ OR SAND FILLED SACKS
35–100	100	* CLAY, BENTONITE,* ~~SOIL~~ OR SAND FILLED SACKS
>100	50	CEMENT FILLED BAGS (WETTED) OF MORTARED STONE

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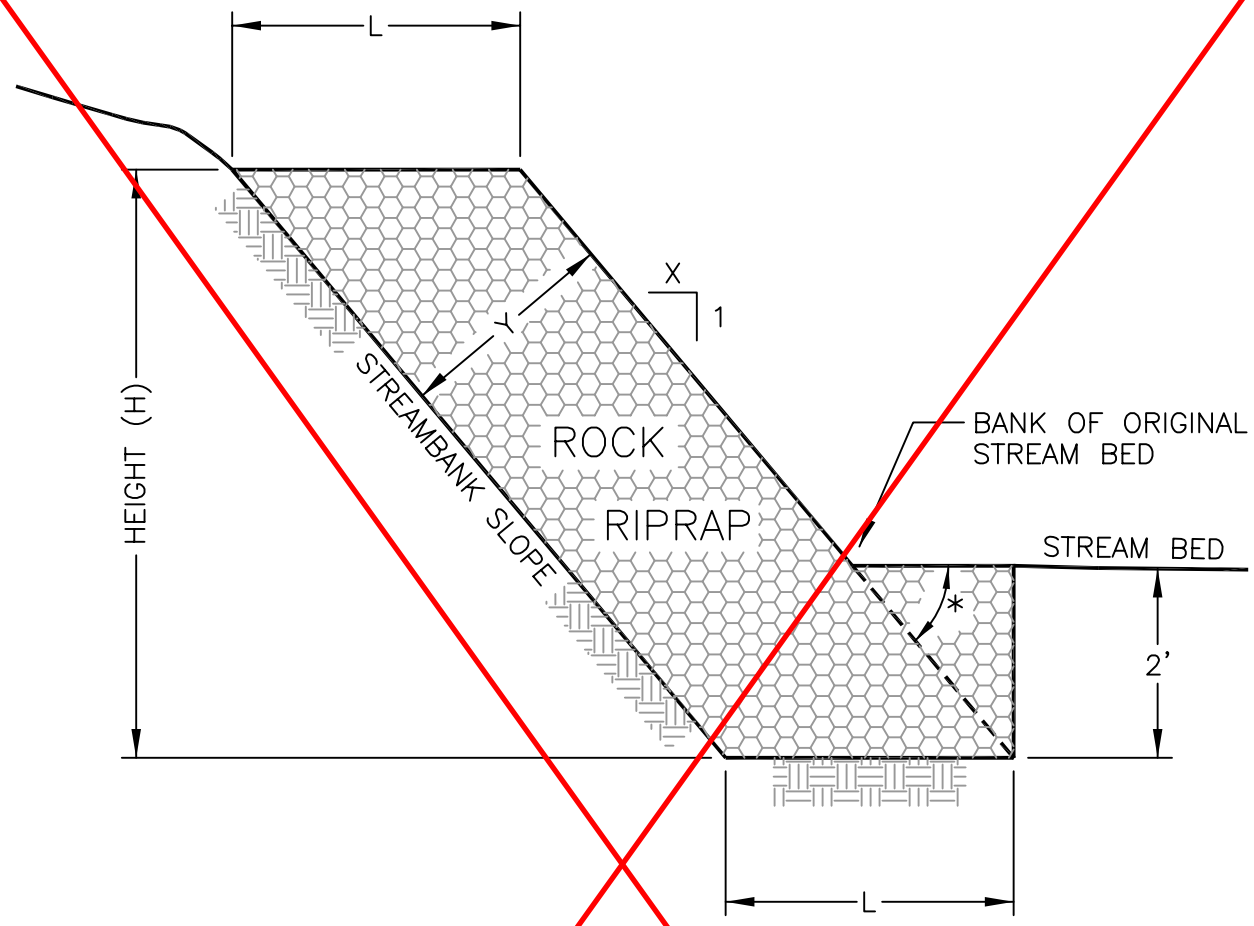
FILENAME: NFGSC\BMP06A.dwg
LAST REVISION DATE: 01/17/2014

TRENCH BREAKER

DRAWING NUMBER: 6A

REVIEWED: 01/2014

REFER TO E&S DETAILS,
FIGURE 18



(Y) ROCK THICKNESS	TABLE OF L VALUES SIDE SLOPES			
	1.5:1	2:1	2.5:1	3:1
12"	1.8'	2.2'	2.7'	3.2'
18"	2.7'	3.4'	4.0'	4.7'
24"	3.6'	4.5'	5.4'	6.3'
30"	4.5'	5.6'	6.7'	7.9'
36"	5.4'	6.7'	8.1'	9.5'
42"	6.3'	7.8'	9.4'	11.1'
48"	7.2'	8.9'	10.8'	12.7'
*	33.69°	26.57°	21.80°	18.43°

FORMULAS TO CALCULATE LENGTH OF RIPRAP (L)

$$L = \frac{Y}{\sin *} \qquad \text{OR} \qquad L = Y\sqrt{X^2 + 1}$$

(ENTER "Y" IN FEET)

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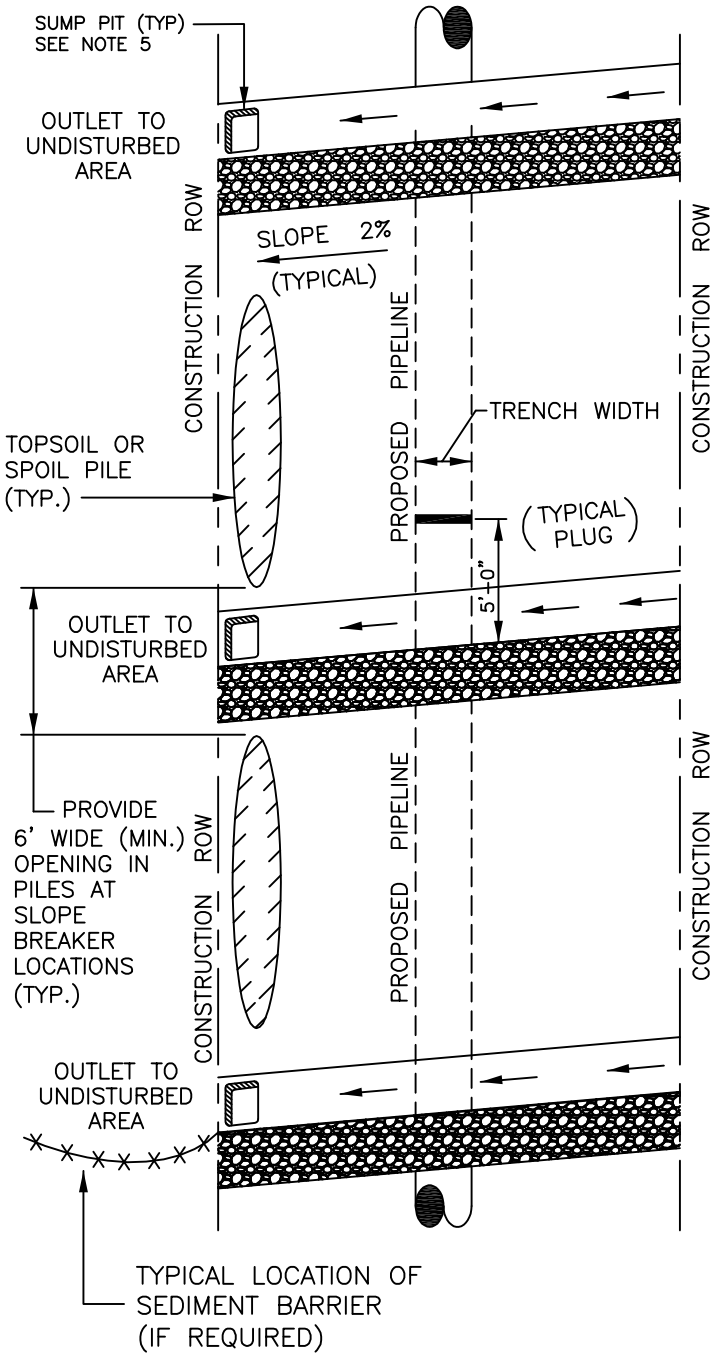
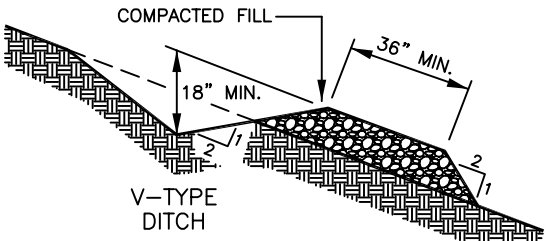
FILENAME: EPC\BMP07.dwg
DATE: 01/07/1997

STREAM BANK STABILIZATION

DRAWING NUMBER: 7

REVIEWED: 01/2014





V-TYPE DITCH TO BE 24" (MIN.) WHEN PLACED ON SLOPES GREATER THAN 33% (3H:1V).

TEMPORARY TRENCH BREAKER

HARD/SOFT PLUG SPACING			
SLOPE	HARD PLUG	(OR)	SOFT PLUG
< 5%	N/A		1000'
5–15%	900'	(OR)	600'
15–30%	600'		400'
>30%	300'		200'

~~NEW YORK PROJECTS SLOPE BREAKER SPACING~~

SLOPE	DISTANCE
<5%	125 FEET
5–10%	100 FEET
10–20%	75 FEET
20–35%	50 FEET
>35%	25 FEET

PENNSYLVANIA PROJECTS SLOPE BREAKER SPACING

SLOPE	DISTANCE
<5%	250 FEET
5–15%	150 FEET
15–30%	100 FEET
>30%	50 FEET

NOTES:

1. DO NOT INSTALL SLOPE BREAKERS TO OUTLET IN THE DIRECTION OF HOUSES OR BUILDINGS.
2. ANY BREAKERS THAT OUTLET ONTO A GRASS YARD WILL BE FILTERED BY A FILTER FENCE.
3. INSTALL AT THE BASE OF SLOPES ADJACENT TO WATERBODIES AND WETLANDS.
4. BREAKERS MAY EXTEND UP TO 4' BEYOND THE EDGE OF CONSTRUCTION IF THE AREA IS ENVIRONMENTALLY CLEARED.
5. OBSTRUCTIONS, (E.G. STRAW BALES, SILT FENCE, ROCK FILTERS, COMPOST SOCKS ETC.)SHOULD NOT BE PLACED IN ANY WATERBARS. WHERE NEEDED, THEY MAY BE LOCATED BELOW THE DISCHARGE END OF THE WATERBAR.
6. HARD PLUGS ARE UN-EXCAVATED PLUGS OF NATIVE SOIL LEFT IN THE PIPELINE TRENCH.
7. SOFT PLUGS ARE COMPACTED SOIL PLUGS THAT ARE PRE-EXCAVATED AND INSTALLED IN THE PIPELINE TRENCH.
8. COMPANY INSPECTOR SHALL DETERMINE THE TYPE OF PLUG TO BE USED.

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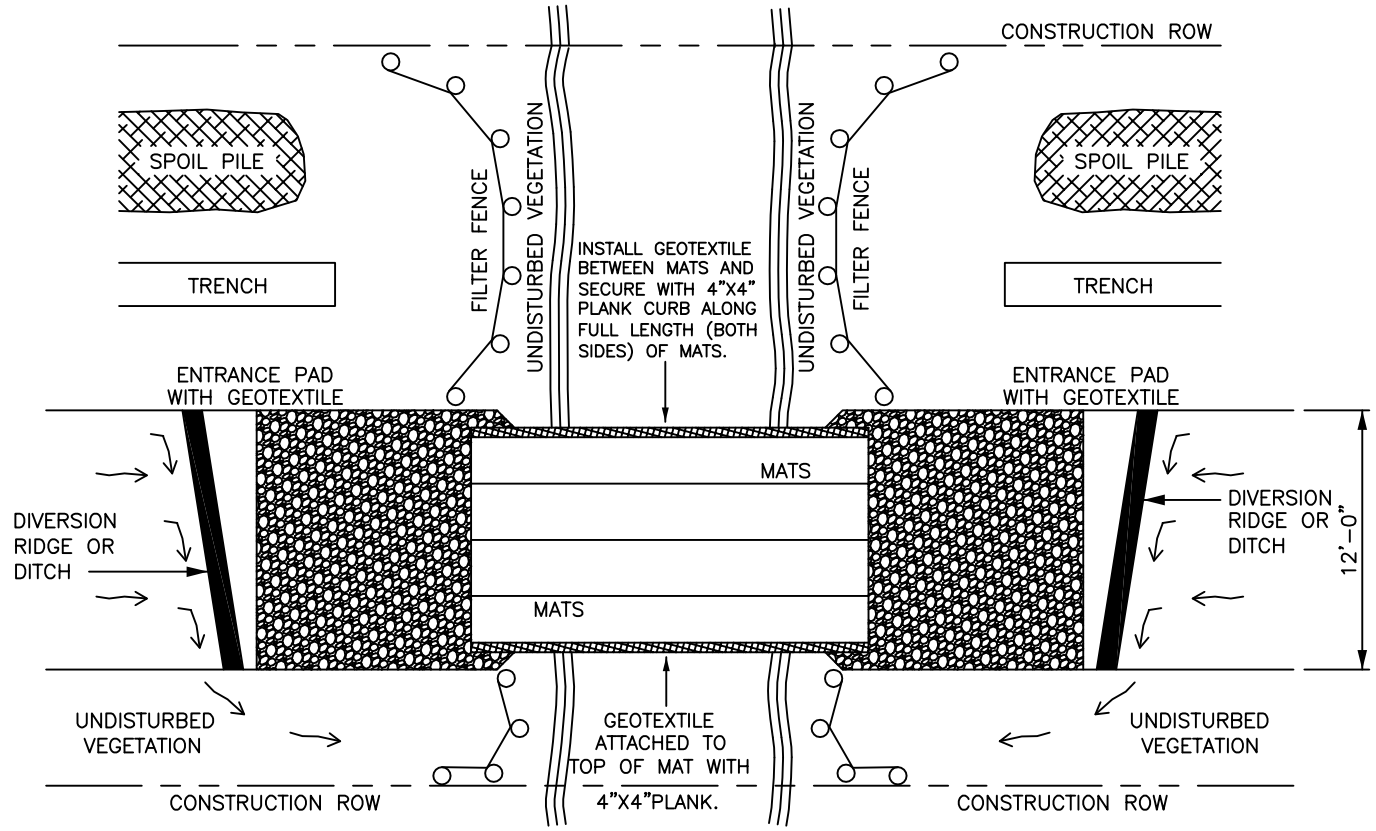
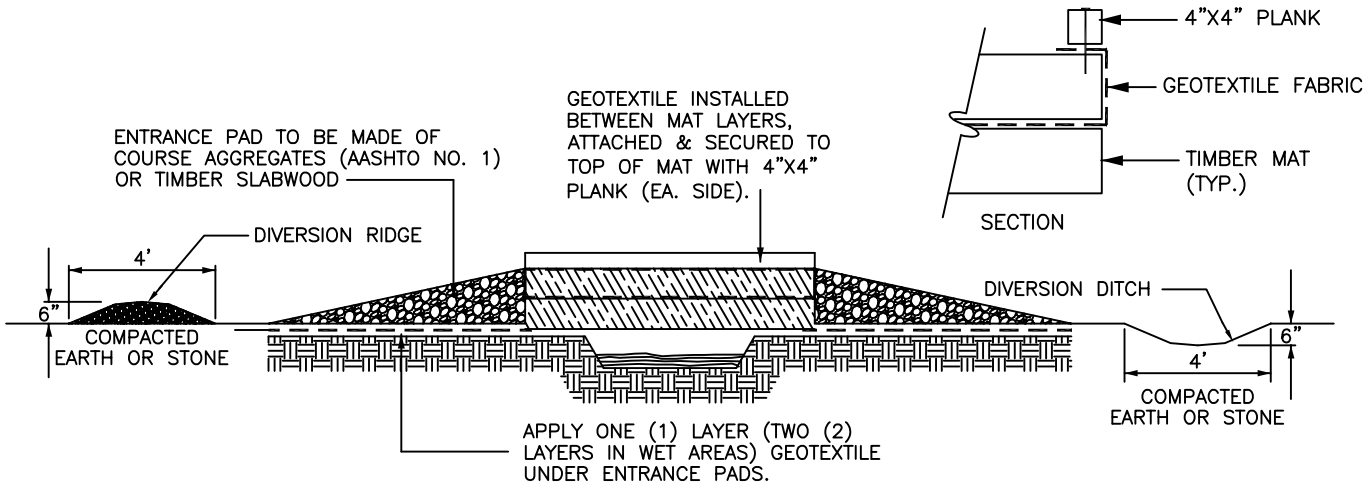
FILENAME: EPC\BMP08A.dwg
LAST REVISION DATE: 01/17/2014

SLOPE BREAKERS HARD PLUGS AND SOFT PLUGS

DRAWING NUMBER: 8A

REVIEWED: 01/2014





1. ONLY CLEARING EQUIPMENT AND EQUIPMENT NECESSARY FOR INSTALLATION OF EQUIPMENT BRIDGES MAY CROSS WATERBODIES PRIOR TO BRIDGE INSTALLATION. LIMIT THE CROSSING OF EACH WATERBODY TO ONE PER PIECE OF CLEARING EQUIPMENT.
2. INSTALL FILTER FENCE ACROSS THE DISTURBED AREA OF THE R.O.W.
3. APPLY GEOTEXTILE UNDER ENTRANCE PADS. INSTALL GEOTEXTILE BETWEEN MATS AND ATTACH TO TOP MAT.
4. EXCESS MUD IS TO BE REMOVED FROM THE ENTRANCE PADS AND MATS DURING CONSTRUCTION.
5. DURING FINAL CLEAN UP WHEN MATS, CULVERT, CLEAN ROCK FILL, ETC. ARE REMOVED, INSTALL FILTER FENCE ACROSS THE ENTIRE R.O.W. ON BOTH SIDES OF STREAM.
6. LOCATE ALL SPOIL A MINIMUM OF 10 FEET FROM THE WATERS EDGE.

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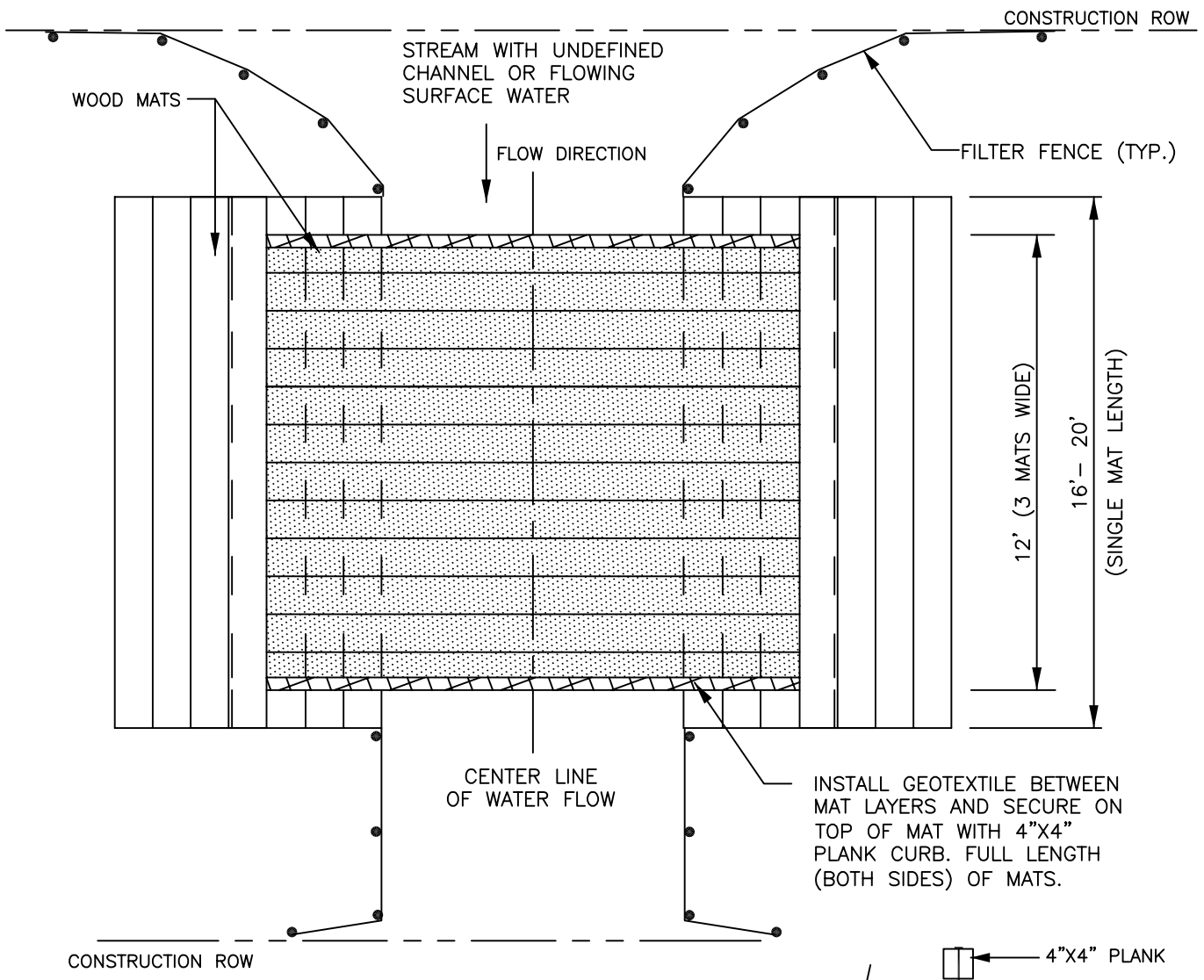
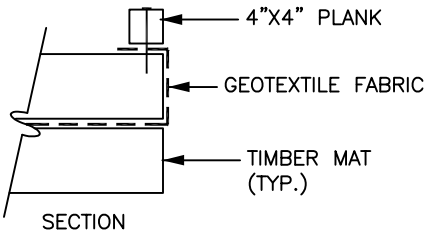
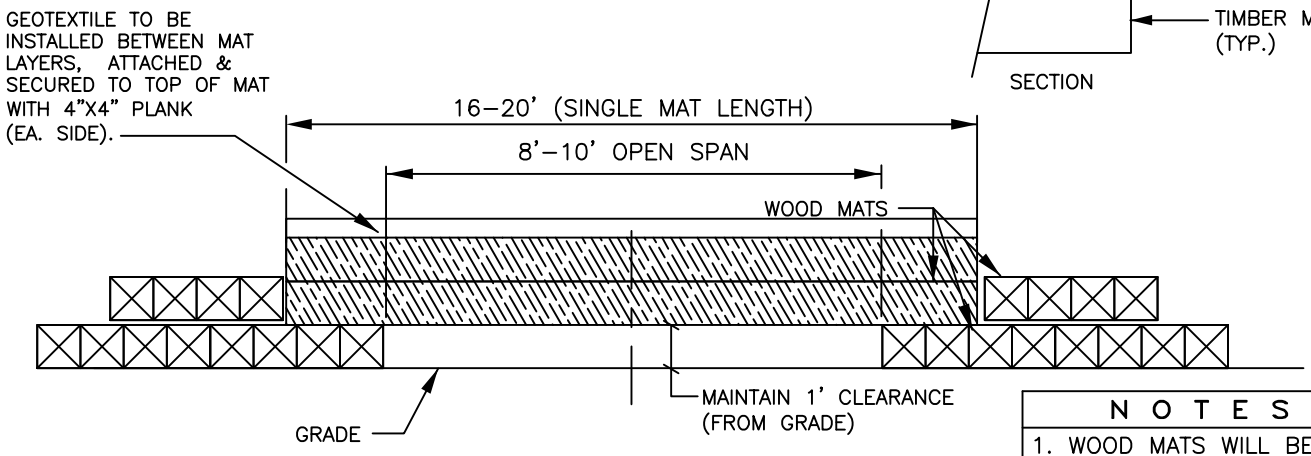
REVIEWED: 01/2014



PLAN VIEW



SECTION



SIDE VIEW

N O T E S

1. WOOD MATS WILL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.
2. ADDITIONAL MATS, IF NEEDED, WILL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.

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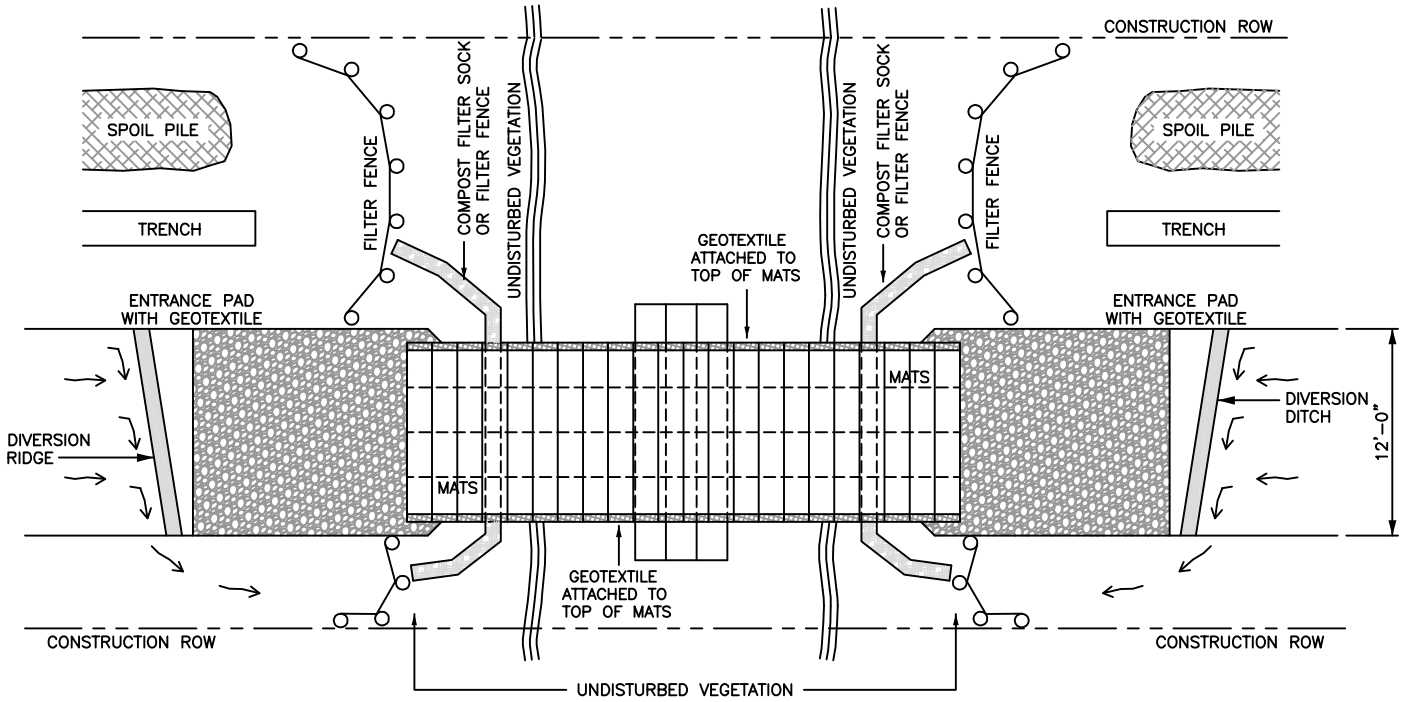
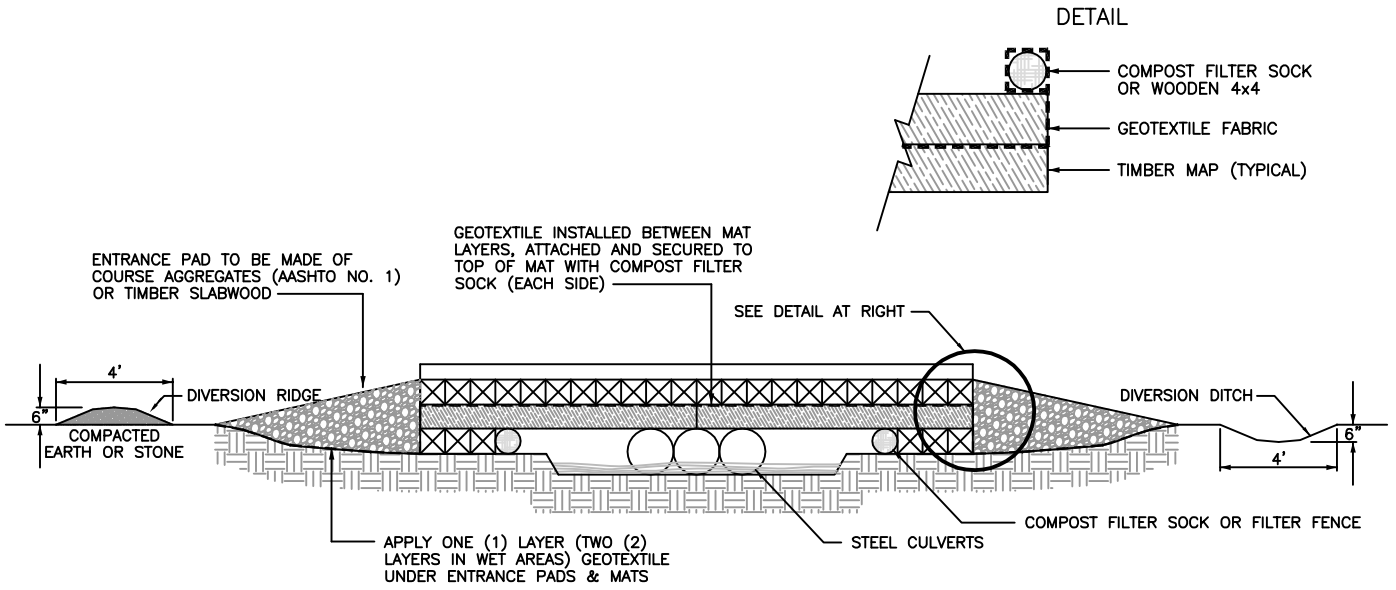
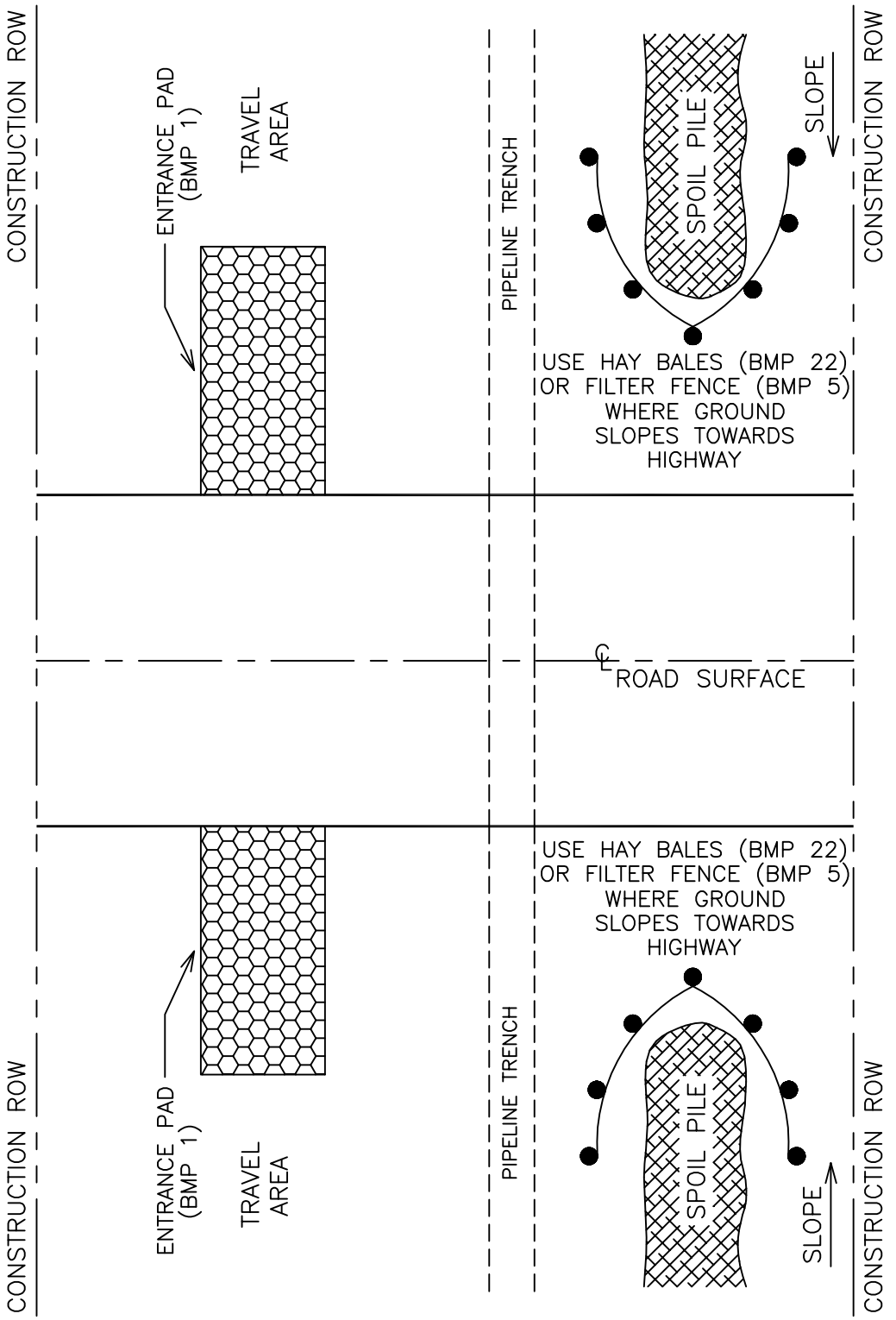




1. ONLY CLEARING EQUIPMENT AND EQUIPMENT NECESSARY FOR INSTALLATION OF EQUIPMENT BRIDGES MAY CROSS WATERBODIES PRIOR TO BRIDGE INSTALLATION. LIMIT THE CROSSING OF EACH WATERBODY TO ONE PER PIECE OF CLEARING EQUIPMENT.
2. INSTALL FILTER FENCE ACROSS THE DISTURBED AREA OF THE R.O.W.
3. APPLY GEOTEXTILE UNDER ENTRANCE PADS AND MATS. ATTACH GEOTEXTILE TO MATS.
4. EXCESS MUD IS TO BE REMOVED FROM THE ENTRANCE PADS AND MATS DURING CONSTRUCTION.
5. DURING FINAL CLEAN UP WHEN MATS, CULVERT, CLEAN ROCK FILL, ETC. ARE REMOVED, INSTALL FILTER FENCE ACROSS THE ENTIRE R.O.W. ON BOTH SIDES OF STREAM.
6. LOCATE ALL SPOIL A MINIMUM OF 10 FEET FROM THE WATERS EDGE.
7. INSTALL TEMPORARY EROSION AND SEDIMENT CONTROLS PRIOR TO EARTH DISTURBANCE.
8. WOODEN SIDE BOARDS WILL BE USED TO KEEP SEDIMENT FROM FALLING INTO STREAM.
9. GEOTEXTILE FABRIC WILL BE PLACED ABOVE FIRST LAYER OF MATS TO PREVENT SEDIMENT FROM FALLING INTO THE STREAM.

national Fuel	DRAWN BY: L. A. PHILLIPS FILENAME: NFGSC\BMP09B.dwg DATE: 08/24/2016	TEMPORARY EQUIPMENT TIMBER MAT STREAM CROSSING	DRAWING NUMBER: 9B



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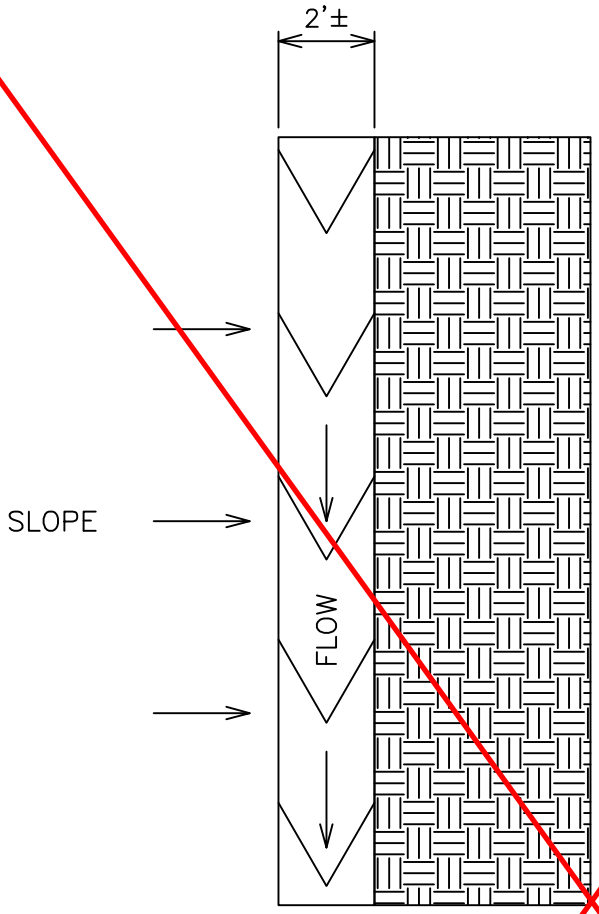
REVIEWED: 01/2014

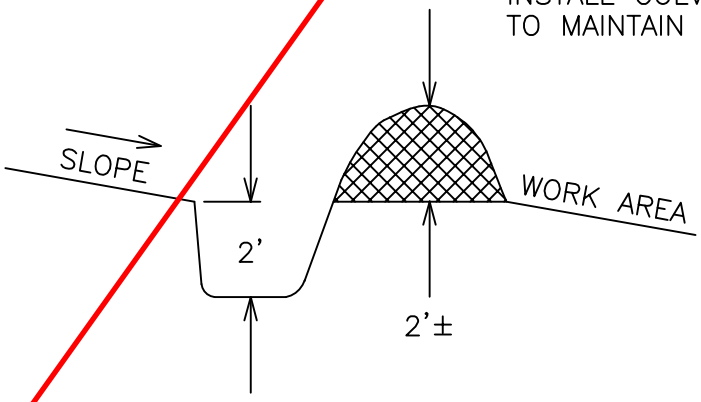
REFER TO E&S DETAILS,
FIGURE 31A



DIVERSION DITCHES ARE INTENDED TO COLLECT AND CONVEY CLEAN SURFACE WATER, SPRINGS, ETC. AWAY FROM THE PROJECT AREA.

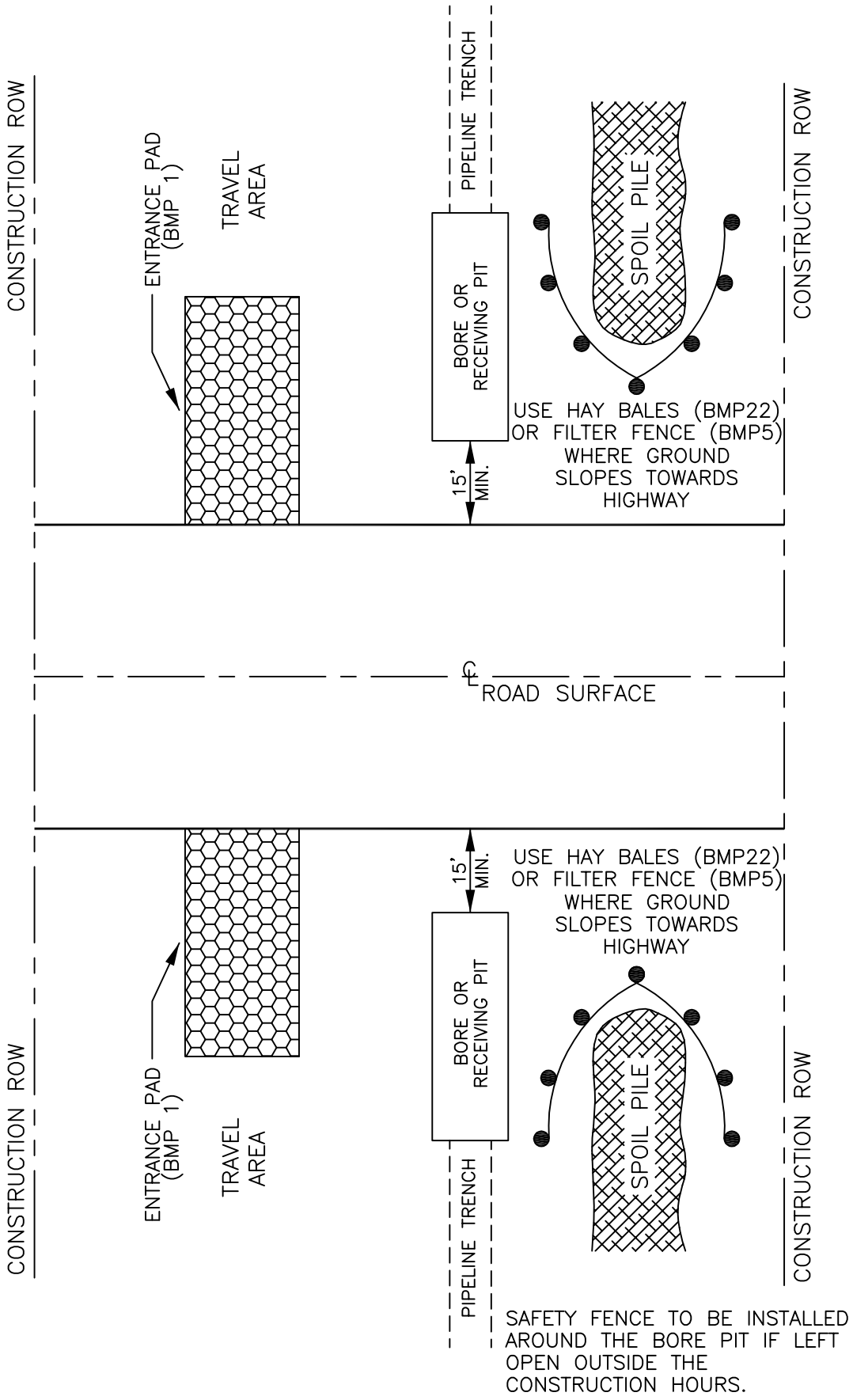
WORK AREA

OUTLET TO UNDISTURBED AREAS OR INSTALL CULVERT ACROSS THE R.O.W. TO MAINTAIN CLEAN WATER.



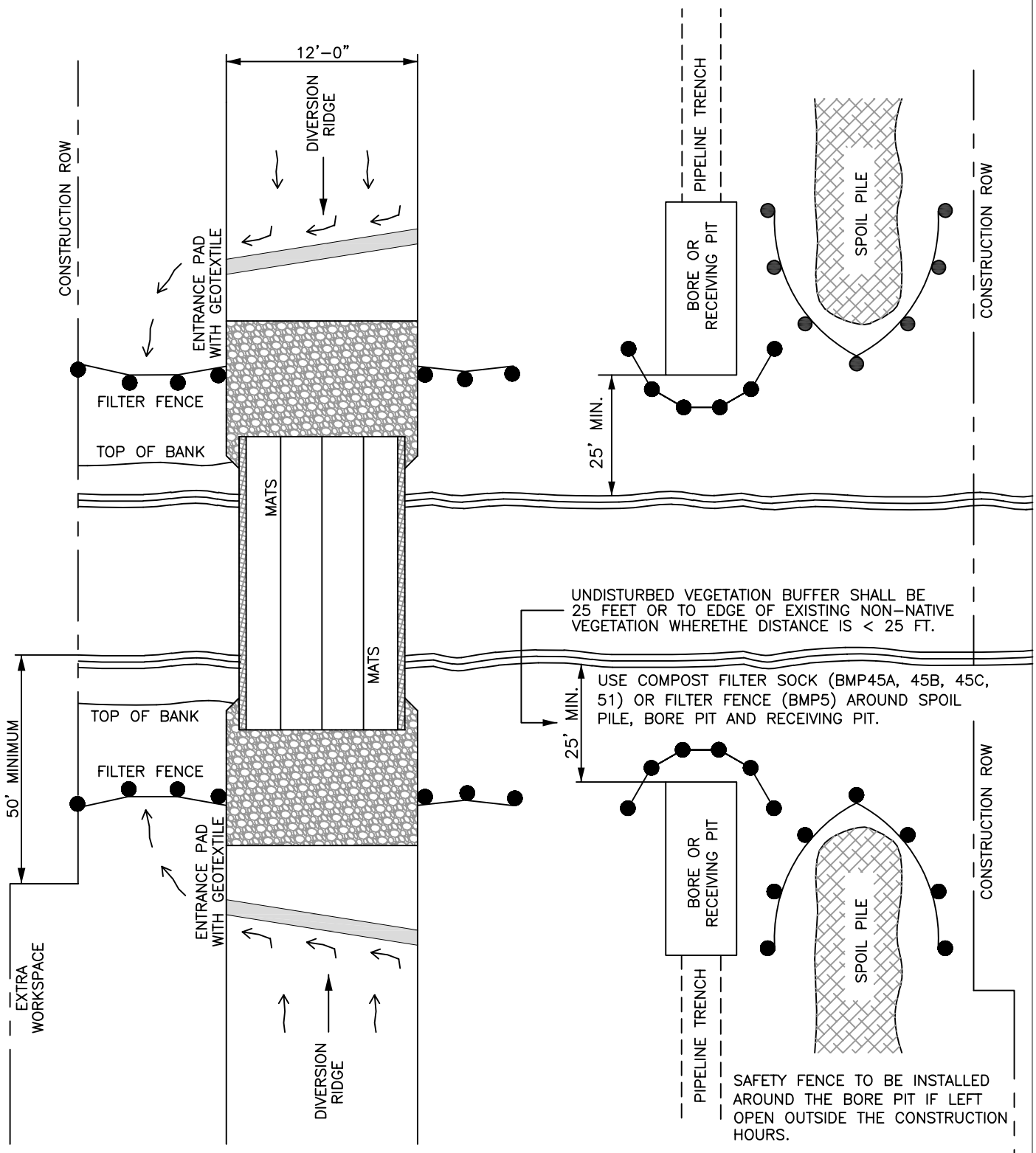
National Fuel SUPPLY CORPORATION	ENGINEERING DEPT. 1100 STATE STREET P.O. BOX 2081 ERIE, PA. 16512 (814) 871-8676	DRAWN BY: L. A. PHILLIPS FILENAME: NFGSC\BMP11.dwg DATE: 01/08/1997	DIVERSION DITCH	DRAWING NUMBER: 11

REVIEWED: 01/2014



national fuel SUPPLY CORPORATION	ENGINEERING DEPT. 1100 STATE STREET P.O. BOX 2081 ERIE, PA. 16512 (814) 871-8676	DRAWN BY: L. A. PHILLIPS FILENAME: EPC\BMP12.dwg LAST REVISION DATE: 01/17/2014	ROAD CROSSING (BORE)	DRAWING NUMBER: 12

REVIEWED: 01/2014



1. UTILIZE DEWATERING FILTER BAG (BMP28) WHEN PUMPING WATER FROM TRENCH.
2. DISPOSE OF DRILLING MUD AT AN APPROVED DISPOSAL FACILITY.

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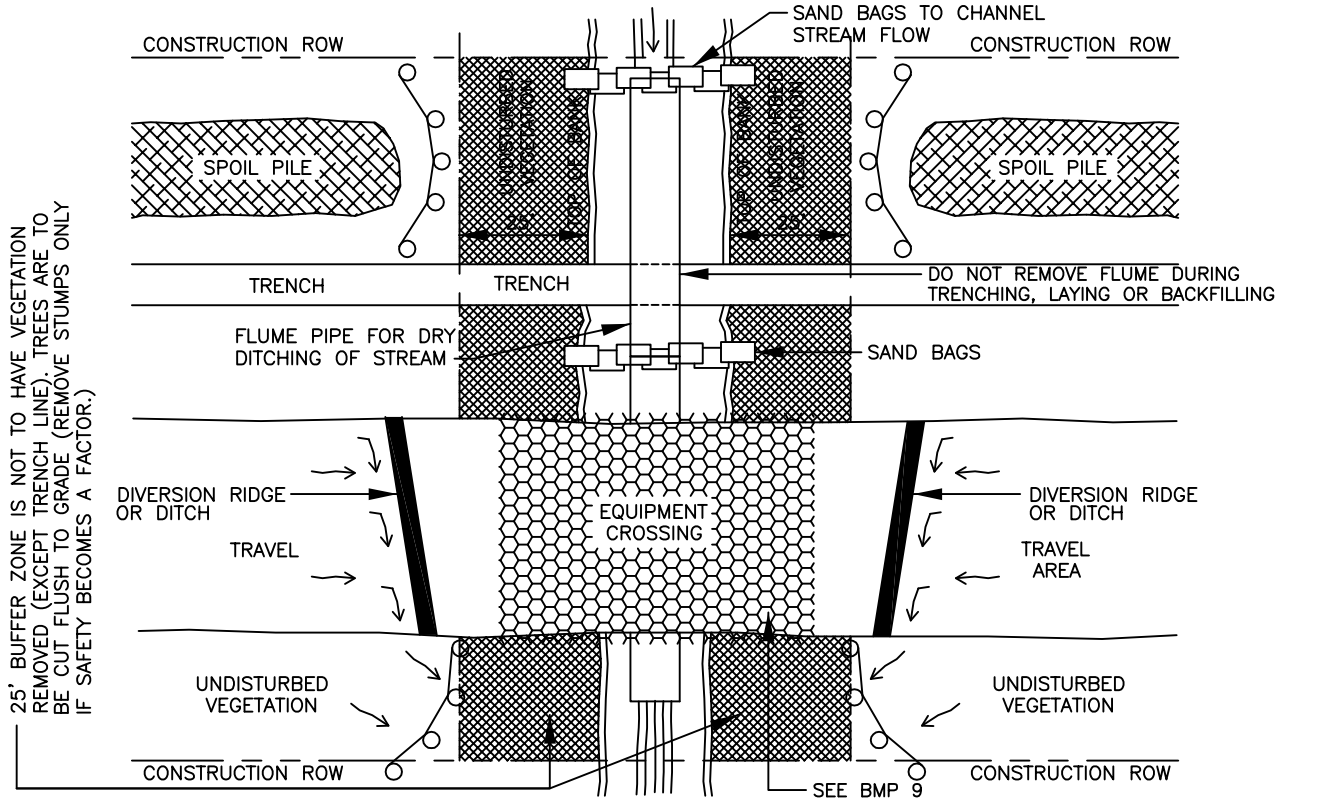
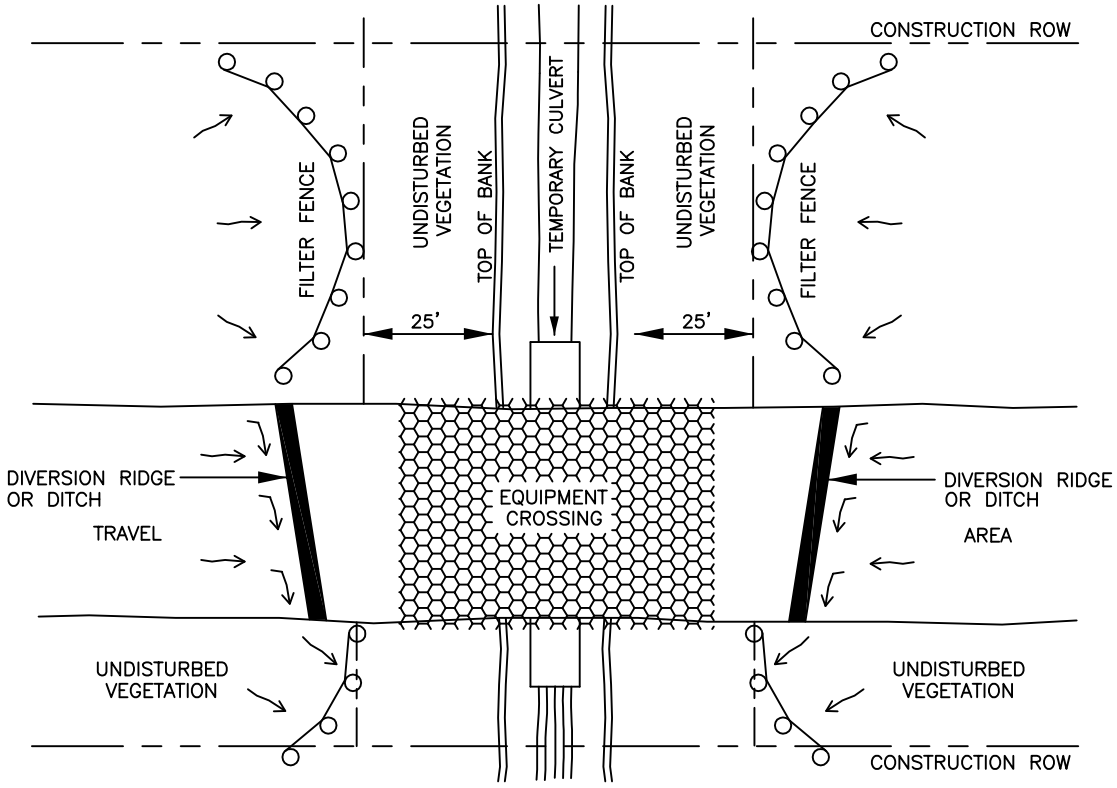


SPOIL REMOVED DURING TRENCH CONSTRUCTION OF CROSSING MAY BE PLACED 10 FT BACK FROM ORDINARY HIGH WATER MARK PROVIDED E&S CONTROLS INSTALLED.

UNDISTURBED VEGETATION BUFFER SHALL BE 25 FT OR TO EDGE OF EXISTING NON-NATIVE VEGETATION WHERE THAT DISTANCE IS <25 FT.

DURING CONSTRUCTION



AFTER CONSTRUCTION

NOTE:
DRY-DITCH CROSSING METHODS CAN BE USED FOR WATERBODIES UP TO 30'.

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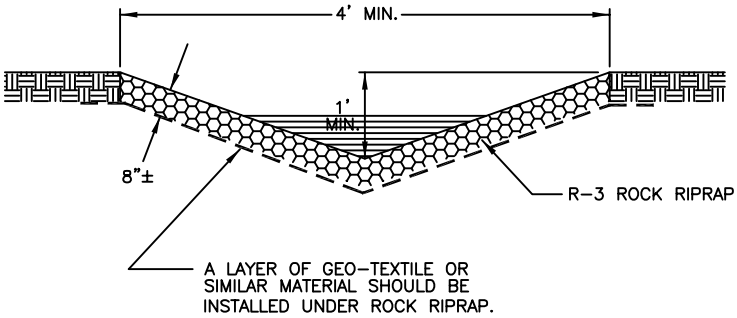
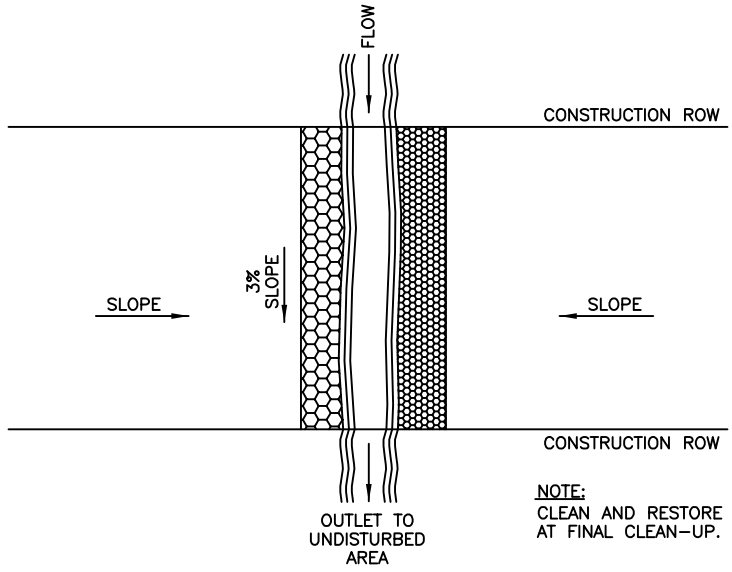
REVIEWED: 01/2014



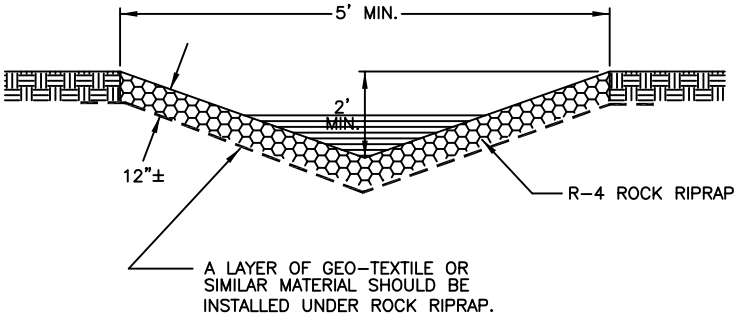
ROCK SIZE (INCHES)

MAX. 6"
AVG. 3"
MIN. 2"

VELOCITY = 6.5'/SEC.
Q = 13 CFS



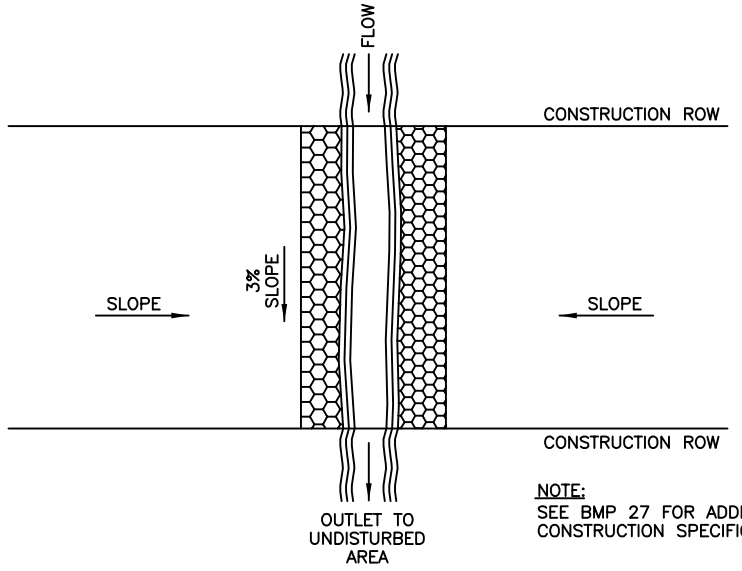
NOTE:
CLEAN AND RESTORE DITCH AT FINAL CLEAN-UP.



ROCK SIZE (INCHES)

MAX. 12"
AVG. 6"
MIN. 3"

VELOCITY = 8.7'/SEC.
Q = 43 CFS



NOTE:
SEE BMP 27 FOR ADDITIONAL DETAILS, CONSTRUCTION SPECIFICATIONS AND MAINTENANCE.

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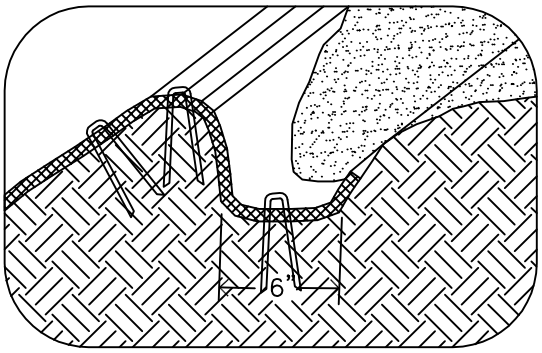
(814) 871-8676

DRAWN BY: L. A. PHILLIPS
FILENAME: EPC\BMP14.dwg
LAST REVISION DATE: 06/27/2007

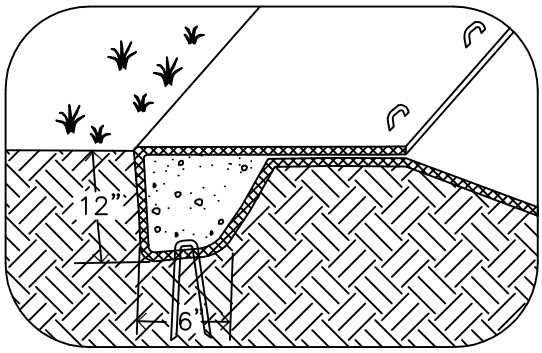
RUN OFF DITCH

DRAWING NUMBER: 14

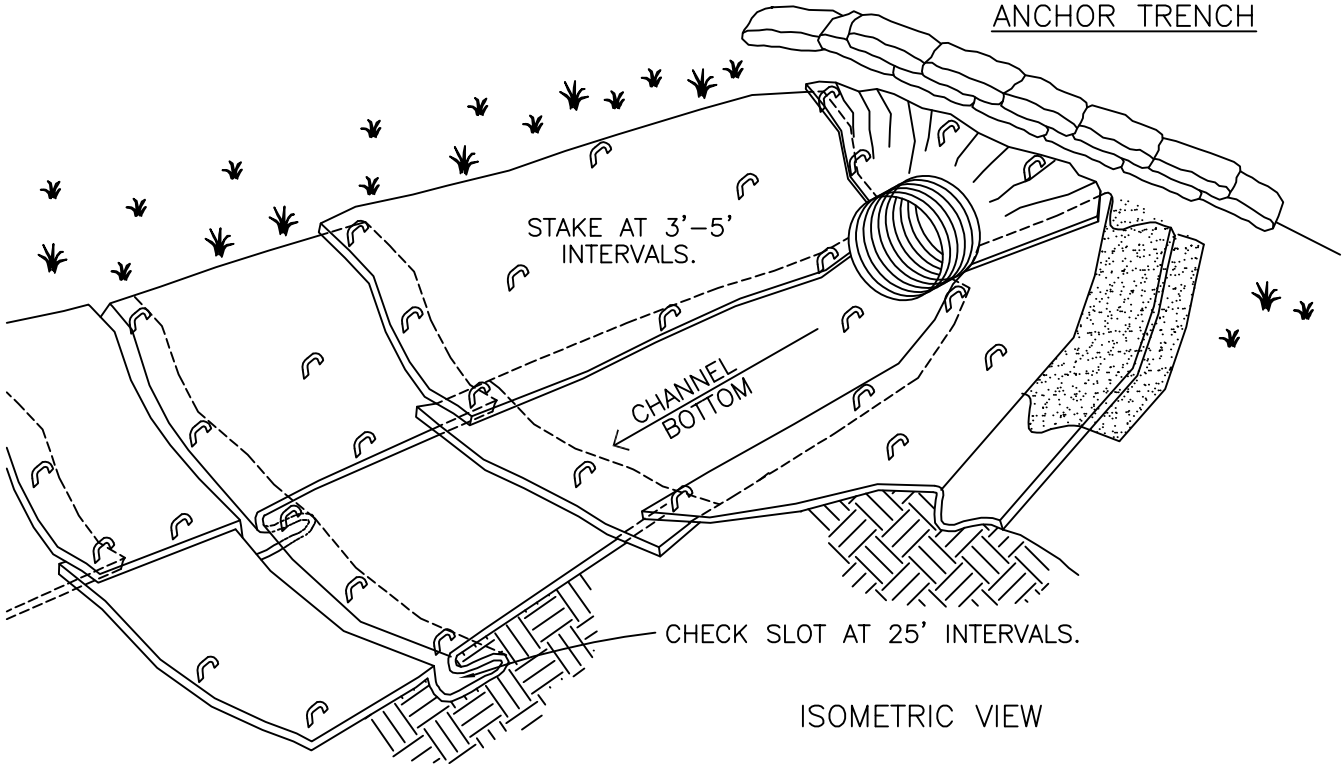
REVIEWED: 01/2014



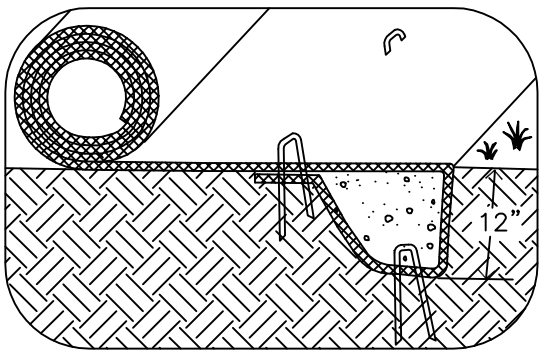
LONGITUDINAL ANCHOR TRENCH



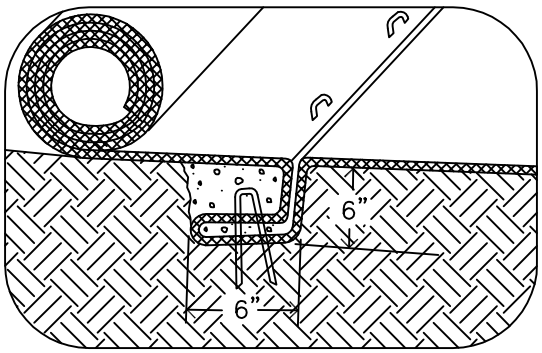
TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH



ISOMETRIC VIEW



INITIAL CHANNEL ANCHOR TRENCH



INTERMITTENT CHECK SLOT

NOTES:

1. CHECK SLOTS TO BE CONSTRUCTED PER MANUFACTURERS SPECIFICATIONS.
2. STAKING OR STAPLING LAYOUT PER MANUFACTURERS SPECIFICATIONS.
3. SEE DRAWING NO. 15A FOR INSTALLATION SPECIFICATIONS.

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national Fuel SUPPLY CORPORATION	ENGINEERING DEPT. 1100 STATE STREET P.O. BOX 2081 ERIE, PA. 16512 (814) 871–8676	MODIFIED BY: L. A. PHILLIPS FILENAME: NFGSC\BMP15.dwg DATE: 01/09/1997	EROSION BLANKETS CHANNEL INSTALLATION	DRAWING NUMBER: 15

REVIEWED - 01/2014

CONSTRUCTION SPECIFICATIONS:

SITE PREPARATION

1. PROPER SITE PREPARATION IS ESSENTIAL TO ENSURE COMPLETE CONTACT OF THE PROTECTION MATTING WITH THE SOIL.
2. GRADE AND SHAPE AREA OF INSTALLATION.
3. REMOVE ALL ROCKS, CLODS, VEGETATIVE OR OTHER OBSTRUCTIONS SO THAT THE INSTALLED BLANKETS, OR MATS WILL HAVE DIRECT CONTACT WITH THE SOIL.
4. PREPARE SEEDBED BY LOOSENING 2"–3" OF TOPSOIL ABOVE FINAL GRADE.
5. INCORPORATE AMENDMENTS, SUCH AS LIME AND FERTILIZER, INTO SOIL ACCORDING TO SOIL TEST AND THE SEEDING PLAN.

SEEDING

SEED AREA BEFORE BLANKET INSTALLATION FOR EROSION CONTROL AND RE–VEGETATION OR SEED AFTER MAT INSTALLATION FOR TURF REINFORCEMENT. WHEN SEEDING PRIOR TO BLANKET INSTALLATION, ALL CHECK SLOTS AND OTHER AREAS DISTURBED DURING INSTALLATION MUST BE RESEEDED. WHERE SOIL FILLING IS SPECIFIED, SEED THE MATTING AND THE ENTIRE DISTURBED AREA AFTER INSTALLATION AND PRIOR TO FILLING THE MAT WITH SOIL.

ANCHORING

U–SHAPED WIRE STAPLES, METAL GEOTEXTILE STAKE PINS OR TRIANGULAR WOODEN STAKES CAN BE USED TO ANCHOR MATS TO THE GROUND SURFACE. WIRE STAPLES SHOULD BE A MINIMUM OF 8 GAUGE. METAL STAKE PINS SHOULD BE 3/16" DIAMETER STEEL WITH A 1 1/2" STEEL WASHER AT THE HEAD OF THE PIN. WIRE STAPLES AND METAL STAKE SHOULD BE DRIVEN FLUSH TO THE SOIL SURFACE. WOODEN STAKES SHOULD BE 3" X 1 1/2" TRIANGULAR WOODEN SURVEY STAKES. TWO INCHES OF WOOD STAKING SHOULD REMAIN ABOVE THE SOIL SURFACE. ALL ANCHORS SHOULD BE 8"–18" LONG AND HAVE SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT. LONGER ANCHORS MAY BE REQUIRED FOR LOOSE SOILS.

INSTALLATION IN CHANNELS

1. DIG INITIAL ANCHOR TRENCH 12" DEEP AND 6" WIDE ACROSS THE CHANNEL AT THE LOWER END OF THE PROJECT AREA.
2. EXCAVATE INTERMITTENT CHECK SLOTS, 6" DEEP AND 6" WIDE ACROSS THE CHANNEL AT 25' TO 30' INTERVALS ALONG THE CHANNEL.
3. CUT LONGITUDINAL CHANNEL ANCHOR SLOTS 4" DEEP AND 4" WIDE ALONG EACH SIDE OF THE INSTALLATION TO BURY EDGES OF MATTING, WHENEVER POSSIBLE EXTEND MATTING 2 – 3 ABOVE THE CREST OF CHANNEL SIDE SLOPES.
4. BEGINNING AT THE DOWNSTREAM END AND IN THE CENTER OF THE CHANNEL, PLACE THE INITIAL END OF THE FIRST ROLL IN THE ANCHOR TRENCH AND SECURE WITH FASTENING DEVICES AT 1' INTERVALS. NOTE: MATTING WILL INITIALLY BE UPSIDE DOWN IN ANCHOR TRENCH.
5. IN SAME MANNER, POSITION ADJACENT ROLLS IN ANCHOR TRENCH, OVERLAPPING THE PRECEDING ROLL A MINIMUM OF 3".
6. SECURE THESE INITIAL ENDS OF MATS WITH ANCHORS AT 1' INTERVALS, BACKFILL AND COMPACT SOIL.
7. UNROLL CENTER STRIP OF MATTING UPSTREAM. STOP AT NEXT CHECK SLOT OR TERMINAL ANCHOR TRENCH.
8. UNROLL ADJACENT MATS UPSTREAM IN SIMILAR FASHION, MAINTAINING 3" OVERLAP.
9. FOLD AND SECURE ALL ROLLS OF MATTING SNUGLY INTO ALL TRANSVERSE CHECK SLOTS. LAY MAT IN THE BOTTOM OF THE SLOT THEN FOLD BACK AGAINST ITSELF. ANCHOR THROUGH BOTH LAYERS OF MAT AT 1 INTERVALS THEN BACKFILL AND COMPACT SOIL. CONTINUE ROLLING ALL MAT WIDTHS UPSTREAM TO THE NEXT CHECK SLOT OR TERMINAL ANCHOR TRENCH.
10. ALTERNATE METHOD FOR NONCRITICAL INSTALLATIONS: PLACE TWO ROWS OF ANCHORS ON 6 CENTERS AT 25' TO 30' INTERVALS IN LIEU OF EXCAVATED CHECK SLOTS.
11. SHINGLE–LAP SPLICED ENDS BY A MINIMUM OF 1' WITH UPSTREAM MAT ON TOP TO PREVENT UPLIFTING BY WATER OR BEGIN NEW ROLLS IN A CHECK SLOT. ANCHOR OVERLAPPED AREA BY PLACING TWO ROWS OF ANCHORS, 1' APART ON 1' INTERVALS.
12. PLACE EDGES OF OUTSIDE MATS IN PREVIOUSLY EXCAVATED LONGITUDINAL SLOTS, ANCHOR USING PRESCRIBED STAPLE PATTERN, BACKFILL AND COMPACT SOIL.
13. ANCHOR, FILL AND COMPACT UPSTREAM END OF MAT IN A 12" X 6" TERMINAL TRENCH.
14. SECURE MAT TO GROUND SURFACE USING U–SHAPED WIRE STAPLES GEOTEXTILE PINS OR WOODEN STAKES.
15. SEED AND FILL TURF REINFORCEMENT MATTING WITH SOIL, IF SPECIFIED.

SOIL FILLING IF SPECIFIED FOR TURF REINFORCEMENT.

1. AFTER SEEDING, SPREAD AND LIGHTLY RAKE 1/2" – 3/4" OF FINE TOPSOIL INTO THE MAT APERTURES TO COMPLETELY FILL MAT THICKNESS.
2. USE BACKSIDE OF RAKE OR OTHER FLAT IMPLEMENT.
3. SPREAD TOPSOIL USING LIGHTWEIGHT LOADER, BACKHOE, OR OTHER POWER EQUIPMENT. AVOID SHARP TURNS WITH EQUIPMENT.
4. DO NOT DRIVE TRACKED OR HEAVY EQUIPMENT OVER MAT.
5. AVOID ANY TRAFFIC OVER MATTING IF LOOSE OR WET SOIL CONDITIONS EXIST.
6. USE SHOVELS, RAKES OR BROOMS FOR FINE GRADING AND TOUCH UP.
7. SMOOTH OUT SOIL FILLING JUST EXPOSING TOP NETTING OF MATRIX.

INSPECTION AND MAINTENANCE

1. ALL BLANKET AND MATS SHOULD BE INSPECTED PERIODICALLY FOLLOWING INSTALLATION.
2. INSPECT INSTALLATION AFTER SIGNIFICANT RAINSTORMS TO CHECK FOR EROSION AND UNDERMINING. ANY FAILURE SHOULD BE REPAIRED IMMEDIATELY.
3. IF WASHOUT OR BREAKAGE OCCURS, RE–INSTALL THE MATERIAL AFTER REPAIRING THE DAMAGE TO THE SLOPE OR DRAINAGEWAY.

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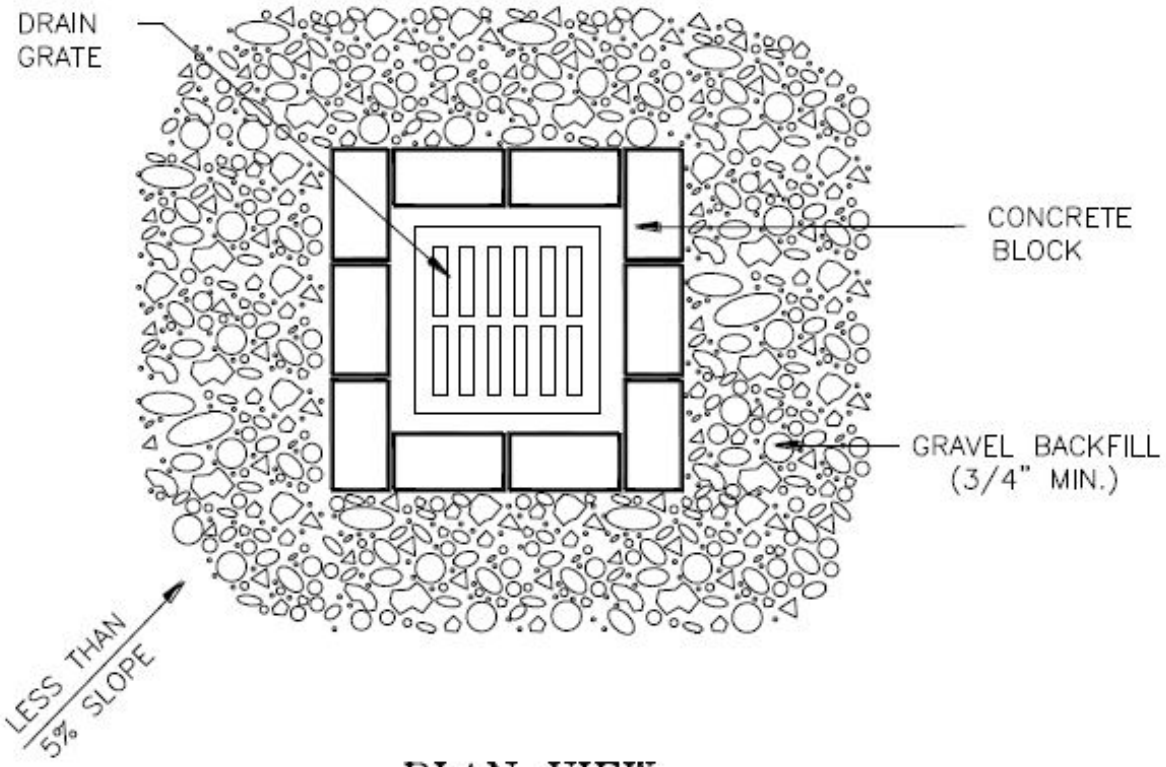
ENGINEERING DEPT.
1100 STATE STREET
P.O. BOX 2081
ERIE, PA. 16512
(814) 871–8676

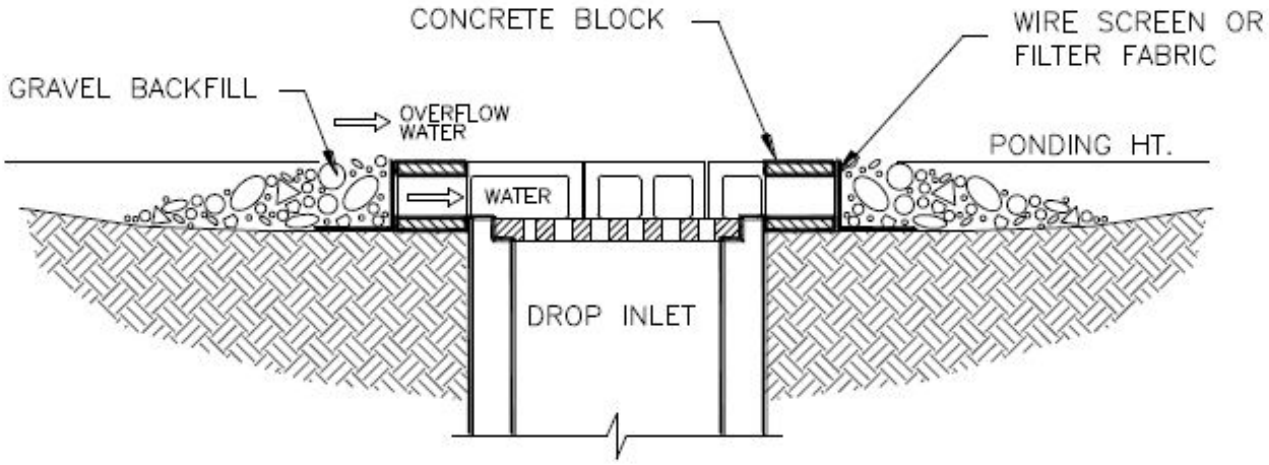
MODIFIED BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP15A.dwg
DATE: 01/09/1997

SPECIFICATIONS EROSION BLANKETS CHANNEL INSTALLATION

DRAWING NUMBER: 15A



PLAN VIEW



ELEVATION VIEW

NOTES:

1. DROP INLET SEDIMANT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BY-PASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

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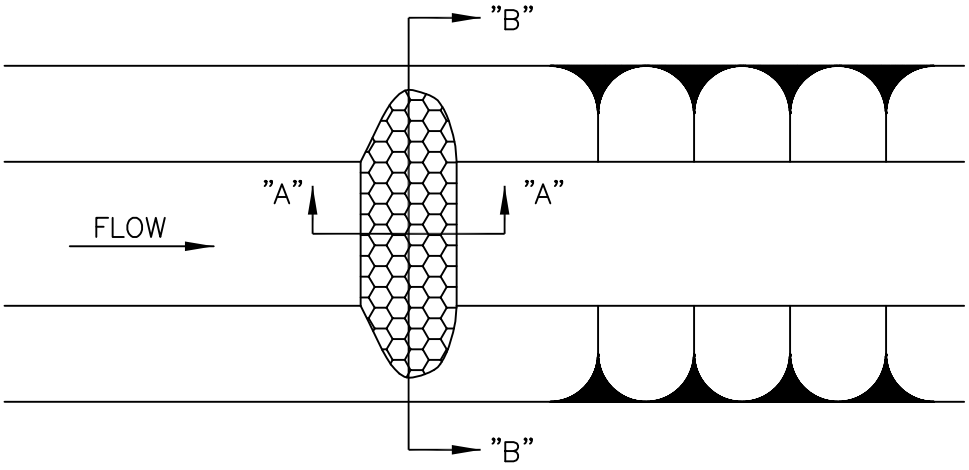
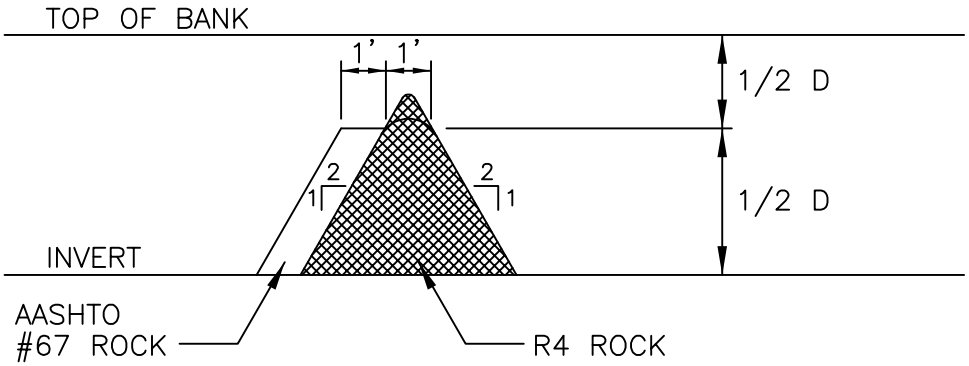
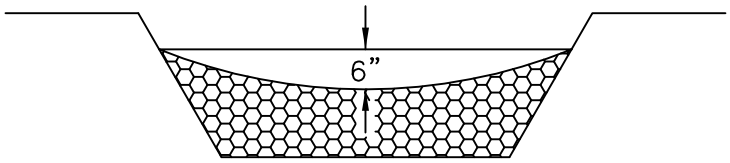
REVIEWED: 03/2017





D=DEPTH OF WATER
AT CHANNEL CAPACITY

SECTION "A–A"



SECTION "B–B"

1. ROCK FILTERS WILL BE CONSTRUCTED WITH AASHTO NUMBER 67 AND R–4 ROCK AS SPECIFIED IN SECTIONS 703.2 AND 850.2 OF PENNDOT'S PUBLICATION 408.
2. FREE STANDING ROCK CHANNEL FILTERS WILL BE CONSTRUCTED TO THE DIMENSIONS SHOWN ABOVE.
3. MAINTENANCE: ROCK FILTERS WILL BE REMOVED WHEN CLOGGED WITH SEDIMENTS. MATERIALS MUST BE WASHED COMPLETELY FREE OF ALL FOREIGN MATERIALS OR NEW ROCK USED TO REBUILD THE FILTER.

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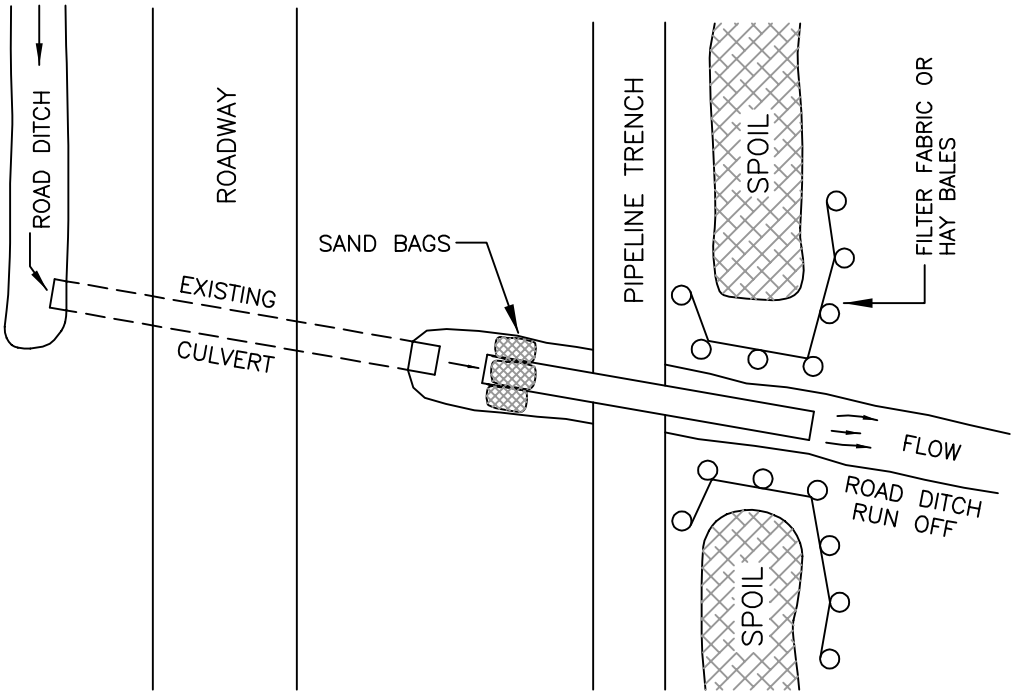

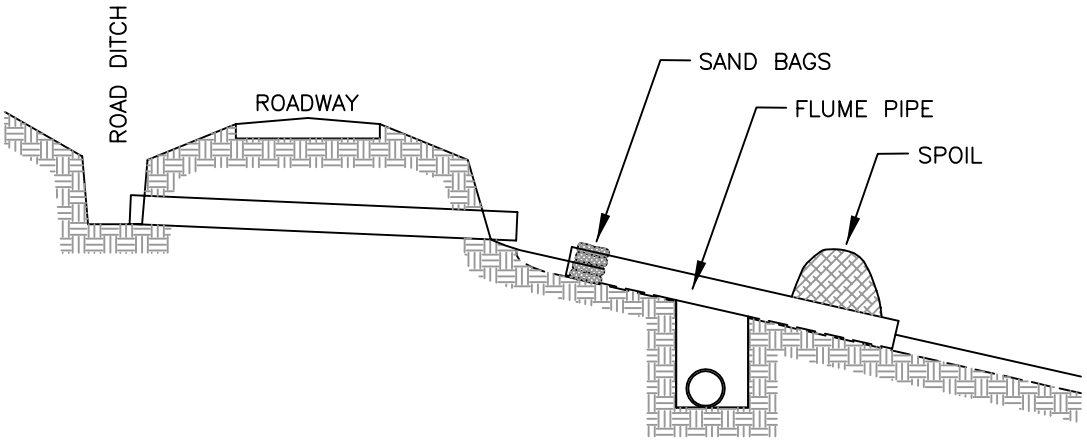

NOTES:

1. INSTALL TEMPORARY CULVERT ACROSS PIPELINE TRENCH AT ROAD CULVERT LOCATIONS WHERE PIPELINE TRENCH IS LOCATED BELOW ROAD SURFACE. AN 8" MINIMUM DIAMETER CULVERT IS TO BE INSTALLED.

2. REMOVE CULVERT WHEN BACK FILLING AND RESTORE ROAD DITCH RUN OFF TO ORIGINAL CONDITION.

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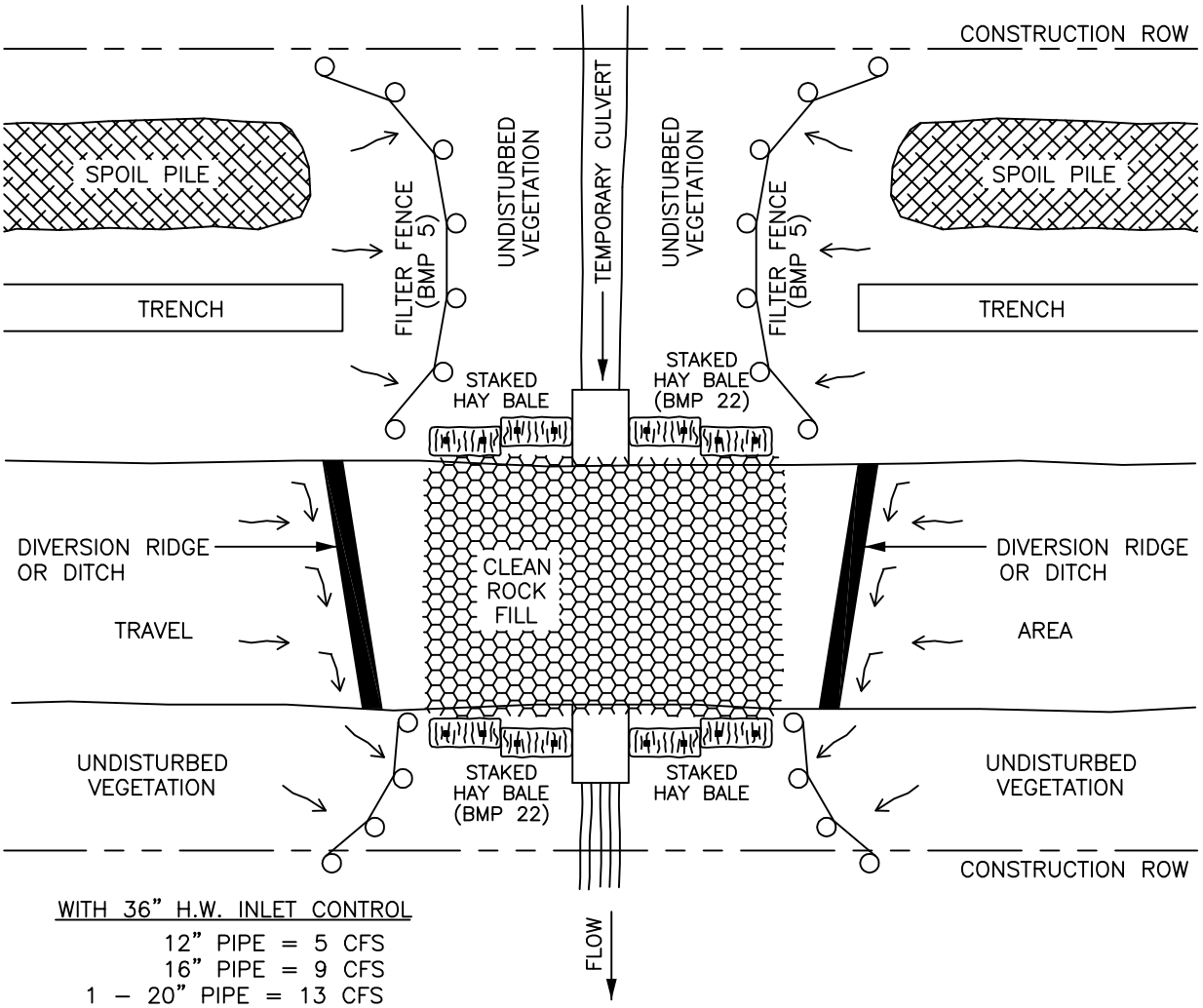
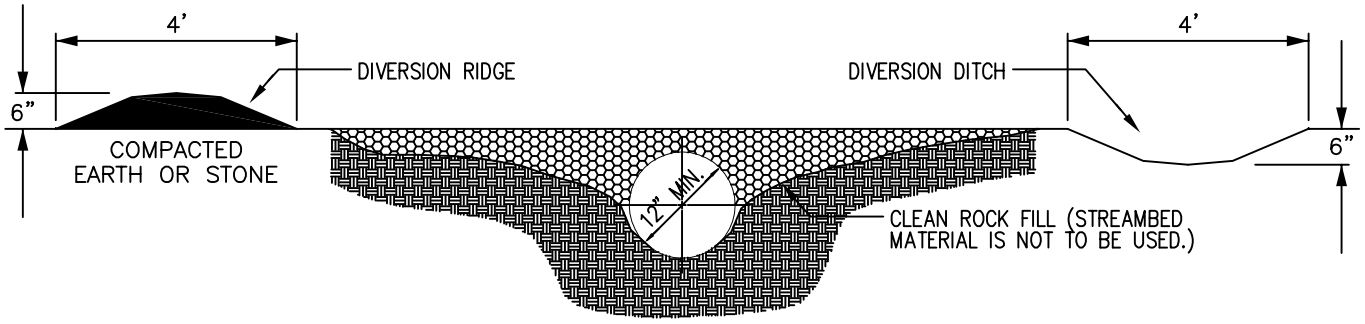
REVIEWED: 01/2014



WITH 36" H.W. INLET CONTROL

12" PIPE = 5 CFS
16" PIPE = 9 CFS
1 – 20" PIPE = 13 CFS
2 – 20" PIPE = 26 CFS
3 – 20" PIPE = 39 CFS



1. TEMPORARY CULVERT SHOULD EXTEND BEYOND TOE OF ROAD.
2. ROADWAY SHOULD BE DEPRESSED OVER CULVERT TO ALLOW FOR OVERFLOW.
3. CLEAN ROCK FILL SHALL BE USED TO GUARD AGAINST EROSION AND SEDIMENTATION. STREAMBED MATERIAL IS NOT TO BE USED.
4. INSTALL FILTER FENCE (BMP 5) ACROSS THE DISTURBED AREAS OF THE R.O.W.
5. INSTALL STAKED HAY BALES (BMP 22) ALONG TRAVEL AREA ON EACH SIDE OF CULVERT OPENING, TO CONTROL MUD FROM CONSTRUCTION TRAFFIC. THESE AREAS ARE TO BE CLEANED PERIODICALLY DURING CONSTRUCTION. **DO NOT INSTALL HAY BALES IN WATERWAY.**
6. DURING FINAL CLEAN UP WHEN CULVERT, CLEAN ROCK FILL, ETC. ARE REMOVED, INSTALL FILTER FENCE ACROSS THE ENTIRE R.O.W. ON BOTH SIDES OF STREAM.
7. LOCATE ALL SPOIL A MINIMUM OF 10 FEET FROM THE WATERS EDGE.

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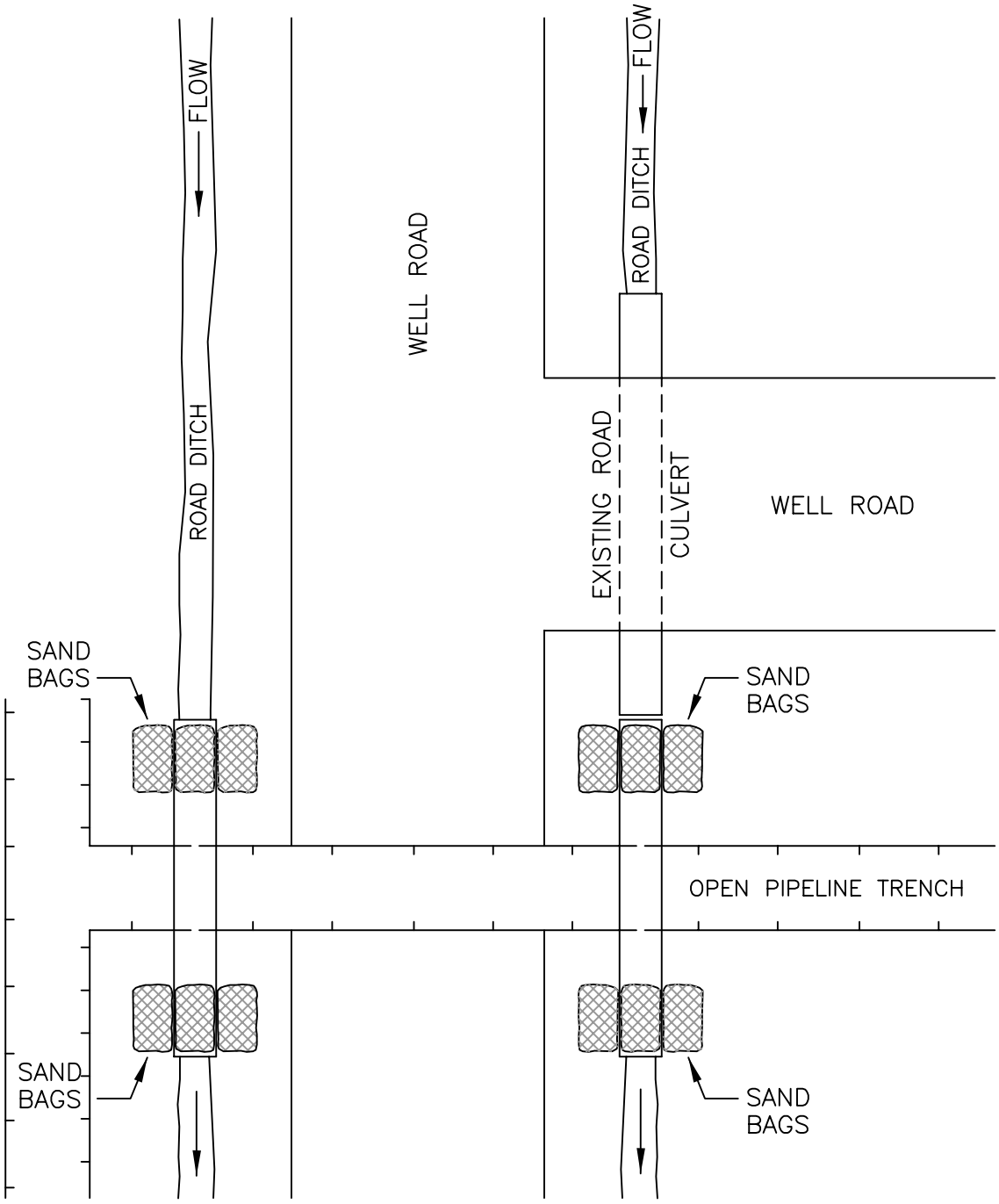
REVIEWED: 01/2014



NOTES:

1. INSTALL TEMPORARY CULVERT IN ROAD DITCH, ACROSS OPEN PIPELINE TRENCH. AN 8" MINIMUM DIAMETER CULVERT IS TO BE INSTALLED.

2. REMOVE CULVERT WHEN BACK FILLING AND RESTORE ROAD DITCH TO ORIGINAL CONDITION.

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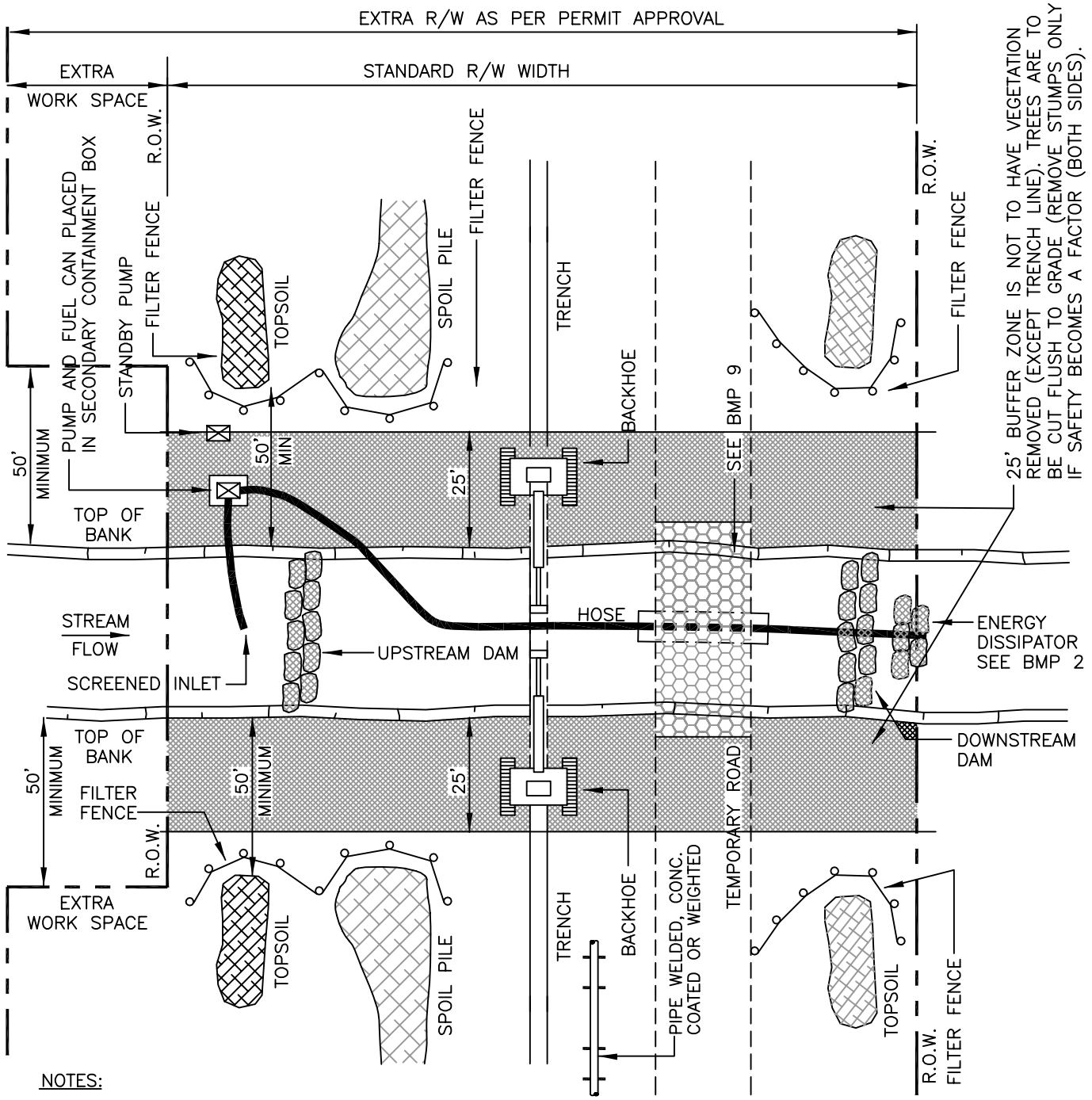
REVIEWED: 01/2014



NOTES:

1. USE DAM AND PUMP METHOD ON NARROW WATERCOURSES WITH LIMITED STREAM FLOW TO PREVENT SEDIMENTATION AND INTERRUPTION OF STREAM FLOW DURING CROSSING CONSTRUCTION. IF FISH PASSAGE IS A CONCERN, THIS METHOD IS NOT APPROPRIATE.
2. SCHEDULE CONSTRUCTION DURING LOW FLOW PERIOD.
3. SET UP PUMP AND HOSE AS SHOWN, OR USE OTHER PRACTICAL ALTERNATIVES. PUMP SHOULD HAVE TWICE THE PUMPING CAPACITY OF ANTICIPATED FLOW. HAVE STANDBY PUMP ON SITE.
4. INSTALL DAMS COMPOSED OF SANDBAGS OR CLEAN GRAVEL WITH PLASTIC LINER TO KEEP STREAM BED DRY.
5. EXCAVATE TRENCH AND LOWER IN PIPE UNDER HOSE. MOVE HOSE AS REQUIRED OR DISCONNECT IF TEMPORARY FLOW BLOCKAGE IS ACCEPTABLE. BACKFILL TRENCH.
6. DISMANTLE DOWNSTREAM DAM, THEN UPSTREAM DAM. KEEP PUMP RUNNING TO MAINTAIN FLOW.
7. MONITOR DAM AND PUMP FOR PROPER OPERATION THROUGHOUT THE CROSSING INSTALLATION.
8. SPOIL REMOVED DURING TRENCH CONSTRUCTION OF CROSSING MAY BE PLACED 10 FT BACK FROM ORDINARY HIGH WATER MARK PROVIDED E&S CONTROLS ARE INSTALLED.
9. UNDISTURBED VEGETATION BUFFER SHALL BE 25 FT OR TO EDGE OF EXISTING NON–NATIVE VEGETATION WHERE THAT DISTANCE IS <25 FT.

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REVIEWED: 01/2014

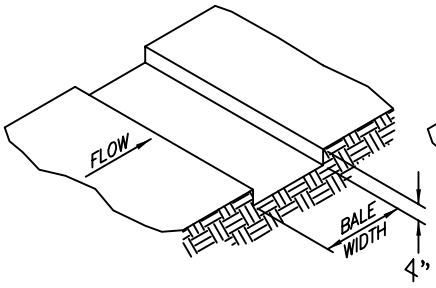
DESIGN RESTRICTIONS:

1. THE FORMATION OF CONCENTRATED FLOWS ON THE UPSLOPE DRAINAGE AREA IS NOT PERMITTED. IF CONCENTRATED FLOWS DO DEVELOP, DIRECT STABILIZATION MEASURES MUST BE EMPLOYED TO PREVENT SUCH CONDITIONS.
2. STRAW BALE BARRIERS MAY NOT BE PLACED IN ANY AREA OF CONCENTRATED FLOWS SUCH AS STREAMS, CHANNELS, DITCHES, SWALES, ETC.
3. STRAW BALE BARRIERS WILL NOT BE USED IN AREAS WHERE ROCK PREVENTS THE FULL AND UNIFORM DEPTH ANCHORING OF THE BARRIER.
4. STRAW BALE BARRIERS WILL BE REPLACED EVERY THREE (3) MONTHS OR MORE OFTEN IF THE BALES DETERIORATE AND BECOME INEFFECTIVE.

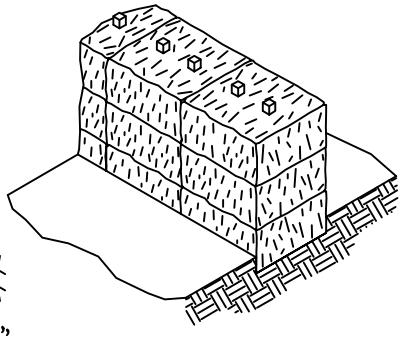
INSTALLATION:

1. THE ANCHORING TRENCH WILL BE CONSTRUCTED TO THE REQUIRED GRADE AND DEPTH AS SHOWN.
2. SUPPORT STAKES WILL BE DRIVEN TO THE REQUIRED DEPTH AS SHOWN.
3. THE ANCHORING TRENCH WILL BE BACKFILLED AND COMPACTED TO A DENSITY EQUAL TO UNDISTURBED SITE SOILS.

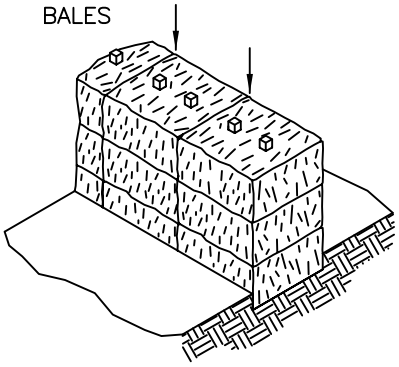
1. EXCAVATE ANCHORING TRENCH



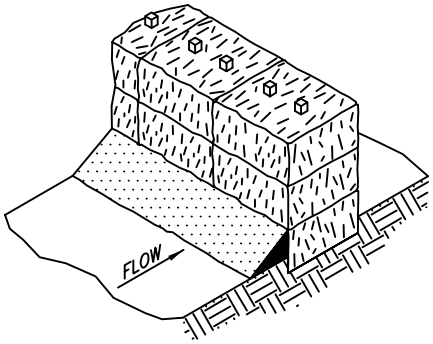
2. PLACE AND STAKE STRAW BALES



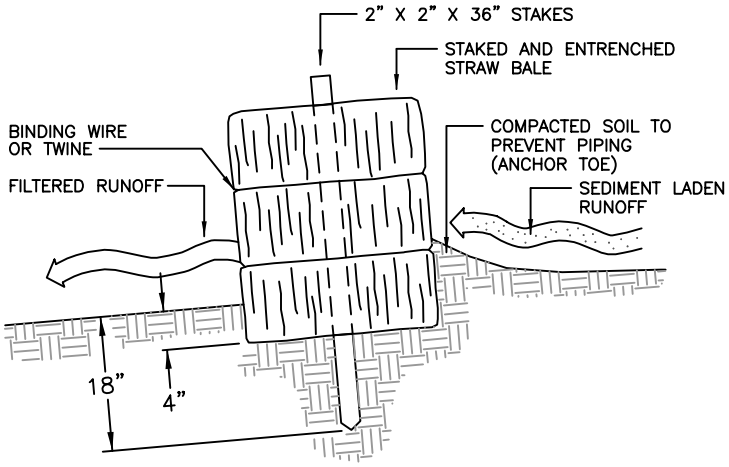
3. WEDGE LOOSE STRAW BETWEEN BALES



4. BACKFILL AND COMPACT THE EXCAVATED SOIL (ANCHOR TOE)



CROSS–SECTION OF STRAW BALE BARRIER



MAINTENANCE:

1. THE BARRIER WILL BE INSPECTED AFTER EVERY RUNOFF EVENT. DISLODGED BALES SHOULD BE RESET, STAKED AND BACKFILLED TO THE REQUIREMENTS LISTED UNDER "INSTALLATION". ALL CLOGGED OR INOPERATIVE BALES WILL BE REPLACED.
2. ACCUMULATED SEDIMENTS WILL BE REMOVED AS REQUIRED AND IN ALL CASES WHERE UNIFORM ACCUMULATIONS REACH 1/3 THE ABOVE GROUND HEIGHT OF THE BARRIER.
3. ALL UNDERCUTTING OR EROSION OF THE ANCHOR TOE WILL BE REPAIRED IMMEDIATELY WITH COMPACTED BACKFILL MATERIALS.

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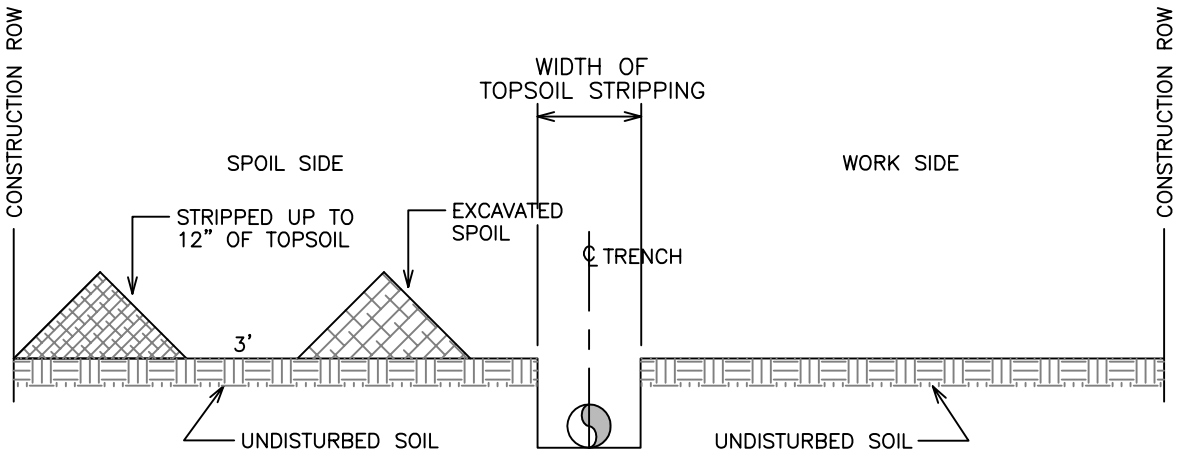
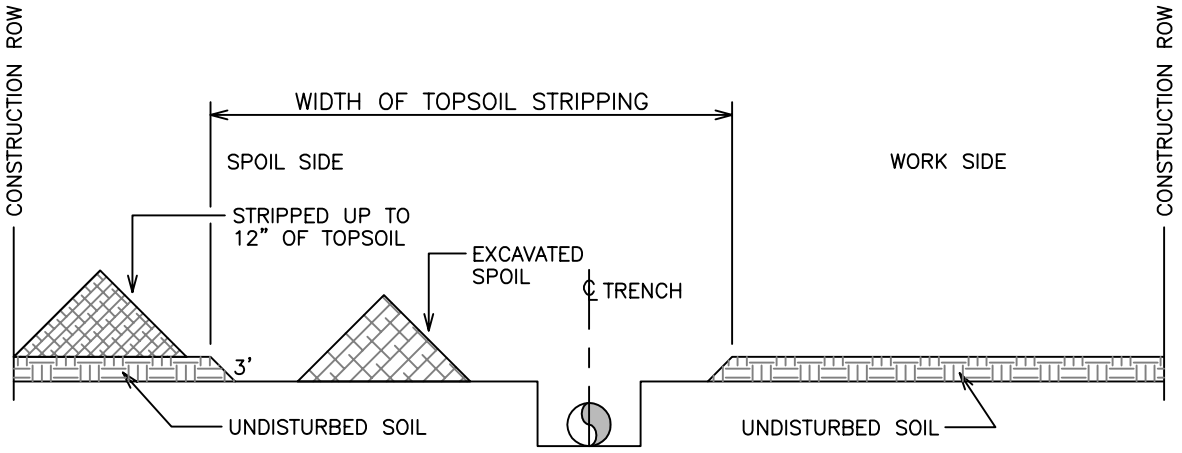


DITCH LINE TOPSOIL STRIPPING

ALSO USED IN NON-SATURATED WETLANDS



DITCH PLUS SPOIL SIDE SEGREGATION

NOTES:

1. ALLOW FOR A 3' SEPARATION BETWEEN THE TOPSOIL PILE AND THE TRENCH SPOIL.
2. RETURN TRENCH SPOIL TO TRENCH AND COMPACT. FEATHER OUT EXCESS SPOIL OVER STRIPPED AREA LEAVING A LOW CROWN CENTERED OVER THE TRENCH. ALLEVIATE COMPACTION OF SUBSOILS OVER THE STRIPPED AREA.
3. RETURN TOPSOIL EVENLY OVER THE STRIPPED AREA AFTER TRENCH HAS SUFFICIENTLY SETTLED OR HAS BEEN COMPACTED.
4. ALLEVIATE COMPACTION OF TOPSOIL OVER ENTIRE RIGHT-OF-WAY.
5. SEGREGATED TOPSOIL MAY NOT BE USED FOR PADDING THE PIPE.

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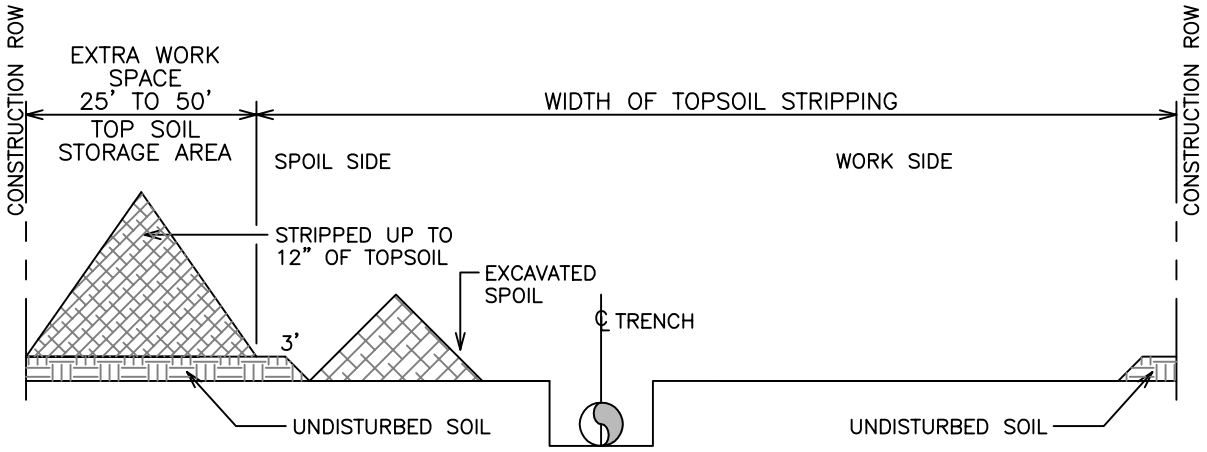
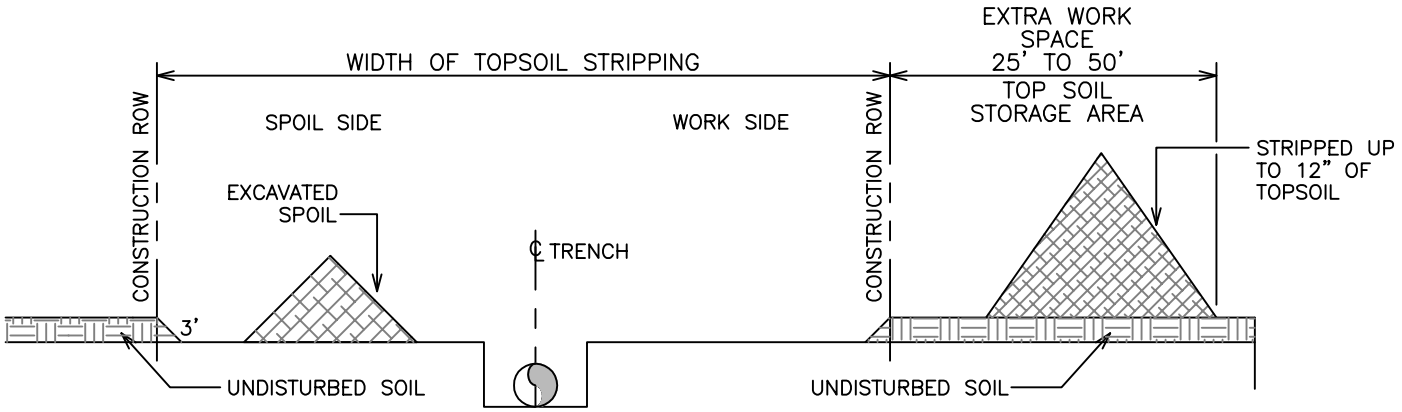
REVIEWED: 01/2014



FULL RIGHT-OF-WAY TOPSOIL STRIPPING - A



FULL RIGHT-OF-WAY TOPSOIL STRIPPING - B

NOTES:

1. ALLOW FOR A 3' SEPARATION BETWEEN THE TOPSOIL PILE AND THE TRENCH SPOIL.
2. RETURN TRENCH SPOIL TO TRENCH AND COMPACT. FEATHER OUT EXCESS SPOIL OVER STRIPPED AREA LEAVING A LOW CROWN CENTERED OVER THE TRENCH. ALLEVIATE COMPACTION OF SUBSOILS OVER THE STRIPPED AREA.
3. RETURN TOPSOIL EVENLY OVER THE STRIPPED AREA AFTER TRENCH HAS SUFFICIENTLY SETTLED OR HAS BEEN COMPACTED.
4. ALLEVIATE COMPACTION OF TOPSOIL OVER ENTIRE RIGHT-OF-WAY.
5. SEGREGATED TOPSOIL MAY NOT BE USED FOR PADDING THE PIPE.

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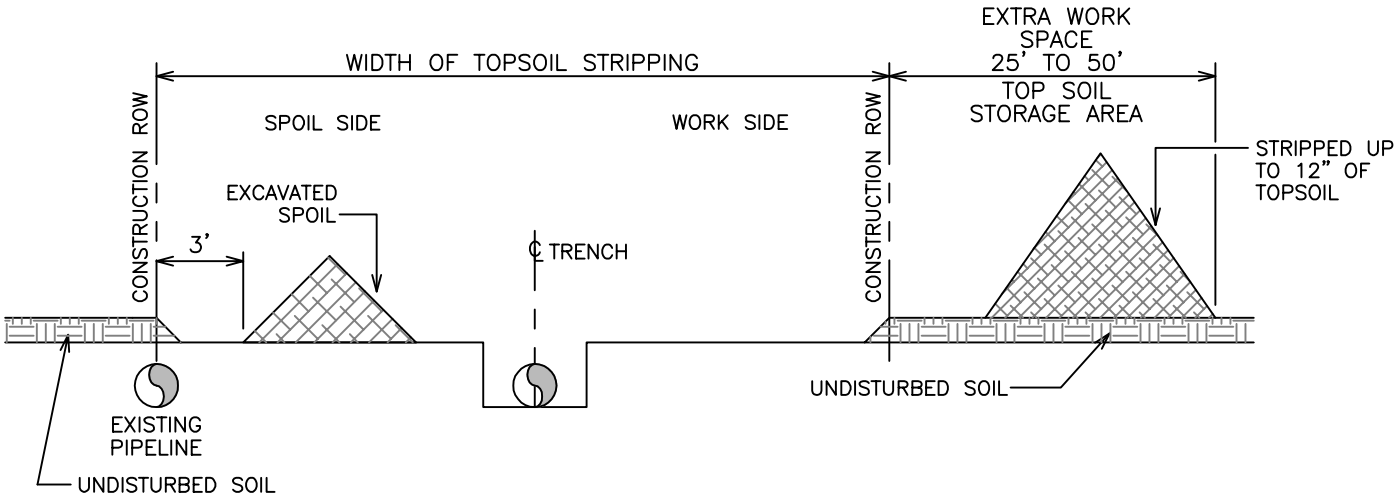
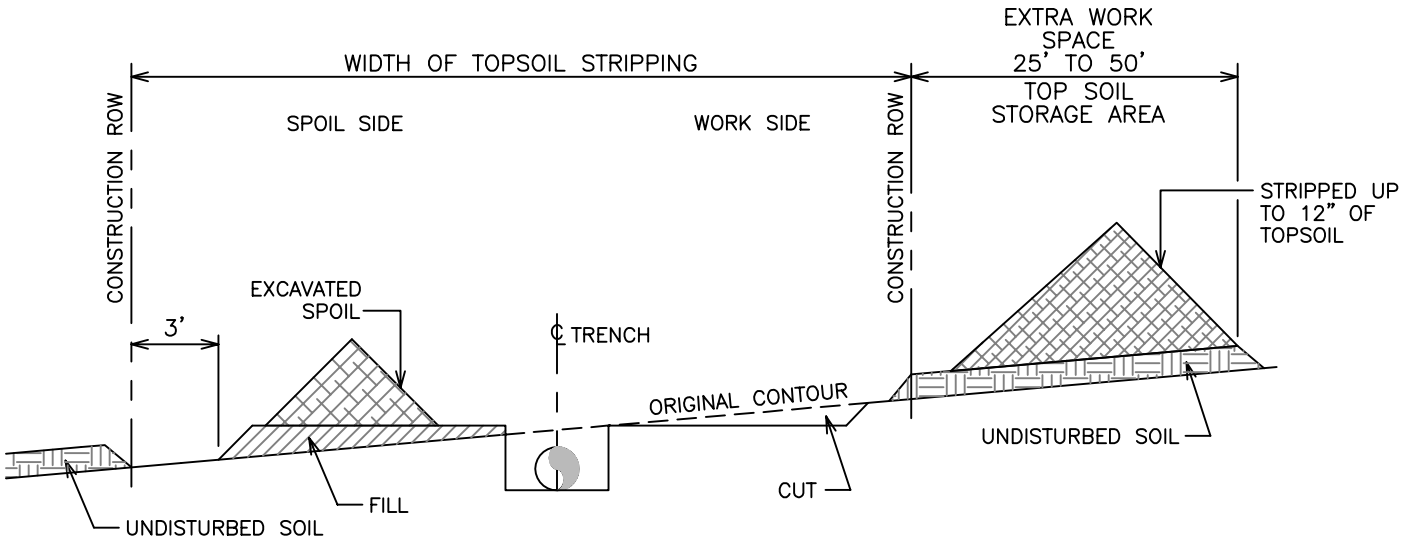
FILENAME: NFGSC\BMP23a.dwg
LAST REVISION DATE: 01/17/2014

TOPSOIL SEGREGATION

DRAWING NUMBER: 23A



FULL RIGHT-OF-WAY TOPSOIL STRIPPING - PARALLELING PIPELINES



FULL RIGHT-OF-WAY TOPSOIL STRIPPING - SIDE SLOPES

NOTES:

1. ALLOW FOR A 3' SEPARATION BETWEEN THE TOPSOIL PILE AND THE TRENCH SPOIL.
2. RETURN TRENCH SPOIL TO TRENCH AND COMPACT. FEATHER OUT EXCESS SPOIL OVER STRIPPED AREA LEAVING A LOW CROWN CENTERED OVER THE TRENCH. ALLEVIATE COMPACTION OF SUBSOILS OVER THE STRIPPED AREA.
3. RETURN TOPSOIL EVENLY OVER THE STRIPPED AREA AFTER TRENCH HAS SUFFICIENTLY SETTLED OR HAS BEEN COMPACTED.
4. ALLEVIATE COMPACTION OF TOPSOIL OVER ENTIRE RIGHT-OF-WAY.
5. SEGREGATED TOPSOIL MAY NOT BE USED FOR PADDING THE PIPE.

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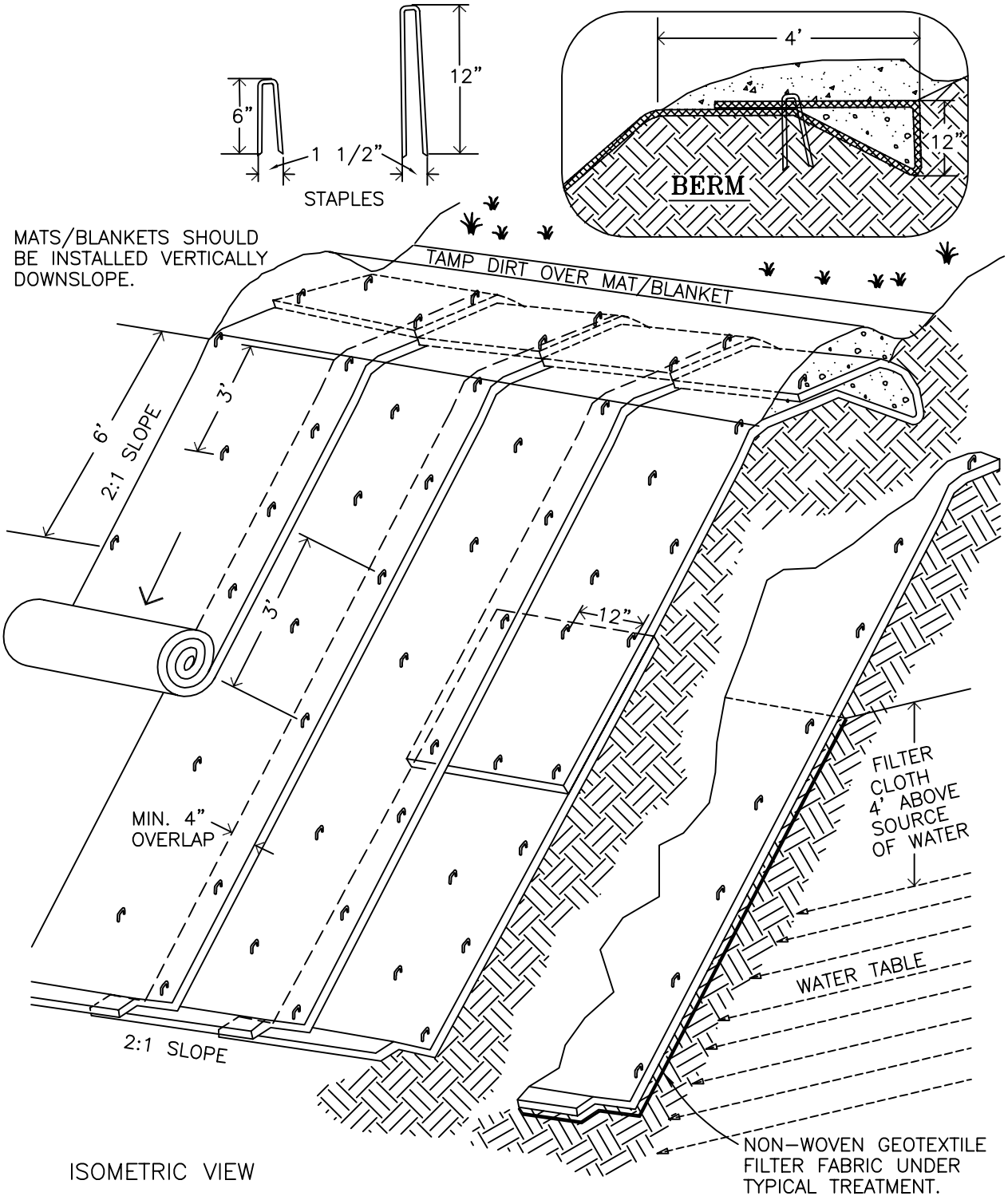
REVIEWED: 01/2014



ISOMETRIC VIEW

TYPICAL SLOPE SOIL STABLIZATION

NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.

2. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

3. SEE DRAWING NO. 24A FOR INSTALLATION SPECIFICATIONS.

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MODIFIED BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP24.dwg
DATE: 01/13/1997

EROSION BLANKETS SLOPE INSTALLATION

DRAWING NUMBER: 24

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CONSTRUCTION SPECIFICATIONS:

SITE PREPARATION

1. PROPER SITE PREPARATION IS ESSENTIAL TO ENSURE COMPLETE CONTACT OF THE PROTECTION MATTING WITH THE SOIL.
2. GRADE AND SHAPE AREA OF INSTALLATION.
3. REMOVE ALL ROCKS, CLODS, VEGETATIVE OR OTHER OBSTRUCTIONS SO THAT THE INSTALLED BLANKETS, OR MATS WILL HAVE DIRECT CONTACT WITH THE SOIL.
4. PREPARE SEEDBED BY LOOSENING 2"–3" OF TOPSOIL ABOVE FINAL GRADE.
5. INCORPORATE AMENDMENTS, SUCH AS LIME AND FERTILIZER, INTO SOIL ACCORDING TO SOIL TEST AND THE SEEDING PLAN.

SEEDING

SEED AREA BEFORE BLANKET INSTALLATION FOR EROSION CONTROL AND RE–VEGETATION OR SEED AFTER MAT INSTALLATION FOR TURF REINFORCEMENT. WHEN SEEDING PRIOR TO BLANKET INSTALLATION, ALL CHECK SLOTS AND OTHER AREAS DISTURBED DURING INSTALLATION MUST BE RESEEDED. WHERE SOIL FILLING IS SPECIFIED, SEED THE MATTING AND THE ENTIRE DISTURBED AREA AFTER INSTALLATION AND PRIOR TO FILLING THE MAT WITH SOIL.

ANCHORING

U–SHAPED WIRE STAPLES, METAL GEOTEXTILE STAKE PINS OR TRIANGULAR WOODEN STAKES CAN BE USED TO ANCHOR MATS TO THE GROUND SURFACE. WIRE STAPLES SHOULD BE A MINIMUM OF 8 GAUGE. METAL STAKE PINS SHOULD BE 3/16" DIAMETER STEEL WITH A 1 1/2" STEEL WASHER AT THE HEAD OF THE PIN. WIRE STAPLES AND METAL STAKE SHOULD BE DRIVEN FLUSH TO THE SOIL SURFACE. WOODEN STAKES SHOULD BE 3" X 1 1/2" TRIANGULAR WOODEN SURVEY STAKES. TWO INCHES OF WOOD STAKING SHOULD REMAIN ABOVE THE SOIL SURFACE. ALL ANCHORS SHOULD BE 8"–18" LONG AND HAVE SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT. LONGER ANCHORS MAY BE REQUIRED FOR LOOSE SOILS.

INSTALLATION ON SLOPES

1. BEGIN AT THE TOP OF THE SLOPE AND ANCHOR ITS BLANKET IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL TRENCH AND TAMP EARTH FIRMLY.
2. UNROLL BLANKET DOWNSLOPE IN THE DIRECTION OF THE WATER FLOW.
3. THE EDGES OF ADJACENT PARALLEL ROLLS MUST BE OVERLAPPED 2" TO 3" AND BE STAPLED EVERY 3 FEET.
4. WHEN BLANKETS MUST BE SPLICED, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH 6" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
5. BLANKETS SHALL BE STAPLED SUFFICIENTLY TO ANCHOR BLANKET AND MAINTAIN CONTACT WITH THE SOIL. STAPLES SHALL BE PLACED DOWN THE CENTER AND STAGGERED WITH THE STAPLES PLACED ALONG THE EDGES STEEP SLOPES, 1:1 TO 2:1, REQUIRE 2 STAPLES PER SQUARE YARD. MODERATE SLOPES, 2:1 TO 3:1, REQUIRE 1 1/2 STAPLES PER SQUARE YARD (1 STAPLE 3' O.C.). GENTLE SLOPES REQUIRE 1 STAPLE PERSQUARE YARD.

SOIL FILLING IF SPECIFIED FOR TURF REINFORCEMENT.

1. AFTER SEEDING, SPREAD AND LIGHTLY RAKE 1/2" – 3/4" OF FINE TOPSOIL INTO THE MAT APERTURES TO COMPLETELY FILL MAT THICKNESS.
2. USE BACKSIDE OF RAKE OR OTHER FLAT IMPLEMENT.
3. SPREAD TOPSOIL USING LIGHTWEIGHT LOADER, BACKHOE, OR OTHER POWER EQUIPMENT. AVOID SHARP TURNS WITH EQUIPMENT.
4. DO NOT DRIVE TRACKED OR HEAVY EQUIPMENT OVER MAT.
5. AVOID ANY TRAFFIC OVER MATTING IF LOOSE OR WET SOIL CONDITIONS EXIST.
6. USE SHOVELS, RAKES OR BROOMS FOR FINE GRADING AND TOUCH UP.
7. SMOOTH OUT SOIL FILLING JUST EXPOSING TOP NETTING OF MATRIX.

INSPECTION AND MAINTENANCE

1. ALL BLANKET AND MATS SHOULD BE INSPECTEDPERIODICALLY FOLLOWING INSTALLATION.
2. INSPECT INSTALLATION AFTER SIGNIFICANT RAINSTORMS TO CHECK FOR EROSION AND UNDERMINING. ANY FAILURE SHOULD BE REPAIRED IMMEDIATELY.
3. IF WASHOUT OR BREAKAGE OCCURS, RE–INSTALL THE MATERIAL AFTER REPAIRING THE DAMAGE TO THE SLOPE OR DRAINAGEWAY.

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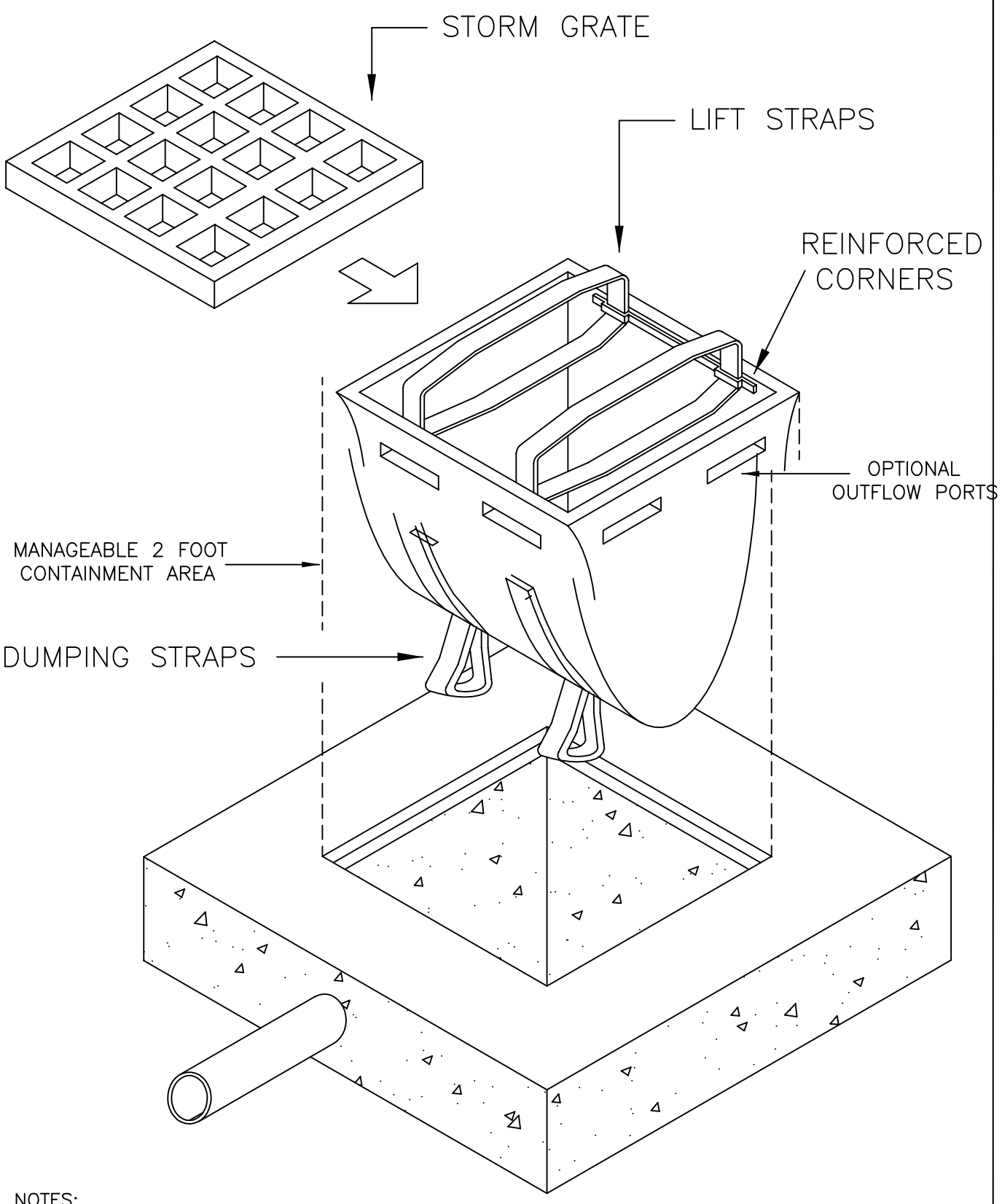
MODIFIED BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP24A.dwg
DATE: 01/13/1997

SPECIFICATIONS EROSION BLANKETS SLOPE INSTALLATION

DRAWING NUMBER: 24A



NOTES:

1. CATCH BASIN SEDIMANT SACK IS TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)

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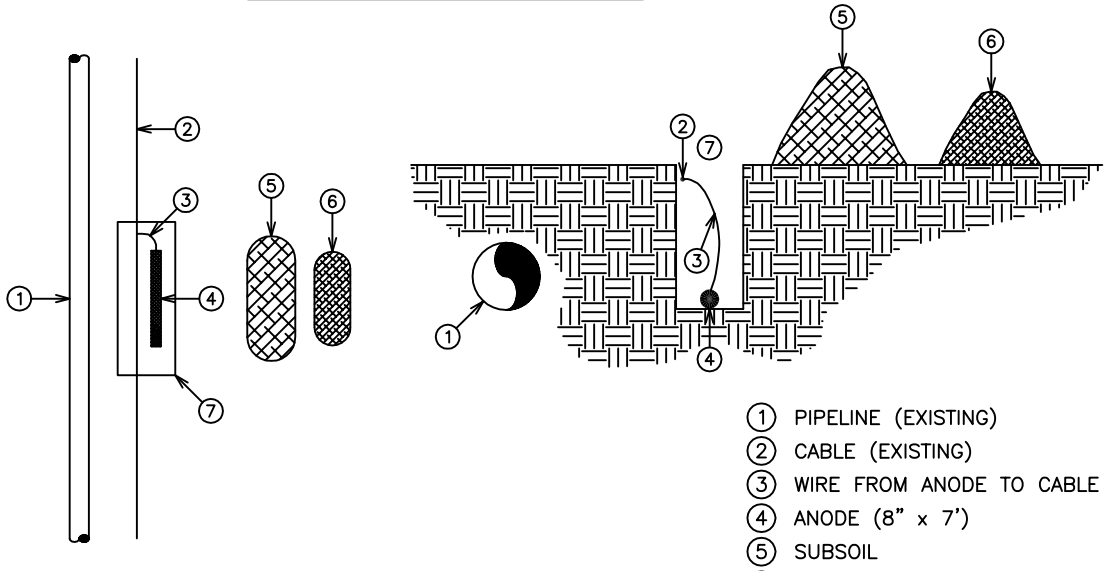
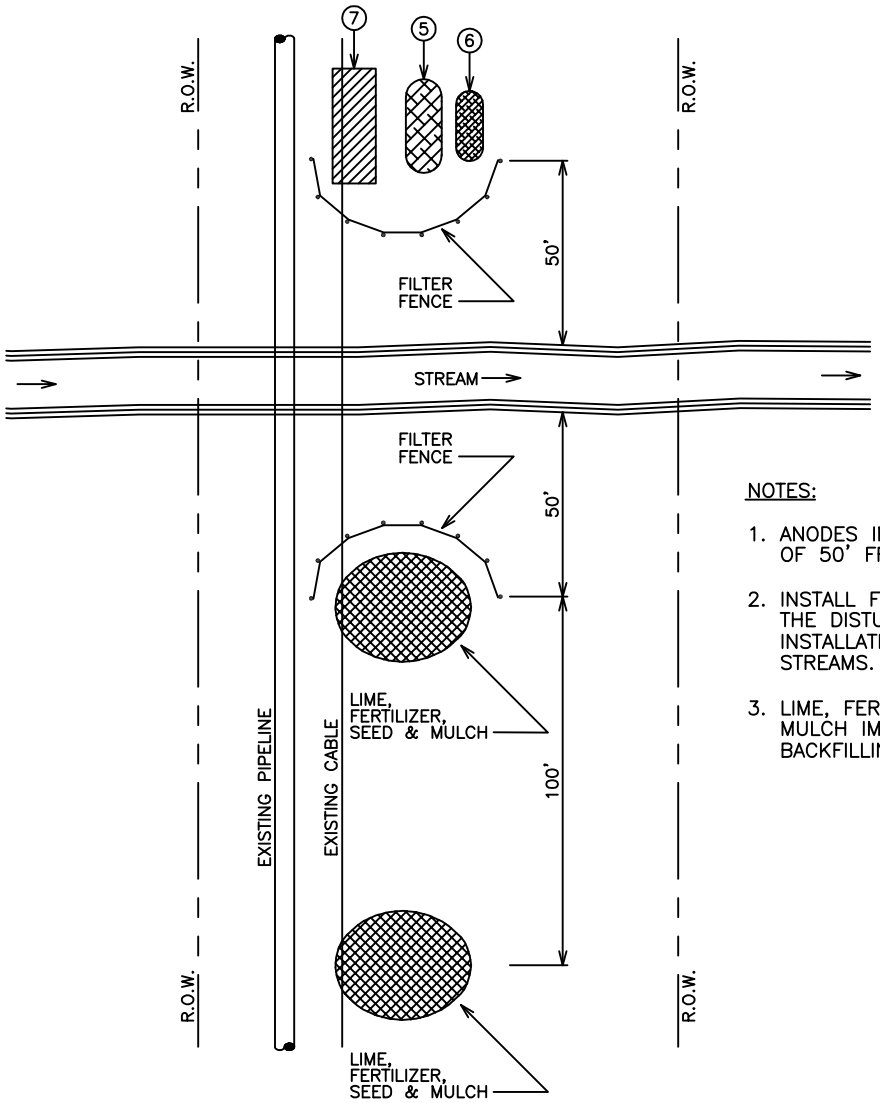
TYPICAL ANODE INSTALLATION



1. PIPELINE (EXISTING)
2. CABLE (EXISTING)
3. WIRE FROM ANODE TO CABLE
4. ANODE (8" x 7')
5. SUBSOIL
6. TOPSOIL
7. OPENING (4'W x 10'L x 5'D)



NOTES:

1. ANODES INSTALLED A MINIMUM OF 50' FROM EDGE OF WATER.
2. INSTALL FILTER FENCE ACROSS THE DISTURBED AREAS AT ANODE INSTALLATIONS ADJACENT TO STREAMS.
3. LIME, FERTILIZE, SEED AND MULCH IMMEDIATELY AFTER BACKFILLING.

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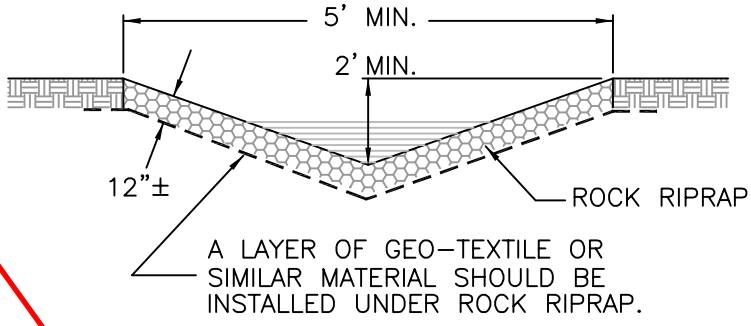
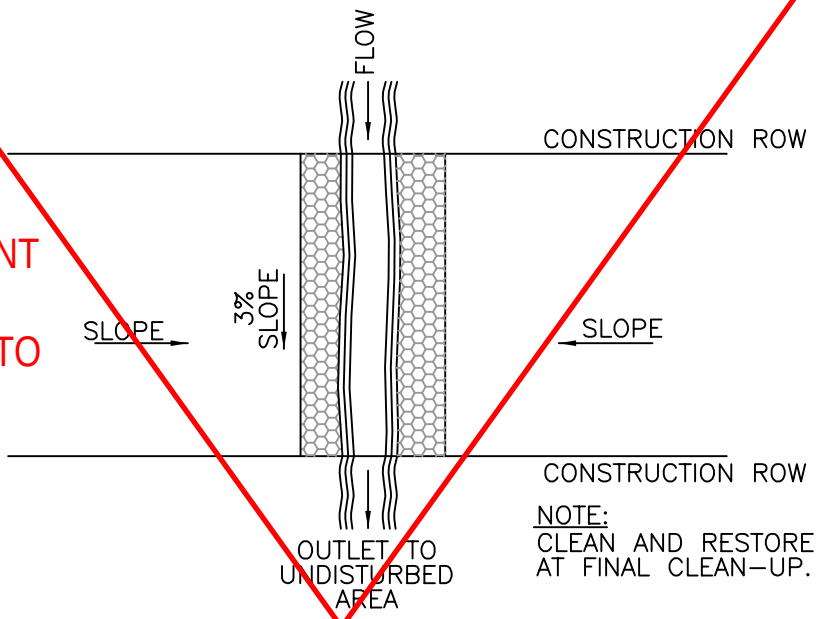


VELOCITY = 8.7'/SEC.
Q = 43 CFS



NOTE:
CLEAN AND RESTORE DITCH AT FINAL CLEAN-UP.

SEE BMP 14 FOR OPTIONAL DIMENSIONS

FOR ANY PERMANENT STORM WATER CHANNELS, REFER TO FACILITY PCSM PACKAGES.

NO TEMPORARY STORM WATER EARTHEN CHANNELS ARE PROPOSED.

CONSTRUCTION SPECIFICATIONS

1. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY APPROXIMATING THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
2. OVERFILL DEPRESSIONS WITH RIPRAP.
3. REMOVE BRUSH, TREES, STUMPS, AND OTHER OBJECTIONABLE MATERIAL.
4. CUT THE SUBGRADE SUFFICIENTLY DEEP SO THAT THE FINISHED GRADE OF THE RIPRAP WILL BE AT THE ELEVATION OF THE SURROUNDING AREA. CHANNELS SHOULD BE EXCAVATED SUFFICIENTLY TO ALLOW PLACEMENT OF THE RIPRAP IN A MANNER SUCH THAT THE FINISHED INSIDE DIMENSIONS AND GRADE OF THE RIPRAP MEET DESIGN SPECIFICATIONS.
5. PLACE THE SAND AND GRAVEL FILTER BLANKET IMMEDIATELY AFTER THE GROUND FOUNDATION IS PREPARED FOR GRAVEL, SPREAD FILTER STONE IN A UNIFORM LAYER TO THE SPECIFIED DEPTH. WHERE MORE THAN ONE LAYER OF FILTER MATERIAL IS USED, SPREAD THE LAYERS WITH MINIMAL MIXING.
6. PLACE THE FILTER FABRIC DIRECTLY ON THE PREPARED FOUNDATION. OVERLAP THE EDGES BY AT LEAST 12 INCHES, AND SPACE ANCHOR PINS EVERY 3 FEET ALONG THE OVERLAP. BURY THE UPPER AND LOWER ENDS OF THE CLOTH A MINIMUM OF 12 INCHES BELOW GROUND. TAKE CARE NOT TO DAMAGE THE CLOTH WHEN PLACING RIPRAP.
7. WHERE LARGE STONES ARE USED OR MACHINE PLACEMENT IS DIFFICULT, A 4-INCH LAYER OF FINE GRAVEL OR SAND MAY BE NEEDED TO PROTECT THE FILTER FABRIC.
8. PLACEMENT OF RIPRAP SHOULD FOLLOW IMMEDIATELY AFTER PLACEMENT OF THE FILTER.
9. PLACE RIPRAP SO THAT IT FORMS A DENSE, WELL-GRADED MASS OF STONE WITH A MINIMUM OF VOIDS.
10. PLACE RIPRAP TO ITS FULL THICKNESS IN ONE OPERATION.
11. DO NOT PLACE RIPRAP BY DUMPING THROUGH CHUTES OR OTHER METHODS THAT CAUSE SEGREGATION OF STONE SIZES.
12. TAKE CARE NOT TO DISLODGE THE UNDERLYING BASE OR FILTER WHEN PLACING THE STONES.
13. THE FINISHED SLOPE SHOULD BE FREE OF POCKETS OF SMALL STONE OR CLUSTERS OF LARGE STONES.

MAINTENANCE

RIPRAP SHOULD BE INSPECTED PERIODICALLY FOR SCOUR OR DISLODGED STONES. CONTROL OF WEED AND BRUSH GROWTH MAY BE NEEDED IN SOME LOCATIONS.

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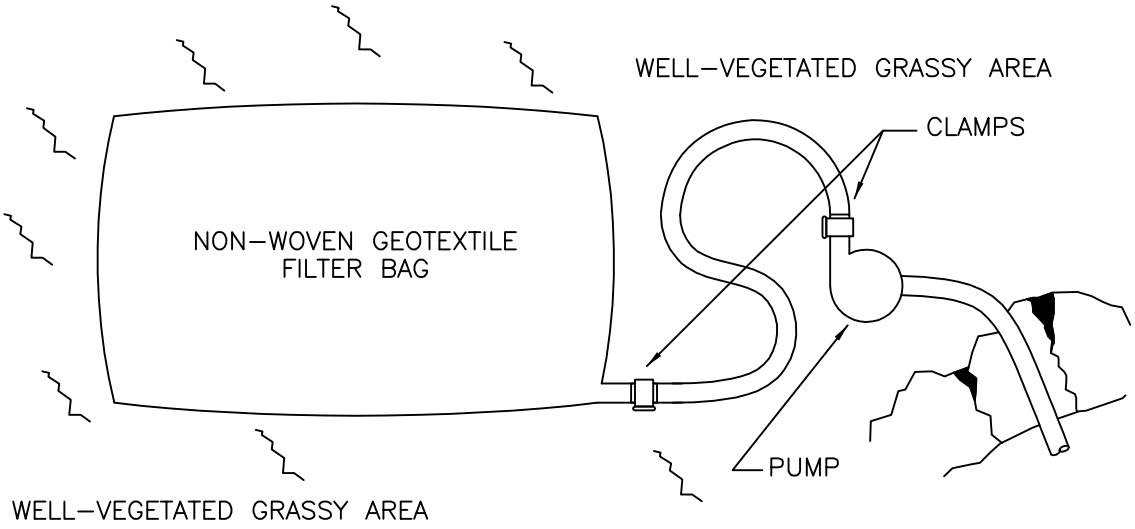
DRAWN BY: L. A. PHILLIPS
FILENAME: EPC\BMP27.dwg
LAST REVISION DATE: 06/27/2007

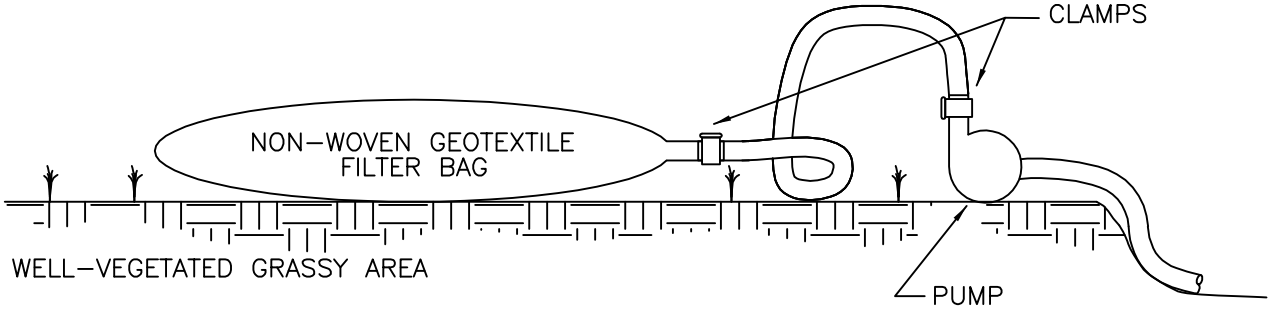
STORM WATER CHANNEL

DRAWING NUMBER: 27

FILTER BAGS FOR REMOVING SEDIMENT FROM PUMPED WATER



PLAN VIEW



ELEVATION VIEW

1. FILTER BAGS SHALL BE MADE FROM NON–WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
2. A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE 1/2 FILLED WITH SEDIMENT.
3. BAGS SHALL BE LOCATED IN WELL–VEGETATED (GRASSY) AREA AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
4. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED.
5. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.
6. ALL FILTER BAGS AND TRAPPED SEDIMENT SHALL BE REMOVED TO A SUITABLE WASTE AREA WHEN ACCUMULATED SEDIMENTS REACH 1/2 TOTAL BAG CAPACITY.

IF SEDIMENT IS OBSERVED LEAVING THE FILTER BAG, UTILIZE STRAW BALE CONTAINMENT SIMILAR TO BMPs 47–48.

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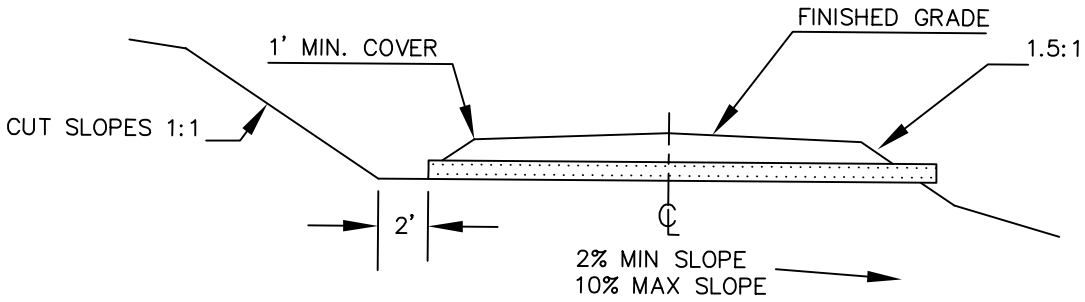
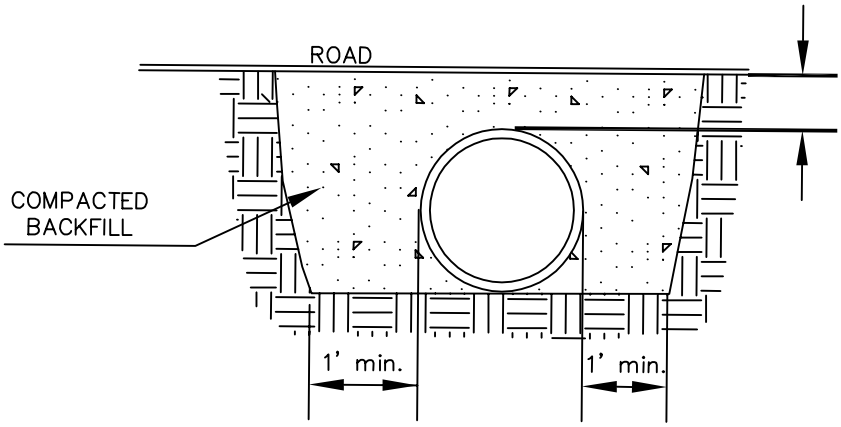
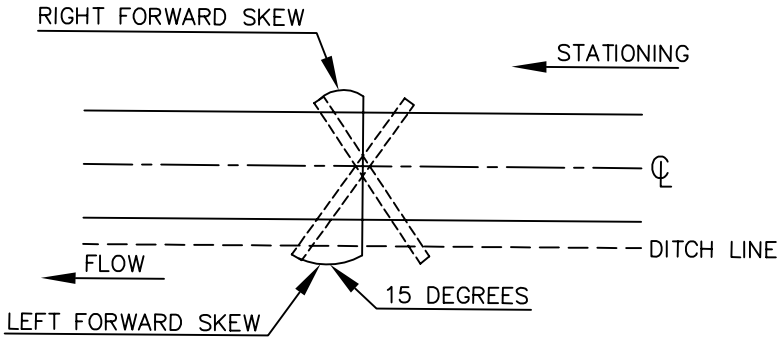


CULVERT SECTION

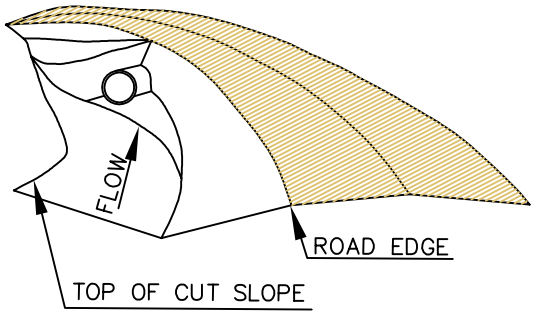


CULVERT – END VIEW

PROFILE VIEW

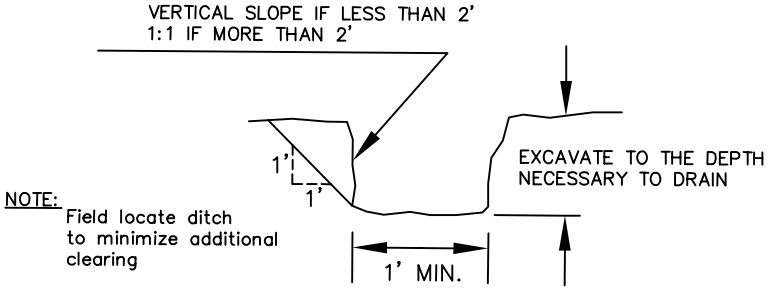


SKEW DETAIL



DITCH BLOCK

PERSPECTIVE VIEW



NOTE: Field locate ditch to minimize additional clearing

OUTLET DITCH SECTION

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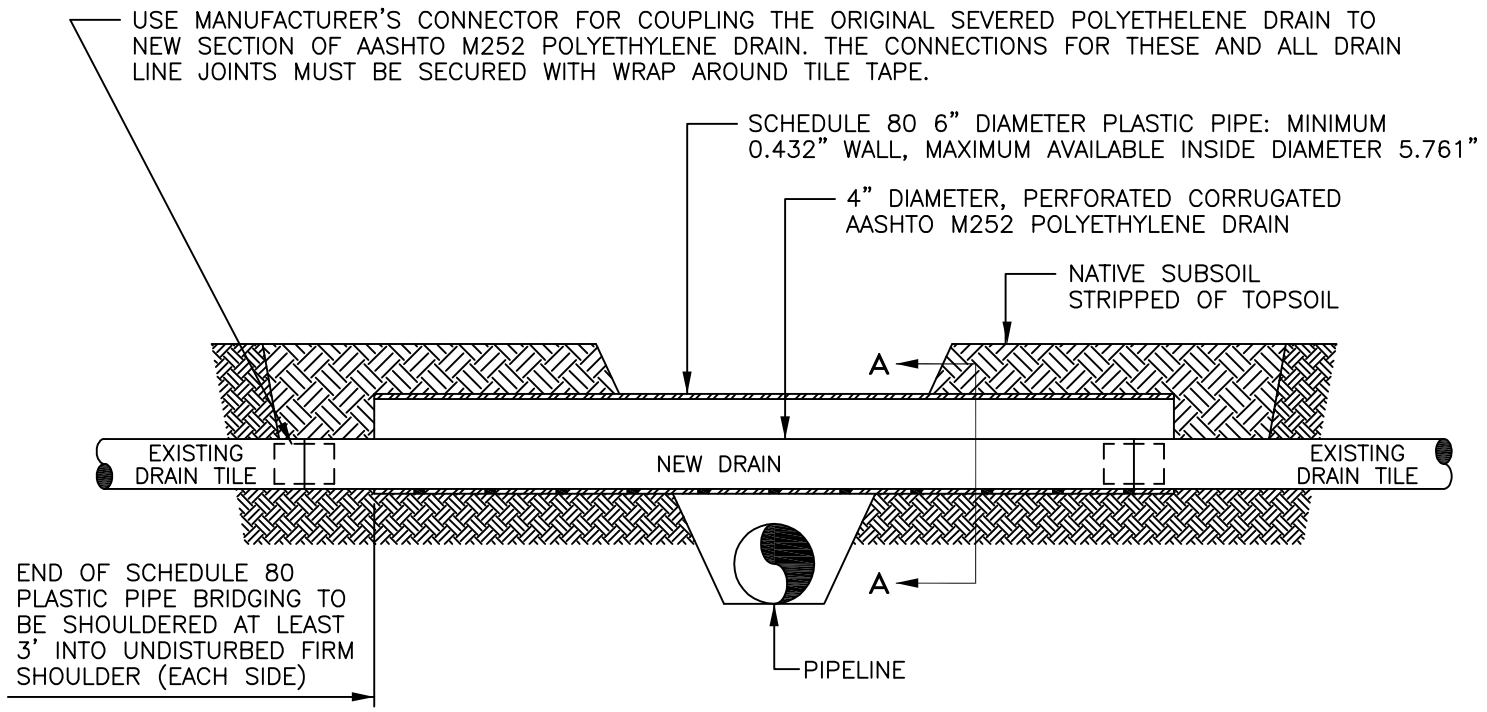


DRAINAGE TILE	SUPPORT SIZE
3" TO 5"	6" PIPE
6"	8" PIPE
7" TO 8"	10" PIPE
9" TO 10"	12" PIPE
12"	W12 x 14
15" TO 18"	W16 x 26
OVER 18"	W18 x 46

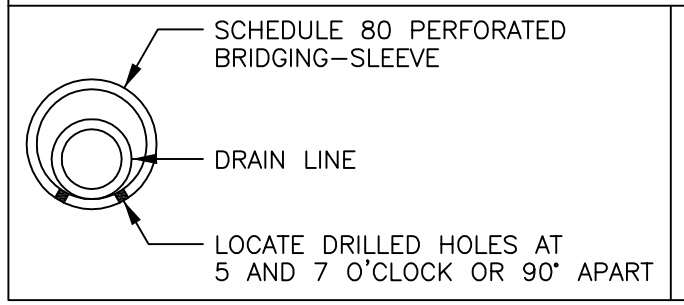
PVC SCHEDULE 80 PIPE (FOR BRIDGING–SLEEVES)

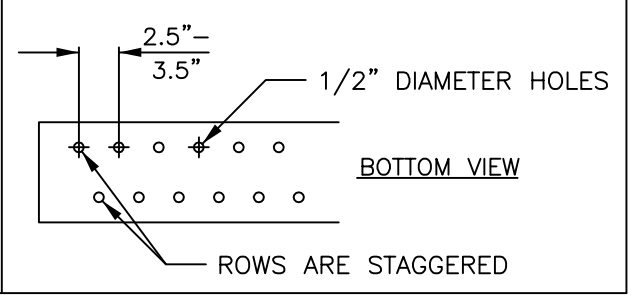
NOMINAL SIZE (INCHES)	AVERAGE O.D. (INCHES)	MAXIMUM WALL THICKNESS (INCHES)	MAXIMUM AVAILABLE I.D. (INCHES)
4	4.500	0.337	3.826
6	6.625	0.432	5.761
8	8.625	0.500	7.625
10	10.750	0.593	9.564
12	12.750	0.687	11.376

AASHTO M252
SINGLE WALL, CORRUGATED, PERFORATED (SLOTTED) POLYETHYLENE DRAIN LINE

NOMINAL SIZE (INCHES)	OUTSIDE DIAMETER (INCHES)
4	4.71
6	7.00
8	9.90
10	11.90
12	14.41
15	17.70

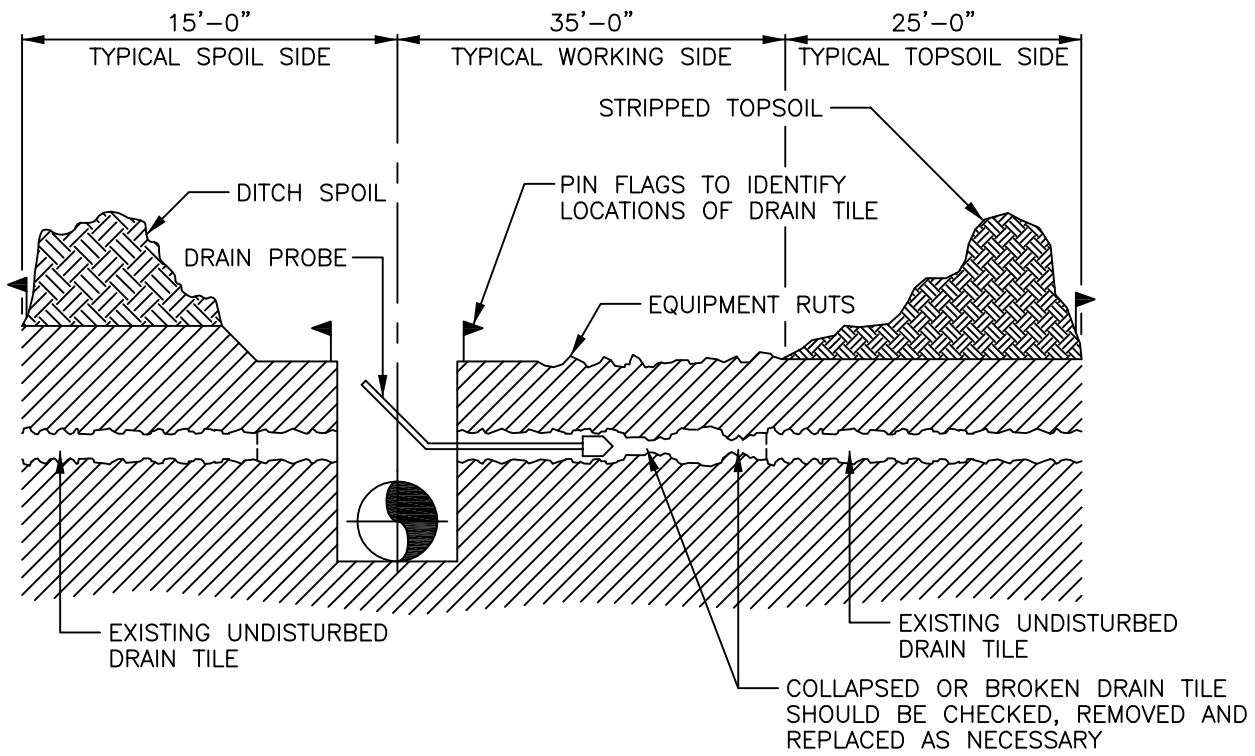
SECTION A–A VIEW OF DRAIN LINE PROTECTED BY PERFORATED, DURABLE SLEEVE





NOTES:

1. THE BRIDGING–SLEEVE REPAIR IS VERTICALLY POSITIONED ACROSS THE TRENCH SO IT MAINTAINS THE GRAVITY–FLOW GRADIENT OF THE ORIGINAL DRAIN TILE.
2. BOTH OF THE RECONNECTIONES MAY BE LOCATED PHYSICALLY OUTSIDE OF THE BRIDGING–SLEEVE (LEFT) OR INSIDE THE SLEEVE (RIGHT) AFTER SLIDING IT OVER THE REPAIR.



NOTE:

WITHIN ALL AREAS OF CONSTRUCTION ACTIVITIES;

1. PROBE AND CLEAN OUT ALL DRAIN TILES.
2. REPLACE ANY DAMAGED TILES.
3. REPAIR ANY DAMAGED JOINTS.

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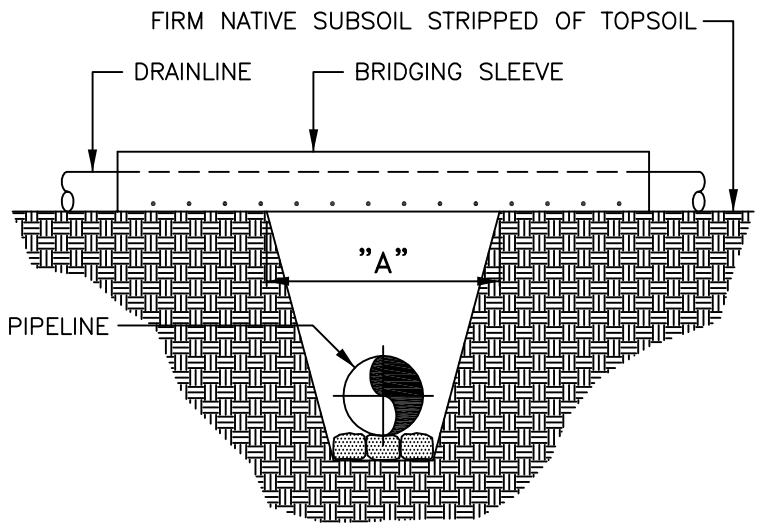
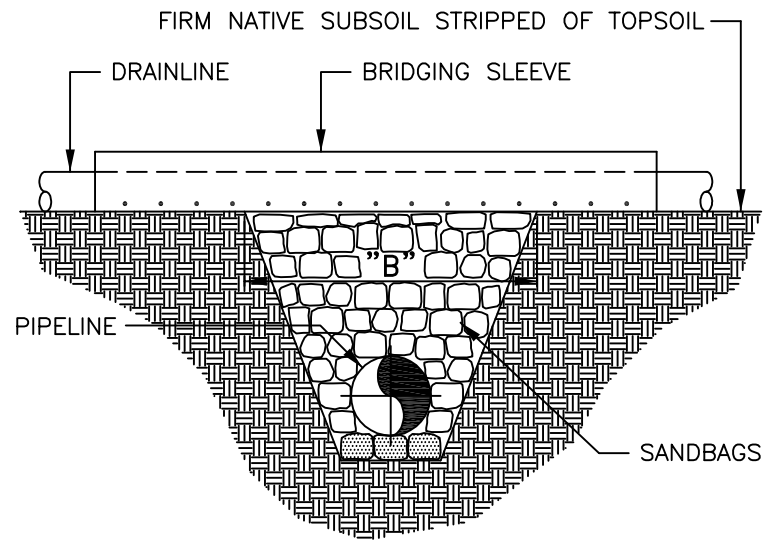
DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP30.dwg
DATE: 06/24/2005

TYPICAL DRAIN TILE REPAIR ACROSS TRENCH

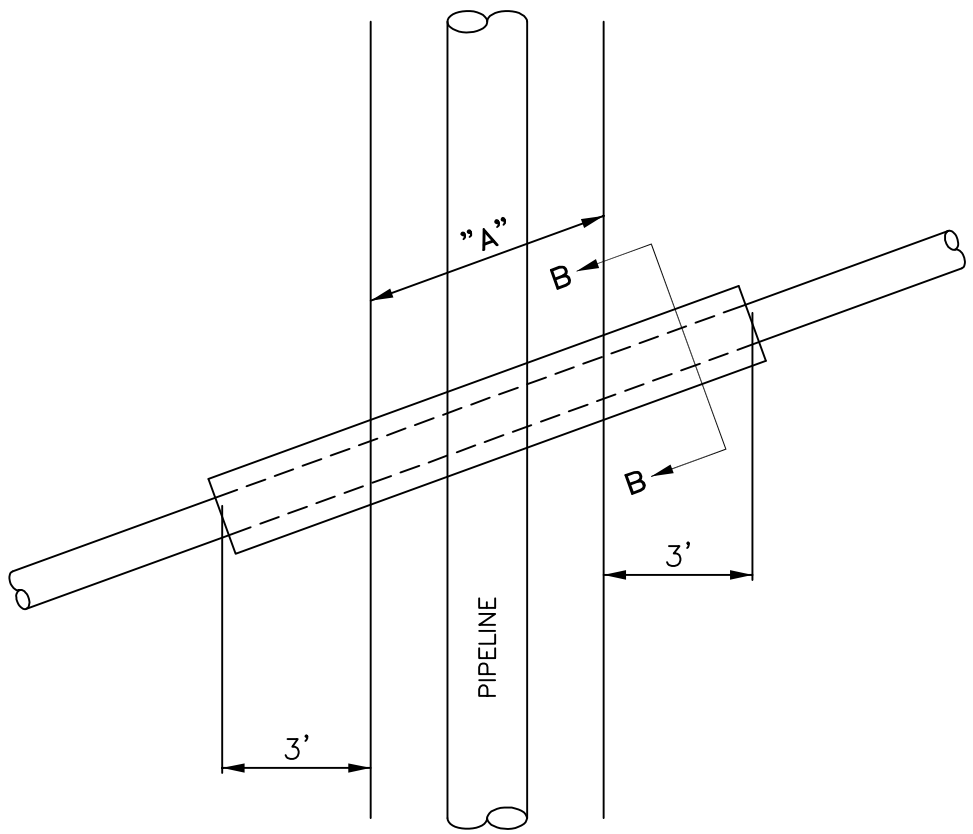
DRAWING NUMBER: 30

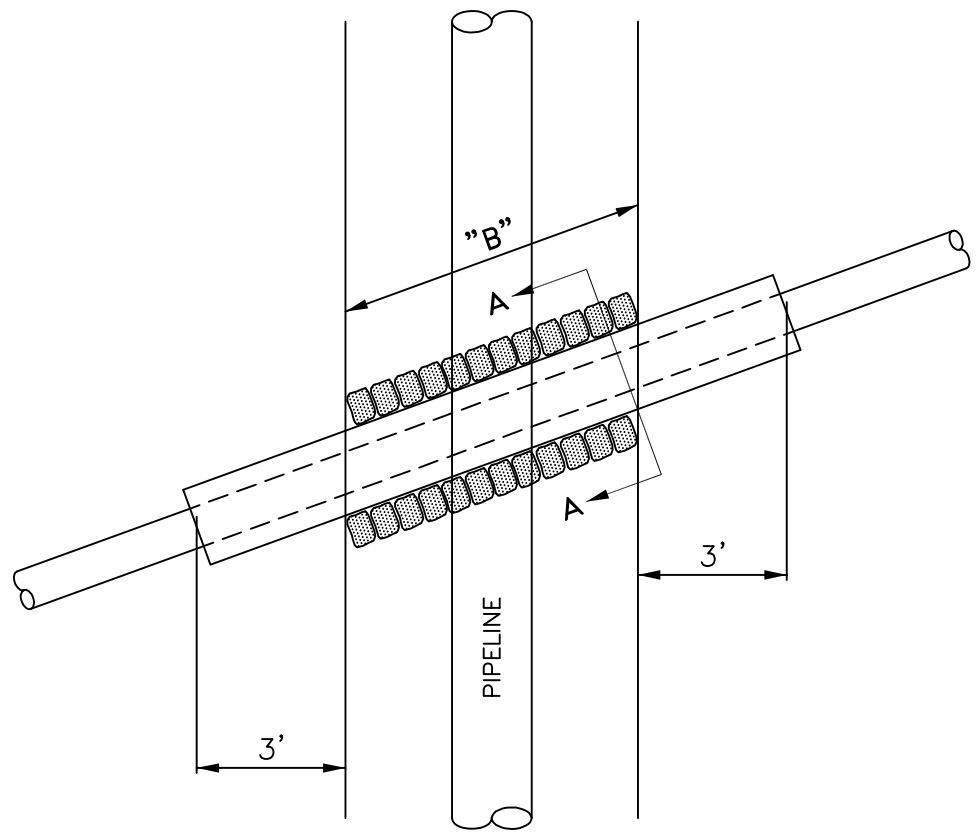


IF DISTANCE "A" DOES NOT EXCEED 10 FEET, THE SCHEDULE 80 PERFORATED BRIDGING–SLEEVE DOES NOT REQUIRE SUPPORT UNDER THE BRIDGING–SLEEVE.

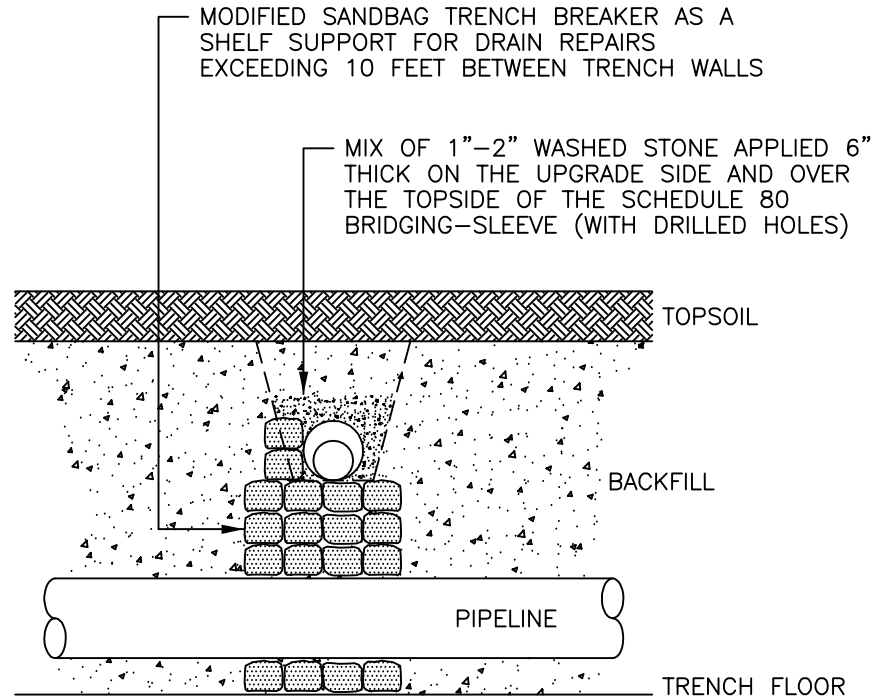


IF DISTANCE "B" EXCEEDS 10 FEET, THE SCHEDULE 80 PERFORATED BRIDGING SLEEVE REQUIRES A MODIFIED SANDBAG TRENCH BREAKER UNDER THE BRIDGING SLEEVE





CROSS SECTION "B–B" IS THE SAME AS CROSS SECTION "A–A", MINUS THE SAND BAG TRENCH BREAKER. MINIMUM OF 1"–2" WASHED STONE 4"–6" THICK UNDERNEATH, AROUND SIDES AND OVER TOP OF THE BRIDGING SLEEVE.



THE BRIDGING–SLEEVE DRAIN REPAIR RESTS ON THE UPGRADIENT SIDE OF THE MODIFIED SANDBAG TRENCH BREAKER. THE HIGHER PORTION OF THE TRENCH BREAKER IS ON THE DOWN GRADIENT SIDE OF THE REPAIR.

NOTE: IF THE REPAIR OF THE SEVERED DRAINLINE CROSSES THE PIPELINE TRENCH AT AN ANGLE REQUIRING MORE THAN 20' OF BRIDGING–SLEEVE BETWEEN THE FARTHEST ENDS OF THE FIRM SHELVES, MODIFY THE CROSSING ANGLE TO SHORTEN THE TOTAL LENGTH OF THE CROSSING AND THEN TIE TO THE EXISTING DRAIN TILE.

SECTION A-A

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DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP30A.dwg
DATE: 06/29/2005

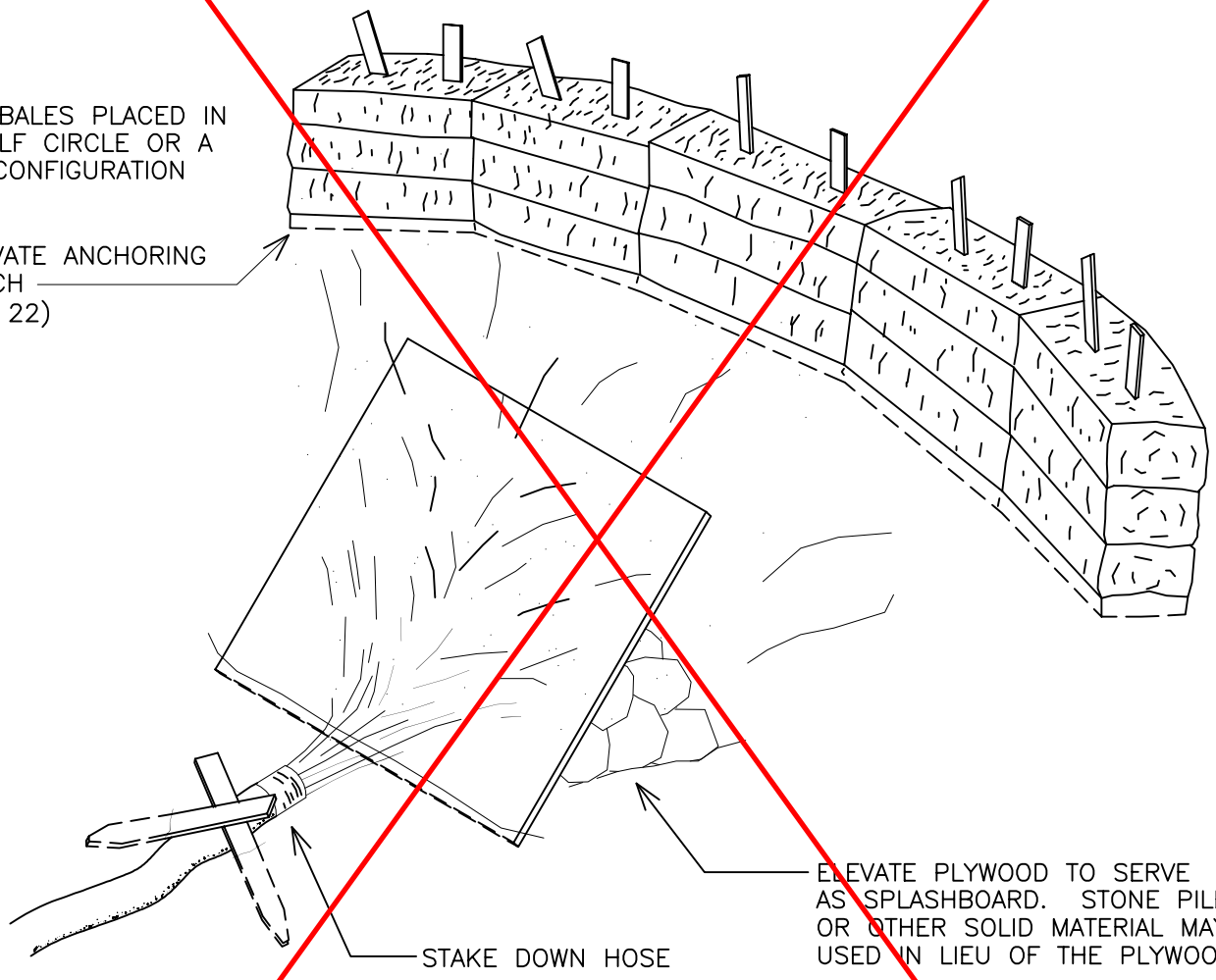
TYPICAL DRAIN TILE REPAIR ACROSS TRENCH

DRAWING NUMBER: 30A

PREFER BARRIER LOCATION
IS IN A VEGETATED AREA

HAY BALES PLACED IN
A HALF CIRCLE OR A
"U" CONFIGURATION

EXCAVATE ANCHORING
TRENCH
(BMP 22)



ELEVATE PLYWOOD TO SERVE
AS SPLASHBOARD. STONE PILE
OR OTHER SOLID MATERIAL MAYBE
USED IN LIEU OF THE PLYWOOD

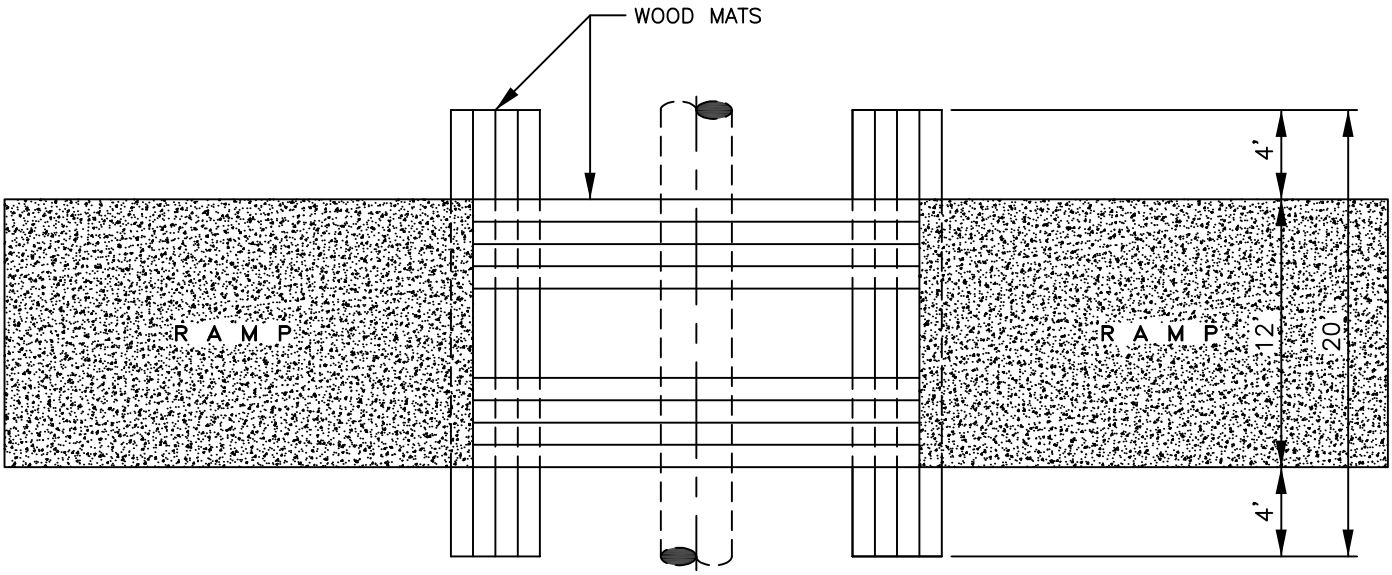
STAKE DOWN HOSE

**ALTERNATIVE CONTROLS USED FOR TRENCH (BMP 28)
HYDROSTATIC DE-WATERING (BMP 3)**

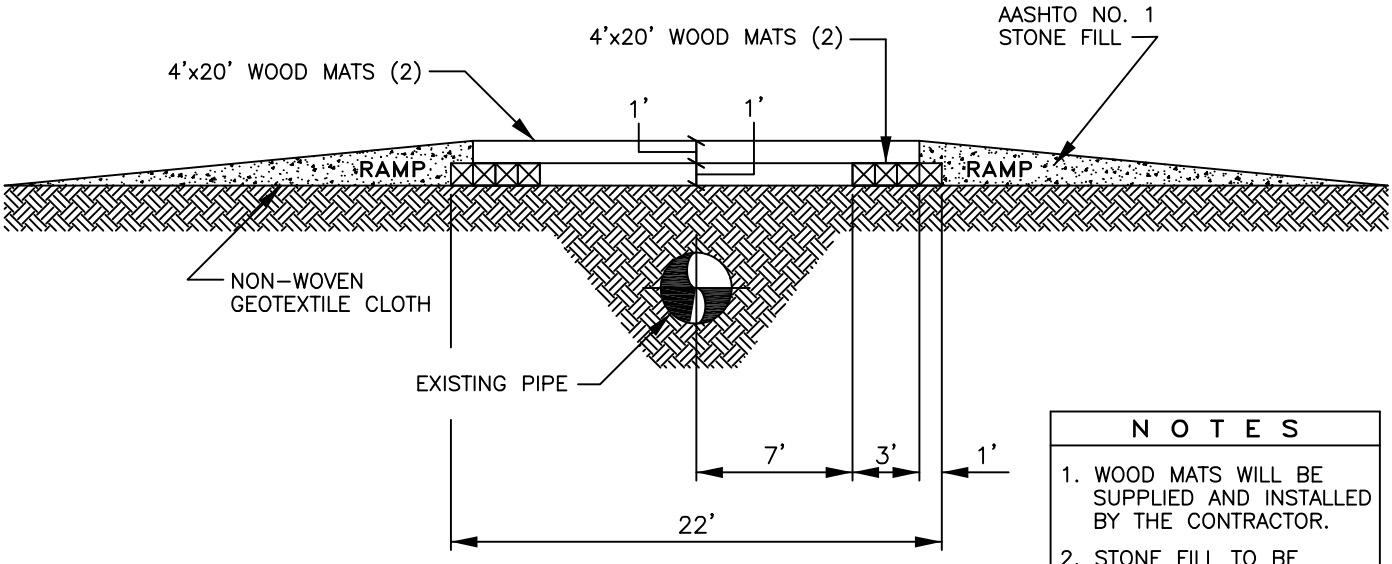
national Fuel SUPPLY CORPORATION	ENGINEERING DEPT. 1100 STATE STREET P.O. BOX 2081 ERIE, PA. 16512 (814) 871-8676	DRAWN BY: DRISCOLL/PHILLIPS FILENAME: EPC\BMP31.dwg LAST REVISION DATE: 06/27/2007	ENERGY DISSIPATER	DRAWING NUMBER: 31

REVIEWED: 01/2014

PLAN VIEW



SIDE VIEW



N O T E S
1. WOOD MATS WILL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.
2. STONE FILL TO BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.
3. ADDITIONAL MATS, IF NEEDED, WILL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.

SPECIAL NOTE:

PROPOSED VEHICLE & EQUIPMENT WHEEL / TRACK LOAD WEIGHTS SHALL BE PROVIDED TO NFG ENGINEERING SERVICES TO DETERMINE IF ADDITIONAL MEASURES ARE NECESSARY BASE ON THE SPECIFIC PIPELINE TO BE CROSSED.

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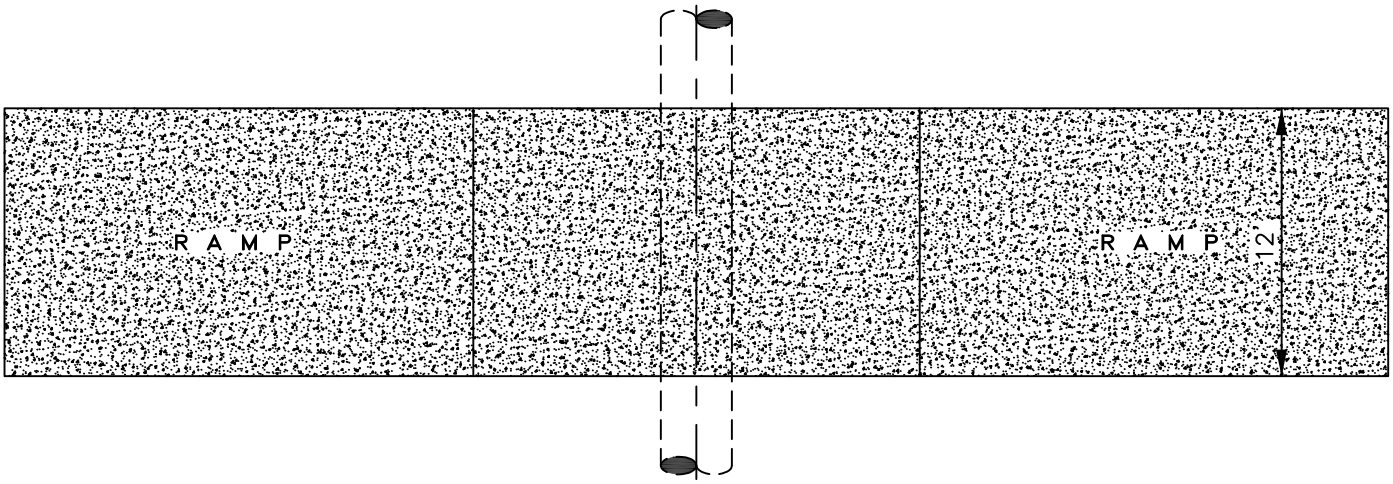
DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP32.dwg
REVISED DATE: 01/17/2014

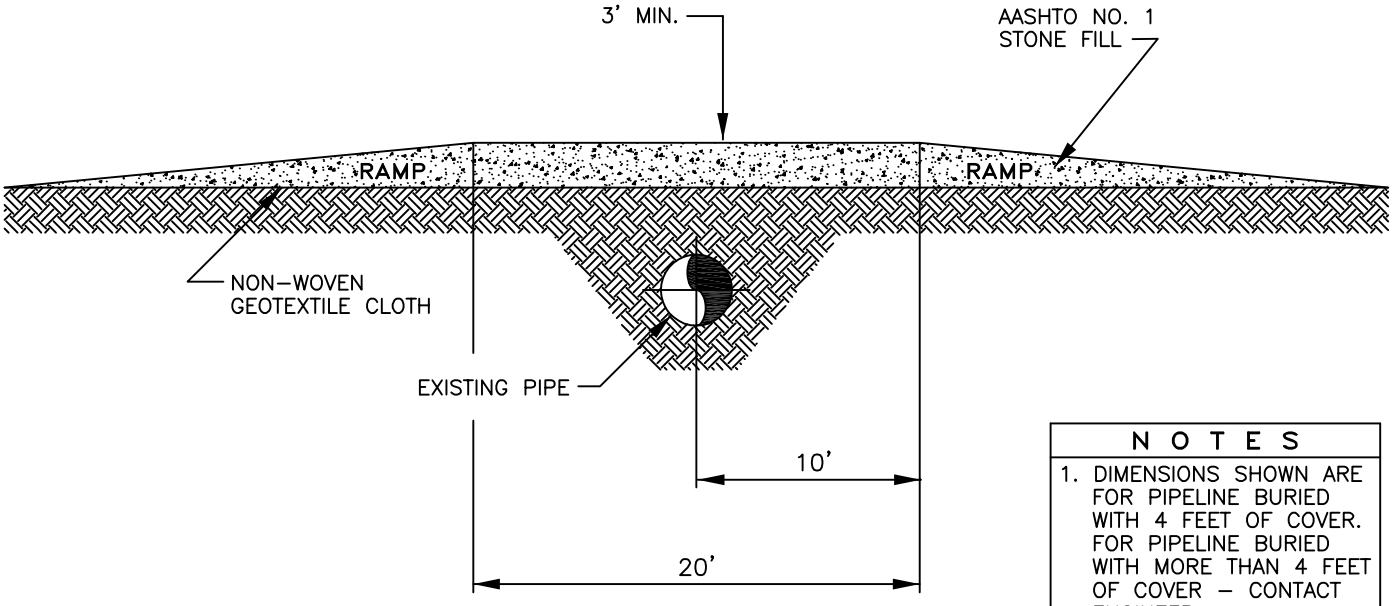
WOODEN MAT BRIDGE PIPELINE CROSSING

DRAWING NUMBER: 32

PLAN VIEW



SIDE VIEW



SPECIAL NOTE:

PROPOSED VEHICLE & EQUIPMENT WHEEL / TRACK LOAD WEIGHTS SHALL BE PROVIDED TO NFG ENGINEERING SERVICES TO DETERMINE IF ADDITIONAL MEASURES ARE NECESSARY BASED ON THE SPECIFIC PIPELINE TO BE CROSSED.

NOTES

1. DIMENSIONS SHOWN ARE FOR PIPELINE BURIED WITH 4 FEET OF COVER. FOR PIPELINE BURIED WITH MORE THAN 4 FEET OF COVER – CONTACT ENGINEER.
2. STONE FILL TO BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.

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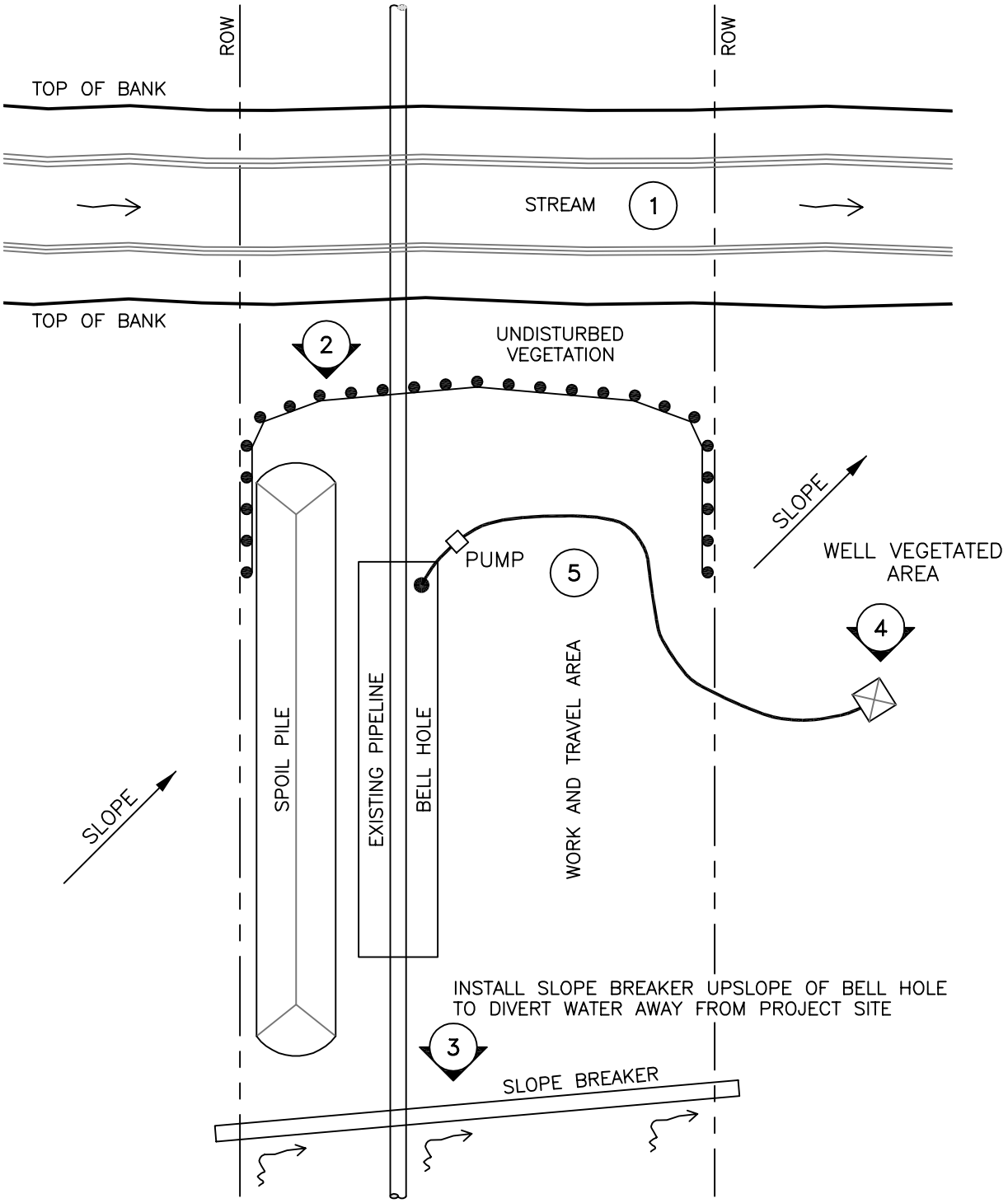

1. REFER TO BMP NO. 9 FOR STREAM CROSSING REQUIREMENTS AND PROCEDURE.
2. REFER TO BMP NO. 5 FOR FILTER FENCE INSTALLATION AND BMP NO. 45A,B,C FOR COMPOST FILTER SOCK INSTALLATION AS PERMITTED AND AS PER PERMIT APPROVAL.
3. REFER TO BMP NO. 8A FOR SLOPE BREAKER INSTALLATION.
4. REFER TO BMP NO. 28 AND 31 FOR DEWATERING FILTER BAG AND ENERGY DISSIPATION.
5. ALL DISTURBED AREAS TO BE RESTORED AND STABILIZED IMMEDIATELY AFTER BACKFILLING.

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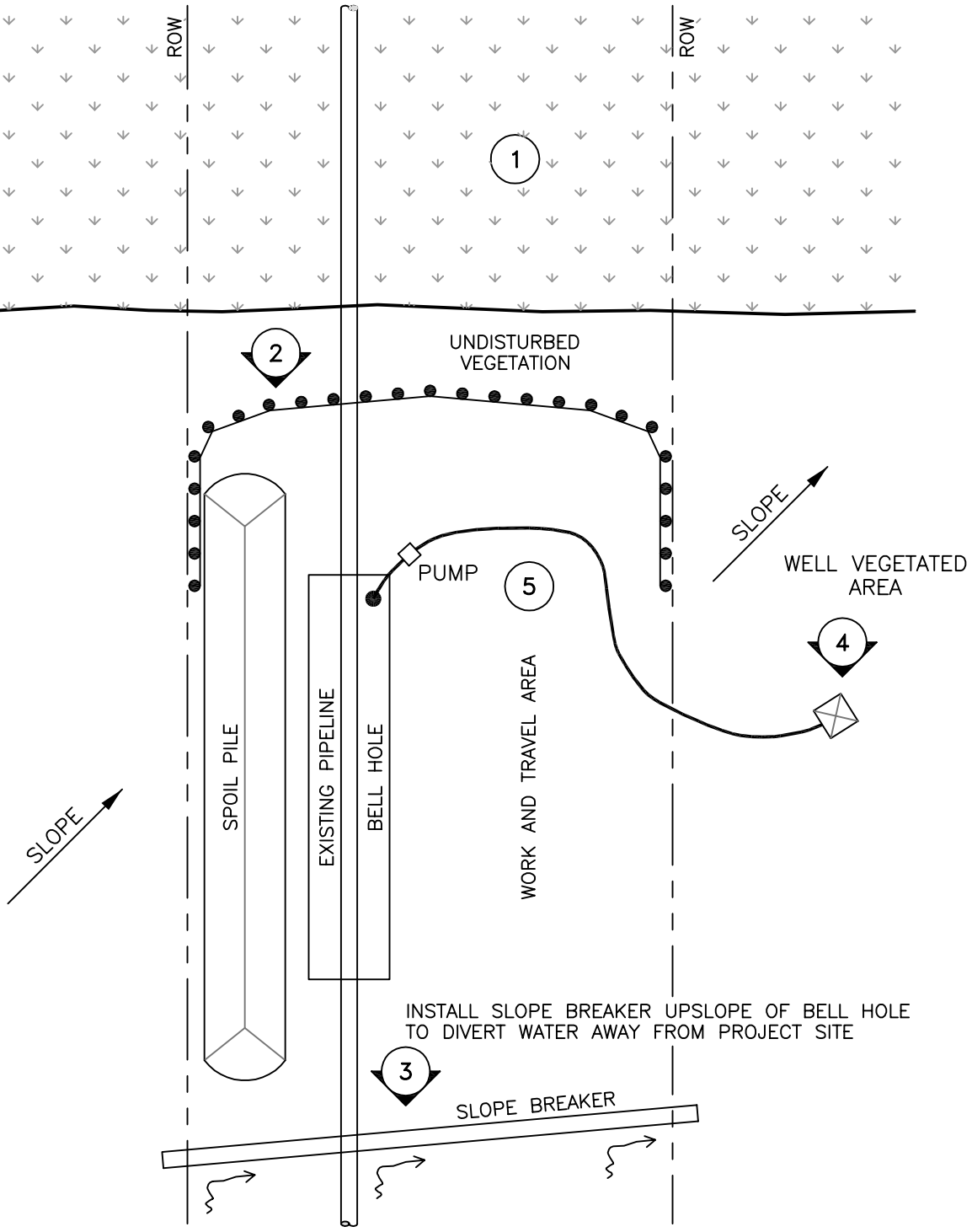
DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP33.dwg
LAST REVISION DATE: 01/17/2014

BELL HOLE NEXT TO WATERBODY

DRAWING NUMBER: 33

REVIEWED: 01/2014



1. REFER TO BMP NO. 4/4A FOR WETLAND CROSSING/TRAVEL REQUIREMENTS AND PROCEDURES.
2. REFER TO BMP NO. 5 FOR FILTER FENCE INSTALLATION AND BMP NO. 45A,B,C FOR COMPOST FILTER SOCK INSTALLATION AS PERMITTED AND AS PER PERMIT APPROVAL.
3. REFER TO BMP NO. 8A FOR SLOPE BREAKER INSTALLATION.
4. REFER TO BMP NO. 28 AND 31 FOR DEWATERING FILTER BAG AND ENERGY DISSIPATION.
5. ALL DISTURBED AREAS TO BE RESTORED AND STABILIZED IMMEDIATELY AFTER BACKFILLING.

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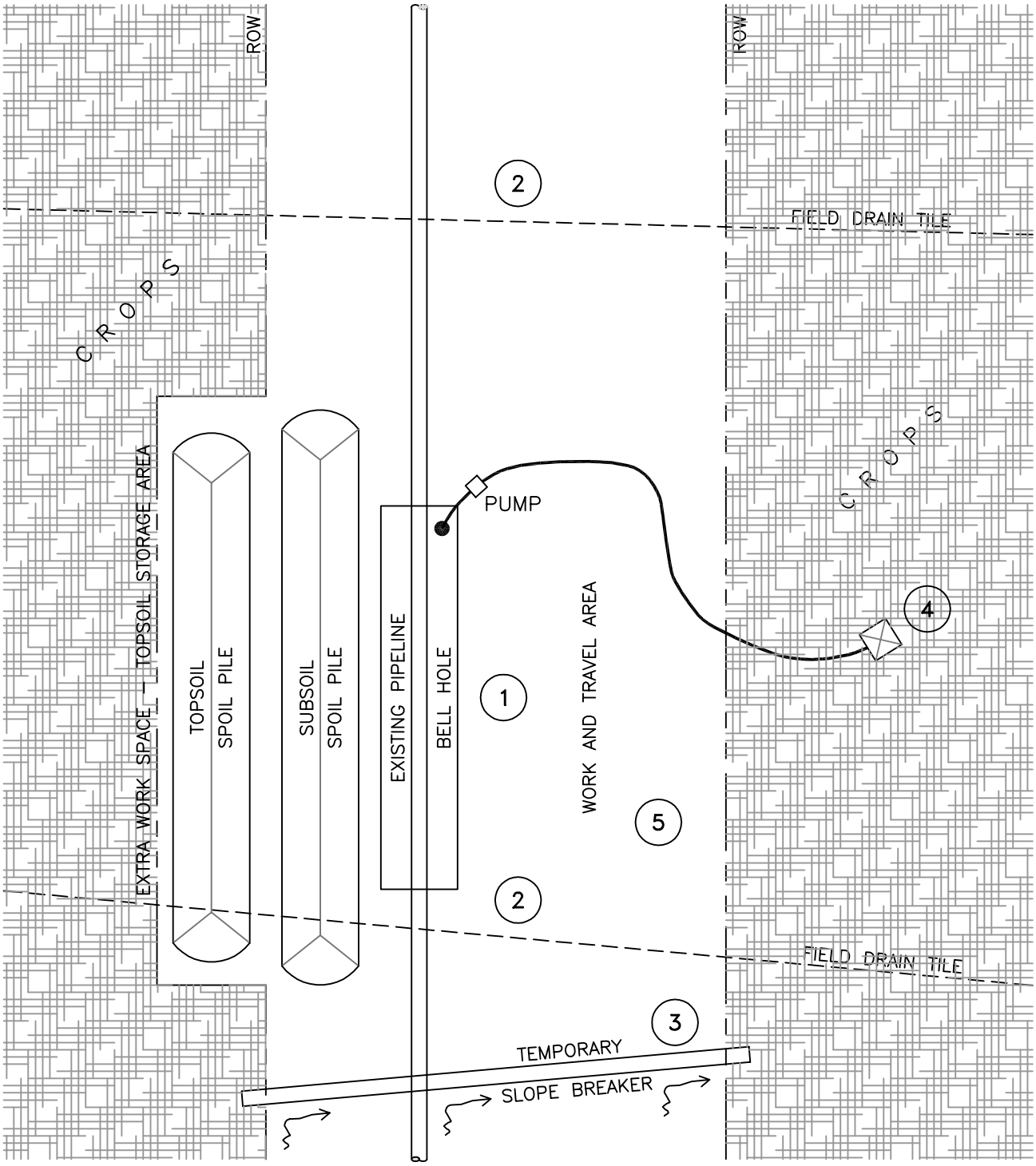
DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP34.dwg
LAST REVISION DATE: 01/17/2014

BELL HOLE NEXT TO WETLAND

DRAWING NUMBER: 34



1. REFER TO BMP NO. 23A AND 23B FOR FULL ROW TOPSOIL SEGREGATION REQUIREMENTS AND PROCEDURES.
2. REFER TO BMP NO. 30 AND 30A FOR DRAIN TILE REPAIR ACROSS TRENCH REQUIREMENTS AND PROCEDURES.
3. REFER TO BMP NO. 8A FOR SLOPE BREAKER INSTALLATION.
4. REFER TO BMP NO. 28 AND 31 FOR DEWATERING FILTER BAG AND ENERGY DISSIPATION.
5. ALL DISTURBED AREAS TO BE RESTORED AND STABILIZED IMMEDIATELY AFTER BACKFILLING.

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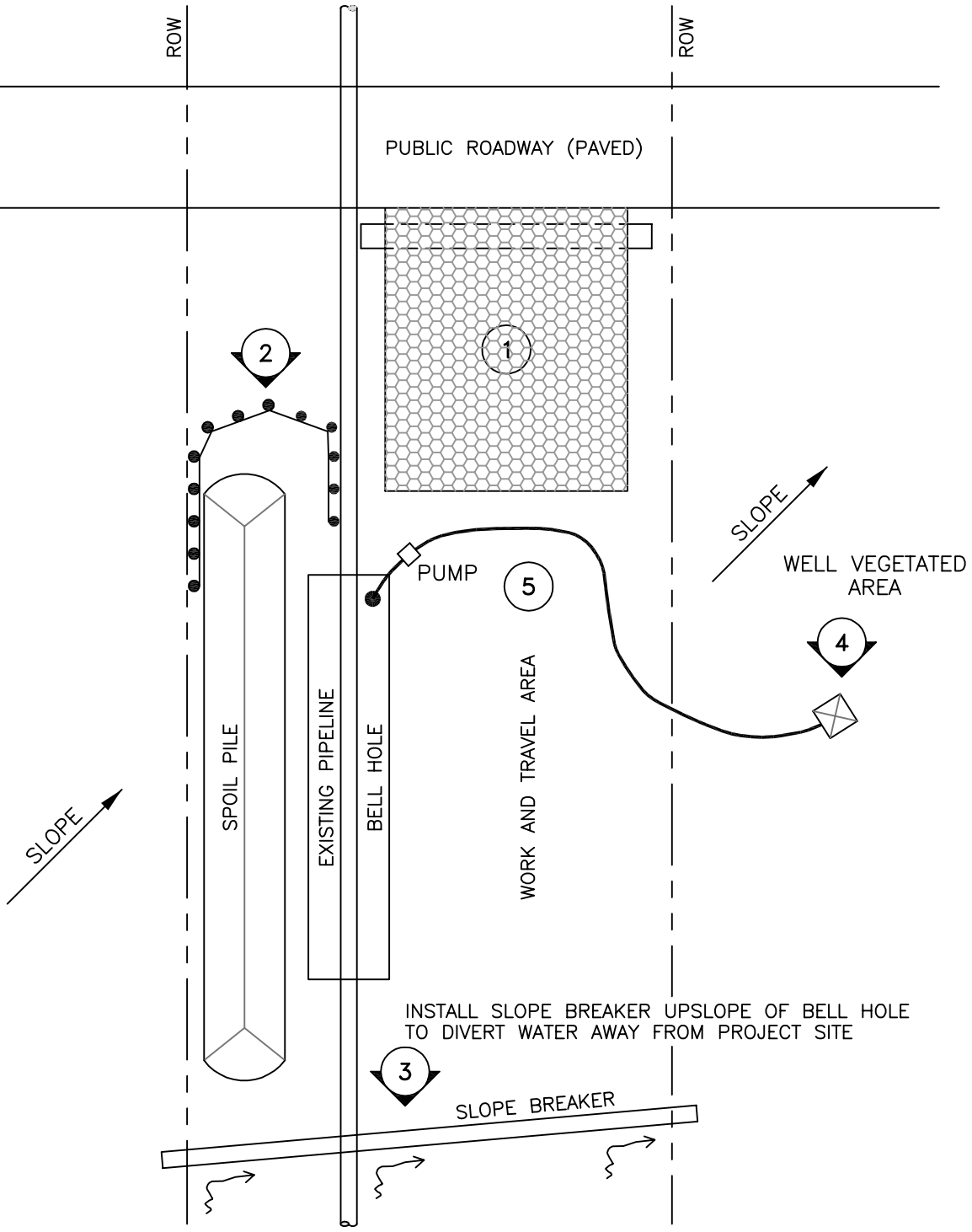

1. REFER TO BMP NO. 1 FOR ENTRANCE PAD INSTALLATION.
2. REFER TO BMP NO. 5 FOR FILTER FENCE INSTALLATION AND BMP NO. 45A,B,C FOR COMPOST FILTER SOCK INSTALLATION AS PERMITTED AND AS PER PERMIT APPROVAL.
3. REFER TO BMP NO. 8A FOR SLOPE BREAKER INSTALLATION.
4. REFER TO BMP NO. 28 AND 31 FOR DEWATERING FILTER BAG AND ENERGY DISSIPATION.
5. ALL DISTURBED AREAS TO BE RESTORED AND STABILIZED IMMEDIATELY AFTER BACKFILLING.

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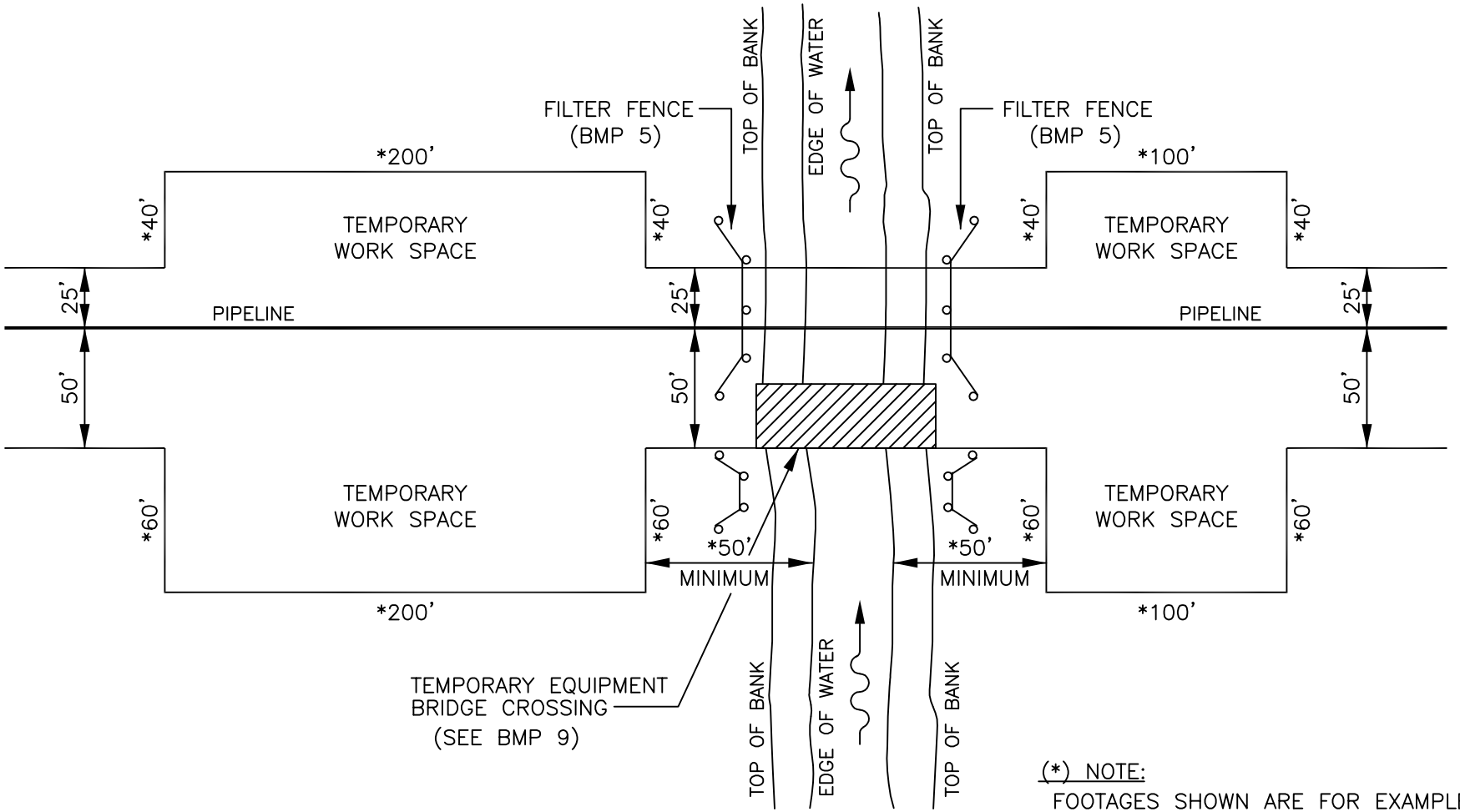
DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP36.dwg
LAST REVISION DATE: 01/17/2014

BELL HOLE ADJACENT TO PAVED ROAD

DRAWING NUMBER: 36



(*) NOTE:

FOOTAGES SHOWN ARE FOR EXAMPLE PURPOSES ONLY. ACTUAL EXTRA WORK SPACE AREAS WILL VARY DEPENDING ON INDIVIDUAL PROJECTS.

1. SPOIL REMOVED DURING TRENCH CONSTRUCTION OF CROSSING MAY BE PLACED 10 FT BACK FROM ORDINARY HIGH WATER MARK PROVIDED E&S CONTROLS INSTALLED.

2. UNDISTURBED VEGETATION BUFFER SHALL BE 25 FT OR TO EDGE OF EXISTING NON-NATIVE VEGETATION WHERE THAT DISTANCE IS <25 FT.

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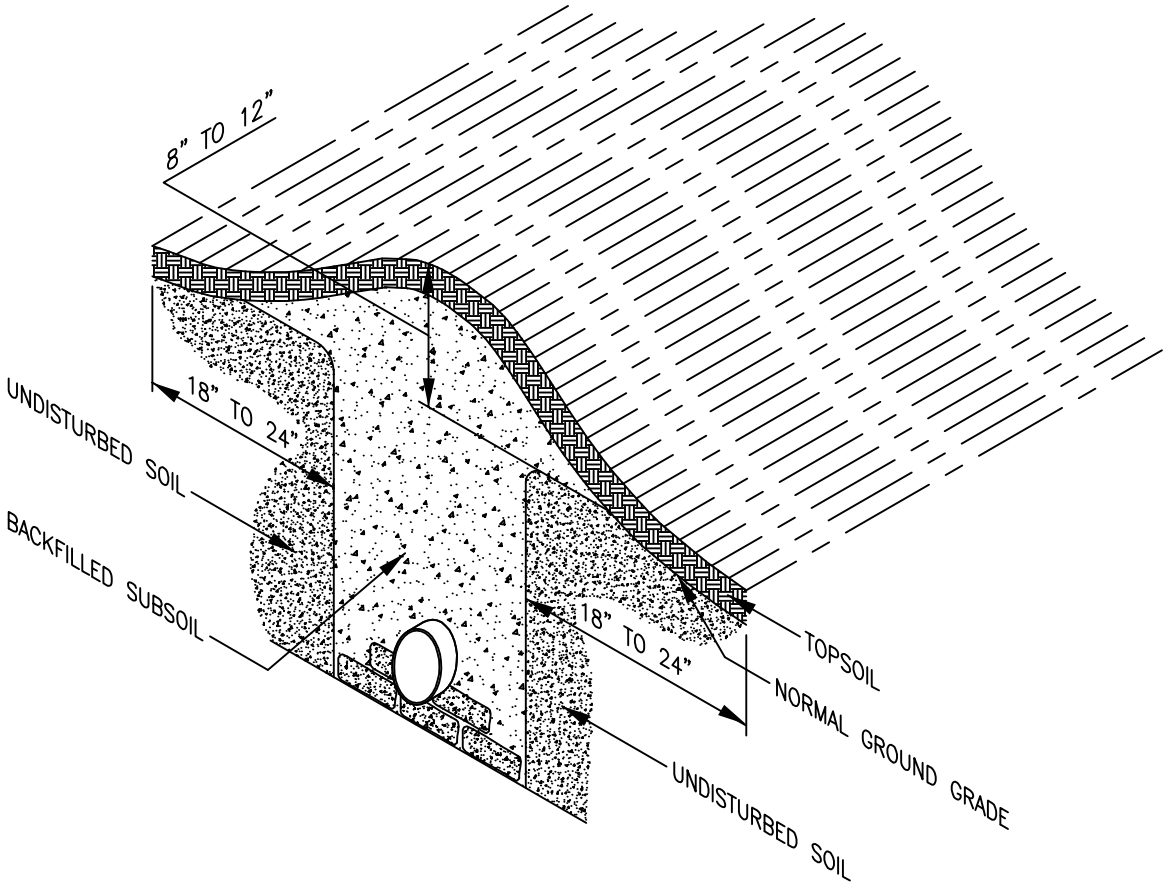
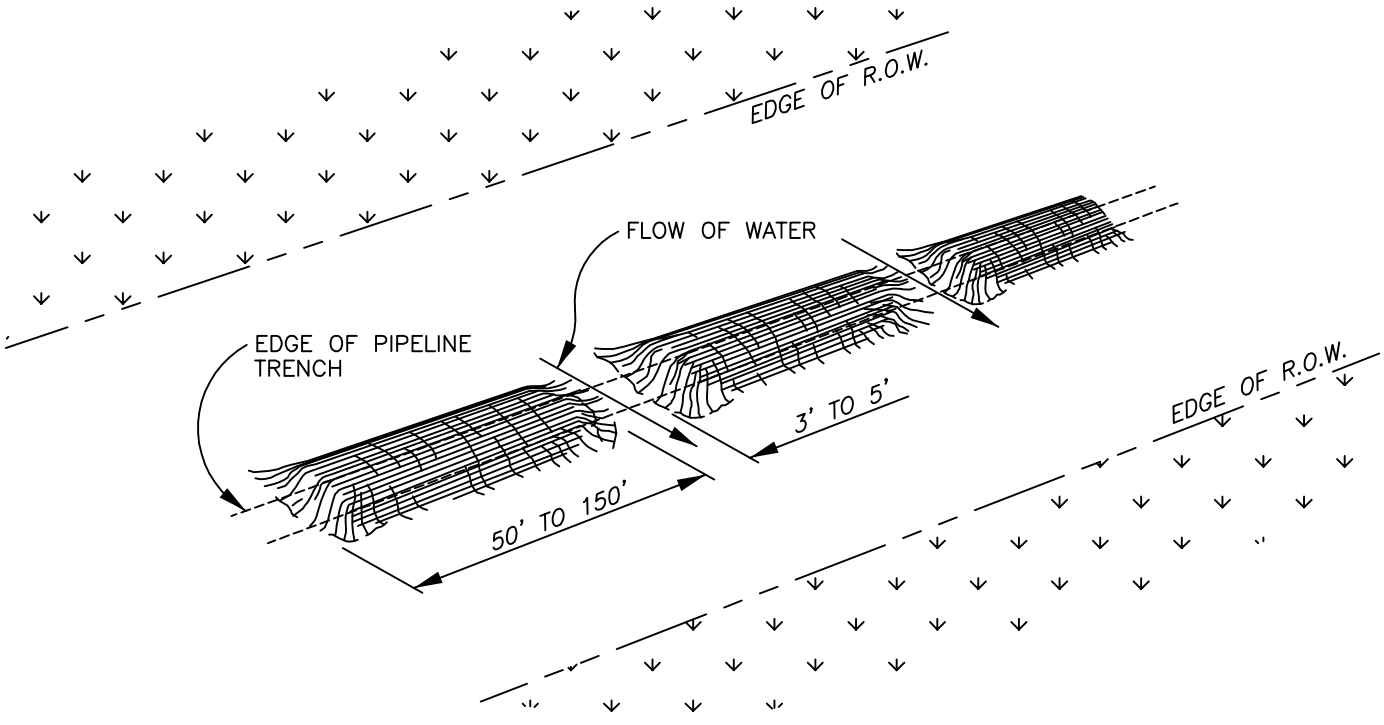
DRAWN BY: L. A. PHILLIPS
FILENAME: EPC\BMP37.dwg
LAST REVISION DATE: 01/17/2014

EXTRA WORK SPACES

DRAWING NUMBER: 37

CREST OF BACKFILL TO BE 8" TO 12" HIGH OVER CENTER LINE OF TRENCH AND FEATHERED OUT TO ZERO 18" TO 24" FROM TRENCH WALL





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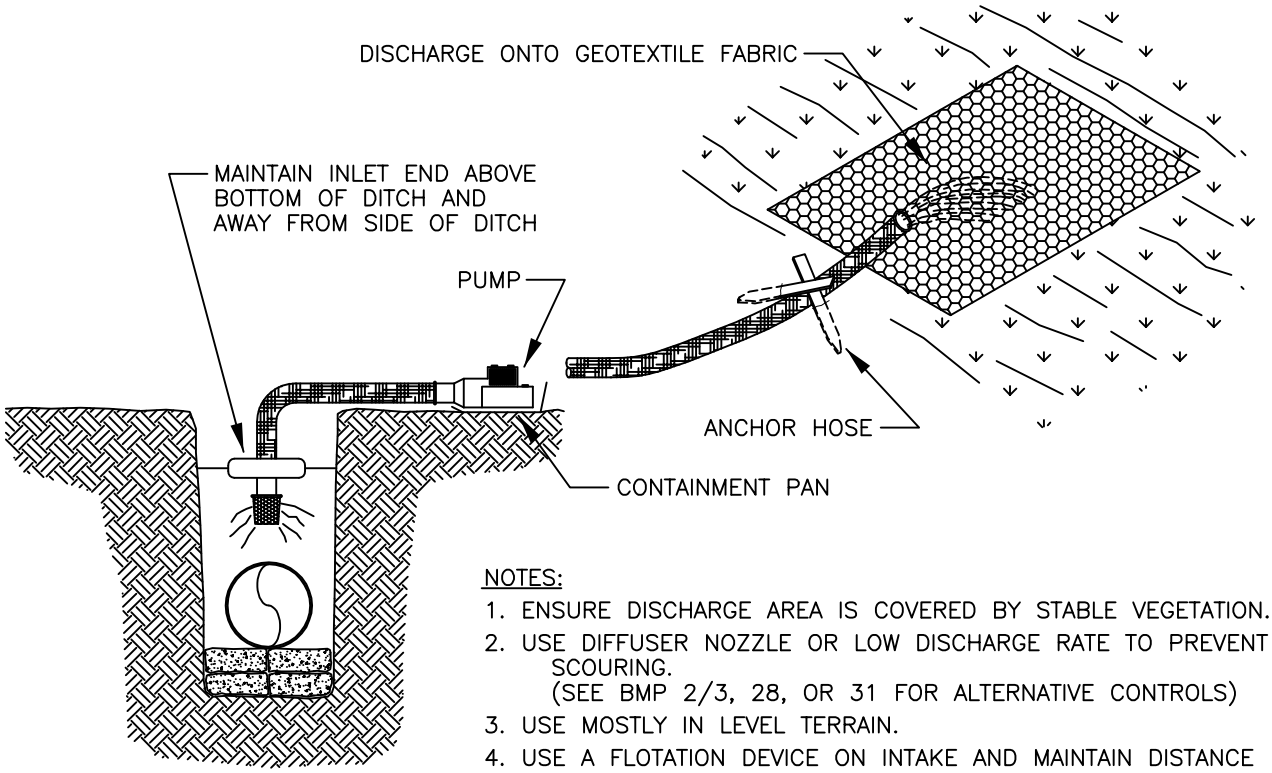
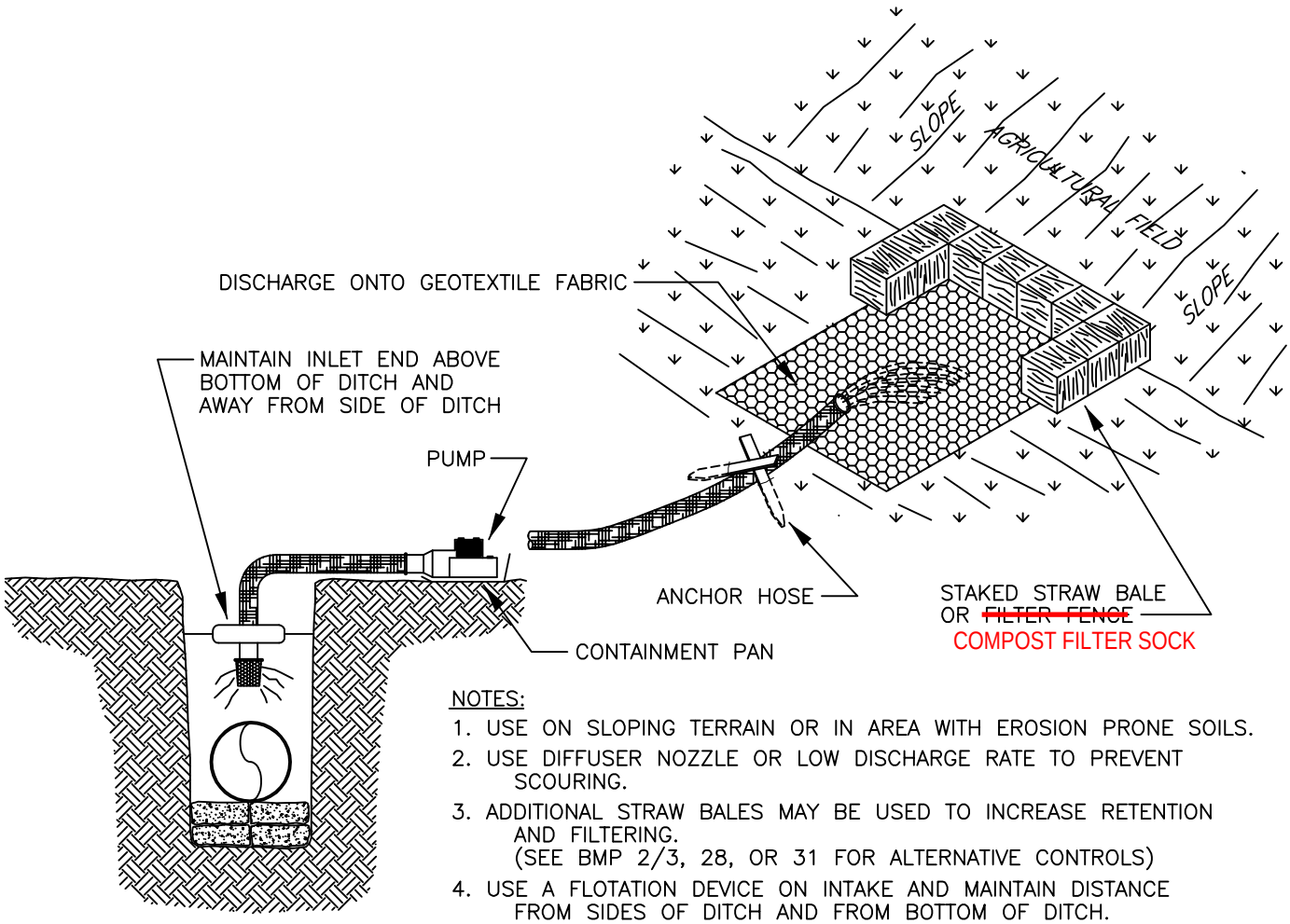


NOTES:

1. ENSURE DISCHARGE AREA IS COVERED BY STABLE VEGETATION.
2. USE DIFFUSER NOZZLE OR LOW DISCHARGE RATE TO PREVENT SCOURING.
   (SEE BMP 2/3, 28, OR 31 FOR ALTERNATIVE CONTROLS)
3. USE MOSTLY IN LEVEL TERRAIN.
4. USE A FLOTATION DEVICE ON INTAKE AND MAINTAIN DISTANCE FROM SIDES OF DITCH AND FROM BOTTOM OF DITCH.



NOTES:

1. USE ON SLOPING TERRAIN OR IN AREA WITH EROSION PRONE SOILS.
2. USE DIFFUSER NOZZLE OR LOW DISCHARGE RATE TO PREVENT SCOURING.
3. ADDITIONAL STRAW BALES MAY BE USED TO INCREASE RETENTION AND FILTERING.
   (SEE BMP 2/3, 28, OR 31 FOR ALTERNATIVE CONTROLS)
4. USE A FLOTATION DEVICE ON INTAKE AND MAINTAIN DISTANCE FROM SIDES OF DITCH AND FROM BOTTOM OF DITCH.

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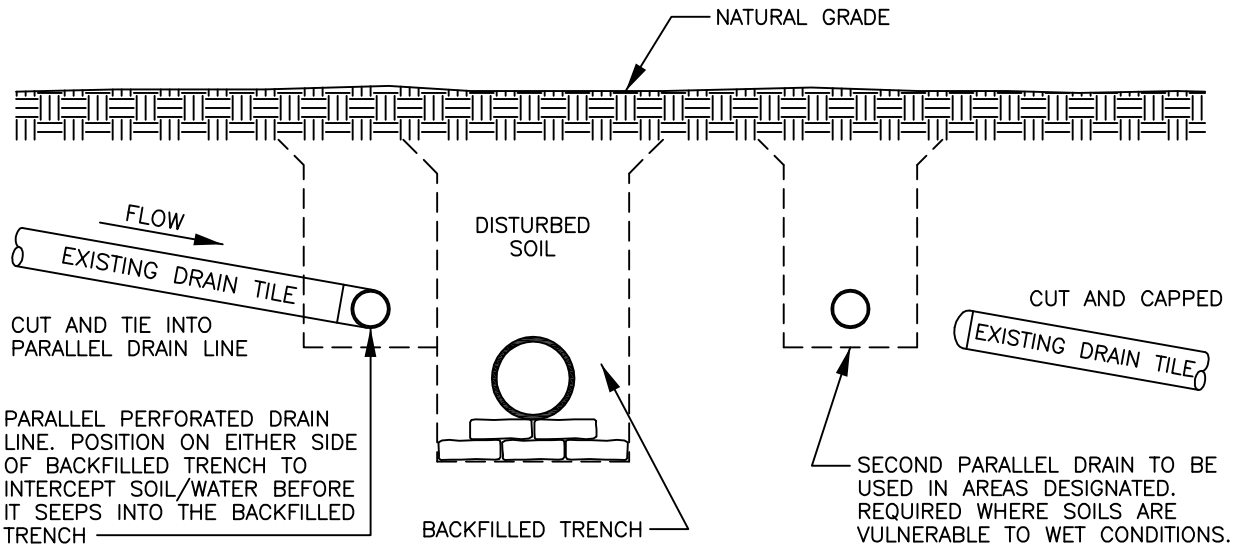
DRAWN BY: L. A. PHILLIPS
FILENAME: EPC\BMP39.dwg
LAST REVISION DATE: 01/17/2014

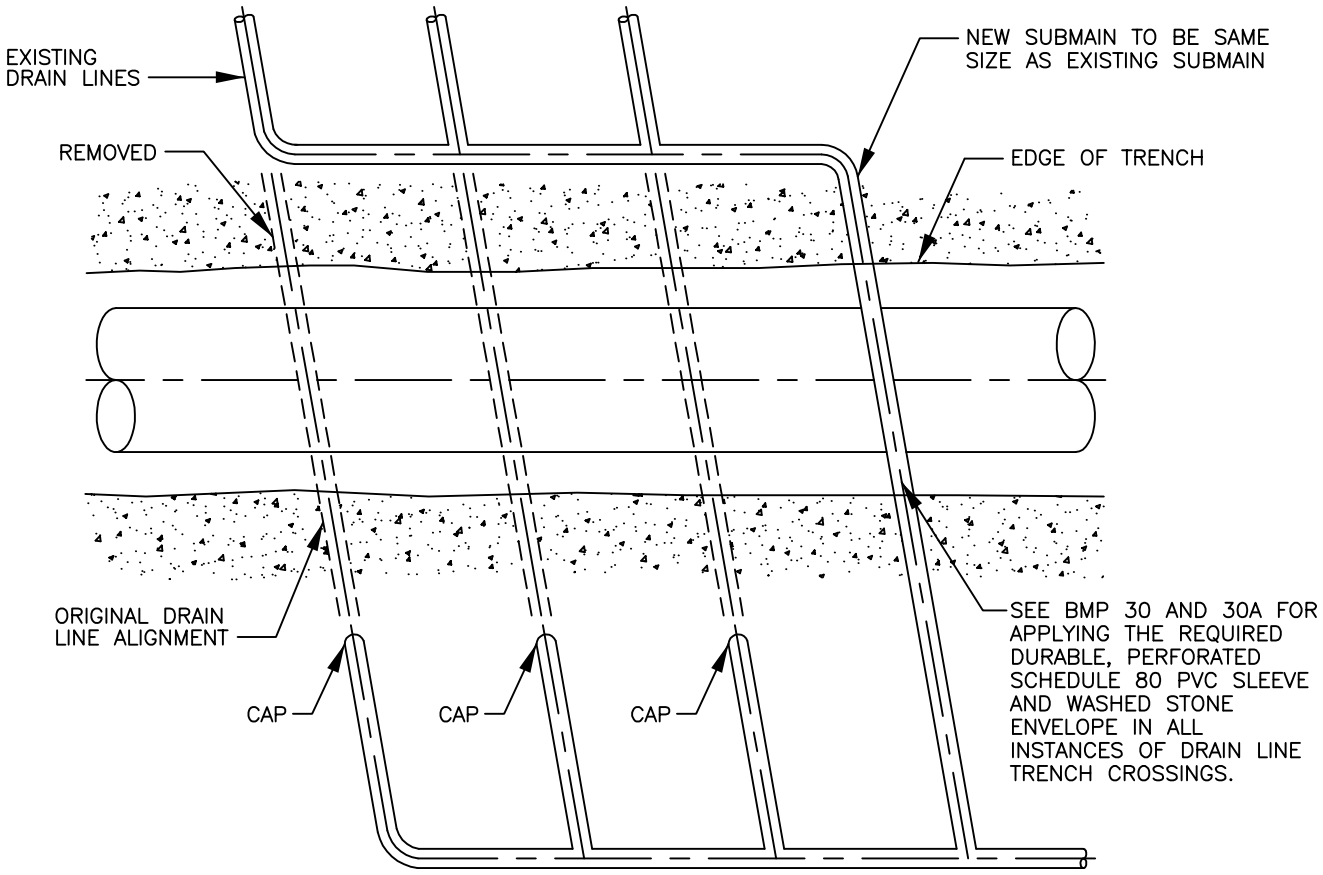
DISCHARGE METHOD FOR TRENCH DEWATERING

DRAWING NUMBER: 39



NOTE:

1. PARALLEL DRAINAGE TILE INSTALLATION TO BE APPROVED FOR SITE SPECIFIC AGRICULTURAL SOILS WHERE REPAIR OF EXISTING CROSS TILES WOULD BE LESS EFFECTIVE FOR EXAMPLE:
   A. SHALLOW BEDROCK.
   B. INTERFERENCE BY OTHER UTILITY LINES.
   C. TO HEADER CLOSELY SPACED SHALLOW TILES AND FRENCH DRAINS.
2. PARALLEL/NEW SUBMAIN TILE INSTALLATION MUST ACCOUNT FOR THE ISSUE OF LONG–TERM ROW SATURATION; AND MUST BE APPROVED BY THE AGRICULTURAL DRAINAGE SPECIALIST.



PLAN VIEW TILE SYSTEM WITH NEW SUBMAIN

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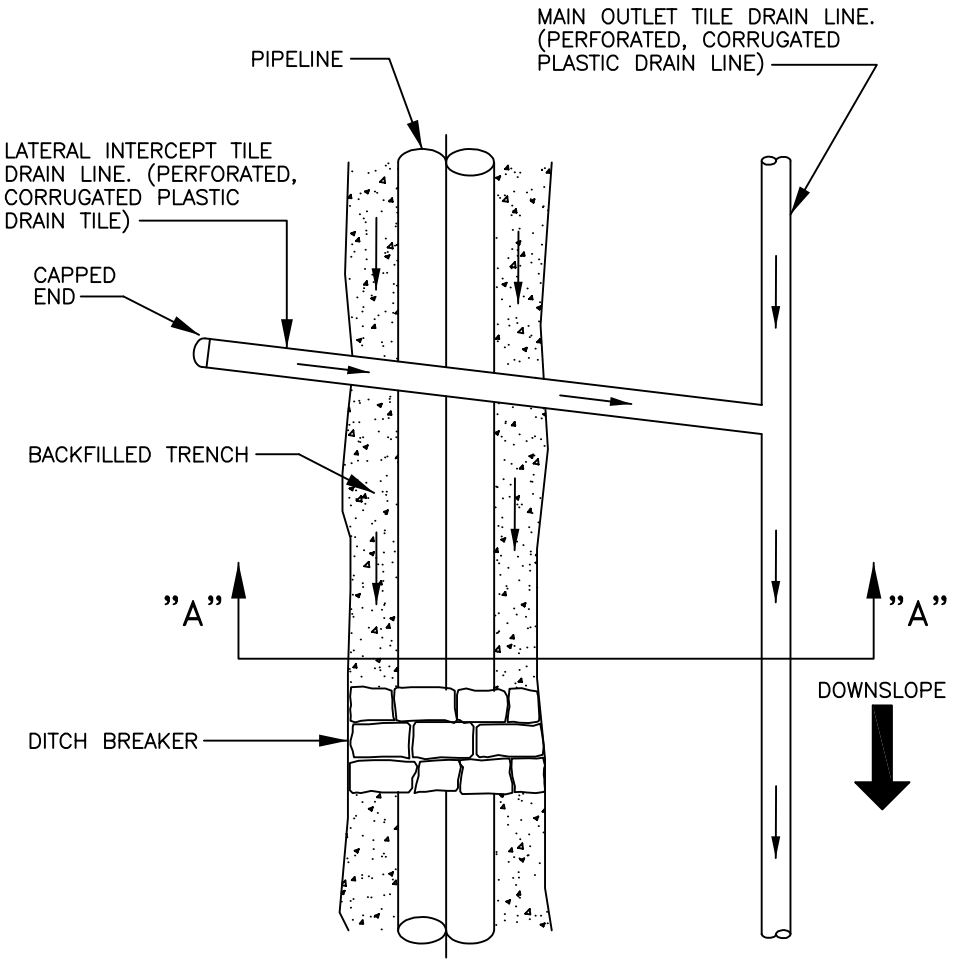
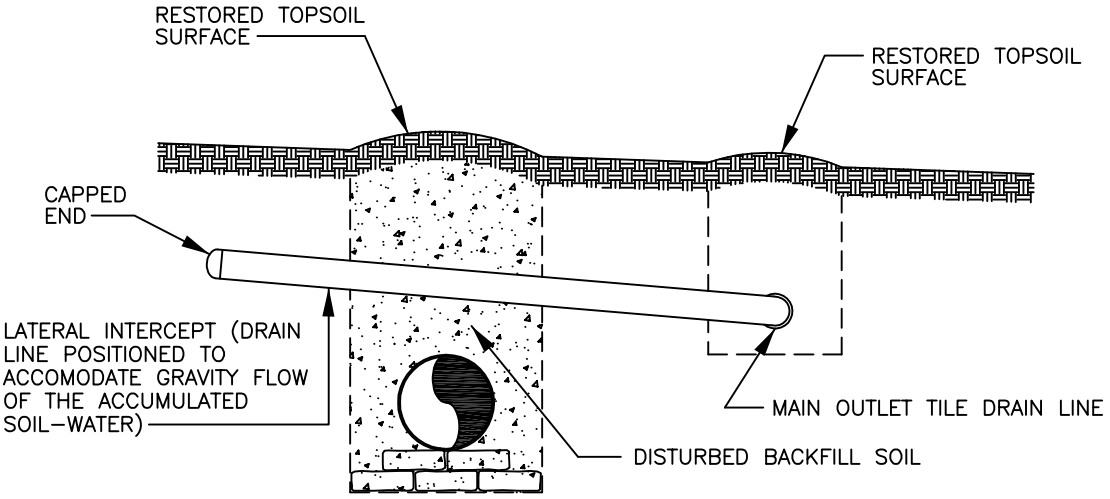


PLAN



PROFILE – SECTION "A"–"A"

NOTES:

1. DITCH BREAKERS PREVENT GULLY EROSION WHILE TRENCH IS OPEN AND HELP INHIBIT WATER PIPING AND WATER BLOWOUTS DOWN THE COURSE OF THE PIELINE AFTER BACKFILLING.
2. INTERCEPT DRAIN LINES ABSORB THE SOIL AND WATER WHICH DRAIN NATURALLY FROM THE UNDISTURBED SOIL PROFILE INTO THE DISTURBED BACKFILL SOIL MATERIAL OF THE TRENCH. THE INTERCEPT DRAIN LINES HELP PREVENT SATURATED SOIL CONDITIONS.
3. AGRICULTURAL CROPLAND MAY REQUIRE CROSS TRENCH DRAINAGE OR PARALLEL DRAINAGE.

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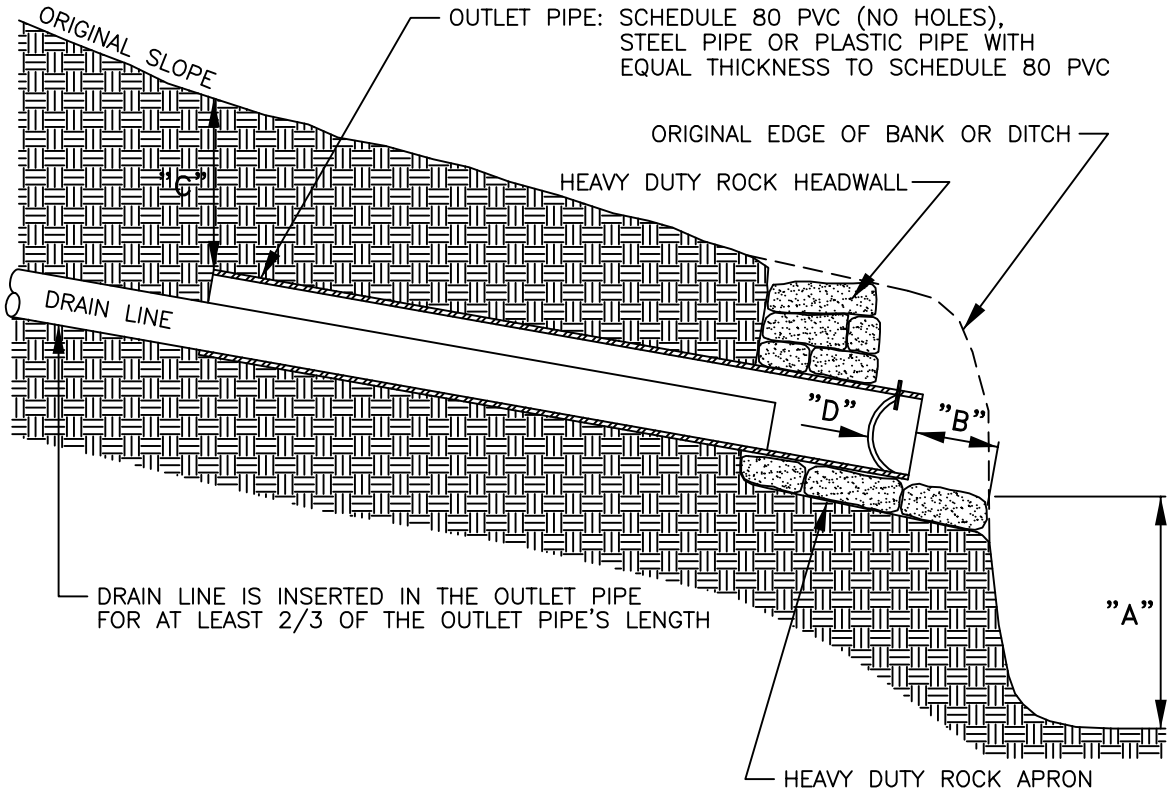

"A" – THE FREE DROP OR OUTFALL DISTANCE OF THE DRAINAGE WATER TO ITS UNRESTRICTED (FREE) DAYLIGHT OUTLET. GUIDELINE IS 2 FEET BUT NOT LESS THAN 1 FOOT WITHOUT SPECIAL DESIGN APPROVAL.

"B" – THE RECESS BACK FROM THE EDGE OF THE BANK OR DITCH OR OTHER POINT OF DAYLIGHT. GUIDLINE IS 2 FEET RECESSED BACK TO AVOID FUTURE DAMAGE.

"C" – THE MINIMUM DEPTH OF COVER OVER THE DRAIN LINE AT WHICH THE OUTLET PIPE MUST BEGIN. THE MINIMUM IS 2 FEET.

"D" – AN INTERNALLY HINGED ANIMAL (RODENT) GUARD, BOLTED FROM THE OUTSIDE. MOUNT THE GUARD 4"–6" BACK INSIDE THE OUTLET PIPE.

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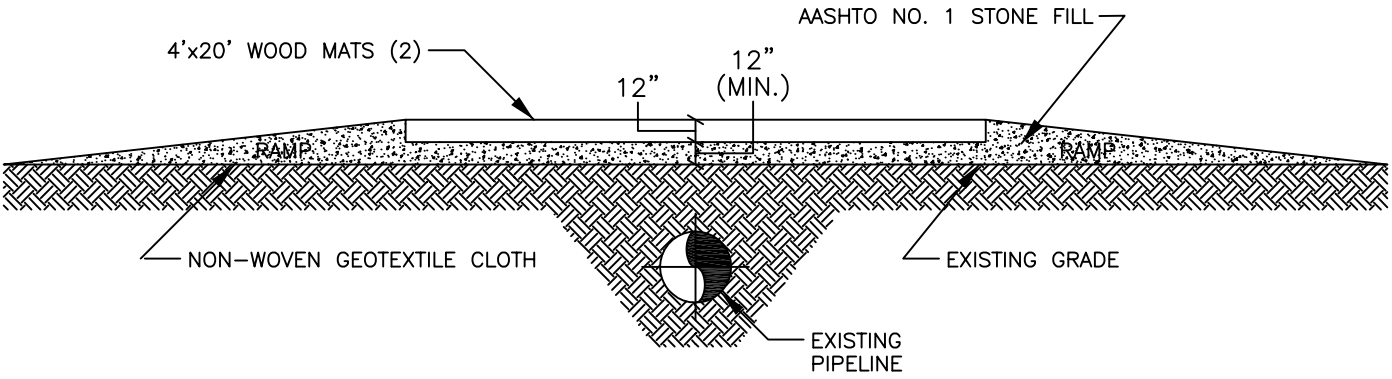

N O T E S
1. ADDITIONAL STONE DEPTH MAY BE REQUIRED – CONTACT ENGINEERING.
2. WOOD MATS WILL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.
3. STONE FILL TO BE SUPPLIED AND INSTALLED BY THE CONTRACTOR. INSTALL 1 (ONE) LAYER OF NON–WOVEN GEOTEXTILE CLOTH PRIOR TO INSTALLING THE STONE.
4. ADDITIONAL MATS, IF NEEDED, WILL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.

SPECIAL NOTE:

PROPOSED VEHICLE & EQUIPMENT WHEEL / TRACK LOAD WEIGHTS SHALL BE PROVIDED TO NFG ENGINEERING SERVICES TO DETERMINE IF ADDITIONAL MEASURES ARE NECESSARY BASED ON THE SPECIFIC PIPELINE TO BE CROSSED.

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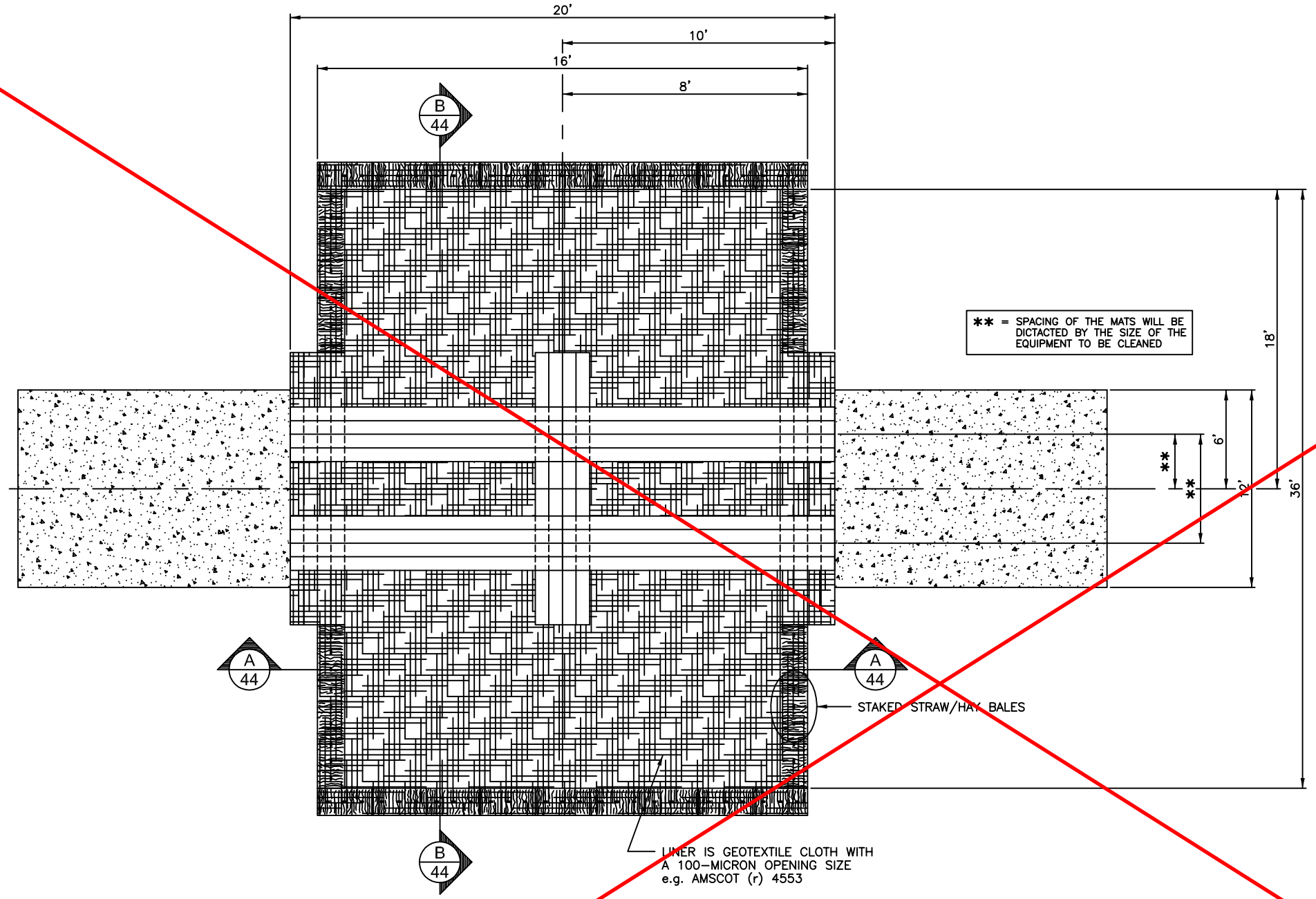
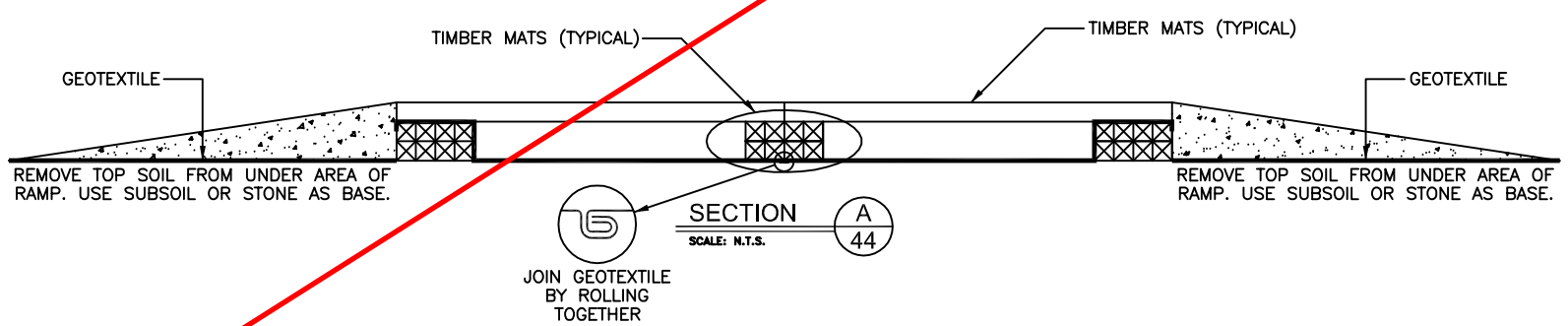
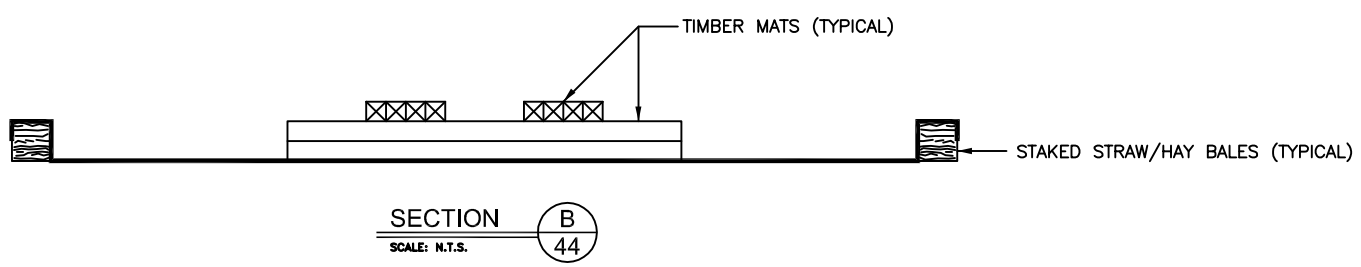
DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP43.dwg
REVISED DATE: 01/17/2014

TEMPORARY WOODEN MAT PIPELINE CROSSING

DRAWING NUMBER: 43







NOTES:

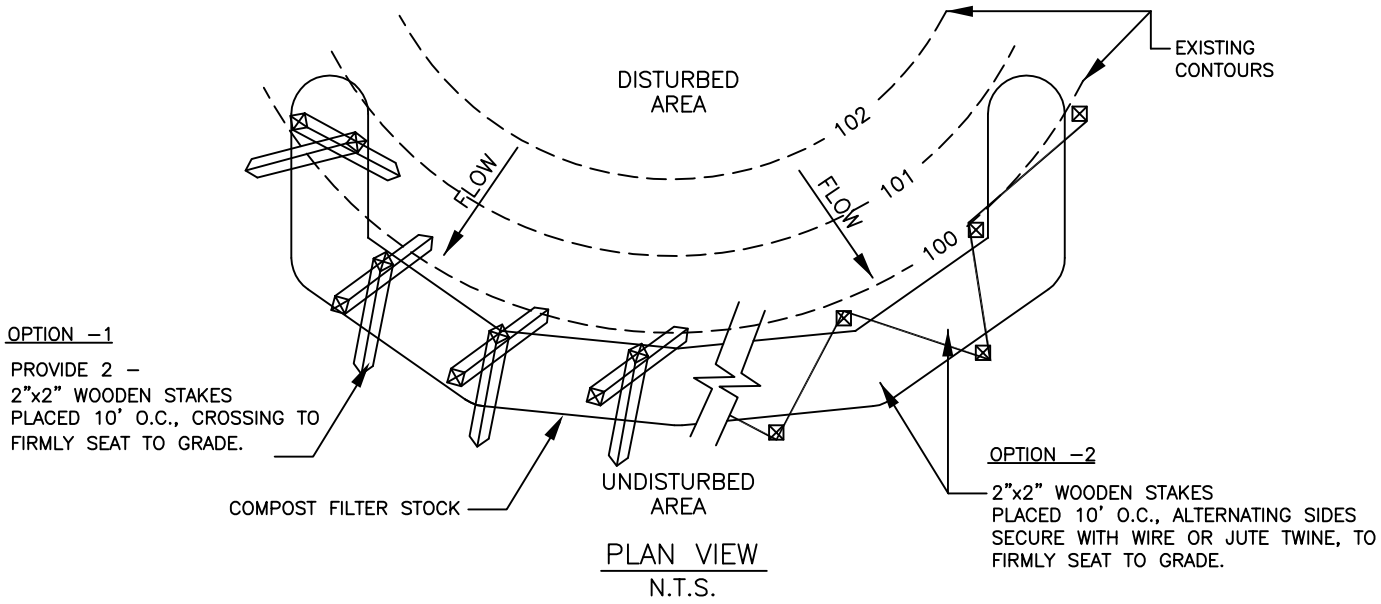
1. WASH STATION MUST BE WITHIN THE ENVIRONMENTALLY CLEARED RIGHT-OF-WAY AND OUTSIDE THE 100' WETLAND BUFFER ZONE.
2. IF WASH STATION IS IN AGRICULTURAL LANDS, REMOVE THE TOPSOIL AND STOCKPILE. BEFORE THE TOPSOIL IS REPLACED, THE SUBSOIL MUST BE DECOMPACTED AND ROCKS REMOVED. THE TOPSOIL MOISTURE MUST PASS THE ATTERBERG TEST PRIOR TO SPREADING THE TOPSOIL.
3. THE LOCATION OF THE PUMPING EQUIPMENT, WATER SUPPLY AND SPRAY EQUIPMENT WILL BE DICTATED BY THE LOCATION OF THE WASH STATION.
4. AFTER THE EQUIPMENT WASHING IS COMPLETE, FOLD OR ROLL THE GEOTEXTILE (CAUTION WILL BE EXERCISED NOT TO SPILL ANY OF THE CONTAINED MATERIAL) AND REMOVE TO AN APPROPRIATE DISPOSAL SITE. REMOVE THE CLEANING EQUIPMENT, RAMPS AND STRAW/HAY BALES AND COMPLETE THE CLEANUP.

National Fuel SUPPLY CORPORATION

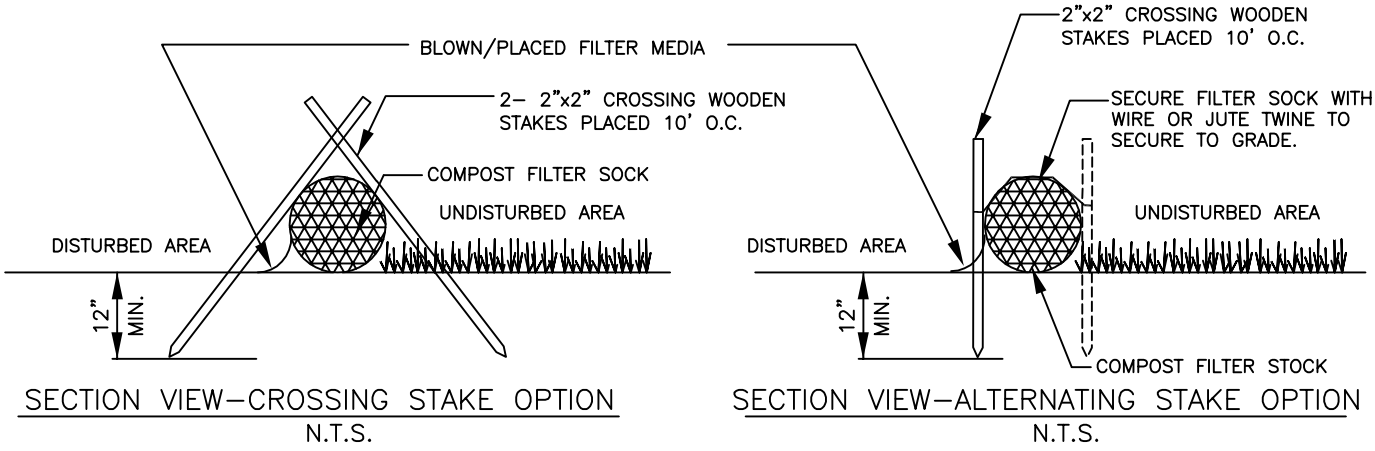
DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP44.dwg
DATE: 05/03/2007

ELEVATED WASHRACK

DRAWING NUMBER: 44



PLAN VIEW
N.T.S.



SECTION VIEW–CROSSING STAKE OPTION
N.T.S.

SECTION VIEW–ALTERNATING STAKE OPTION
N.T.S.

Adapted from Filtrexx

Sock fabric shall meet standards of Table 4.1.
Compost shall meet the following standards:

Oganic Matter Content	80% – 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 – 8.0
Moisture Content	35% – 55%
Particle Size	98% pass through 1" screen
Soluable Salt Concentration	5.0 dS Maximum

Compost Filter Sock shall be placed at existing level grade. Both ends of the sock shall be extended at least 8 feet up slope at 45 degrees to the main sock alignment (see Figure 4.1). Maximum slope length above any sock shall not exceed that shown on Figure 4.2.

Traffic shall not be permitted to cross filter socks.

Accumulated Sediment shall be removed when it reaches 1/2 the above ground height of the sock and disposed in the manner described elsewhere in the plan.

Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Biodegradable filter sock shall be replaced after 6 months; photodegradable socks after 1 year. Polypropylene socks shall be placed according to manufacturer's recommendations.

Upon stabilization of the disturbed area to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh shall be cut open and the mulch spread as a soil pupplement, dispose of mesh.

National Fuel Supply Corporation
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ERIE, PA. 16512
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DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP45a.dwg
DATE: 12/09/2013

COMPOST FILTER SOCK
(FOR PENNSYLVANIA USE)

DRAWING NUMBER: 45A
SHEET 1 OF 3

Compost Filter Sock

Sediment Removal Efficiency: HIGH. This devise is an ABACT (Antidegradation Best Available Combination of Technologies) for HQ and EV watersheds.

Compost filter socks are a type of contained compost filter berm. They consist of a biodegradable or photodegradable mesh tube filled (typically using a pneumatic blower) with a coarse compost filter media that meets certain performance criteria (e.g. hydraulic flow through rate, total solids removal efficiency, total suspended solids removal efficiency, turbidity reduction, nutrient removal efficiency, metals removal efficiency, and motor oil removal efficiency).

Filter socks are flexible and can be filled in place or filled and moved into position. They are especially useful on steep slopes. Heavy vegetation should be removed prior to installing the sock. Filter socks can also be used on rocky slopes if sufficient preparation is made to ensure good contact of the sock with the underlying soil along its entire length. They may also be used on pavement as a perimeter control. Socks used in this manner range in diameter from 8" to 32". **Note:** Some settlement of the tube typically occurs after installation. The diameter of the sock tube is the dimension to be used for slope design purposes (Figure 4.2). Socks with diameters less than 12" should only be used for residential housing lots of ½ acre or less that are a branch to a sediment basin or sediment trap.

As with other sediment barriers, filter socks must be placed parallel to contour with both ends of the sock extended upslope at a 45-degree angle to the rest of the sock to prevent end-arounds (See Figure 4.1). Socks placed on earthen slopes should be anchored with stakes driven through the center of the sock (see Standard Construction Detail 4-1) at intervals recommended by the manufacturer. Where socks are placed on paved surfaces, concrete blocks should be used immediately down-slope of the socks to help hold the sock in place.

The maximum slope length above a filter sock should not exceed those shown in Figure 4.2.

The anticipated functional life of a biodegradable filter sock should be 6 months; for photodegradable socks 1 year. Projects with anticipated disturbances lasting longer than the functional life of a sock should plan to replace the socks periodically or use another type of BMP.

Upon stabilization of the disturbed area, the filter sock may be left in place and vegetated or removed. In the latter case, the mesh is typically cut open and the compost/mulch spread as a soil supplement, the mesh is removed from the site and disposed of.

Filter socks using other fillers may be approved on a case-by-case basis if sufficient supporting information (including manufacturer's specs and independent test data) is provided.

TABLE 4.1 Compost Sock Fabric Minimum Specifications		
Material Type	**5 mil HDPE**	**5 mil HDPE**
Material Characteristics	Bio-degradable	Photo-degradable
Sock Diameters	12-inch 18-inch 24-inch 32-inch	12-inch 18-inch 24-inch 32-inch
Mesh Opening	3/8"	3/8"
Tensile Strength	26 psi	26 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	-----	23% at 1000 hr.
Minimum Functional Longevity	6 months	9 months
Two-ply Systems		
Inner Containment Netting	HDPE biaxial net	
	Continuously wound	
	Fusion-welded junctures	
	3/4" x 3/4" Max. aperture size	
Outer Filtration Mesh	Composite Polypropylene Fabric (Woven layer & non-woven fleece Mechanically fused via needle punch)	
	3/16" Max. aperture size	
Sock fabrics composed of burlap may be used on projects lasting 6 months or less.		

FIGURE 4.2

Maximim Permissible Slope Lengths Above Compost Filter Socks

12-inch Sock Diameter		18-inch Sock Diameter	
Maximum Slope Length (ft)	**Percent Slope**	**Maximum Slope Length (ft)**	**Percent Slope**
520	2	700	2
210	5	340	5
170	10	240	10
120	15	200	15
90	20	140	20
60	25	100	25
45	30	80	30
40	35	60	35
35	40	50	40
30	45	30	45
25	50	20	50

National Fuel Supply Corporation

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1100 STATE STREET
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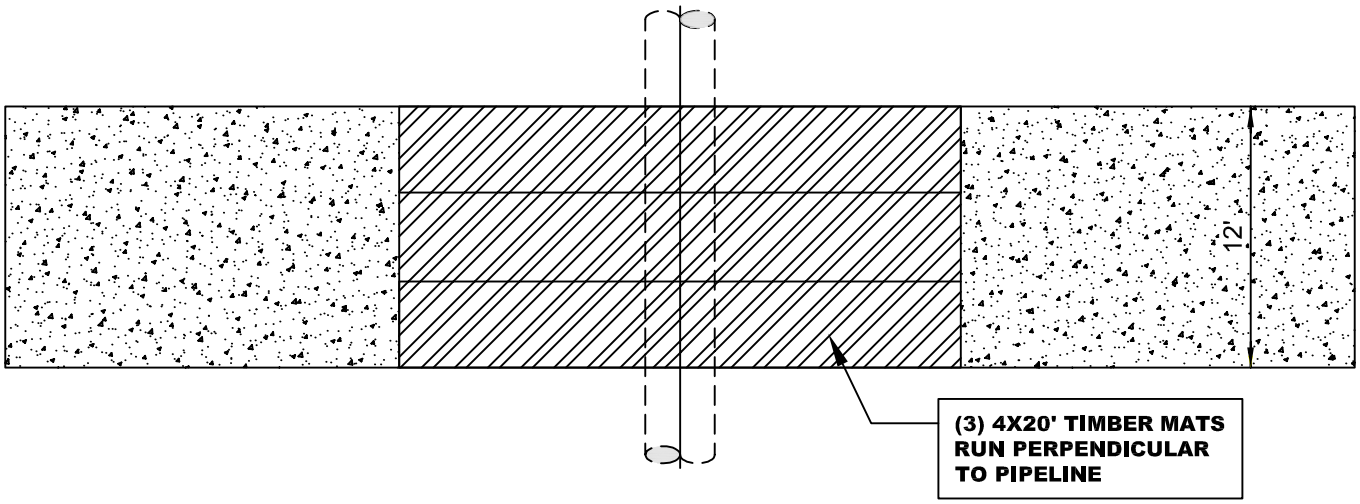
ERIE, PA. 16512
(814) 871-8676

DRAWN BY: L. A. PHILLIPS
FILENAME: NFGSC\BMP45c.dwg
DATE: 03/11/2010

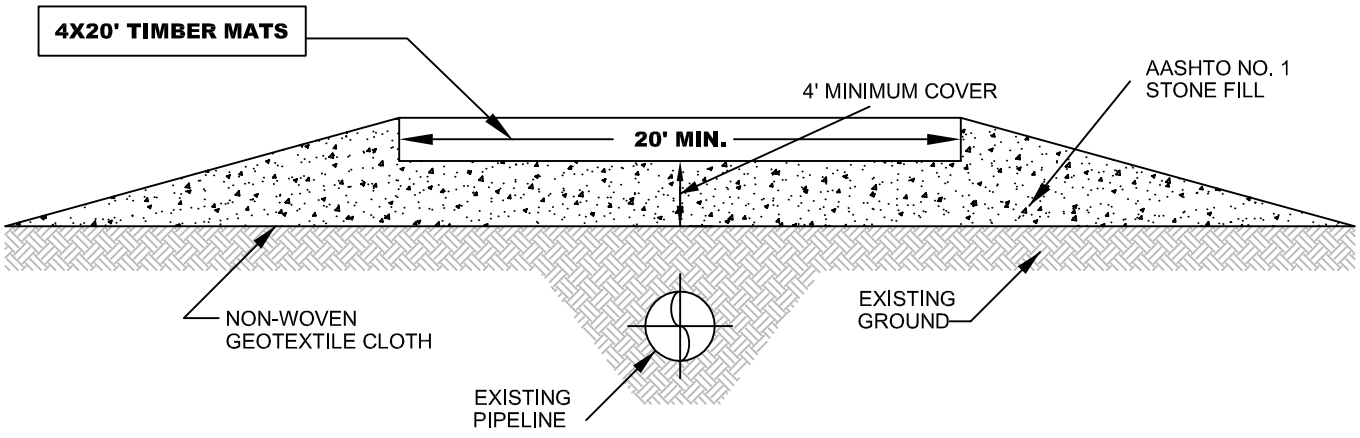
COMPOST FILTER SOCK

DRAWING NUMBER: 45C
SHEET 3 OF 3

PLAN VIEW



SIDE VIEW



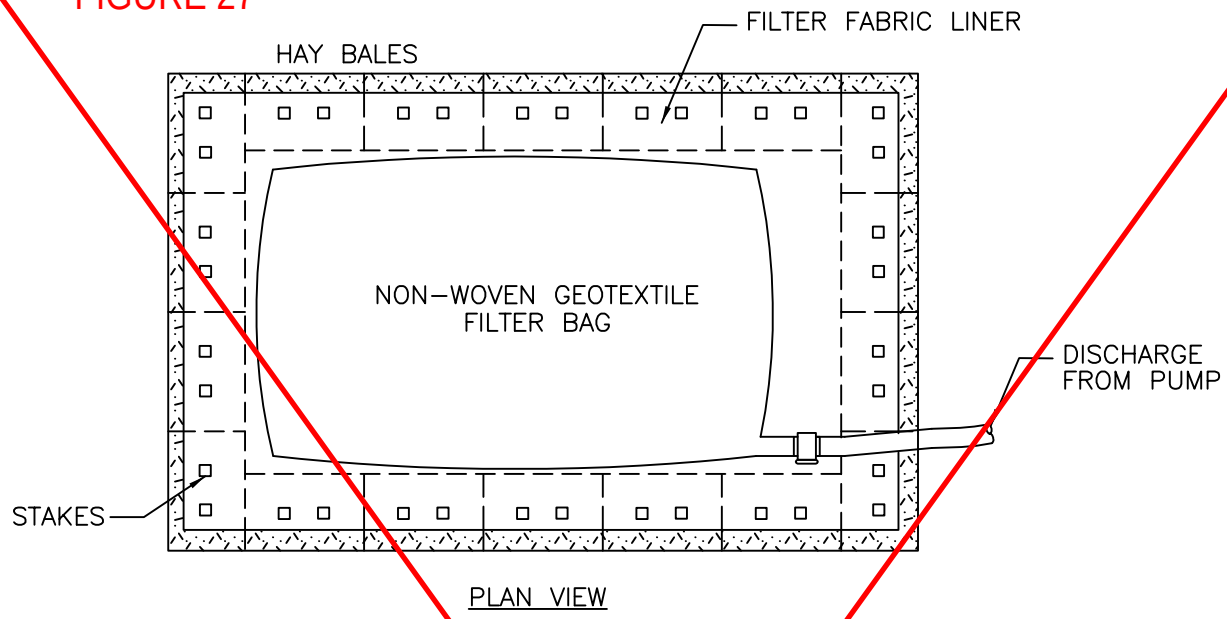
National Fuel
SUPPLY CORPORATION

STONE PIPELINE CROSSING WITH TIMBER MATTING BMP 46

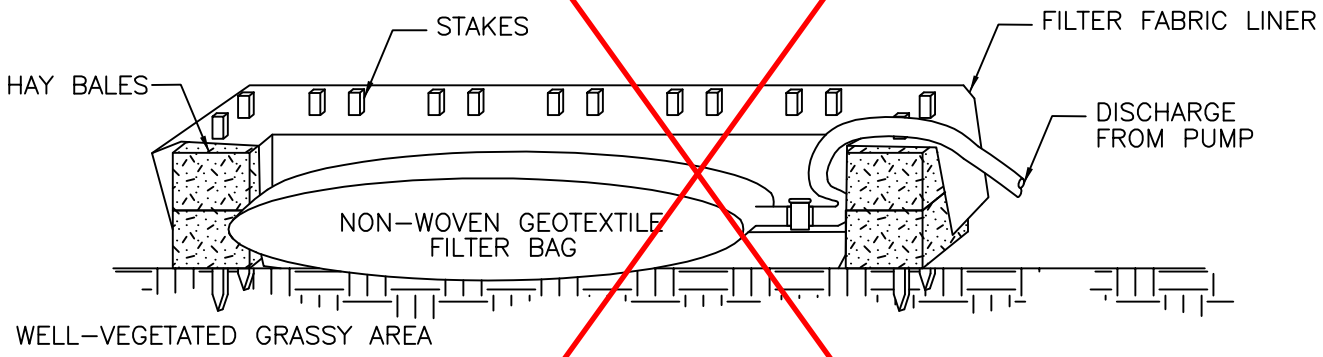
ENGINEERING DEPARTMENT
GEOMATICS SECTION
1100 STATE STREET
ERIE, PENNSYLVANIA 16501

DATE:	DRAWN BY:	APPROVED BY:
01/17/2014	Gary Hoffacker	M. P. WALLACE
SCALE: N.T.S.	FILENAME: BMP46.DWG	

REFER TO E&S DETAILS,
FIGURE 27



PLAN VIEW



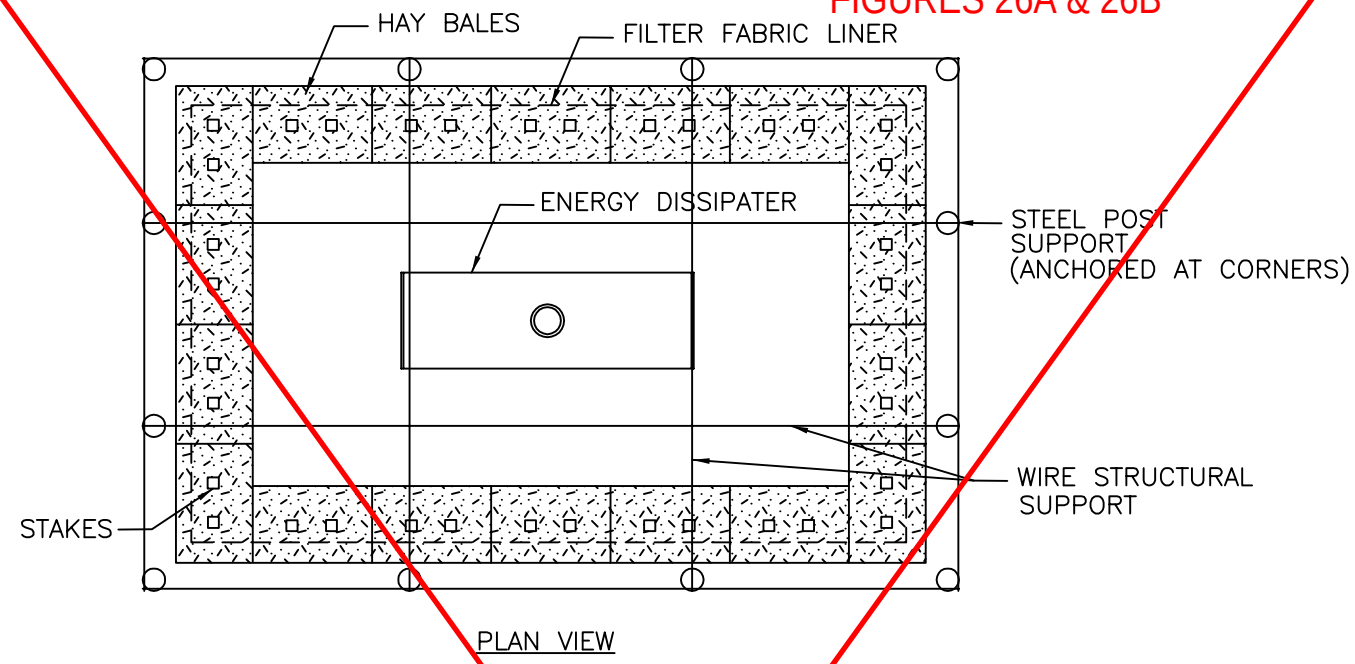
ELEVATION VIEW

NOTES:

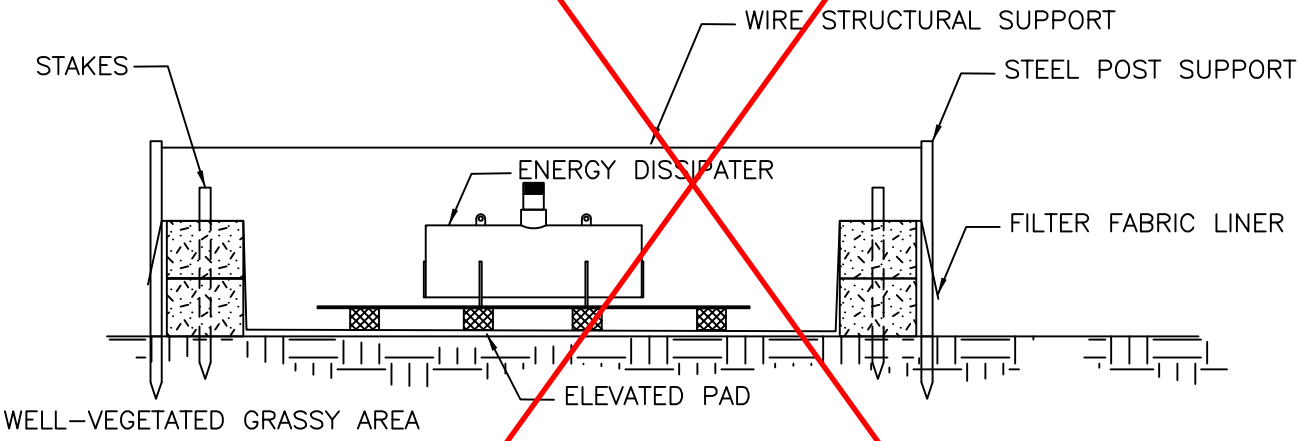
1. RECTANGULAR DETWATERING DISCHARGE AREA CONSTRUCTED OUT OF HAY BALES STACKED ONE OR TWO ROWS HIGH AND SECURED WITH WOODEN STAKES (SEE BMP 22 FOR HAY BALE INSTALLATION).
2. FILTER FABRIC LINER INSTALLED COVERING ENTIRE INTERIOR OF STRUCTURE AND SECURED ATOP THE HAY BALES WITH WOODEN STAKES.
3. DEWATERING DEVICE SHALL BE LOCATED IN WELL–VEGETATED (GRASSY) AREA AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. DISCHARGE DEVICE SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
4. SEE BMP 28 FOR DEWATERING FILTER BAG DETAILS.
5. FOR LESS TURBID WATER DISCHARGE GEOTEXTILE FILTER BAG IS OPTIONAL AND STRUCTURE MAY UTILIZE JUST FILTER FABRIC LINER.

National Fuel SUPPLY CORPORATION	ENGINEERING DEPT. 1100 STATE STREET P.O. BOX 2081 ERIE, PA. 16512 (814) 871–8676	DRAWN BY: L. M. TELESCA FILENAME: BMPs\BMP47.dwg DATE: 09/13/2010	TRENCH DEWATERING SEDIMENT CORRAL	DRAWING NUMBER: 47

REFER TO E&S DETAILS,
FIGURES 26A & 26B



PLAN VIEW



ELEVATION VIEW

NOTES:

1. RECTANGULAR DETWATERING DISCHARGE AREA CONSTRUCTED OUT OF HAY BALES STACKED TWO HIGH SECURED WITH WOODEN STAKES (SEE BMP 22 FOR HAY BALE INSTALLATION) AND WIRED (STEEL) POSTS.
2. FILTER FABRIC LINER INSTALLED COVERING ENTIRE INTERIOR OF STRUCTURE AND SECURED BETWEEN THE HAY BALES WITH WOODEN STAKES.
3. DEWATERING DEVICE SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. DISCHARGE DEVICE SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
4. SEE BMP 3 FOR ENERGY DISSIPATER DETAILS.

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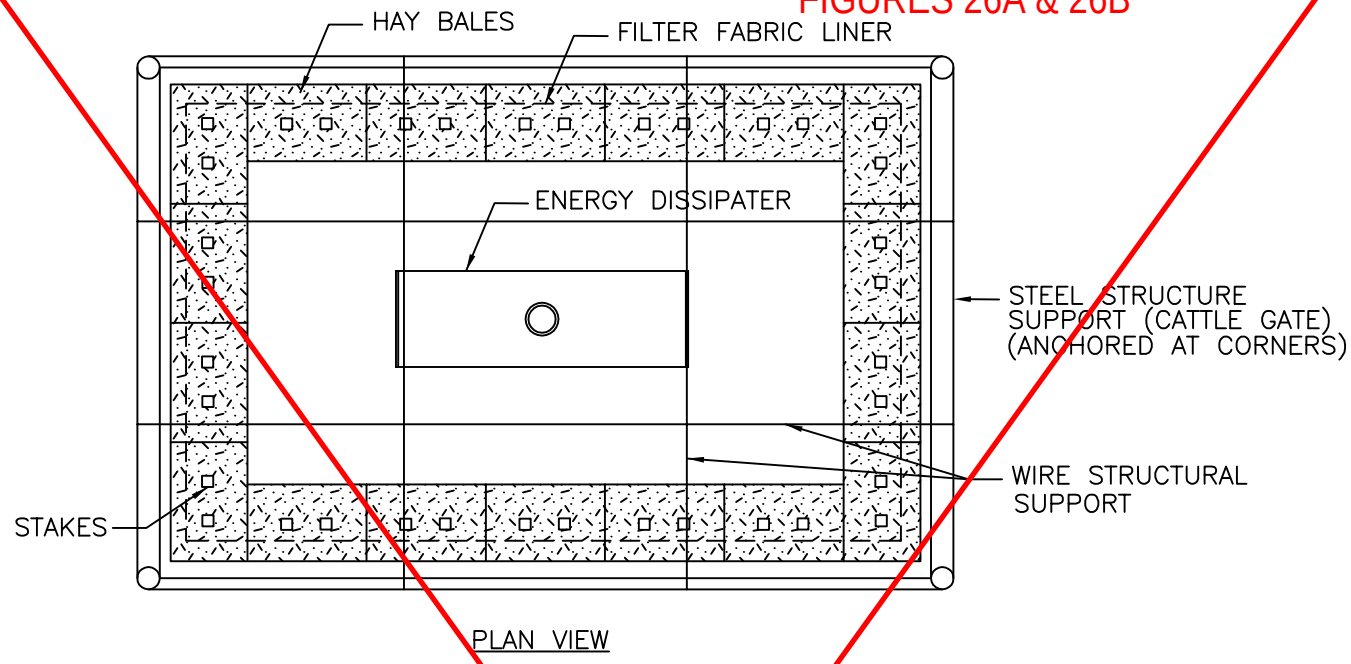
(814) 871-8676

DRAWN BY: L. M. TELESCA
FILENAME: BMPs\BMP48.dwg
DATE: 01/17/2014

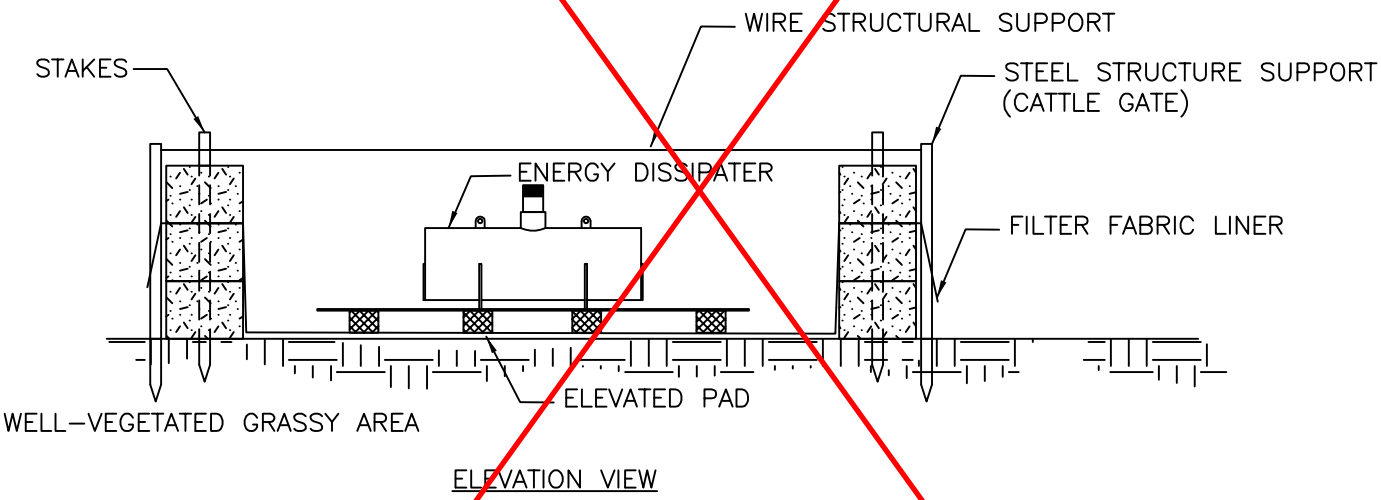
HYDROTEST WATER DISCHARGE DEVICE

DRAWING NUMBER: 48

REFER TO E&S DETAILS,
FIGURES 26A & 26B



PLAN VIEW



ELEVATION VIEW

NOTES:

1. RECTANGULAR DETWATERING DISCHARGE AREA CONSTRUCTED OUT OF HAY BALES STACKED THREE HIGH SECURED WITH WOODEN STAKES (SEE BMP 22 FOR HAY BALE INSTALLATION) AND WIRED (STEEL) CATTLE GATES.
2. FILTER FABRIC LINER INSTALLED COVERING ENTIRE INTERIOR OF STRUCTURE AND SECURED BETWEEN THE HAY BALES WITH WOODEN STAKES.
3. DEWATERING DEVICE SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. DISCHARGE DEVICE SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
4. SEE BMP 3 FOR ENERGY DISSIPATER DETAILS.

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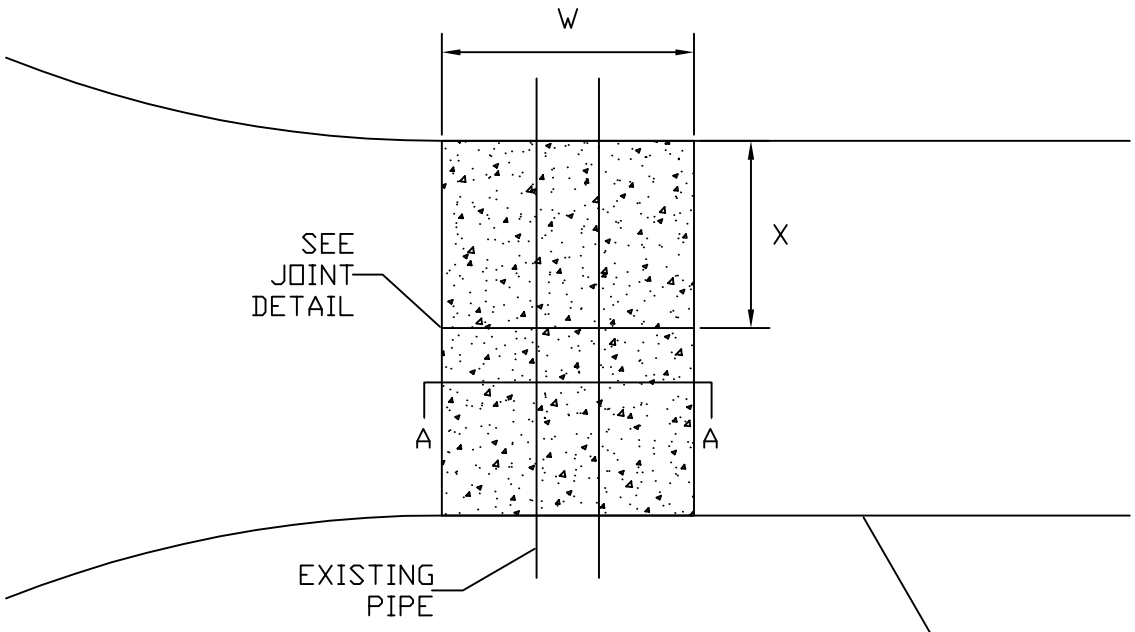
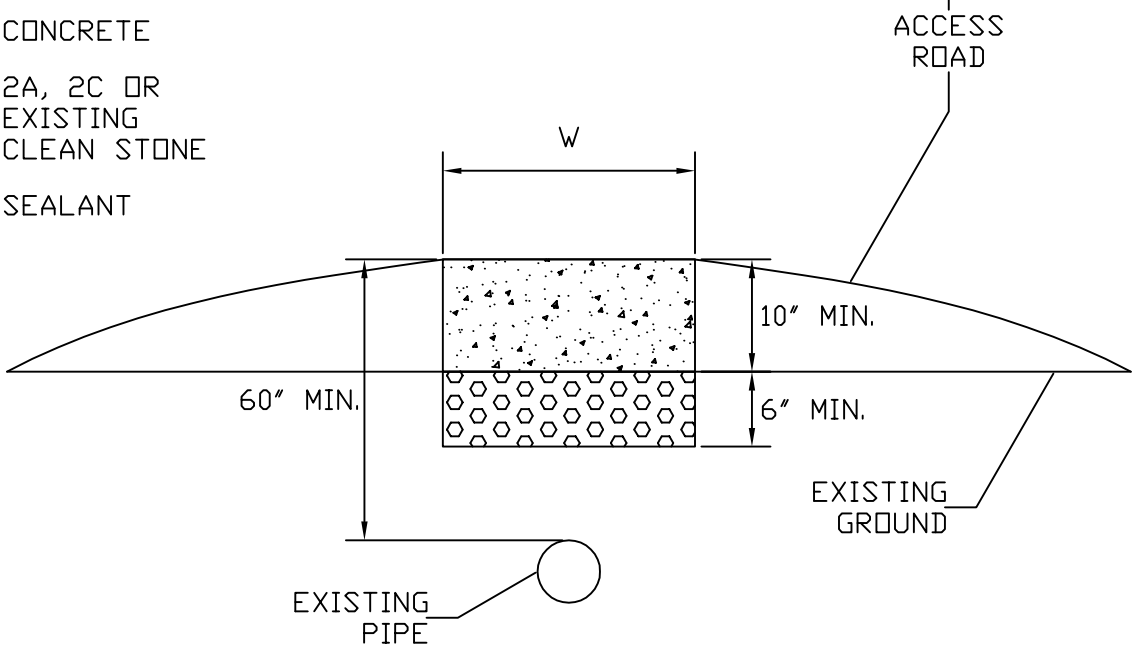


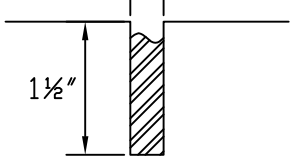
CONCRETE

2A, 2C OR
EXISTING
CLEAN STONE

SEALANT



CONTRACTION
JOINT
DETAIL
3/8"



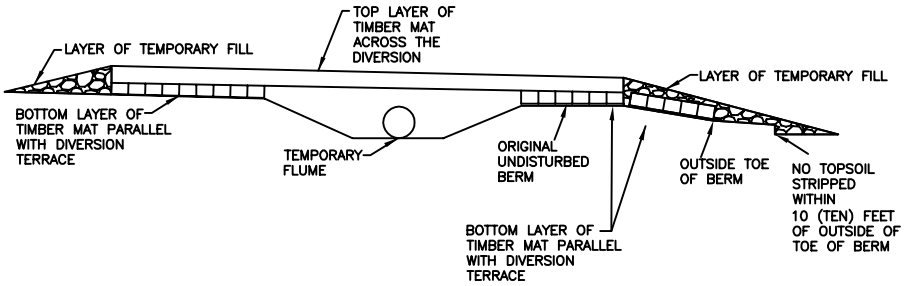
GENERAL NOTES

W=6'+OD+6' (15' MIN)
X=PUT JOINT ON ℄ OR
EVERY W×1.5

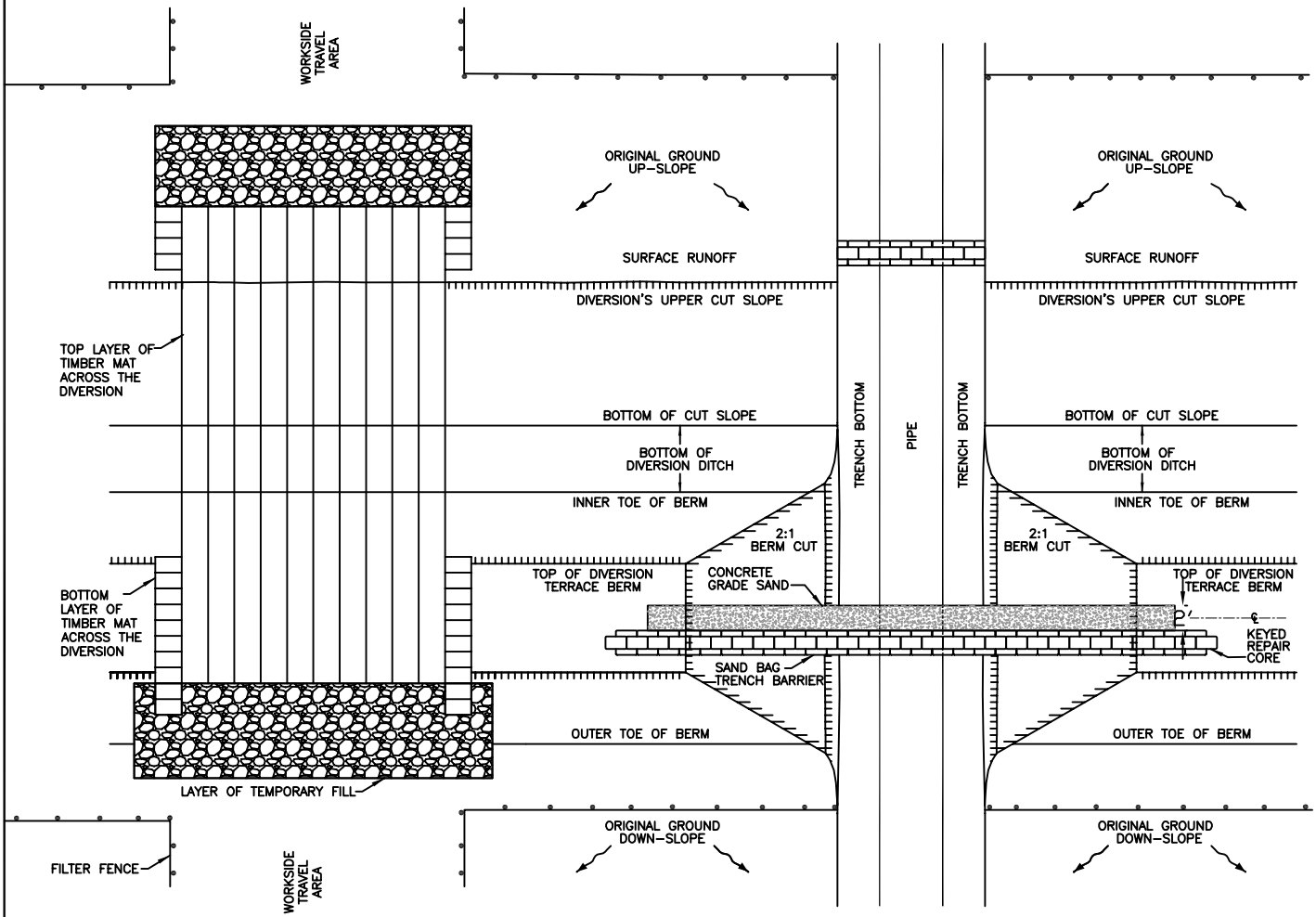
REFER TO C,S&P MANUAL
SECTION 16 FOR
CONCRETE PLACEMENT
AND CURING
INFORMATION

National Fuel SUPPLY CORPORATION	ENGINEERING DEPT. 1100 STATE STREET P.O. BOX 2081 ERIE, PA. 16512 (814) 871-8676	DRAWN BY: B. MCSHANE FILENAME: BMP49.dwg LAST REVISION DATE: 01/17/2014	CONCRETE SLAB PIPE PROTECTION DETAIL	DRAWING NUMBER: 49

DIVERSION TERRACE TIMBER MAT BRIDGE SIDE VIEW



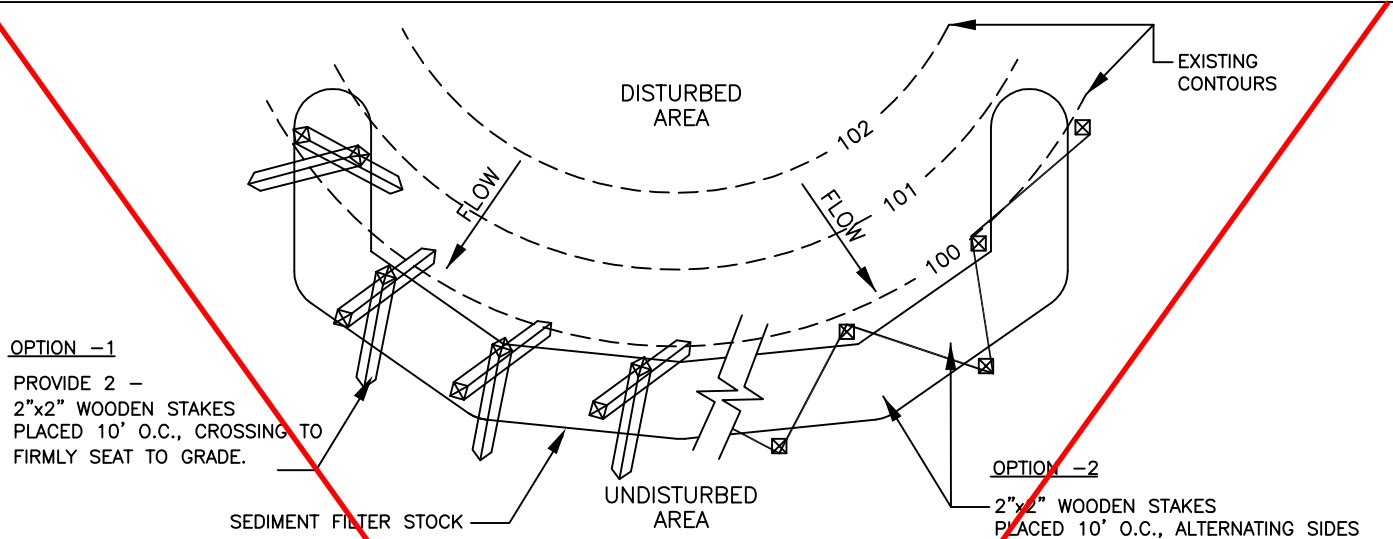
TOP VIEW OF DIVERSION BERM REPAIR AND TIMBER MAT BRIDGE



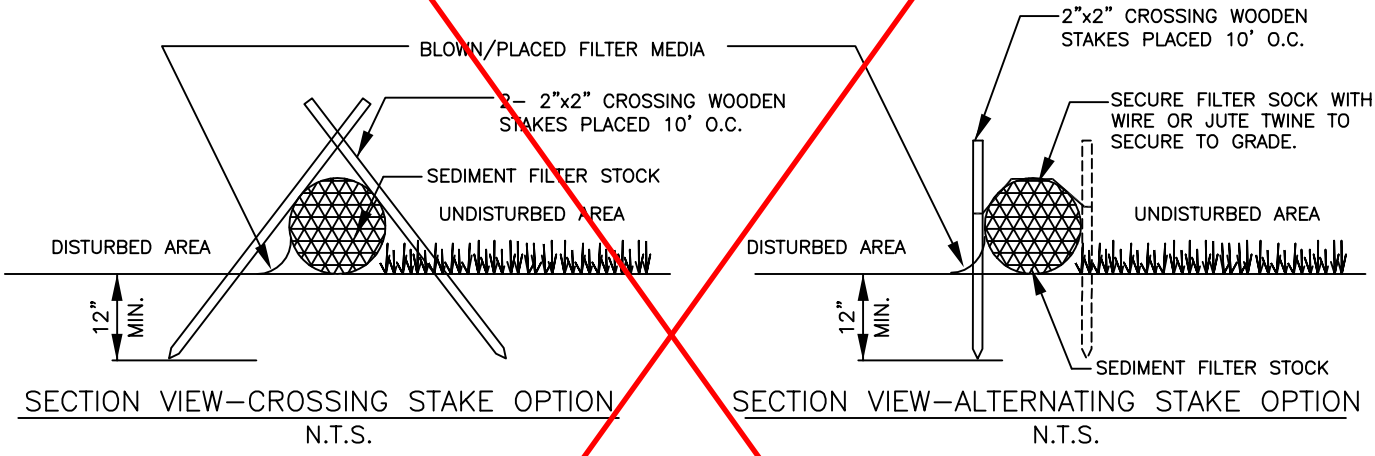
NOTES:

1. THE ONLY PORTION OF DIVERSION TO BE DISTURBED IS THE PIPELINE TRENCH AND THE 2:1 BERM CUT, DURING CONSTRUCTION; AND THE BERM'S KEYED-IN REPAIR CORE DURING THE RECONSTRUCTION OF THE DIVERSION TERRACE.
2. ALL OTHER ORIGINAL FEATURES OF THE DIVERSION TERRACE ARE PROTECTED THROUGHOUT THE RIGHT OF WAYS CONSTRUCTION AND RESTORATION STAGES OF WORK AND ACCESS BT TEMPORARY FILL LAYERS AND TIMBER BRIDGING.
3. A TEMPORARY FLUME WILL BE MAINTAINED UNTIL THE DIVERSION TERRACE IS FULLY RECONSTRUCTED.
4. FILTER FENCE WILL BE INSTALLED AT THE UPSLOPE AND DOWNSLOPE SIDES OF THE DIVERSION BERM (AT THE LIMITS OF THE TOPSOIL STRIPPING) TO LIMIT ACCESS AND DISTURBANCE.

National Fuel SUPPLY CORPORATION		DRAWN BY: T. HARRIS (H&A) FILENAME: Plan.dwg LAST REVISION DATE: 01/17/2014	DIVERSION TERRACE PROTECTION AND MAT	DRAWING NUMBER: 50



PLAN VIEW
N.T.S.



SECTION VIEW–CROSSING STAKE OPTION
N.T.S.

SECTION VIEW–ALTERNATING STAKE OPTION
N.T.S.

Adapted from Filtrexx

SEDIMENT FILTER SOCKS MAY BE FILLED WITH THE FOLLOWING MEDIA:
WOOD FIBER/CHIPS, SHREDDED ASPEN, COCONUT FIBERS, STRAW.

COMPOST FILLED LOGS ARE NOT ACCEPTABLE FOR USE IN NEW YORK STATE

SPREADING OF SEDIMENT SOCK MEDIA ON SITE AFTER UPGRADE STABILIZATION HAS BEEN ACHIEVED SHALL BE ACCEPTABLE ONLY AFTER APPROVAL IS GRANTED BY OWNER. HEAVY SEDIMENT SATURATION IN SOCK OR POOR SPREADING MEDIA MAY REQUIRE THE REMOVAL OF THE ENTIRE SOCK FROM THE PROJECT SITE UPON STABILIZATION.

REFER TO CHECK DAM BMP (17) FOR DESIGN STANDARDS WHEN UTILIZING SOCK FOR THAT PURPOSE.

Traffic shall not be permitted to cross filter socks.

Accumulated Sediment shall be removed when it reaches 1/2 the above ground height of the sock and disposed in the manner described elsewhere in the plan.

Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Biodegradable filter sock shall be replaced after 6 months; photodegradable socks after 1 year. Polypropylene socks shall be placed according to manufacturer's recommendations.

Upon Owner approval and stabilization of the disturbed area to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh shall be cut open and the mulch spread as a soil supplement, dispose of mesh.

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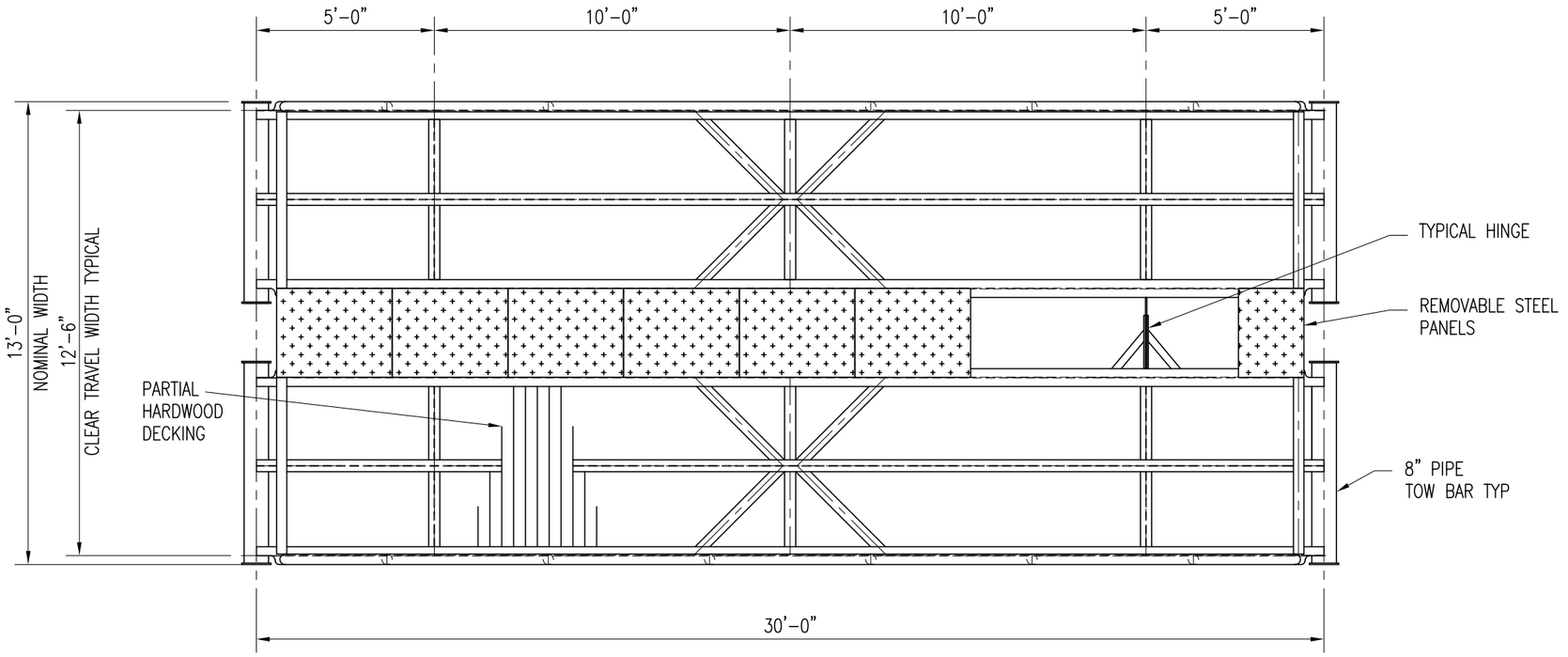
(814) 871–8676

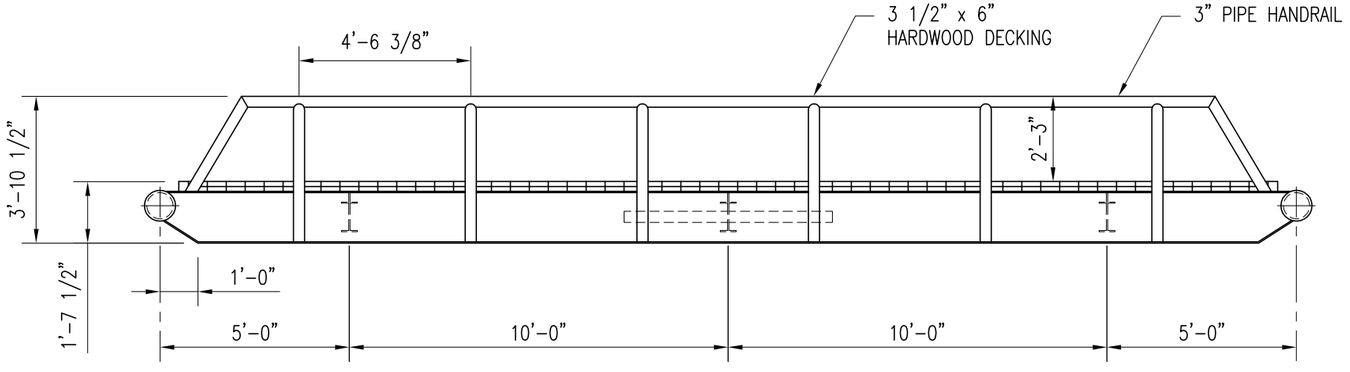
DRAWN BY: L. A. PHILLIPS
FILENAME:
DATE: 01/23/2014

SEDIMENT FILTER SOCK
(FOR NEW YORK USE)

DRAWING NUMBER: 51



PLAN VIEW

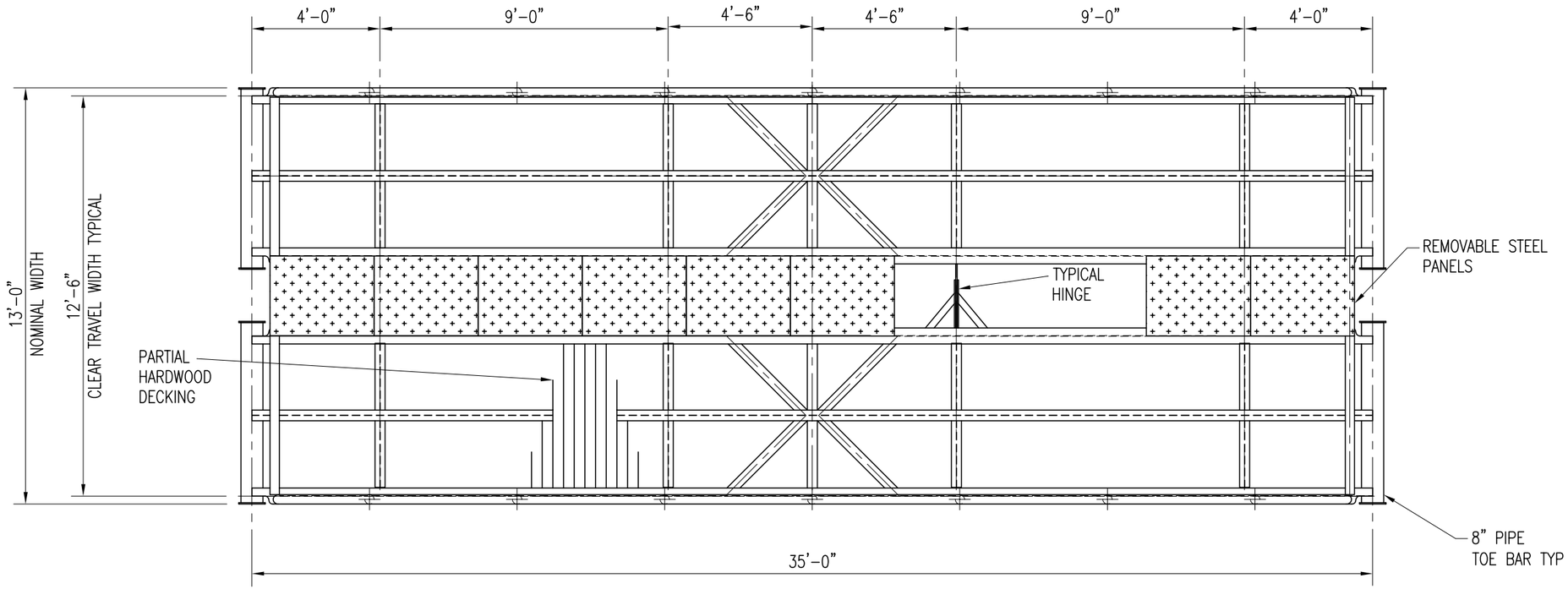


SIDE VIEW

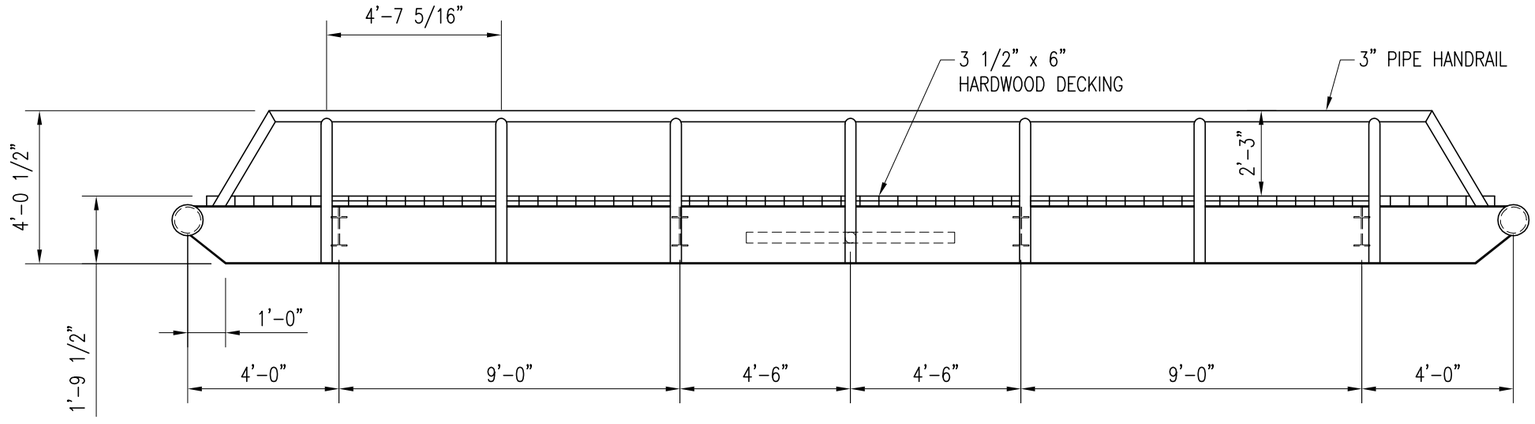
SCALE: 3/8"=1'-0"

THIS BRIDGE – PRODUCT OF: ADM WELDING AND FABRICATION, LLC 37 BROADHEAD STREET WARREN, PA 16365 FILE No. HS25-30A PHONE: 814-723-7227 FAX: 814-723-7326 WWW.ADMWELDING.COM EMAIL: ADMWELDING@VERIZON.NET	national fuel	DRAWN BY: TD (ATSI) FILENAME: BMP 52.DWG DATE: 02/09/17	30'-0" PORTABLE BRIDGE	DRAWING NUMBER: 52

Q:\Project\National Fuel\94350-NFG Pipeline\0001-Portable Bridges\Contract Dwgs\BMP 52.dwg Mar 15 2017 @ 8:40am Release 17.2s by DAUPHINEE



PLAN VIEW

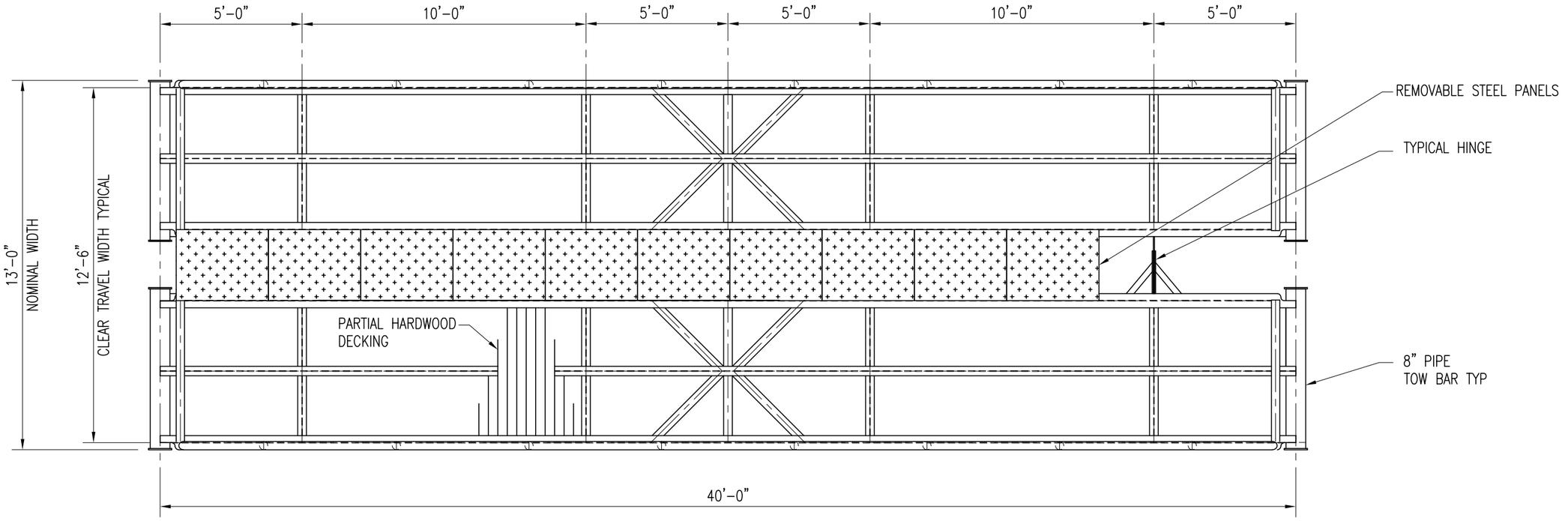


SIDE VIEW

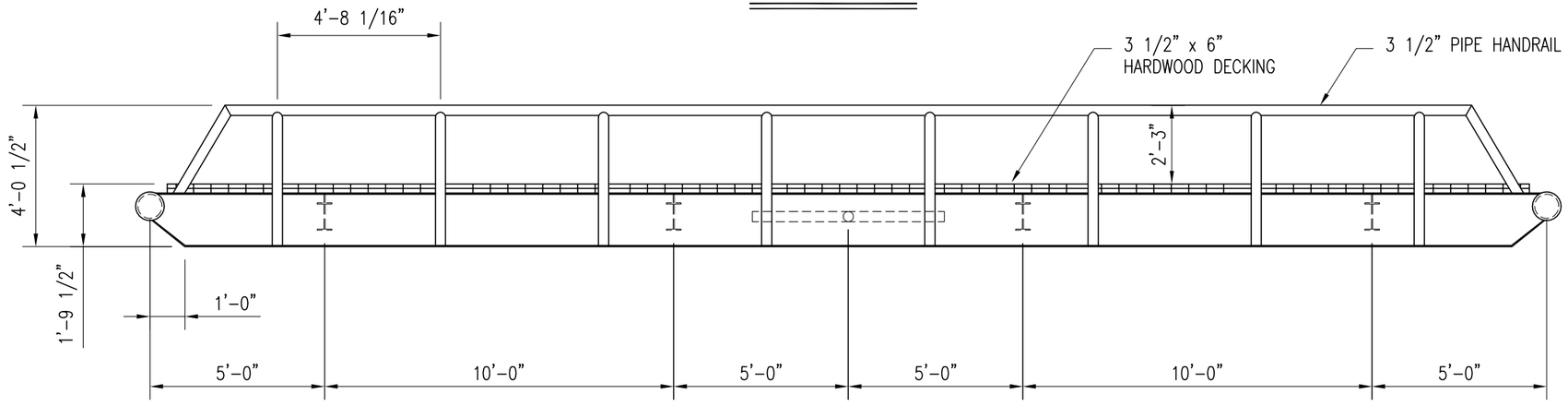
SCALE: 3/8"=1'–0"

THIS BRIDGE – PRODUCT OF: ADM WELDING AND FABRICATION, LLC 37 BROADHEAD STREET WARREN, PA 16365 FILE No. HS25–35A PHONE: 814–723–7227 FAX: 814–723–7326 WWW.ADMWELDING.COM EMAIL: ADMWELDING@VERIZON.NET	national fuel	DRAWN BY: TD (ATSI) FILENAME: BMP 52.DWG DATE: 02/09/17	35'-0" PORTABLE BRIDGE	DRAWING NUMBER: 53

Q:\Project\National Fuel\94350-NFG Pipeline\0001-Portable Bridges\Contract Dwgs\BMP 53.dwg Mar 15 2017 @ 8:40am Release 17.2s by DAUPHINEE



PLAN VIEW



SIDE VIEW

SCALE: 3/8"=1'-0"

THIS BRIDGE – PRODUCT OF:
ADM WELDING AND FABRICATION, LLC
37 BROADHEAD STREET
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national fuel

DRAWN BY: TD (ATSI)
FILENAME: BMP 52.DWG
DATE: 02/09/17

40'-0" PORTABLE BRIDGE

13'W x40'L x 45-TON, 5 AXLE COMBINATION VEHICLE LOAD CAPACITY.
SUBJECT TO A 10 MPH MAXIMUM SPEED RESTRICTION

DRAWING NUMBER: 54

Q:\Project\National Fuel\34350-NFG Pipeline\0001-Portable Bridges\Contract Dwgs\BMP 54.dwg Mar 15 2017 @ 8:39am Release 17.2s by DAUPHINEE

Attachment 3

Special Crop Productivity Monitoring Procedures

SPECIAL CROP
PRODUCTIVITY MONITORING PROCEDURES

February 1993

Provided by:
NYS Dept. of Agriculture & Markets
10-13 Airline Drive
Albany NY 12235-0001

The following outline explains the method the agriculture specialists should use to compare crop yields on and off the right-of-way. It is important that the specialist use sound judgment when selecting areas to sample. These areas should be representative of the field and should have similar soil types, drainage characteristics, and topography.

Evaluating Corn Crops

Plant Population

1.0 Check the plant population in the corn fields in late May or early June.

2.0 Count the number of plants in an area equal to 1/1000 of an acre (see table below). A population count should be done for the spoil area, the trench area, and the traffic area of the right-of-way. Do the same for the unaffected field.

Row Length to Sample 1/1000 Acre

Row Width Inches	Length of Row
42	12' 5"
40	13' 1"
38	13' 9"
36	14' 6"
34	15' 5"
32	16' 4"
30	17' 5"

3.0 Repeat the population counts for two other locations along the right-of-way in the same field.

4.0 Average the population counts from on the right-of-way and convert to plants per acre. Do the same for counts from off the right-of-way.

General Appearance

1.0 Observe the fields in late July/early August and note any visual differences in population, color, and size on and off the right-of-way.

Yield

1.0 Record differences in general appearance on and off the right-of-way during early September (silage) or early October (grain corn).

2.0 Select sample plots using the same method as in lb, above. Count the number of ears in each sample area. Count the number of rows of kernels and the number of kernels per row on at least three of the ears in the sample area. Kernels at the tip of the ear that are less than 1/2 normal size should not be counted.

3.0 Multiply the number of ears x the number of rows of kernels x the number of kernels per row x 0.01116 = bushels per acre.'

[1]Corn yields are calculated at 15.5% moisture

4.0 Average the results from the three ears from one sample plot. Average the results from the nine sample plots on the right-of-way, do the same for the three sample plots off right-of-way (see example below). Examples of corn yield estimates:

Row width = 30" Length of Row = 17' 5" #of ears in row = 21

	Ear #1	Ear #2	Ear #3
Rows of Kernels	12	10	10
Kernels/Row	40	38	44

21 x 40 x 12 x .0116 = 116.9 bu/ac
21 x 38 x 10 x .0116 = 92.6 buiac
21 x 44 x 10 x .0116 = 107.2 bu/ac

Avg. yield for plot #1 = 105.5 bu/ac

Evaluating Small Grains

1.0 Plant Population

1.1. Check populations in October (winter grains) or mid/late May (spring grains). Population counts should be done for the spoil area, trench area, the traffic area, and the unaffected field. Count the number of plants in 1/10,000 of an acre (2.09' x 2.09'). Repeat the population counts at the other two locations in the same field.

2.0 General Appearance

2.1. Observe the fields in June or early July and record any visual differences in color, size, and plant population on and off the right-of-way.

3.0 Yield

3.1. Harvest the crop for yield checks in mid-July/early August (earlier for winter grains).

3.2. Select sample plots using the same method that was used for the population checks.

3.3. Cut the crop from the sample plot by hand approximately three inches above the ground.

3.4. Separate the grain, weigh, test for moisture level, and average the results from on the right-of-way. Convert the results to bushels per acre and compare (see example below).

Yield estimate for small grains:

Plot size = 1/10,000 of an acre

crop — wheat Avg. weight = 60 lbs./bu

Sample weight = .25 lbs.
Moisture level = 22%
Ideal harvest moisture = 12%
22% - 12% = 8%
.25 lbs. x 8% = .02 lbs,
.25 lbs. - .02 lbs. = .2.3 lbs

[1]Corn yields are calculated at 15.5% moisture

.23 lbs. x 10,000 = 2300 lbs./ac
2300 lbs/ac : 60 lbs/bu = 38.3 bu/ac

Evaluating Soybeans

1) Plant Population
   a) Check the plant populations in late June/early July. if the soybeans are planted in rows use the same method that is used for corn. If the beans are planted with closer spacing use the method for small grains (2.09' x 2.09')

2) General Appearance
   a) Check the general appearance in early August, note any visual differences in population, color, and size on and off the right-of-way.
   b)
3) Yield
   a) Harvest the plants in late September and early October. If the soybeans are planted in rows use the same method that is used for corn. If they are planted with closer spacing use the method for small grains.
   b) Separate the beans, weigh them, and test for moisture. Average the results for the sample areas on the right-of-way using the same method that was used for small grains. Do the same for the areas off the right-of-way.
   c) Convert to bushels per acre.

Evaluating Hay Crops

1) Plant Population
   a) It is not necessary to do population counts for hay crops, however, the agricultural specialist will need to note the percentage of alfalfa in mixed stands on and Off the right-of-way.
   b) Any visible difference in populations of pure alfalfa stands should also be noted.

2) General Appearance
   a) The general appearance of hay stands should be recorded in late spring, mid summer, and late summer. Any differences in color, height, and stand quality should be noted.

3) Yield
   a) Complete yield checks for hay crops just before the second cutting is done.
   b) Cut vegetation from sample plot (1/10,000 of an acre) two to three inches above the ground. Test the moisture level and weigh the sample, adjust the weights using the example below. Average the results from on the right-of-way, do the same for the off right-of-way samples.

      Ideal moisture level = 18% Sample weight = .6 lbs.
      Moisture level of sample = 25%

      25% - 18% = 7%
      .6 lbs. x .07 = .042 lbs.
      .6 lbs. -.042 lbs. = .56 lbs.
      .56 lbs x 10,000 = 5,600 lbs./ac = 2.8 tons/ac.

[1]Corn yields are calculated at 15.5% moisture

Attachment 4

Seeding, Fertilizing, and Lime Recommendations
for
Gas Pipeline Right-of-Way Restoration in Farmlands

NEW YORK STATE FARMLANDS
SEEDING, FERTILIZING, AND LIME RECOMMENDATIONS
FOR GAS PIPELINE RIGHT-OF-WAY RESTORATION
IN FARMLANDS

Rev, 6-15-2005
Provided by
NYS Dept. of Agriculture and Markets
Division of Agricultural Protection and Development Services
10-B Airline Drive
Albany NY 12235-0001

NEW YORK STATE FARMLANDS

1.0 SEEDING, FERTILIZER, AND LIME RECOMMENDATIONS FOR GAS PIPELINE RIGHT-OF-WAY RESTORATION IN FARMLANDS

This paper supplements the Department of Agriculture and Markets' publication, "Pipeline Right-of-Way Construction Projects: Agricultural Mitigation Through Stages of Project Planning, Construction/ Restoration and Follow.. Up Monitoring (Rev. 1 I-97)." It is intended to familiarize the reader with varieties of seed mixes that are proven highly effective, in New York State farmlands affected by pipeline right-of-way construction, with full agricultural mitigation.

The paper lists several different seed mixes, for permanent cover, and provides other pertinent information including: temporary cover; the need for and use of soil nutrients; as well as follow-up monitoring and other useful notes. This paper is NOT intended as a guide to the sequential steps of disking and surface tillage for seedbed preparation and the sequence of liming, fertilizing, seeding, and mulching.

******* ALL SEEDING RATES BELOW ARE FOR DRILL SEEDER APPLICATION *[PREFERRED METHOD1.*

*** IF BROADCAST SEEDING IS USED, ALL SEEDING RATES *[BELOW]* MUST BE DOUBLED.

1.1 Permanent Seeding Mixtures.

1.1.1 Common for hayland planting:

a.) Alfalfa 20# if seeded alone, or with one of the following cold season grasses: Timothy, or Orchard grass, or Bromegrass should be added if one of these grasses is desired by the farm operator, at the rate of 8# per *acre. [See "3) Quick Erosion Control" below.]*

b.) Pardee Birdsfoot Trefoil 16# per acre, plus either:
Timothy, or Orchard grass, or Bromegrass should be added [per farm operator's choice] at 6# per acre rate. *[See "3) Quick Erosion Control" below.]*

c.) Medium Red Clover or Mammoth Red Clover 15# per acre, plus either: Timothy, or Orchard grass, or Bromegrass should be added [per farm operator's choice] at the rate of 6# per acre. *[See "3) Quick Erosion Control" below.]*

1.1.2 Common for pasture planting:

d.) Dutch White Clover 6# per acre; plus Pardee Birdsfoot Trefoil 6# per acre; plus Orchard grass 6# per acre

e.) Note: Reed Canary Grass at the rate of 18# per acre is excellent hay or pasture grass for wetter soils. For hay, cut early. Do not use Reed Canary Grass in wetlands *[See "3) Quick Erosion Control" below.]*

1.1.3 *Quick Erosion Control.-*

f.) For quick control of erosion when seeding the right-of-way: mix Annual Ryegrass as an additive into each of the Permanent Seeding Mixtures [see above]. Annual Ryegrass provides the quickest temporary cover against erosion [while the other plants are still in their slower/longer period of development]. Use approximately 6# or 7# per acre of the Annual Ryegrass when drill seeding the mix. Double the amount to 12# to 14# of Annual Ryegrass if broadcast.

g.) THE DRILL SEEDING RATES [LISTED ABOVE] FOR DISTURBED PIPELINE RIGHT-OF-WAY ARE SLIGHTLY INCREASED OVER THE STANDARD RATES IN ORDER TO HELP COMPENSATE FOR THE LOWER THAN NORMAL GERMINATION RATES DUE TO:

- THE LOWERING OF NUTRIENTS AVAILABLE TO THE PLANTS AFTER PIPELINE CONSTRUCI ION HAS DISTURBED TOPSOIL AND SUBSOIL.
- TIMING OF SEED MIX APPLICATION MAY BE IDEAL FOR SOME OF THE VARIETIES IN A MIX BUT ONLY MARGINAL FOR ONE OR MORE OTHERS.

h.) Special situation seeding, at project's risk for pastureland only: If the right-of-way's soil is restored by late September, a "risk" seeding can be applied between late September and the third week in October: Aroostook Winter Rye at 2 bu. or 112# per acre, mixed with: Pardee Birdsfoot Trefoil 16# per acre, Tall Fescue 20# per acre and Orchard Grass 8# per acre. The Aroostook Rye provides winter cover, and portions of the high rate of Trefoil, Fescue, and Orchard Grass seed may stay dormant until the following spring season. If successful in coverage, the permanent seeding of respective pastures is complete. If not, the site must be reseeded.

1.2 Temporary Cover.

1.2.1 For large-size pipeline right-of-way projects with a two-year plan, to construct one year and restore the following year.

i.) Topsoil berm

Topsoil stripping and stockpiling performed in late spring to mid-summer - broadcast seed the entire topsoil berm with either Oats at 2 bu. [80#] per acre, or Aroostook Winter Rye at 2 bu. [112#] per acre in July-August. A light to moderate rate [about 1500 -2000 #/acre] of weed-free straw mulch cover may be needed for retaining adequate summer soil moisture. *[For larger size topsoil berms, the temporary cover seeding may be more uniformly applied by `flattening- the top of the berm and using small, light equipment to drop and broadcast seed from the top, covering all surfaces of the berm.]*

j.) Exposed construction zone/subsoil
After backfilling, by or before late October, plant the exposed right-of-way subsoil to Aroostook Winter Rye at the rate of 3 bu. [168#] per acre with broadcast seeder; or 2 bu. [112#] if drill seeded. In preparation, the surface of the exposed subsoil is first scarified generally parallel with the slope's contours and fertilized with 200# of 10-20-20 (N,P,K) per acre, for temporary winter cover to succeed, due to the subsoil compaction and its low fertility. Apply a light to moderate [not heavy] rate [about 1000 #/acre] of weed-free straw mulch over the temporary seeding,

Note that other temporary cover seedings, in addition to those noted above, may be used, pending on seasonal conditions and the mutual approval of the farmland operator and agricultural inspector.

1.2.2 For any pipeline right-of-way project, large or small where a "winterized" right-of-way is necessary and a seeding with Aroostook Winter Rye can be applied before the end of October:

Topsoil berm and exposed, backfilled construction zone
Apply 3 bu. [168#] per acre, broadcast, Refer to Exposed construction zone above regarding scarification of surface and rate of straw mulch.

1.2.3 For unavoidable, off-season construction ['mud and freeze-thaw" season construction], when topsoil is stripped after October, and effective, temporary cover seeding is impossible due to inherent climate factors: use a moderate rate of weed-free straw mulch cover over the topsoil berm. Establish and maintain all temporary erosion controls along the construction right-of-way corridor - throughout the off season construction - including but not limited to: outside perimeter runoff ditching; silt fencing; water bars and runoff drainage gaps through the topsoil berm and across right-of-way to prevent water ponding, berm saturation, and erosion.

1.3 Use Seed Inacculant.

1.3.1 Remember to apply the appropriate variety of fresh inocculant to all legume seed before use [e.g.: alfalfa, birdsfoot trefoil, etc.]. *Even if the seed label says it is pre-inocculated, the viable seed in the batch could easily be two or more years old while the pre-inocculant is past its life.* The certified seed itself may still be good, but non-responsive without the proper fresh inocculant applied at the time of seeding.

1.4 Fertilizer For Right-of-Way Reseeding:

Soil Testing, The fertilizer rates listed below are approximations. Prior to construction, before the topsoil is stripped, representative sampling is conducted: agronomic soil samples are obtained about 400 feet apart along the right-of-way, and submitted and laboratory tested for: pH; % organic material; cation exchange capacity, and N,P,K [Nitrogen, Phosphorus/Phosphate, and Potassium/Potash). The results are applied to determine the lime and fertilizer rate to apply for the respective soils and farms.

1.4.1 "10-20-20" This means 10# of nitrogen, 20# of phosphorus, 20# of potash per 100# of fertilizer. Pending on test results, use 300# per acre, [This totals out to 30# of nitrogen, 60# of phosphorous, 60# of potash per acre.]

1.4.2 "5-10-10" This means 5# of nitrogen, 10# of phosphorus, 10# of potash per 100# of fertilizer. Pending on test results, use 600# per acre. [This totals out to 30# of nitrogen, 60# of phosphorous, 60# of potash per acre.]

1.5 Fertilizer for temporary cover seeding of exposed right-of-way construction work surface.

Refer to "Temporary Cover" B. 1. b. exposed construction zone/subsoil on page 2.
(Fertilizer is not recommended for temporary seed cover on the topsoil berm, but is strongly advised on the exposed subsoil surface.)

1.6 Fertilizer as a topdressing [follow-up additive] in haylands and pastures:

"16-8-8" This means 16# of nitrogen, 8# of phosphorous, 8# of potash per 100# of fertilizer. Use 200-300# per acre, depending on field conditions. This totals out to either:
32# of nitrogen, 16# of phosphorus, 16# of potash; or
48# of nitrogen, 24# of phosphorus, 24# of potash per acre,

1.7 Agricultural Lime.

See reference to Soil testing, for pH, in D. Fertilizing For Right-of-Way Reseeding, above.

- A minimum rate of 3 tons agricultural lime per acre for most permanent seedings in naturally low-lime soils [e,g.: Southern Tier/northern Allegheny Plateau]. A heavier amount will be applied if so indicated from pH test results. Use lower lime rate on naturally high-lime soils based on site specific soil pH test and farm record of recent lime application [e.g.: Central Plains/northern half of Finger Lakes Region].

- Pelletized and agriculture lime are rated the same in tons to be applied.
  Except pelletized is easier to handle and reacts to the soil quicker but it cannot be reduced in its amount. [Do not use "liquid lime" on agricultural land.]

1.8 Monitoring and Follow-Up.
Restored right-of-way is monitored for not less than two years after initial restoration seeding is completed. The seeding is satisfactory if it produces equal to or better than the adjacent undisturbed planting. Seasonal surface soil moisture conditions will vary from year to year, and may be ideal to poor [excessively dry] for germination when pipeline project applies the seed. Seedings that are unsatisfactory due to lower plant population/poor plant health or overpopulation of weeds will be replanted.

Far monitoring of crop productivity, refer to: "Special Crop Productivity Monitoring Procedures," a February 1993 paper, provided by the NYS Department of Agriculture and Markets.

1.9 Final Notes on Seedings.

- Always use certified seed for each variety used alone or in a mix.
-
- Always use a Brilion drill seeder with rear cultipacker, or similar implement, for hayland and improved pasture seedings.

- Do not try to seed when the ground is wet.

- While Empire birdsfoot trefoil has been a traditional variety applied throughout the region, the more recently developed "Pardee" birdsfoot trefoil is widely applied with proven performance in soils with drainage limitations and even better in well-drained soils. The Pardee variety has improved winter survival over other varieties when properly planted.

- Remember to double the permanent seeding rates when using broadcast seeding due to the mortality rate,

- Perennial Ryegrass is not a favorite grass with farmers and is not recommended in seed mixes on agricultural right-of-way.

- Incorporate fertilizer and lime into the soil; and apply fine surface tillage/seedbed preparation practices

- Creeping Fescue is shade tolerant.

Attachment 5

NFG General Seed Mixtures

Temporary Mixtures ~~October 15th through March 31st. New York requires the mixtures to be used between November 15th and April 1st.~~

Site preparation: Apply 1 ton of agricultural-grade limestone per acre, plus fertilizer at the rate of 10-10-10 per acre, and work in where possible. After seeding, mulch with hay or straw at a rate of 3 tons per acre.

Lime	Fertilizer	Mulch
One (1) ton per acre	150 lbs. per acre 10-10-10	Hay or Straw 3 tons per acre in PA ~~4 tons per acre in NY~~

Temporary Seed Mixture
Winter Rye
170lbs. per acre

Permanent Mixtures - April 1 through October 14
For disturbed areas that achieve finished grade during non-germinating seasons, use temporary mixtures until germinating season begins.
For non-agricultural lands use the following guidelines:

Lime	Fertilizer	Mulch
Six (6) ton per acre	1,000 lbs. per acre 10-10-20	Hay or Straw 3 tons per acre

☐NFG Seed Mixture No. 1
General R.O.W. Mixture
Application Rate 40 lbs. per acre
30% Fawn Tall Fescue
25% Annual Ryegrass
15% Timothy
10% Birdsfoot Trefoil
10% Alsike Clover
5% Yellow Blossom Clover
5% Red Top

☐NFG Seed Mixture No. 3 Wet Upland Areas
Application Rate 50 lbs. per acre
70% Perennial Ryegrass
24% Birdsfoot Trefoil
6% Red Top

☐NFG Seed Mixture No. 4
Residential Lawns
Application Rate 120 lbs. per acre
ERNST # ERNMX-114
"Penn State Mix"
50% Kentucky Bluegrass
30% Creeping Red Fescue
10% Perennial Ryegrass
10% Annual Ryegrass

☐NFG Seed Mixture No. 5
Agricultural Lands
Application Rate 30 lbs. per acre
50% Alfalfa
50% Timothy

☐NFG Seed Mixture No. 6
Wetlands
Application Rate 40 lbs. per acre
100% Annual Ryegrass

☐NFG Seed Mixture No. 9
Steep Slopes >20%
Application Rate 50 lbs. per acre
40% Perennial Ryegrass
40% Lathco Flatpea (2 x inoculm)
20% Birdsfoot Trefoil

☐Ernst Seed Mixture
Cattle Grazing Mix
Application rate 30 lbs. per acre
ERNST # ERNMX-118
30% Festuloliom
30% Orchardgrass
30% Perennial Ryegrass
5% Red Clover
5% White Clover

☐Ernst Seed Mixture
Cattle Hay mix
Application Rate 20 lbs. per acre
ERNST # ERNMX-108
40% Red Clover
30% Tall Fescue
20% Alfalfa
10% Timothy

☐Ernst Seed Mixture
Horse Pasture and Hay Mix
Application rate 25 lbs. per acre
ERNST # ERNMX-107
40% Orchardgrass
28% perennial Ryegrass
20% Tall Fescue
5% Timothy
5% Kentucky Bluegrass
2% Meadow Brome

☐Strip Mine Seed Mixture
Application Rate 43 lbs. per acre
20 lbs. Annual Ryegrass
8 lbs. Switchgrass
6 lbs. Alsike Clover
5 lbs. Creeping Red Fescue
4 lbs. Red Top

Attachment 6

Winter Construction Plan

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WINTER CONSTRUCTION PLAN

Revised: January 2019

NOTE: All elements of this Plan are subject to applicable permit requirements and conditions, as well as general or specific applicable regulatory requirements imposed by Federal, State or Local agencies (Regulatory Authorities). Any contradictions between regulations or activities imposed by Regulatory Authorities and those outlined in this Plan, shall default to the measures prescribed by the Regulatory Authorities.

It will be required by The Contractor to correct any trenchline subsidence that occurs during spring thaw prior to final restoration

1. PRECONSTRUCTION PLANNING

The Company has developed and suggests the implementation of this winter construction plan when any of the following conditions could occur:

- ☐ Sustained cold temperatures occur that result in the freezing to a depth of 2 inches or more;
- ☐ Backfill material could freeze to the extent that adequate compaction becomes difficult;
- ☐ Topsoil stockpiles could freeze and cannot be uniformly redistributed across disturbed areas or separated from the sub-grade material;
- ☐ Snow accumulations are great enough to prevent visual observation of the construction work area; or
- ☐ Historical conditions in the region indicate that significant runoff from spring snow melt may require additional protective measures.

This plan addresses and identifies the chain of decision making that will occur on a day-to-day basis for determining the construction practices that can occur in any one area. The right-of-way conditions will be evaluated in morning meetings with the Contractor

and Company and re-evaluated during the day if weather changes may affect construction practices.

2. SAFETY RECOMMENDATION

2.1 Tips to Protect Workers

Prolonged exposure to freezing or cold temperatures may cause serious health problems such as trench foot, frostbite, and hypothermia. In extreme cases, including cold water immersion, exposure can lead to death. Danger signs include uncontrolled shivering, slurred speech, clumsy movements, fatigue, and confused behavior. If these signs are observed, call for emergency help.

OSHA's Cold Stress Card (attached) provides a reference guide and recommendations to combat and prevent many illnesses and injuries. Other tips include the following:

2.2 Recommendations for Employers

Employers should take the following steps to protect workers from cold stress:

- ☐ Schedule cold projects for the warmer part of the day, if possible.
- ☐ Reduce the physical demands of workers.
- ☐ Use relief workers or assign extra workers for long, demanding tasks.
- ☐ Provide warm liquids to workers.
- ☐ Provide warm areas for use during break periods.
- ☐ Monitor workers who are a risk of cold stress.
- ☐ Provide cold stress training that includes information about:
    - o Worker risk
    - o Prevention
    - o Symptoms
    - o The importance of monitoring yourself and coworkers for symptoms
    - o Treatment Personal protective equipment

2.3 Recommendations for Workers

Workers should avoid exposure to extremely cold temperatures when possible. When cold environments or temperatures cannot be avoided, workers should follow these recommendations to protect themselves from cold stress:

- ☐ Wear appropriate clothing.
  - o Wear several layers of loose clothing. Layering provides better insulation.
  - o Tight clothing reduces blood circulation. Warm blood needs to be circulated to the extremities.
  - o When choosing clothing, be aware that some clothing may restrict movement resulting in a hazardous situation.
- ☐ Make sure to protect the ears, face, hands, and feet in extremely cold weather.
  - o Boots should be waterproof and insulated.
  - o Wear a warm hat; it will keep your whole body warmer. (Hats reduce the amount of body heat that escapes from your head.)
- ☐ Move into warm locations during work breaks; limit the amount of time outside on extremely cold days.
- ☐ Carry cold weather gear, such as extra socks, gloves, hats, jackets, a change of clothes, and a thermos of hot liquid.
- ☐ Include a thermometer and chemical hot packs in your first aid kit.
- ☐ Avoid touching cold metal surfaces with bare skins.

Monitor your physical condition and that of your coworkers.

3. SNOW USES, REMOVAL, AND STORAGE

3.1 Uses

Snow can be used for insulation over the trench line prior to excavation to reduce frost penetration along the line until the ditching process begins.

3.2 Removal

Snow should be removed from the construction workspace to provide safe and efficient working conditions and to expose soils for grading/excavation when snow impedes safe working conditions. Removal of snow along the access roads is necessary to ensure safe access to the right-of-way. Snow should be removed from all storage locations to allow the subsurface to freeze. Snow removal shall be accomplished using equipment designed for that purpose and care should be taken so that underlying soil and/or vegetation is not scraped off or blown away during snow removal. Snow removal equipment is limited to approved workspaces, however, snow may be lifted or blown off and deposited into areas beyond the approved workspaces provided the equipment stays entirely within the approved workspace. Snow shall be removed in a manner so as not to cause damage to woody vegetation, environmentally sensitive areas, or other resources.

3.3 Storage

Snow storage within the right of way should clearly separate snow from spoil storage to avoid mixing.

Snow removal and storage shall be placed in an area to avoid any potential erosion problems due to sudden melting.

3.4 Landowner Requirements

Prior to construction, if winter construction is anticipated, the Company will identify appropriate snow removal and storage areas, and secure approval from affected landowners, addressing landowner access, fences and gates.

3.5 Acceptable Snow Removal and Storage Methods

Snow removal on the right-of-way and access roads should be accomplished by minimizing spoil being removed along with the snow. The snow should be stockpiled in designated areas, as allowed by landowner agreements and permit conditions.

The placement and protection of the stockpiles should ensure that snow melt will not cause erosion and sedimentation issues.

3.6 Sensitive Areas

No stockpiled snow shall be placed in designated avoidance areas, such as cultural resource sites, residential mitigation areas, sensitive species or habitat areas, or within wetlands/waterbodies including buffer areas. ~~In New York, edges of disturbed areas that drain within 100 feet of a waterbody will have two rows of silt fence, five feet apart, installed on the contour.~~ The Company will identify these areas and provide signage and/or safety fence as applicable, to ensure compliance with this condition.

4. CROSSING WETLANDS AND WATERBODIES

4.1 Topsoil Segregation

Prior to trench excavation, snow can be piled over the trench line to form an insulating barrier and prevent deep frost penetration. The stockpiled snow is then removed just prior excavation to prevent mixing of the snow and the topsoil material. Where the excavated materials are exposed to freezing ambient air temperatures for extended periods of time the backfill will tend to be larger, angular blocks. The blocks should be broken into smaller pieces to reduce trench subsidence during spring thaw.

The Contractor should not use frozen backfill. To avoid frozen backfill, strip off the outer frozen layer of the spoil pile to expose the inner unfrozen subsoil. The frozen soil should then be broken up into smaller pieces to avoid voids which cause subsidence. In winter conditions a slight crown should be created over the trench line, this will allow for backfill subsidence. During final grading and clean-up, restore the trench line back to surrounding contours.

To minimize high water content wetland spoil freezing to ground surface, minimize the amount of open trench during frozen conditions. Fill should not be placed on saturated or frozen surfaces. To avoid this, the Contractor should place timber mats and/or geotextile matting on the ground prior to excavation and fill placed on top. ~~In New York, a barrier must be installed at least fifteen feet from the toe of the stockpile to prevent migration.~~

Pipeline excavation activities should limit the length of open ditch to allow for excavation, lowering in, and backfilling to a range of 24 to 72 hours. Frozen or soft, mucky, or highly

compressible materials should not be incorporated into fills. Frozen material should be set aside and placed on top of the backfilled trench or the trench backfilled with a crown. The crown should only be constructed directly over the backfilled trench with native material and should not extend out beyond the trench line.

Subsoil that is used to crown the trench line should not extend above the natural surface grade. The crown will be capped with native topsoil to ensure elevations will be restored with topsoil at the surface. If the topsoil has been removed as a frozen material, the topsoil should be placed on top of the trench line as the cap of the crown. Small gaps can be left in the crown to allow for natural surface drainage before the material is completely settled during thaw conditions.

All backfilled material should be monitored for subsidence and excessive crowning conditions.

Final restoration of wetlands should be completed to the maximum extent practicable during winter conditions. Complete remediation may be required during non-frozen conditions as necessary.

4.2 Temporary Bridges

During construction temporary bridges will be installed across wetlands and waterbodies. In the event that the wetland is frozen and traveling across with equipment will not cause rutting, temporary bridges are not required. If construction activities cease during winter periods, all bridges will be removed that will be impacted by high flow during spring runoff.

5. UPLAND AREAS

5.1 Topsoil Segregation

Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus spoil side method) in:

- ☐ Cultivated or rotated croplands, and managed pastures;
- ☐ Residential areas;

- ☐ Hayfields; and

- ☐ Other areas that are defined by the restriction list.

The average duration and intensity of winter conditions in the project region should be considered early in project planning and scheduling. Regions that have extended periods of freezing temperatures and deeper frost depths will require more deliberate planning for topsoil segregation. Long-term topsoil stockpiling to manage the topsoil may be required to ensure a more effective seeding and restoration after the spring thaw.

5.2 Residential Area Construction

In residential areas, importation of topsoil is an acceptable alternative to topsoil segregation.

Where topsoil segregation is required, the Company will:

- ☐ Segregate at least 12 inches of topsoil in deep soils (more than 12 inches of topsoil); and
- ☐ Make every effort to segregate the entire topsoil layer in soils with less than 12 inches of topsoil. Maintain separation of snow, salvaged topsoil, and subsoil throughout all construction activities.

Segregated topsoil may not be used for padding the pipe, constructing temporary slope breakers or trench plugs, improving or maintaining roads, or as a fill material.

Stabilize topsoil piles and minimize loss due to wind and erosion with use of sediment barriers, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary. Topsoil segregation should be accomplished, where practicable, prior to frozen conditions. Specialized equipment may be used to break up the topsoil prior to stripping.

Restoration of the topsoil should ideally occur after both the topsoil and the exposed subsoil have thawed, the ground has dried after the spring melt, and the soils are more easily worked. If an extended wet period occurs after the spring thaw, proper erosion and sediment controls should be set into place to avoid topsoil loss and discharges into wetlands or waterbodies. Right-of-way stabilization needs to be implemented regardless

of whether topsoil restoration has taken place. Temporary stabilization of the right-of-way and topsoil pile can take place by re-mulching and dormant seeding if necessary.

For all properties with residences located within 50 feet of construction work areas, the Company will:

- ☐ Avoid removal of mature trees and landscaping within the construction work area unless necessary for safe operation of construction equipment, or as specified on landowner agreements;
- ☐ Fence the edge of the construction work area for a distance of 100 feet on either side of the residence; and
- ☐ Restore all lawn areas and landscaping, if possible, immediately following cleanup operations, or as specified in landowner agreements.

If frozen conditions prevent compliance with these time frames, maintain and monitor temporary erosion controls (sediment barriers and mulch) until conditions allow completion of restoration.

Throughout construction, traffic lanes and access to homes will be maintained except for the brief periods essential for laying the new pipeline. The Contractor will erect temporary safety fences in the vicinity of streets and homes to keep the public away from the construction zone. The Company may use techniques such as stovepipe and drag section construction in order to minimize the impacts of construction in residential areas on a site-specific basis. Site-specific residential mitigation plans will be utilized in areas with residences within 25 feet from the edge of construction right-of-way.

Homeowners will be notified in advance of any scheduled disruption of household utilities and the duration of the interruption will be kept as brief as possible. Representatives of the local utility companies will be on- site during construction when necessary. In addition, the Company and Contractor will strive to accommodate any special concerns regarding ornamental shrubs, trees, or structures by avoiding them as long as such avoidance will not unduly interfere with construction and operation of the pipeline.

The Company and Contractor will take measures to ensure that construction activities will not prevent access to residential areas by fire and emergency vehicles. At least one lane

of traffic will be kept open for emergency vehicles when constructing on or across residential streets. During the brief period of road closure, steel plates will be available on site to cover the open area to permit travel by emergency vehicles.

6. WATER HANDLING

The Contractor will maintain, at all times during winter construction, sufficient means to promptly remove and dispose of water entering the trench or other parts of the right-of-way or construction area.

Fill should not be placed on saturated or frozen surfaces. Any and all ice should be removed from the open trench prior to backfill. If not removed significant subsidence following spring melt can occur.

Dewatering activities performed during frozen conditions will be continuously monitored and adjusted as necessary. Discharge locations should be carefully evaluated and selected based on the site conditions including vegetation cover, soil type, and topography. When dewatering pumps are not in use, pumps and hoses should be properly drained to prevent damage.

6.1 Structure Installation/Removal

Planning for dewatering structure locations that include filter bags and straw bale structures should be completed early in the construction process and, if possible, when ground conditions are favorable (before freezing).

Removal of dewatering structures should take place promptly after final use. If conditions do not allow for a prompt removal, clearly mark structures until proper removal can take place.

6.2 Hydrostatic Testing

In areas where test water discharges are occurring on top of frozen ground, the discharge water will not absorb into the ground, resulting in increased surface water runoff and ponding in low lying areas. The increased runoff can melt and erode the upper layer of frozen soil, especially in areas where the water may become channelized. Discharged

water can also flow underneath snow, causing unobserved erosion and potential deposition in sensitive resource areas.

Similar to dewatering activities during standard non-frozen construction conditions, dewatering activities performed during frozen conditions should be continuously monitored and adjusted as necessary. Discharge locations should be carefully evaluated and selected based on site conditions including vegetation cover, soil type, and topography. Dewatering activities will only take place during daylight hours.

Where testing will occur during low-flow periods, the Company will discuss any appropriation volume or rate restrictions with the appropriate regulatory agencies.

6.3 Equipment Care

Freezing conditions make operating equipment outdoors more difficult Lubricants and other liquids in pumps can freeze up and not operate. Plans should consider measures to ensure equipment is protected from the elements and operational prior to use. When dewatering during freezing conditions, pumps may have to be installed in small, heated shelters to prevent the pumps from freezing and becoming non-operational or causing damage to the pumps that could result in a spill or leak of lubricants or fuel. The use of anti-freeze liquids in the pump housing is not recommended due to the difficulty of removing the potentially hazardous liquids prior to the re-use of the pumps. When not in use, dewatering pumps and hoses should be properly drained during freezing conditions to prevent damage.

7. TEMPORARY EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures installed prior to or during frozen conditions may not remain functional under these conditions. The Company and Contractor will review the construction right- of-way in advance of frozen ground conditions and install the necessary temporary erosion and sediment control devices in advance of changing weather.

Advance placement will allow for the “keying” in of bales to the ground that will enable the devices to be more effective throughout construction. Sediment barriers (silt fence, straw

bales, earthen berms, filter sock) will be installed across the right-of-way at waterbodies, wetlands, and road crossings as determined necessary by the Environmental Inspector. ~~New York requires a minimum twenty five foot buffer to be maintained from all perimeter controls. In New York, silt fence should be marked with stakes that are visible above the snow.~~

The Company and/or Contractor will keep an Environmental Inspector (EI) and environmental labor crew on site or on call through the periods of thaw to monitor erosion control structures and stabilization efforts and make adjustments or repairs as necessary and as right-of-way conditions allow. Crews should have proper equipment available to allow access to the right-of-way under soft soil conditions.

If final cleanup and restoration activities have not occurred prior to the spring melt, monitoring of the right-of-way should be implemented during the delay between construction and restoration or temporary shutdown of construction activities. The monitoring program should include:

- ☐ Erosion control structures requiring repair;
- ☐ Areas of slope instability; and
- ☐ Areas where significant levels of erosion are occurring.

The Environmental Inspector should determine the most effective means of dealing with identified problems, taking into consideration the suitability of the right-of-way for access by equipment, potential damages that could occur by equipment accessing the right-of-way, and the urgency/significance of the problem.

8. WINTER STABILIZATION PLANNING

When construction is complete or has been postponed, and final restoration (i.e. decompaction, final grading, topsoil replacement, and lime/fertilization/seeding) is delayed until the spring or summer, the development of a site specific winter stabilization plan should be implemented. The purpose of this plan is to avoid excess site disturbance resulting from freeze/thaw periods and precipitation events in the winter months and into the spring.

The plan should be drafted using any applicable information including, but not limited to: guidelines provided by appropriate agencies, specifications found within the ESCAMP, and guidance from the Company or third-party environmental inspector personnel. The plan should identify key areas of concern, additional erosion control measures to be implemented, timeframes for site inspections over winter shutdown, timeframes for restoration activities, and any site-specific factors that may affect proper restoration of the project area (i.e. landowner restrictions).

8.1 General Guidelines

As construction approaches winter months, weather conditions must be closely monitored and the Contractor must take measures to stabilize areas that will not be restored before winter freeze. These areas should be properly stabilized ahead of time, during favorable weather conditions when soils are more easily worked, if possible. ~~In areas in New York where soil disturbance has temporarily or permanently ceased, soil stabilization measures should be initiated by the end of the next business day and completed within three days. In advance of a melt event, New York requires that disturbed soil should be stabilized at the end of each work day unless work will resume within 24 hours in the same area and no precipitation is in the forecast or the work is in disturbed areas that collect and retain runoff (i.e. open utility trenches).~~

When construction timeframes and/or seasonality do not allow for, or are not likely to allow for, proper restoration of the ROW after backfilling, all non-active areas should be stabilized once facilities are installed.

When construction in an area ceases, open excavations will be backfilled as necessary, or safety fencing will be installed for protection. Because restoration will be delayed, any compacted subsoil must be roughened to reduce the potential for erosion during snowmelt or significant rain events.

Slope breakers, berms, and other erosion and sediment control measures will be installed to minimize erosion along the ROW and deposition of sediments off the ROW. If not already completed, gaps will be cut into topsoil and subsoil piles and through the crown

over the trench to allow drainage across the ROW. Environmental Inspectors may determine the need for additional erosion and sediment controls, where necessary.

Equipment bridges will be removed from water courses where potential for high spring flows could compromise the integrity of bridges. Stream banks and adjacent areas on either side of stream or wetland crossings will be stabilized, where needed. Wetland areas where mats are removed will be cleaned up to the extent possible and disturbed soils adjacent to streams and wetlands will be stabilized, if necessary.

All disturbed areas will require temporary mulch before a winter shutdown. Temporary mulch will be applied to all disturbed areas at a rate of 3 tons per acre in Pennsylvania ~~and 4 tons per acre in New York~~. The temporary mulch will be crimped in where possible, or will be track-walked into the right-of-way where ground conditions or slopes make the use of the crimping tool impractical. One hundred percent (100%) mulch will be spread on non-stabilized slopes of 10% or steeper. Only weed-free straw mulch, not hay mulch, will be used where mulch is needed on agricultural land. If significant snow cover or frozen conditions exist on the right-of-way, the decision to apply mulch to disturbed areas will be determined by the Environmental Inspector. If the situation permits, consultation with local erosion control professionals and applicable agencies may be necessary to determine the best methods for anchoring the mulch (i.e. soil tackifiers).

All temporary erosion and sediment controls and stabilization measures should be inspected prior to winter shutdown and periodically throughout the shutdown period to ensure they are functioning properly. If deficient erosion and sediment control measures are discovered during winter shutdown, The Contractor must mobilize personnel to the site to remedy the problem upon notification.

8.2 Seeding

For instances where weather conditions allow proper decompaction of soils, final grading, and topsoil replacement, the following temporary mixtures may be used to stabilize the right-of way between the dates **October 15th** and **March 31st in Pennsylvania** ~~**and between the dates November 15th and April 1st in New York**~~

Lime	Fertilizer	Mulch
One (1) ton per acre	150 lbs. per acre 10-10-10	Hay or Straw 3 tons per acre in PA ~~4 tons per acre in NY~~

8.3 Temporary Seed Mixture

Winter Rye

170 lbs. per acre

If winter rye is unavailable, an alternative such as winter oats or winter wheat may be substituted. For other seed mixes, to ensure adequate vegetation growth when seeding outside of the recommended seeding windows, seed at a higher rate to account for lower germination success. Before permanent seeding is planted in spring, the right-of-way will be inspected and any grade or water control structures that have been damaged over the winter will be repaired.

H. Blasting Plan

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PROCEDURES FOR BLASTING

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PROCEDURES FOR BLASTING

General Considerations:

1. Insure that the pipeline lay contractor uses only a state-licensed blasting subcontractor (or its own employees are licensed blasters).

2. Where permits are required, they must be obtained in advance of project.

3. Blasting along live lines (either ours or someone else's) must be carefully monitored by means of a seismograph. (See notes on use of seismographs, page 6-5.)

4. Before blasting along a live line, the use of non-explosive means should be considered.
   - Equipping hoe with ripper blades
   - Utilizing a hydraulic hoe ram
   - Rock trenchers (Vermeer, Tesmec, Trencor)
   - S-Mite

5. If a pipeline contractor working for National needs to blast along a pipeline while it is in service, it is their responsibility to arrange for a seismograph to monitor the blast vibrations.

6. A similar situation exists for surface mines, quarries, developers, etc. who need to blast along our pipelines. They are responsible for conducting their blasting operations in a manner that insures our facilities will not be damaged. They should arrange for a certified blasting consultant to monitor all blasts within 100 feet of our pipeline. National must approve of the consultant.

7. Every pipeline is different. Pipelines vary in size, wall thickness, pipe grade, metallurgical properties, depth of burial, operating pressure, and degree to which they have been weakened by corrosion. The end result is that there exists **NO RULE OF THUMB** for dealing with blasts. Each one must be analyzed individually. All situations, which involve blasting, should be referred to Engineering to review prior to actual blasting.

8. A blast will propagate most readily toward a free or open face, such as a highwall. This is because the majority of the blast energy will travel towards the free face. When a pipeline is between a blast and the free face, a dangerous situation can be created. Great care must be exercised. Pages 6-3 and 6-4 show examples of this.

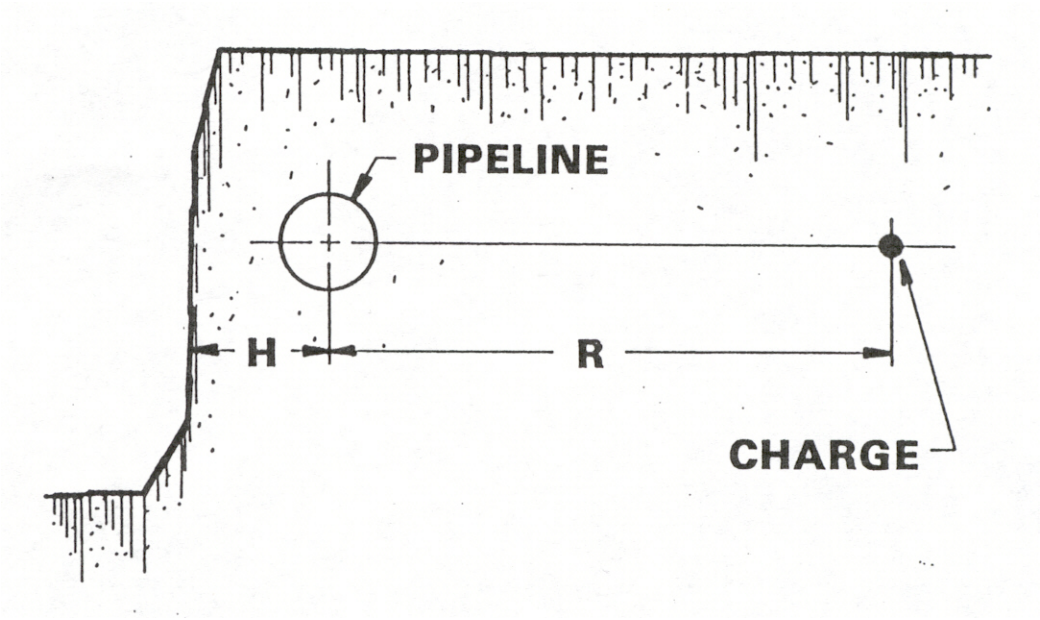
9. The distance from the nearest blast hole to the pipeline as well as the geometric pattern of a blast are important in predicting the resulting stress on the pipeline. Insure that these are properly shown on the blasting plan.

10. The blasting contractor is required to prepare a blasting plan. This plan should be forwarded to Engineering 48 hours prior to the blasting. A sample blast plan is shown on page 6-6.

11. Care should be taken to eliminate or minimize the occurrence of flyrock. Precautions include the use of blasting mats, using lesser amounts of explosives per shot hole and employing delays between adjacent blast holes.

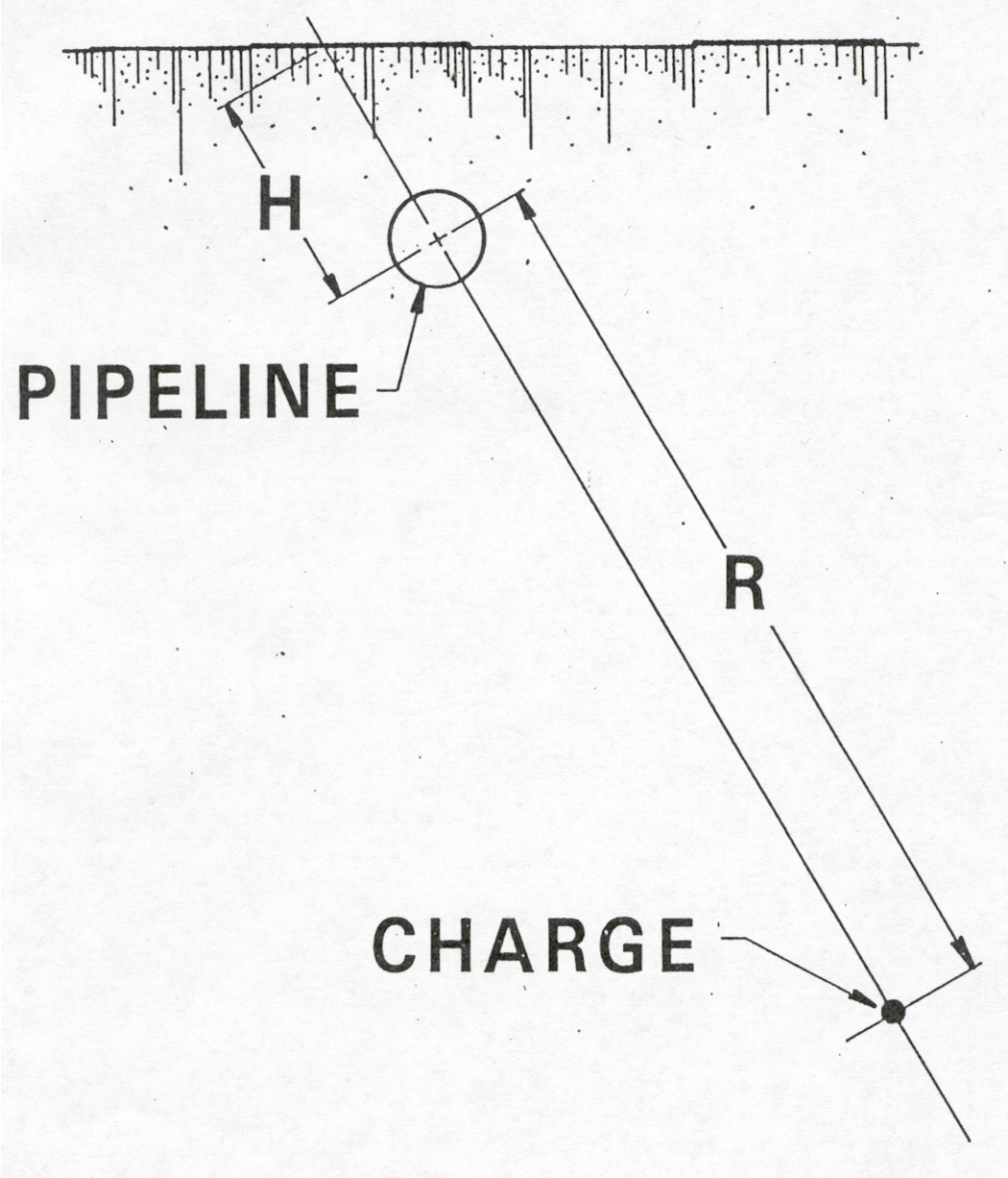
12. After blasting is completed, a leak survey is recommended.

13. Blasting in streams, agricultural fields, near residences, etc. require special precautions. The Project Engineer should be consulted if blasting in these or similar situations.



R = Distance from blast hole to pipeline

H = Distance from pipeline to free face



R = Distance from blast hole to pipeline

H = Distance from pipeline to free face

SEISMOGRAPHS

Notes on the use of Seismographs

1. A seismograph is an instrument which measures the velocity of the ground vibration caused by blasting, vibratory and impacting equipment.

2. It is a sensitive piece of equipment and should be handled with care.

3. A seismograph should always be set up by a trained blasting consultant. (They may ask for assistance from the contractor or NFG employees, but the consultant should oversee its use.)

4. A typical seismograph setup consists of a velocity receiver (usually about the size of a hockey puck) and a data recorder. They are hooked together with hardwired electric cables.

5. The receiver should be installed immediately over the top of the pipe (about 3-6 inches is ideal) in a small hand bug bell hole. Placing the receiver in the same depth horizon as the pipe allows it to measure the vibration as seen by the pipe.

6. The receiver should not be placed on the surface of the ground. If this is done, inaccurate readings can result from the air blast.

7. The receiver should be located as far away from the blast as the wire cables will allow. Additional protection can be afforded by building a small corral around the instrument using a dozen or so pipe skids. This will help protect it from being damaged by flyrock.

8. Printouts from the seismograph should be sent to Engineering. Any reading in excess of 2.0 inches per second violate NFG's Blasting Specifications and require changes to the blasting plan before continuation of blasting.

rmit Number_____ Date_____

TYLER BLASTING INC.

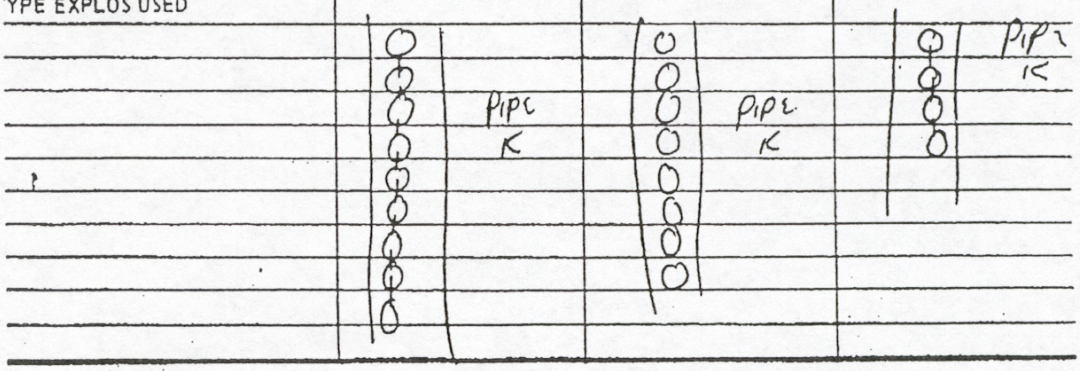
PENFIELD, PENNSYLVANIA 15849

ustomer:_____ Del. Ticket Number:_____

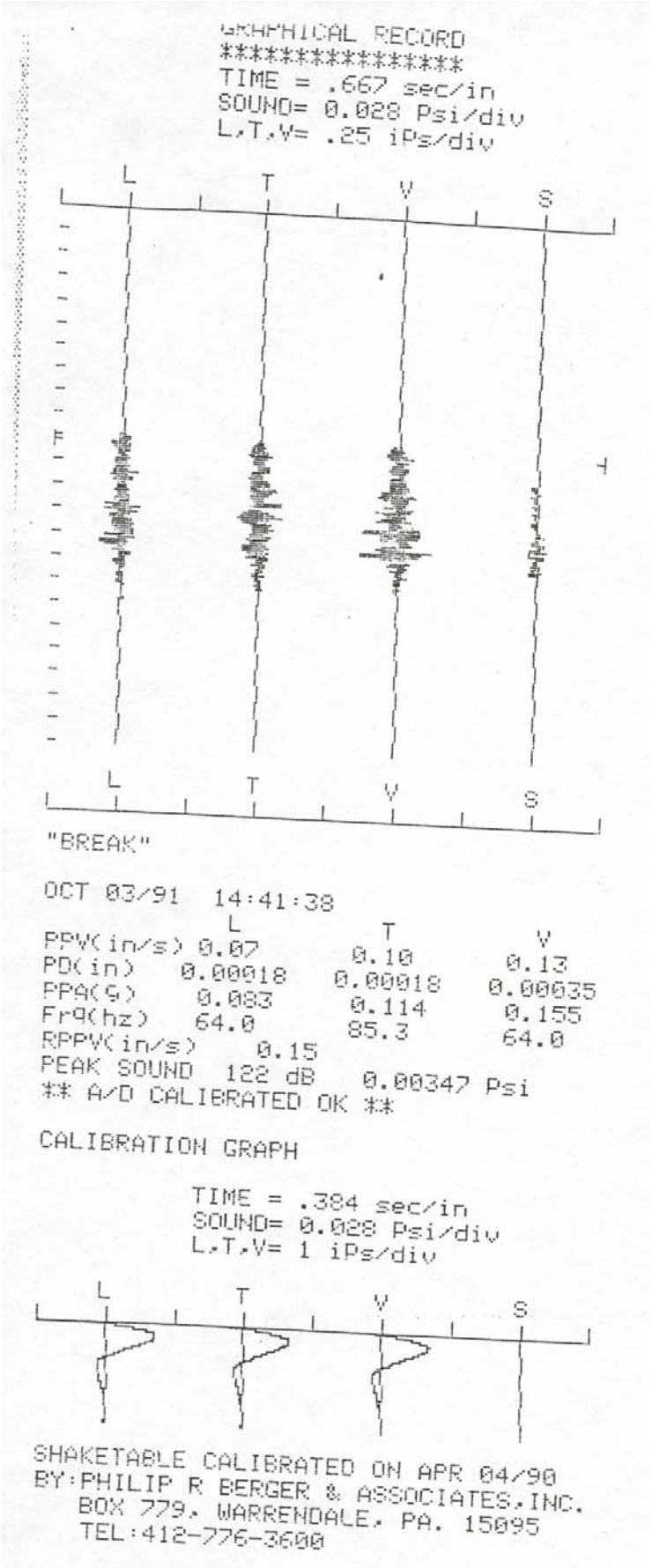
ddress:_____ Job Location: 528 Link K

ome Lisc. Blaster: Patsy Graziano Customer Signature:_____

IME SHOT:			
IGNATURE BLASTER: & NUMBER	Poly Dyne 860-A	———	———
LASTER HELPER:	DANNY		
LASTER HELPER:			
O. HOLES	9	7	4
IA HOLES:	3 inch	3 inch	3 inch
EPTH HOLES	6 ft	4-6 ft	6 ft
URDEN:			
PACING:			
TEM:	2 ft	2 ft	2 ft
YPE STEM:	Drill Shavings	Drill Shavings	Drill Shavings
ECKS PER HOLE	ONE	ONE	ONE
OTAL AMOUNT EXP USED	10 lbs	12	9
AX EXPLOS PER DELAY	3 lb	3 LB	3 lb
IETHOD OF FIRING	NON Elec	NON Elec	NO Elec
YPE & NUMBER OF CIRCUIT	ONE	ONE	ONE
IST TO NEAREST STRUCT.			
IRECTION TO NEAREST STRUCT.			
CALE DIST			
EATHER COND. & TEMP.	Cloudly 67°	Cloudly 65°	Cloudly
PEED & DIRECTION OF WIND	NW 5 MPH	NW - 5 mph	NW - 5 mph
LAST MATS USED:	NONE	NONE	NONE
YPE OF BLAST CAPS	E.B.	E.B.	E.B.
ELAY PERIODS USED:	12	12	12
YPE OF MATERIAL BLAST:	SAND Rock	SAND Rock	SAND Rock
EQUENTIAL SET -			
EISMOGRAPH LOCATION	LINE K	LINE K	LINE K
NAME OF OPERATOR	Patsy	Patsy	Patsy
EIS NUMBER	22239	2239	2239
APE NUMBER	Utility	Utility	Utility
IR READ	NONE	NONE	NONE
ART READ	.7	3.5	2.0
YPE EXPLOS USED			



Typical Blast Plan for Pipeline Construction



Typical Seismograph Tape Printout

I. Geologic Hazard Mitigation Plan

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MOTT MACDONALD

National Fuel

FM100 Project

Geohazard Review

July 2019

PF17-10-000: Public

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July 2019

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Acronyms

BMP	Best Management Practices
ESCAMP	Erosion and Sediment Control and Agricultural Mitigation Plan
FERC	Federal Energy Regulatory Commission
FERC Plan	FERC Upland Erosion Control, Revegetation, and Maintenance Plan
FERC Procedures	FERC Wetland and Waterbody Construction and Mitigation Procedures
ft	feet
MP	milepost
National Fuel	National Fuel Gas Supply Corporation
NGA	Natural Gas Act
PA	Pennsylvania
PADCNR	Pennsylvania Department of Conservation and Natural Resources
Project	FM100 Project
ROW	right(s)-of-way
USGS	United States Geological Survey

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1 Phase I: Desk Study Data

National Fuel Gas Supply Corporation (National Fuel) is applying to the Federal Energy Regulatory Commission (Commission or FERC) for a Certificate of Public Convenience and Necessity under Sections 7(b) and 7(c) of the Natural Gas Act (NGA) for authorization to construct, operate and abandon various facilities in connection with its proposed FM100 Project (Project) located in Cameron, Clearfield, Clinton, Elk, McKean, and Potter counties, Pennsylvania (PA).

The intent of this review is to identify potential geohazards to facilitate design decisions and mitigation solutions if necessary. The ultimate objective of this review is to reduce geohazard risks to acceptable levels for the construction and long-term operation of the Project. The study is consisted of a desktop review which reviewed published information to gain an understanding of the overall conditions and potential risk levels posed by geotechnical conditions for construction and operation of the Project. This desktop review was used to target specific areas for follow-up field observations.

1.1 Study Area

The study will cover:

- 29.5-mile proposed Line YM58, located in McKean and Potter Counties, PA
- 1.4-mile proposed Line YM244, located in Potter County, PA

Other Project components were not evaluated in this review because they are not located in areas susceptible to significant geohazards (e.g., Marvindale and Tamarack Compressor Stations) and/or the proposed construction activities will have minor land disturbance and occur entirely within an existing pipeline right of way (ROW) (e.g., bell hole excavations for abandonment activities on Line FM100).

The desk study generally considered a 2,000 ft wide corridor (i.e., 1,000 ft on either side of the proposed pipeline centerline). This was expanded as necessary to capture coverage of significant slopes if they extended beyond 1,000 ft from the pipeline centerline.

1.2 Pipeline Slope Considerations

Hazards posed to pipeline infrastructure by slope construction can be separated into two broad categories. Firstly, the challenge of restoring site soils and vegetation on steep slopes, thus increasing potential soil erosion rate. The second and more serious hazard is the potential for larger scale slope movements which can results in significant undesirable forces being applied to the pipeline. Proposed mitigation for erosion and sedimentation control are addressed within the project's Erosion and Sediment Control and Agricultural Mitigation Plan[1] (ESCAMP) (see Resource Report 2, Appendix 2-F, associated permits (i.e., ESCGP-3 and Chapter 105 permits) and industry accepted best management practices (BMP). The focus of this study is to identify locations where measures exceeding standard construction practices may be necessary to safely install the pipeline, or where an elevated hazard of slope failure may exist, thus requiring additional engineering controls.

[1] The ESCAMP incorporates the protocol and procedures contained within the Commission's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan), (2013a); and the Commission's *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), (2013b). Applicable BMP typical drawings accompany the ESCAMP.

1.3 Geological Context

The proposed pipelines are within a relatively simple geological location with generally near horizontally bedded sedimentary formations. The project intersects the following mapped geological formations (U.S. Geological Survey [USGS] descriptions quoted):

1.3.1 Pottsville Formation

Predominantly gray sandstone and conglomerate; also contains thin beds of shale, claystone, limestone, and coal; includes Olean and Sharon conglomerates of northwestern Pennsylvania; thin marine limestones present in Beaver, Lawrence, and Mercer Counties; minable coals and commercially valuable high-alumina clays present locally. Pennsylvanian age (USGS 2019a).

1.3.2 Catskill formation

Grayish-red sandstone, siltstone, shale, and mudstone; units of gray sandstone occur in upper part; lithologies in upper part arranged in fining-upward cycles. In the Altoona area, the Catskill Formation is mapped as the Duncannon, Sherman Creek, and Irish Valley Members, which are described under “Central and Eastern Pennsylvania” provinces. Devonian age (USGS 2019b).

1.3.3 Shenango and Oswayo formation (undivided)

Greenish-gray, olive, and buff sandstone and siltstone, and gray shale in varying proportions; includes “Pocono” (“Knapp”) and Oswayo of earlier workers; difficult lithologic distinction between Oswayo and “Knapp”- “Pocono” south and east of type area at Olean, NY; contains marine fossils; includes lateral equivalents of Shenango Formation, Cuyahoga Group, Corry Sandstone, Bedford Shale, and Cussewago Sandstone, plus Oswayo Formation. Mississippian and Devonian age (USGS 2019c).

1.3.4 Huntley Mountain formation

Greenish-gray and light-olive-gray, flaggy, fine-grained sandstone, siltstone, and a few red shale interbeds; includes lower “Pocono” plus “Oswayo” of earlier workers. Forms transition between Catskill Formation and Burgoon Sandstone. Mississippian and Devonian age (USGS 2019d).

1.4 Landslide context

The following graphics (Figures 1.4-1 and 1.4-2) are extracted from the Pennsylvania Department of Conservation and Natural Resources (PADCNR), Pennsylvania Geological Survey publication *Landslides in Pennsylvania* (2006).

The project is located within an area with a landslide susceptibility classified as *“Generally low, but included local areas of high to moderate”* within the *“Deep Valleys*” physiographic province as seen in Figure 1.4-1.

The project lies within a zone defined within zone of *“flat-laying sedimentary rocks, thin soil cover on steep slopes, some thick colluvial and glacial soils. Debris avalanches, debris flows, and debris slides; slumps in thick soils”*, as seen in Figure 1.4-2.

Figure 1.4-1: Physiographic Provinces and Sections of PA, and Landslide Susceptibility

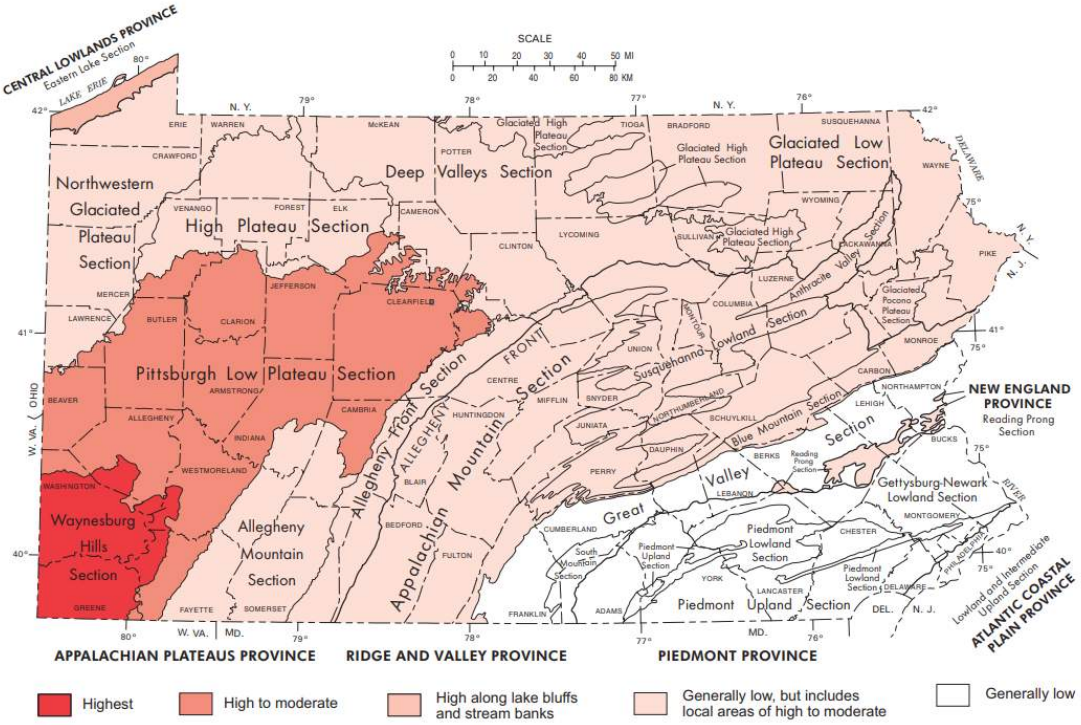
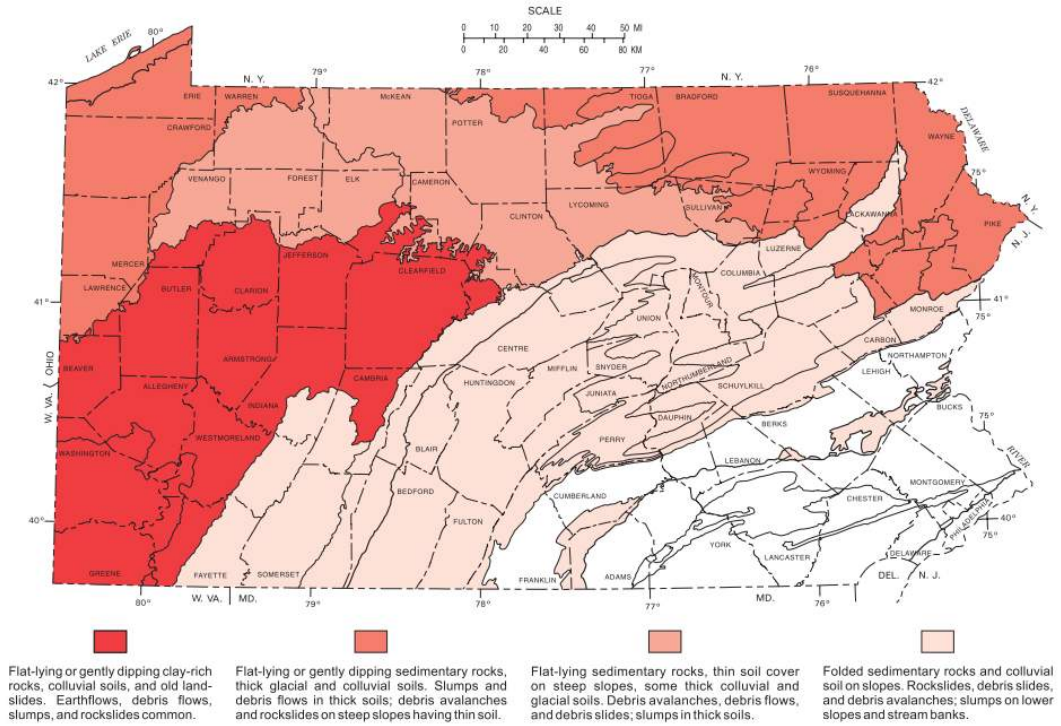


Figure 1.4-2: Distribution of Landslides in PA



1.5 Historic Landslides

USGS *Landslide-Inventory Maps of Pennsylvania* were obtained from the PADCNR (1981). The following quadrangles are intersected by Line YM58 and were reviewed (see Figure GH-001 in Section 6: Attachments):

- dcnr_007348 Crosby
- dcnr_007534 Smethport
- dcnr_007489 Port Allegany
- dcnr_007508 Roulette
- dcnr_007344 Coudersport

Line YM224 is located within the Ellisburg Quadrangle which is not included in the PADCNR landslide inventory.

The USGS mapping includes identification of the following landslide classifications:

- Active or recently active landslides
- Old landslide
- Colluvial slope
- Areas susceptible to debris flows and debris avalanches
- Areas susceptible to rock fall
- Soil and rock susceptible to landsliding.

Of the six classifications included in the legend the only classification which occurs near the project is “old landslide”. This classification is described as an “Area of extensive hummocky ground caused by earth flow and earth and rock slump. Lacks clear evidence of sliding. Relatively stable in natural, undisturbed state, generally not affected by small structures properly sites in areas away from edge of toe; can be reactivated by extensive, rapid excavation, loading and changes in ground water and surface water conditions…”

The following represents Mott MacDonald’s review of each quadrangle crossed by the project:

1.5.1 Crosby Quadrangle

Line YM58 does not intersect mapped landslide features in this quadrangle. The closest mapped feature is approximately 800 ft south of milepost (MP) 6.

1.5.2 Smethport

Line YM58 intersects two mapped landslide features in this quadrangle. These features are located from MPs 6.9 to 7.4 and MPs 7.7 to 7.8. (Slopes 4 and 5 respectively). These are both recorded as “old landslide”.

1.5.3 Port Allegheny

Line YM58 does not intersect mapped landslide features in this quadrangle. At MP 8.5 the pipeline is within 100ft of a recorded “old landslide” (slope 6). From MPs 13.6 to 13.7 the pipeline runs parallel to a mapped “old landslide” located approximately 50 ft north of the proposed alignment (slope 10).

1.5.4 Roulette

Line YM58 intersects one mapped landslide feature in this quadrangle. The project intersects an “old landslide” at MP 19.2; however, at this location the pipeline is located on low gradient ground. The mapped “old landslide” zone extends up the slope and the Project only intersects the extreme lowest portion of the mapped feature (slope 16).

1.5.5 Coudersport

Line YM58 does not intersect mapped landslide features in this quadrangle. The nearest mapped “old landslide” feature is approximately 120 ft north of the pipeline at MP 25.6 near the crest of a slope where the pipeline alignment diverges from the existing Tennessee Gas Pipeline ROW (slope 23).

1.6 Slope Topography Review

Publicly available LiDAR data was processed to evaluate the site topography. The data set was obtained from Pennsylvania Spatial Data Access (PASDA) PAMAP Program – 3.2ft digital elevation model (Pennsylvania State University 2006-2008). The contour lines were clipped to within 1,300 ft of the project centerline. Figure GH-002 in Section 6: Attachments, presents general slope topography contour lines.

1.6.1 Topography Classification

The topography was processed into a slope gradient raster file on a 70 ft grid within the 2,600 ft project topography corridor. The mean slope gradient within each cell was used to classify the project study area into the following graduated color scale (e.g., green to red; green representing the lowest slope gradient and red on the opposite end of the spectrum):

- <10% slope gradient
- >10% to <20% slope gradient
- >20% to <30% slope gradient
- >30% to <40% slope gradient
- >40% to <50% slope gradient
- >50% to <60% slope gradient
- >60% slope gradient

Figure GH-003 in Section 6: Attachments, presents maps with a colored raster map coded for slope angle.

For the proposed Line YM58 pipeline alignment, 6.8 miles are between 15% and 30% gradient and 3.2 miles are >30% gradient. For the proposed Line YM224 pipeline alignment, 0.18 miles are between 15% and 30% gradient and 0.05 miles are >30% gradient.

Table 1.6-1: Location of Slopes > 30% Gradient

Facility/County	Start MP	End MP	Length (miles)	Average Gradient (%)	Max Gradient (%)
Line YM58					
McKean	0.34	0.35	0.01	29	32
McKean	0.46	0.62	0.16	19	38
McKean	1.37	1.41	0.04	23	43
McKean	1.47	1.47	0.0	30	46
McKean	1.52	1.52	0.0	30	33
McKean	2.34	2.54	0.20	16	68
McKean	2.77	2.87	0.10	28	52
McKean	3.01	3.07	0.06	31	57
McKean	3.24	3.25	0.01	21	41
McKean	3.37	3.51	0.14	33	63
McKean	4.16	4.20	0.04	16	40
McKean	4.32	4.33	0.01	18	40
McKean	5.92	6.16	0.24	34	73
McKean	6.45	6.49	0.04	24	78
McKean	6.68	7.32	0.64	25	70
McKean	7.47	7.48	0.01	42	47
McKean	7.51	7.51	0.0	25	31
McKean	7.58	7.59	0.01	26	36
McKean	7.68	7.68	0.0	36	43
McKean	7.72	7.98	0.26	29	55
McKean	8.57	8.60	0.03	26	37
McKean	10.08	10.08	0.0	28	35
McKean	10.23	10.29	0.06	26	43
McKean	10.45	10.45	0.0	26	35
McKean	10.58	10.72	0.14	36	61
McKean	10.8	10.8	0.0	29	34
McKean	10.82	10.84	0.02	36	55
McKean	10.90	11.00	0.10	28	50
McKean	11.24	11.26	0.02	21	33
McKean	11.37	11.38	0.01	28	35
McKean	11.79	11.80	0.01	25	35
McKean	11.90	11.91	0.01	30	33
McKean	11.97	12.00	0.03	15	42
McKean	12.17	12.17	0.0	31	33
McKean	12.37	12.37	0.0	27	32
McKean	12.41	12.41	0.0	31	34
McKean	12.48	12.49	0.01	27	36
McKean	12.54	12.59	0.05	18	34

Facility/County	Start MP	End MP	Length (miles)	Average Gradient (%)	Max Gradient (%)
McKean	12.74	12.74	0.0	30	34
McKean	12.82	13.03	0.21	39	83
McKean	13.07	13.09	0.02	28	43
McKean	13.39	13.42	0.03	14	42
McKean	13.62	13.64	0.02	18	54
McKean	13.89	13.89	0.0	30	34
McKean	13.96	13.99	0.03	20	39
McKean	14.15	14.22	0.07	22	39
McKean	14.34	14.39	0.05	11	61
McKean	14.7	14.7	0.0	31	36
McKean	14.80	14.84	0.04	16	42
McKean	15.26	15.26	0.0	30	32
McKean	15.31	15.39	0.08	29	53
McKean	15.43	15.69	0.26	37	74
McKean	15.78	15.78	0.0	26	31
McKean	15.82	15.83	0.01	21	38
McKean	15.96	16.22	0.26	20	47
McKean	16.35	16.38	0.03	23	33
McKean	16.76	16.77	0.01	35	42
McKean	17.03	17.03	0.0	22	36
McKean	17.18	17.20	0.02	13	38
McKean/Potter	17.25	18.13	0.88	35	85
Potter	18.29	18.30	0.01	39	58
Potter	18.59	18.60	0.01	41	46
Potter	19.02	19.05	0.03	25	41
Potter	19.11	19.11	0.0	32	42
Potter	19.18	19.60	0.42	29	70
Potter	21.02	21.44	0.42	35	69
Potter	22.06	22.34	0.28	41	86
Potter	22.61	22.62	0.01	31	43
Potter	22.72	22.92	0.20	22	62
Potter	22.99	23.23	0.24	39	74
Potter	23.33	23.34	0.01	20	32
Potter	23.53	23.56	0.03	21	46
Potter	23.98	23.99	0.01	22	48
Potter	24.16	24.19	0.03	26	39
Potter	24.27	24.29	0.02	13	40
Potter	24.33	24.38	0.05	24	62
Potter	24.48	24.49	0.01	16	43
Potter	24.59	24.60	0.01	28	47

Facility/County	Start MP	End MP	Length (miles)	Average Gradient (%)	Max Gradient (%)
Potter	24.75	24.76	0.01	28	44
Potter	24.88	24.94	0.06	16	37
Potter	25.02	25.05	0.03	32	54
Potter	25.91	25.91	0.0	36	43
Potter	26.11	26.11	0.0	35	49
Potter	26.18	26.21	0.03	30	38
Potter	27.06	27.21	0.15	27	40
Potter	27.28	27.29	0.01	25	33
Potter	27.45	27.52	0.07	19	36
Potter	27.64	27.67	0.03	19	35
Potter	27.86	28.21	0.35	23	58
Line KL Extension					
McKean	0.05	0.05	0	33	37
Line YM224 Loop					
Potter	0.97	1.04	0.08	34	42

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2 Phase II: Field Investigations

2.1 Field Investigation Objectives

The purpose of field investigations is to provide evaluations of observable site-specific features such that potential hazards and risks can be identified and considered during project design and mitigated for if necessary. The results of the desktop review focused the field investigations on locations most likely to contain terrain that may pose construction challenges and/or operational risk.

2.2 Methods

Twenty-three (23) locations were visually inspected by Mott MacDonald staff personnel over a three-day period; June 10 to 12, 2019. The inspection crew consisted of a Professional Geologist, licensed in the Commonwealth of Pennsylvania and a junior environmental scientist. Slope locations were observed from afar and via direct canvasing. The crew walked the existing adjacent pipeline ROW and descended the proposed centerline in forested areas.

Slope gradient measurements were taken to quantify steepness. In addition, visual observations were made to screen for evidence of possible historic movement, or suitability for future movement. Examples of features which may indicate past, present or potential future slope movement included, but were not limited to:

- Disturbed structures
- Disturbed trees
- Disturbed utilities
- Mid slope ground water springs or saturated ground
- Vegetation modification
- Unvegetated slopes
- Young vegetation on slopes
- Back tilted blocks
- Hummocky ground
- Scarps
- Back tilted blocks
- Toe bulge
- Talus
- Tension cracks

The anticipated project construction methods were also considered. Locations where side slope construction will be required are typically at a higher risk than construction which is oriented directly up or down the slope.

2.3 Locations

All four mapped historic USGS landslide locations identified in Section 1.5 which are intersected by the project were field inspected. In addition, locations identified as having a slope angle greater than 40% were reviewed; this included locations where the project is adjacent to steep slopes, such as steep slopes adjacent to, above, or below the proposed alignment that may pose a hazard to the pipeline. All identified selected locations lay along the alignment of Line YM58; no steep slopes were identified at Line YM224 Table 2.3-1 lists the steep slopes identified for inspection. Attachments GH-001 through GH-004 in Section 6: Attachments, show the slope locations.

Table 2.3-1: Slopes Identified for Field Inspection

Facility[1]/County	Slope ID	MP (center)	Slope Height (ft)[2]	Potential for Side Slope Construction (Y/N)	USGS Mapped Landslide Features (Y/N)
Line YM58					
McKean	1	3.2	230	No	No
McKean	2	3.8	300	No	No
McKean	3	6.5	400	No	No
McKean	4	7.3	400	No	Yes
McKean	5	7.7	350	No	Yes
McKean	6	8.2	400	Yes	No
McKean	7	11.1	370	No	Yes
McKean	8	11.5	400	Yes	No
McKean	9	13.2	400	Yes	No
McKean	10	13.5	550	No	No
McKean	11	16.1	650	Yes	No
McKean	12	16.7	600	No	No
McKean	13	17.8	600	No	No
Potter	14	18.3	500	No	No
Potter	15	18.5	500	No	No
Potter	16	19.0	690	No	Yes
Potter	17	20.0	560	Yes	No
Potter	18	21.7	400	No	No
Potter	19	22.0	400	No	No
Potter	20	22.8	560	No	No
Potter	21	23.8	470	No	No
Potter	22	24.1	500	No	No
Potter	23	25.7	280	No	No

Source: Mott MacDonald field review (June 10 – 12, 2019).
[1] Line YM224 Loop is located within the Ellisburg Quadrangle which is not included in the PADCNR landslide inventory. There are no steep slopes based upon the USGS topo map review.
[2] Slope height is measured from the base of the steep slope to its apex.

2.4 Hazard Designation Levels

A slope hazard rating was assigned to each site which was based on the results of the desktop review and field observations. The assigned hazard indicates the probability for slope movement to occur at the location using basic construction methods with no elevated precautions. The slope hazard rankings follow:

2.4.1 Low Hazard

The slope appears to be stable under current conditions with limited evidence of prior or active slope movements. Some shallow soil movements may be observed where the topography is locally over steepened near small streams or recent tree falls etc. No major indication of shallow ground water or other key risk factors.

It is likely that construction can progress through this location with the utilization of standard soil and erosion controls (e.g., water bars, silt sock, trench plugs, etc.).

2.4.2 Medium Hazard

No active slope movements observed, but some evidence of prior slope movements are present. The prior movements may be shallow in nature or originating from prior climatic conditions which are no longer present. In these locations elevated slope management practices may be necessary during construction. This include tighter spaced water bars, trench drainage installations, vegetation restoration fabrics, utilization of well-draining granular geotechnical materials as backfill or other location-specific BMPs.

2.4.3 High Hazard

Active or recently active slope movements are observed. It is considered likely that construction disturbance may result in an undesirable decrease in slope stability and possibly reactive / trigger slope movements which may pose a challenge during construction, or during the operation of the pipeline.

2.5 Project Hazard Designations

All reviewed slopes were assigned a slope hazard rating as identified below and summarized in Table 2.5-1

- 3 of 23 slopes were classified as low hazard
- 3 of 23 slopes were classified as low to moderate hazard
- 17 of 23 slopes were classified as moderate hazard
- 0 of 23 slopes were classified as high hazard

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Table 2.5-1: Slope Hazard Evaluation Summary

Facility[1]/County	Slope ID	Milepost (center)	Inspection Date	Steepest 6ft Section	Height[2] (ft)	Side Slope (Y/N)	Slope Hazard
Line YM58							
McKean	1	3.2	2019-06-10	50 º	230	N	Moderate
McKean	2	3.8	2019-06-10	90 º	300	N	Moderate
McKean	3	6.5	2019-06-10	40 º	400	N	Moderate
McKean	4	7.3	2019-06-10	40 º	400	Y	Moderate
McKean	5	7.7	2019-06-11	40 º	350	N	Moderate
McKean	6	8.2	2019-06-11	60 º	400	Y	Moderate
McKean	7	11.1	2019-06-11	35 º	370	N	Low to Moderate
McKean	8	11.5	2019-06-11	35 º	400	Y	Low to Moderate
McKean	9	13.2	2019-06-11	35 º	400	Y	Low
McKean	10	13.5	2019-06-11	40 º	550	N	Moderate
McKean	11	16.1	2019-06-11	40 º	650	N	Moderate
McKean	12	16.7	2019-06-11	35 º	600	Y	Low
McKean	13	17.8	2019-06-11	42 º	600	N	Moderate
Potter	14	18.3	2019-06-11	35 º	500	N	Moderate
Potter	15	18.5	2019-06-11	35 º	500	N	Moderate
Potter	16	19.0	2019-06-12	30 º	690	N	Low
Potter	17	20.0	2019-06-12	30 º	560	N	Moderate
Potter	18	21.7	2019-06-12	48 º	400	N	Moderate
Potter	19	22.0	2019-06-12	40 º	400	N	Moderate
Potter	20	22.8	2019-06-12	40 º	560	N	Moderate
Potter	21	23.8	2019-06-12	45 º	470	N	Moderate
Potter	22	24.1	2019-06-12	30 º	500	Y	Moderate
Potter	23	25.7	2019-06-12	30 º	280	N	Low to Moderate

Source: Mott MacDonald field review (June 10 – 12, 2019).

[1] Line YM224 Loop is located within the Ellisburg Quadrangle which is not included in the PADCNR landslide inventory. There are no steep slopes based upon the USGS topo map review.

[2] Slope height is measured from the base of the steep slope to its apex.

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3 Summary and Recommendations

3.1 General

The presence of the existing adjacent pipelines provides a precedent that the construction and operation of a natural gas pipeline is feasible in this terrain.

The project does not intersect any of the high hazard documented landslides on the USGS mapping such as *Active landslide* or *Soil and rock susceptible to landsliding*. The only USGS mapped landslide category which was intersected by project components was *Old Landslides* (4 locations) which are described as "…relatively stable…" by the USGS. Field inspections were performed which did not observe any recent, or actively occurring major slope movements.

3.2 Recommendations

The hazard level designation was performed on the explicit assumption that good construction practices are implemented throughout construction. Poor construction practices can lead to the destabilization of any slope, even if it was highly stable in its pre-construction state.

The details and notes provided within the ESCAMP should be utilized to guide slope construction practices. It is recommended that allowances be made within the budget and program timeline to appropriately mitigate any un-anticipated slope stability challenges which may arise during construction.

It is recommended that during construction a Professional Engineer specializing in geotechnical engineering and slope stability, or a Professional Geologist with experience in engineering geology and slope stability, perform part-time project observations. The part-time observations will not absolve the construction contractor of the prime responsibility for construction safety and compliance with U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration regulations. The observations should be performed at key events including; post vegetation clearing, first breaking ground, trenching, and final grade restoration.

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4 Limitations

This document is issued for National Fuel and for specific purposes connected with the FM100 Project only. It should not be relied upon by any other party or used for any other purpose. We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to Mott MacDonald by third-parties. This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from Mott MacDonald and from the party which commissioned it. The site observations included within this report represent the conditions at the time of inspection only. The slope review was performed using visual observations and slope angle measurements only, no boreholes or other intrusive investigations were performed. The slope hazard rating assigned to each slope is provided for comparative purposes and represents the subjective hazard level for slope failures during or post-construction using typical industry standard basic construction methodology. This brief visual field review should not be relied upon as a full slope stability assessment through to construction and it is the responsibility of construction phase parties to observe and appropriately respond to site conditions during construction to ensure the safety of site personnel and equipment, and the resiliency of the project. The content of this report shall not be used to establish any contract quantities.

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5 References

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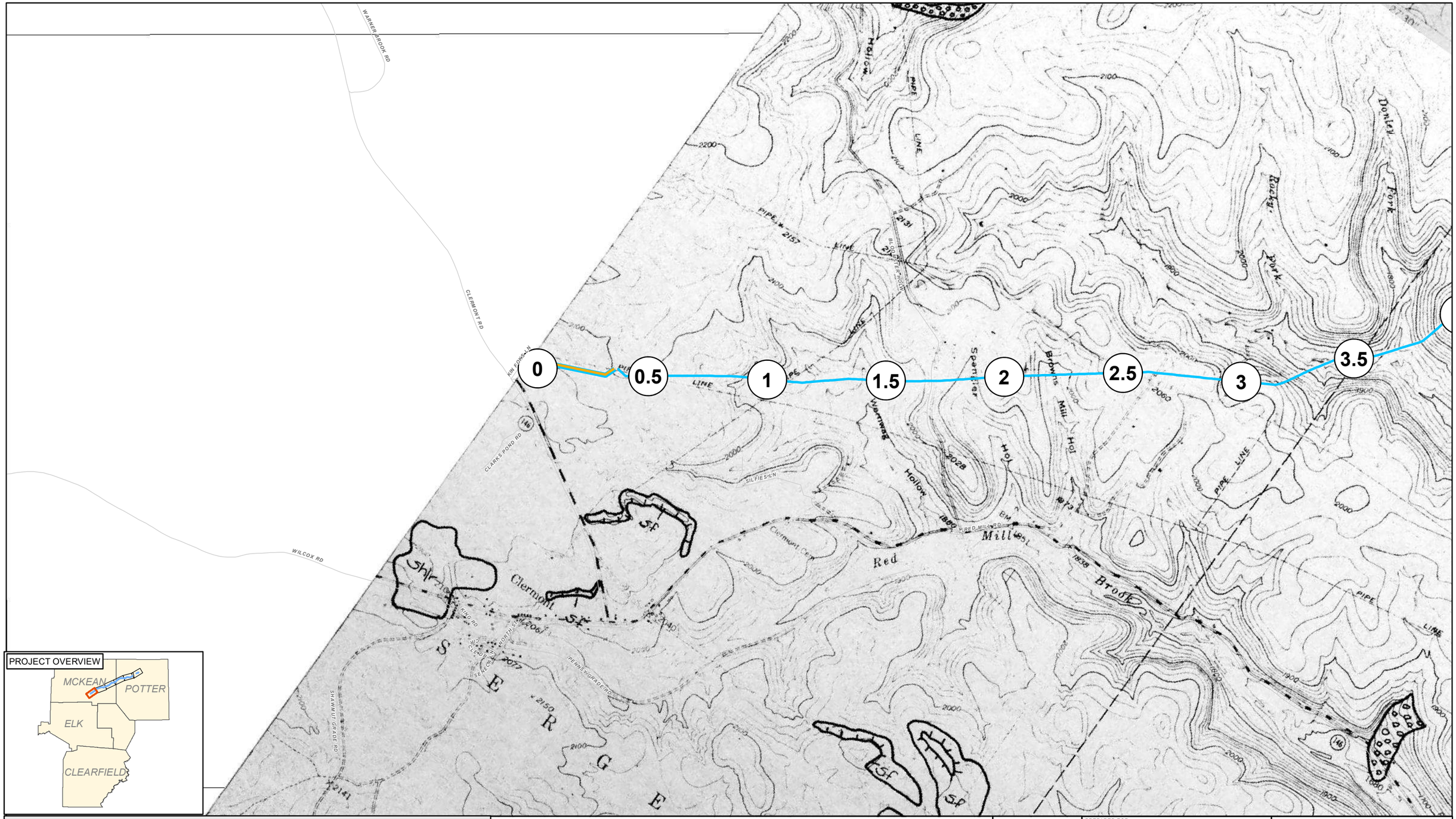
6 Attachments



PROPOSED LINE KL EXTENSION
PROPOSED LINE YM224 LOOP
PROPOSED LINE YM58
ROAD
RAILROAD
INDEX SHEET
MILE POST

NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 PROJECT

FIGURE GH-001

HISTORIC LANDSLIDES

COUDERSPORT, CROSBY, PORT ALLEGHENEY, ROULETTE, AND SMETHPORT QUADRANGLES
PENNSYLVANIA - USGS, 1981

2,000 1,000 0 2,000 4,000 FEET

ABSOLUTE SCALE: 1:24,000

REFERENCE SCALE: 1 IN = 2,000 FT

PREPARED FOR: National Fuel

PREPARED BY: MOTT MACDONALD

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PROPOSED LINE KL EXTENSION
PROPOSED LINE YM224 LOOP
PROPOSED LINE YM58
ROAD
RAILROAD
INDEX SHEET
MILE POST

NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 PROJECT

FIGURE GH-001

HISTORIC LANDSLIDES

COUDERSPORT, CROSBY, PORT ALLEGHENY, ROULETTE, AND SMETHPORT QUADRANGLES
PENNSYLVANIA - USGS, 1981

2,000 1,000 0 2,000 4,000 FEET

ABSOLUTE SCALE: 1:24,000

REFERENCE SCALE: 1 IN = 2,000 FT

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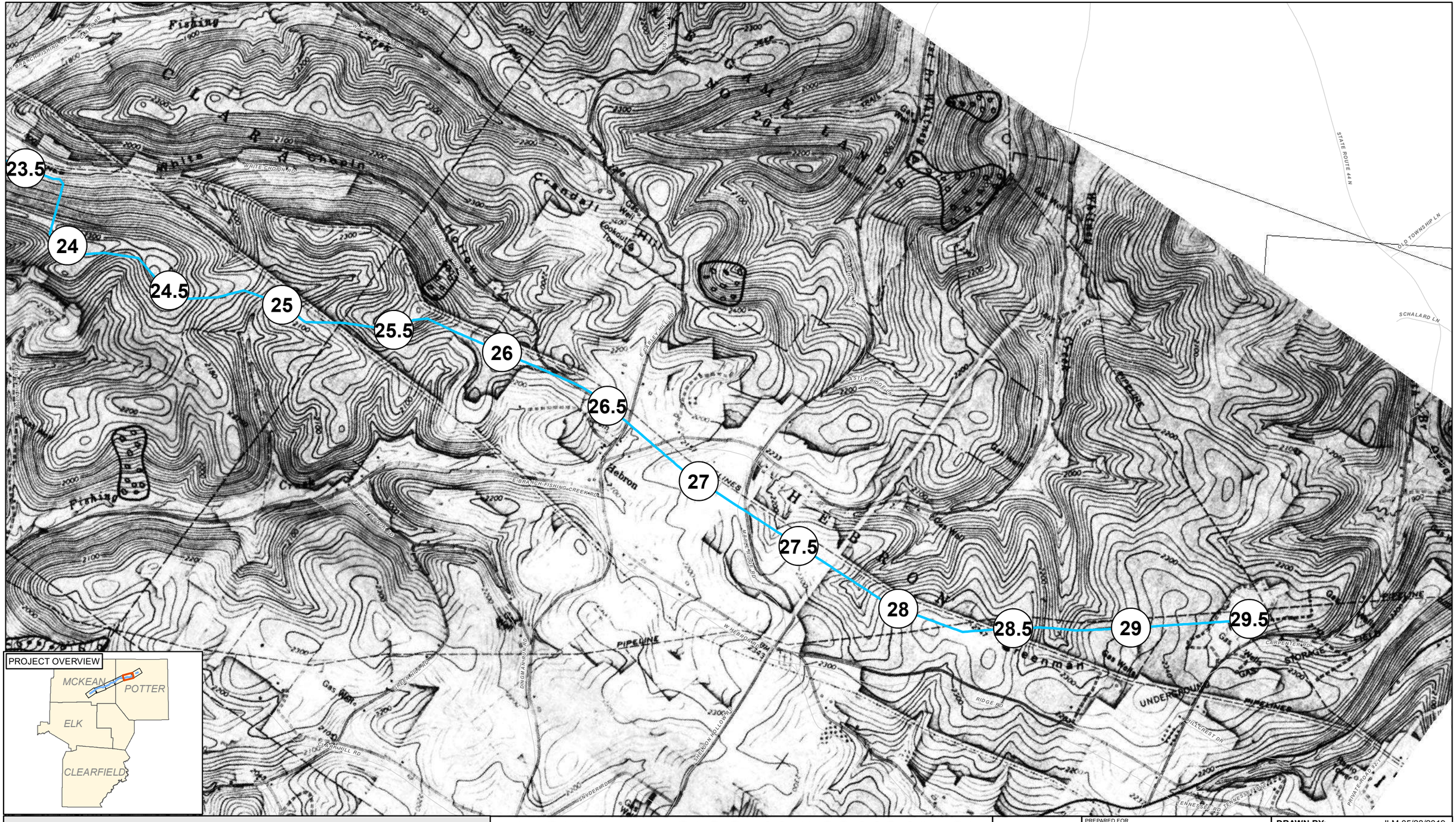

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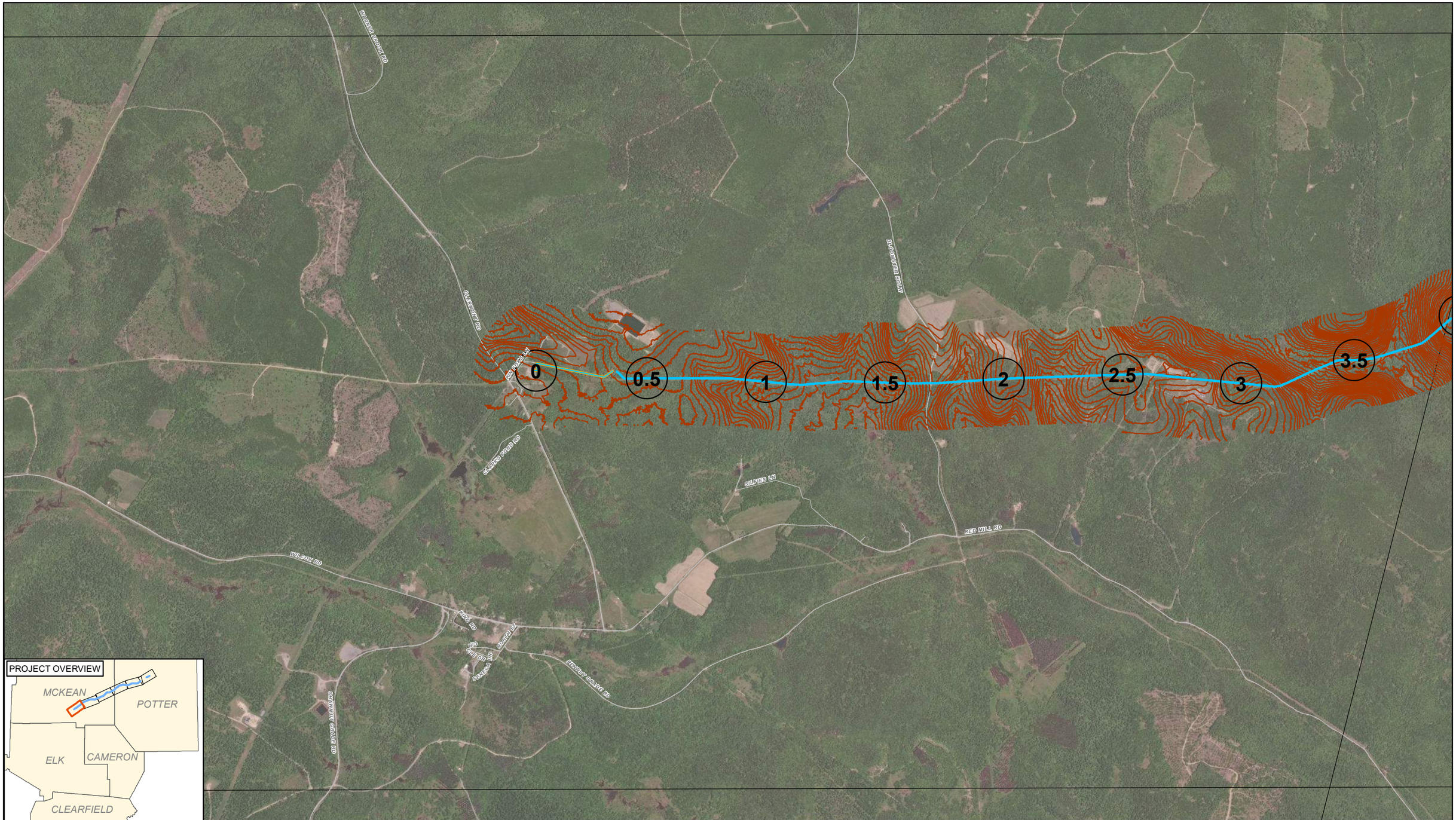

PROJECT OVERVIEW

ROAD
RAILROAD
MILE MARKER
10' CONTOURS
INDEX SHEET
PROPOSED LINE KL EXTENSION
PROPOSED LINE YM224 LOOP
PROPOSED LINE YM58

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 PROJECT

FIGURE GH-002

SITE TOPOGRAPHY

MCKEAN AND POTTER COUNTIES
PENNSYLVANIA

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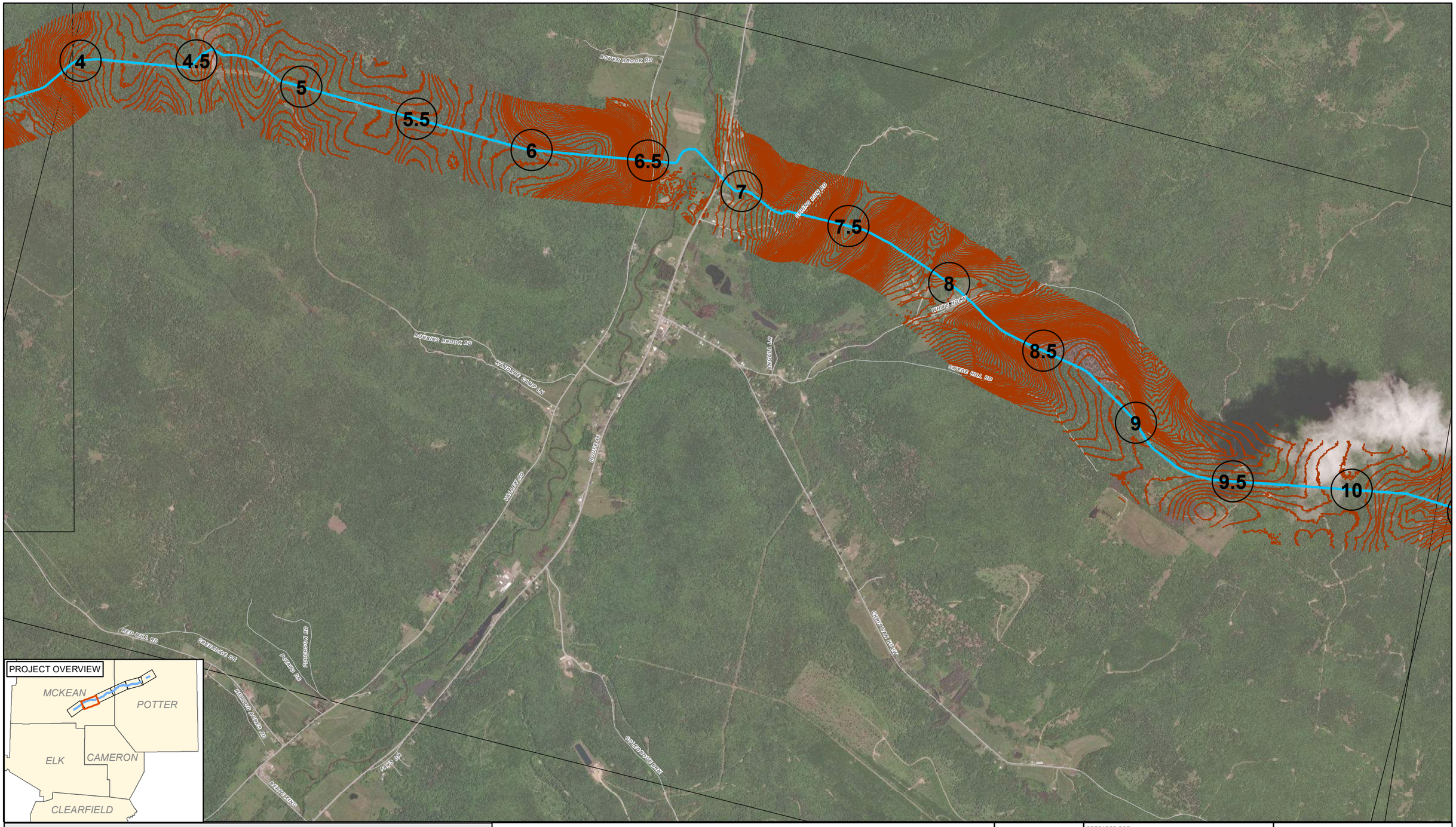

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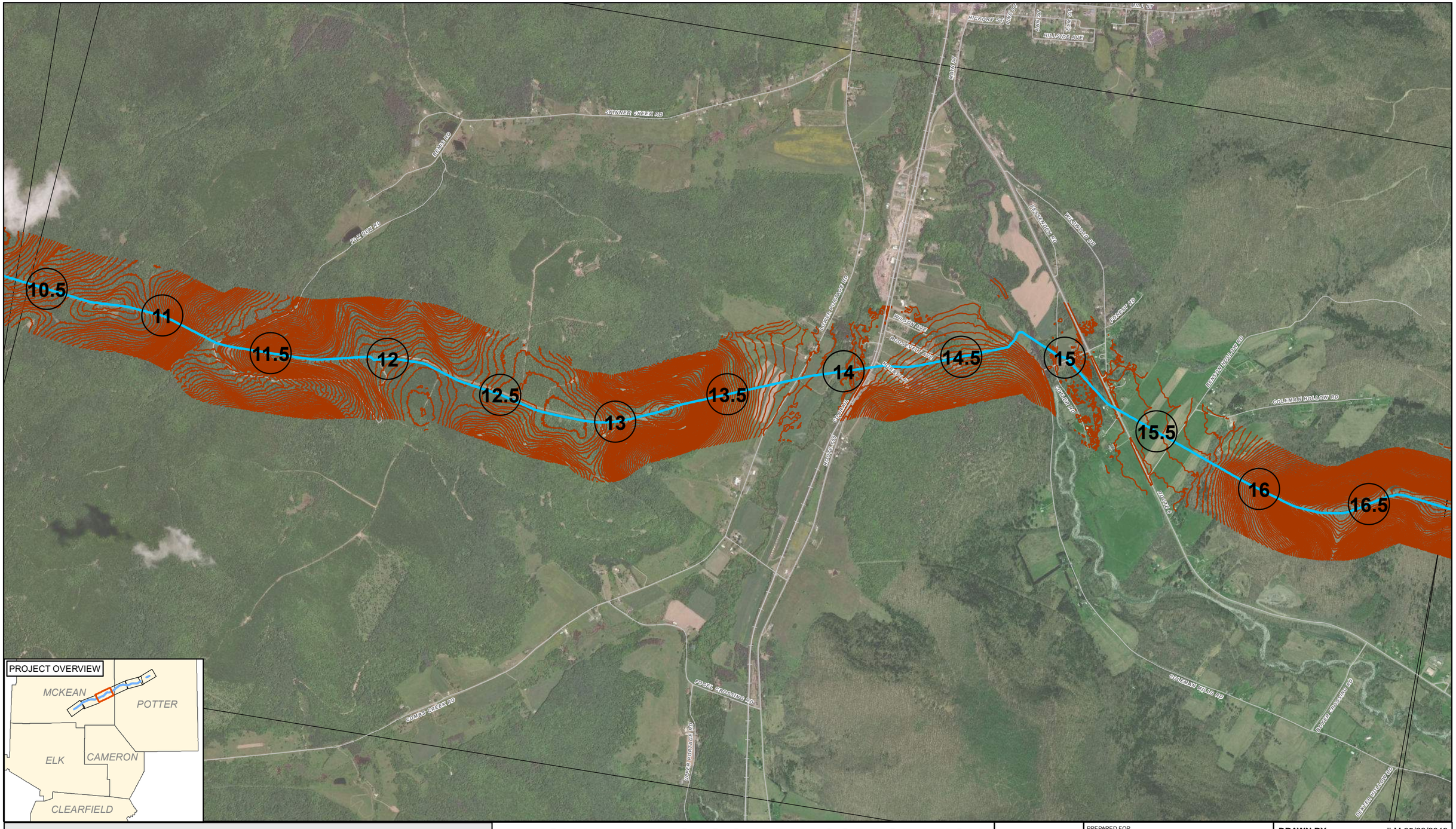

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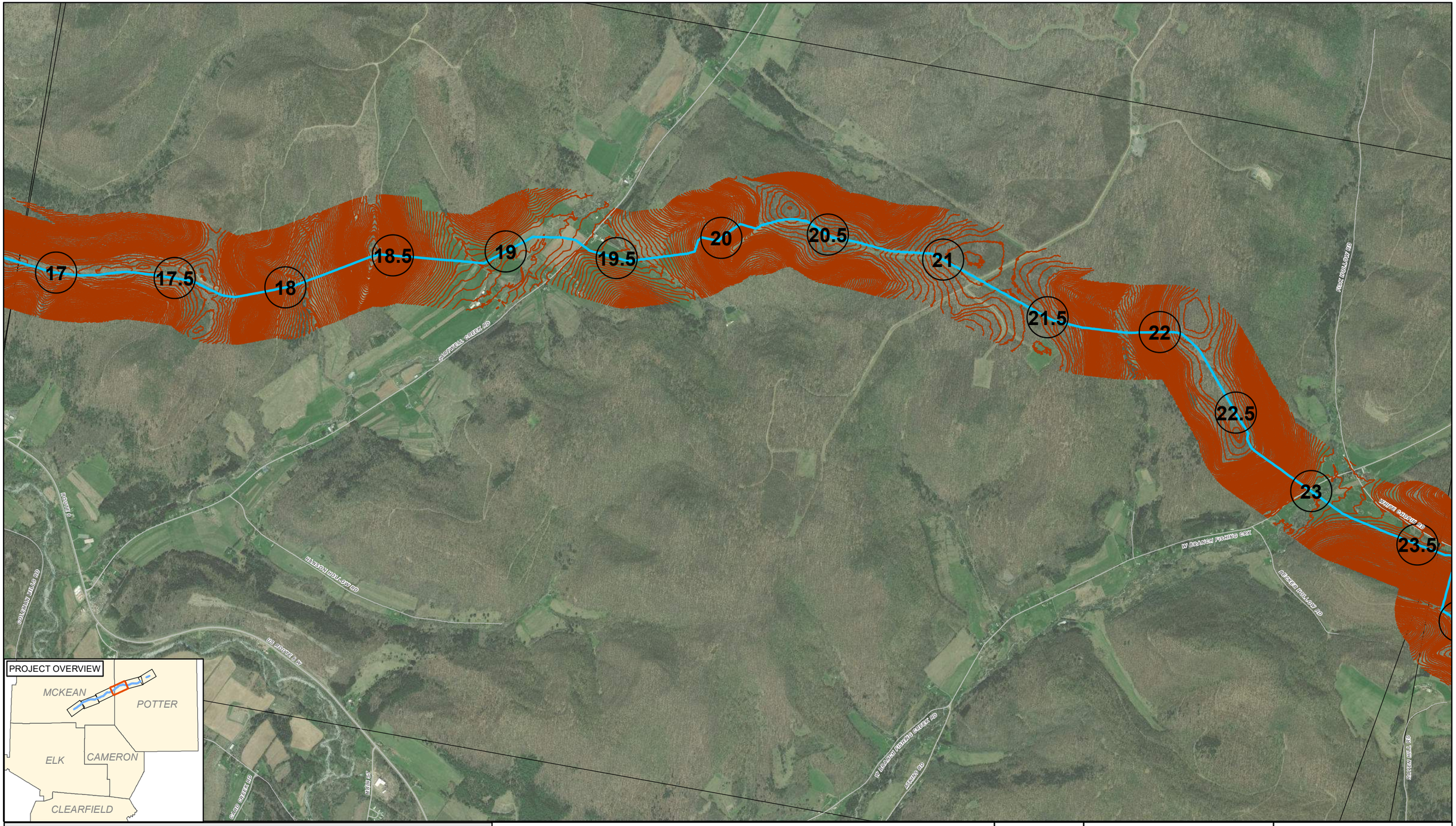

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FM100 PROJECT
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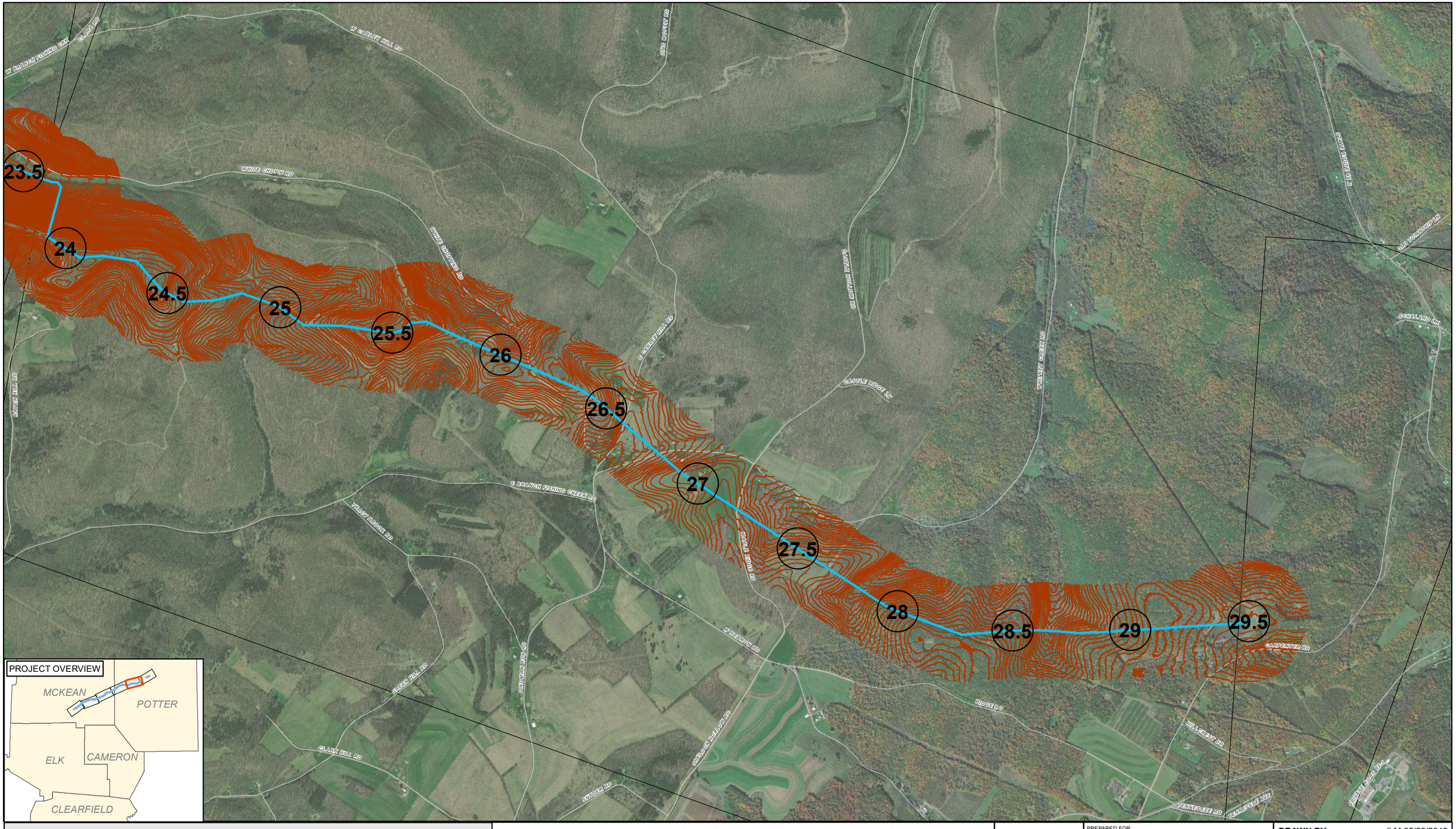

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FM100 PROJECT

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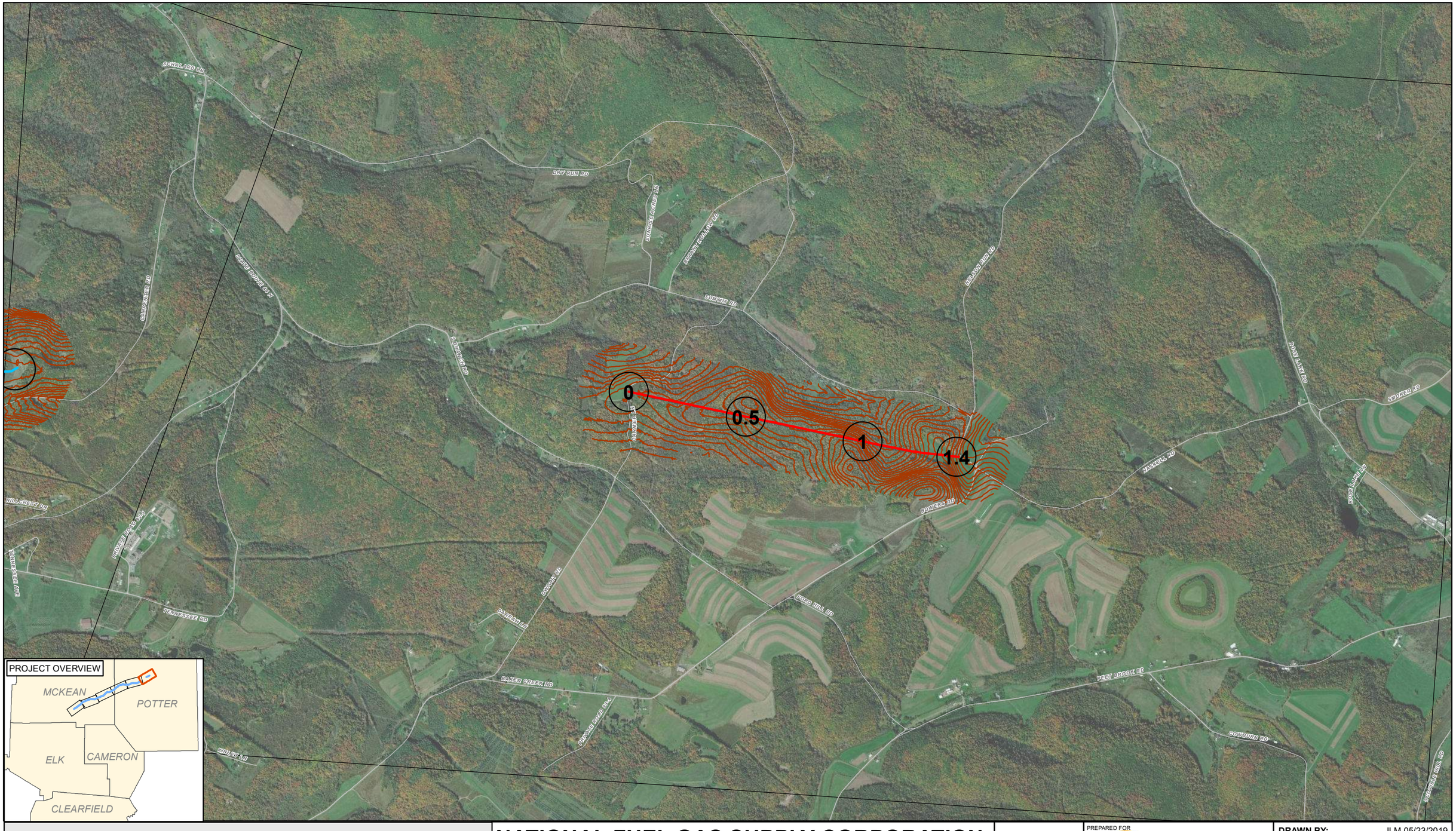

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- <10% SLOPE
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- >20%<30% SLOPE
- >30%<40% SLOPE
- >40%<50% SLOPE
- >50%<60% SLOPE
- >60% SLOPE

MILE MARKER

NATIONAL FUEL GAS SUPPLY CORPORATION

FM100 PROJECT
FIGURE GH-003
SLOPE GRADIENT
MCKEAN AND POTTER COUNTIES
PENNSYLVANIA

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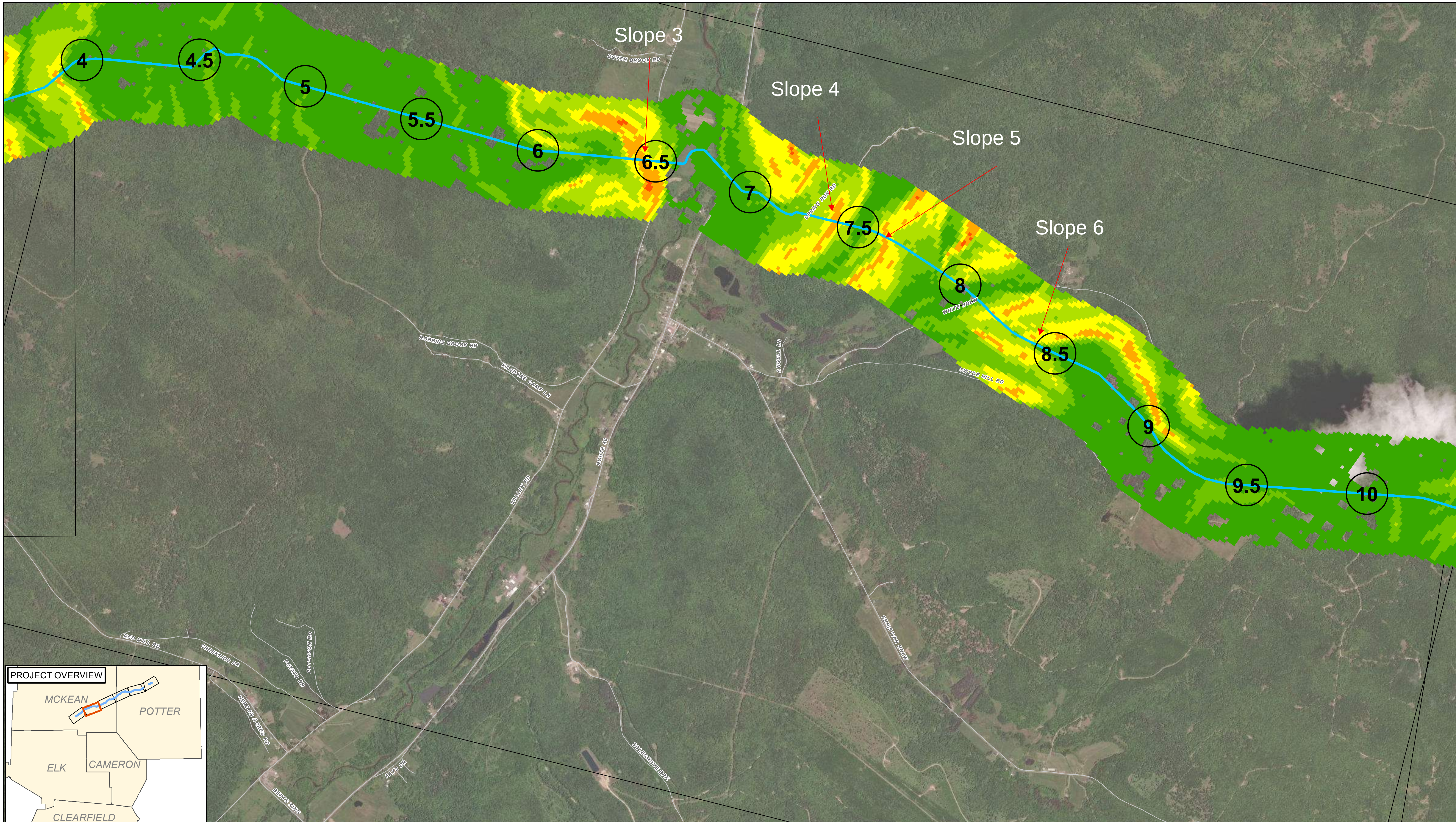

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Slope 7

Slope 8

Slope 9

Slope 10

Slope 11

Slope 12

10.5

11

11.5

12

12.5

13

13.5

14

14.5

15

15.5

16

16.5

SKINNER CREEK RD

KEITH RD

FOSTER RD

HICKORY ST

JULIE ST

ANN ST

HARRISON ST

MEE ST

HILLSIDE AVE

MILL ST

MAIN ST

FES SWOBE ST

WILDWOOD DR

LOWER PARADISE RD

WILSON AVE

ROOSEVELT AVE

ROUSE LN

FOREST RD

BUTLER RD

SOUTH ST

SOUTH ST

COLEMAN HOLLOW RD

BENSON HOLLOW RD

PO BOX 0

COMBS CREEK RD

FOSTER CROSSING RD

TYLER PORTAGE RD

COLEMAN HOLLOW RD

FOSTER CROSSING RD

BENSON HOLLOW RD

PROJECT OVERVIEW

MCKEAN

POTTER

ELK

CAMERON

CLEARFIELD

INDEX SHEET
RAILROAD
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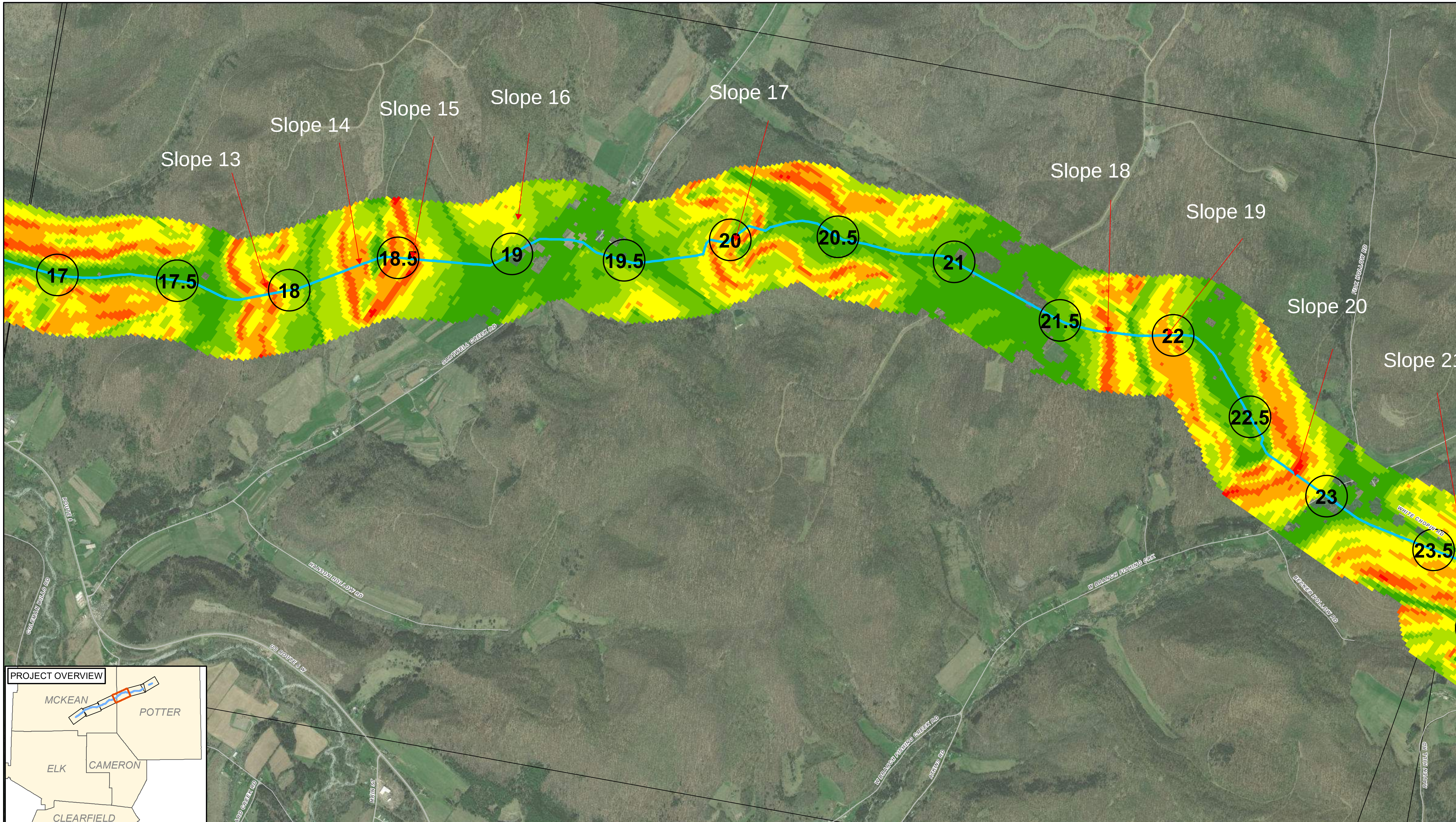

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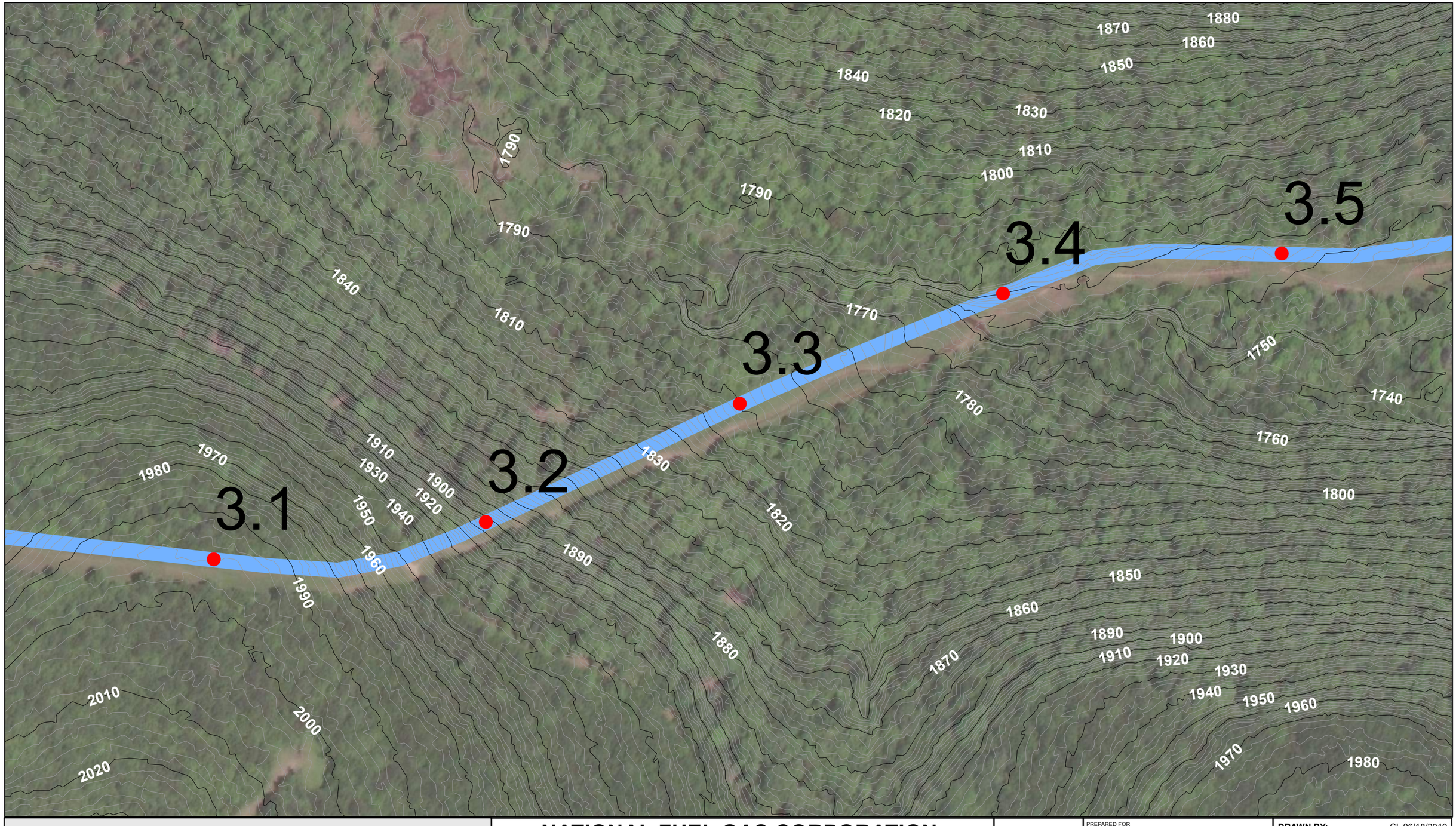

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope One

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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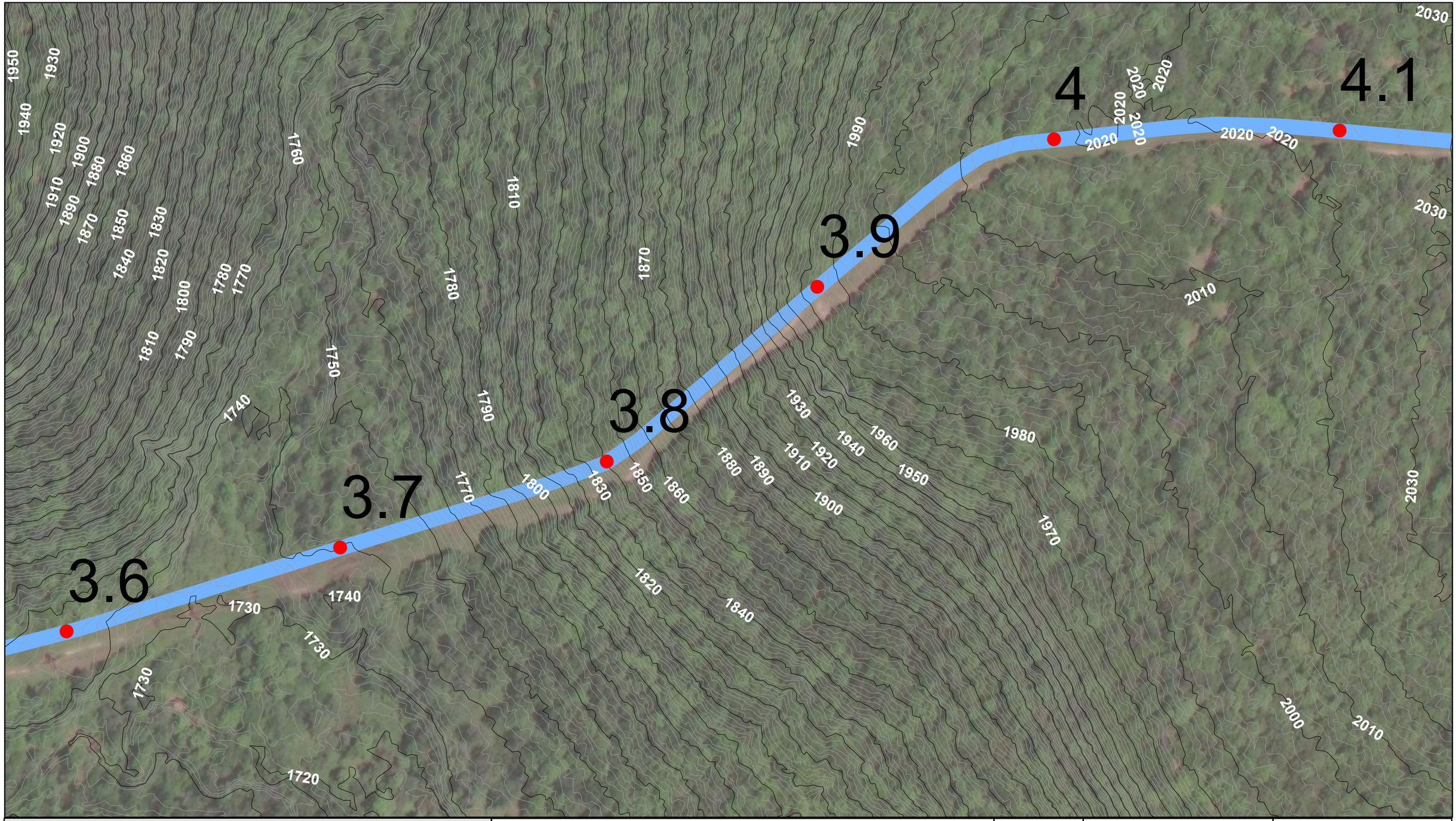

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Two
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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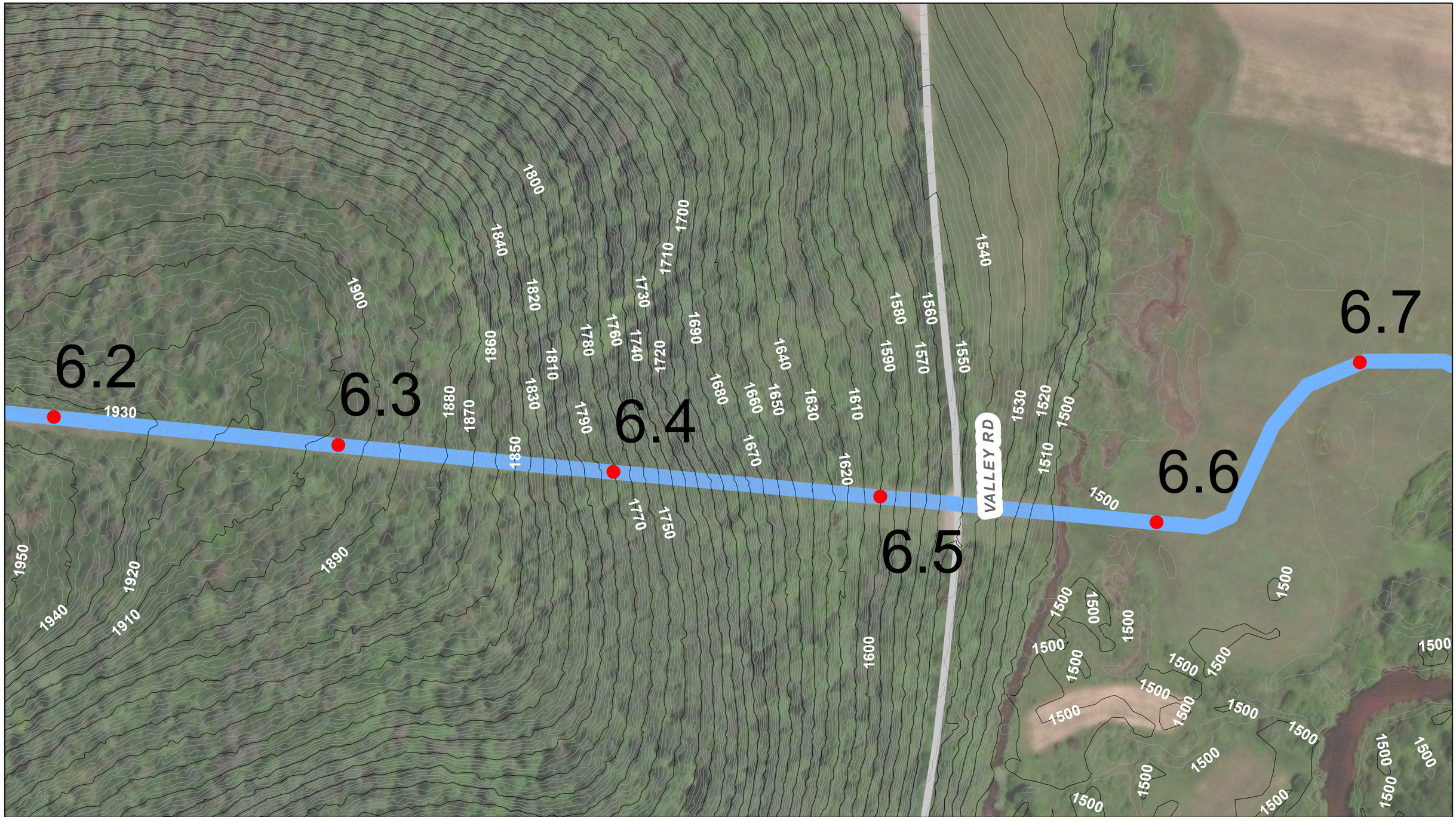

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

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FM100 PROJECT

Slope Three

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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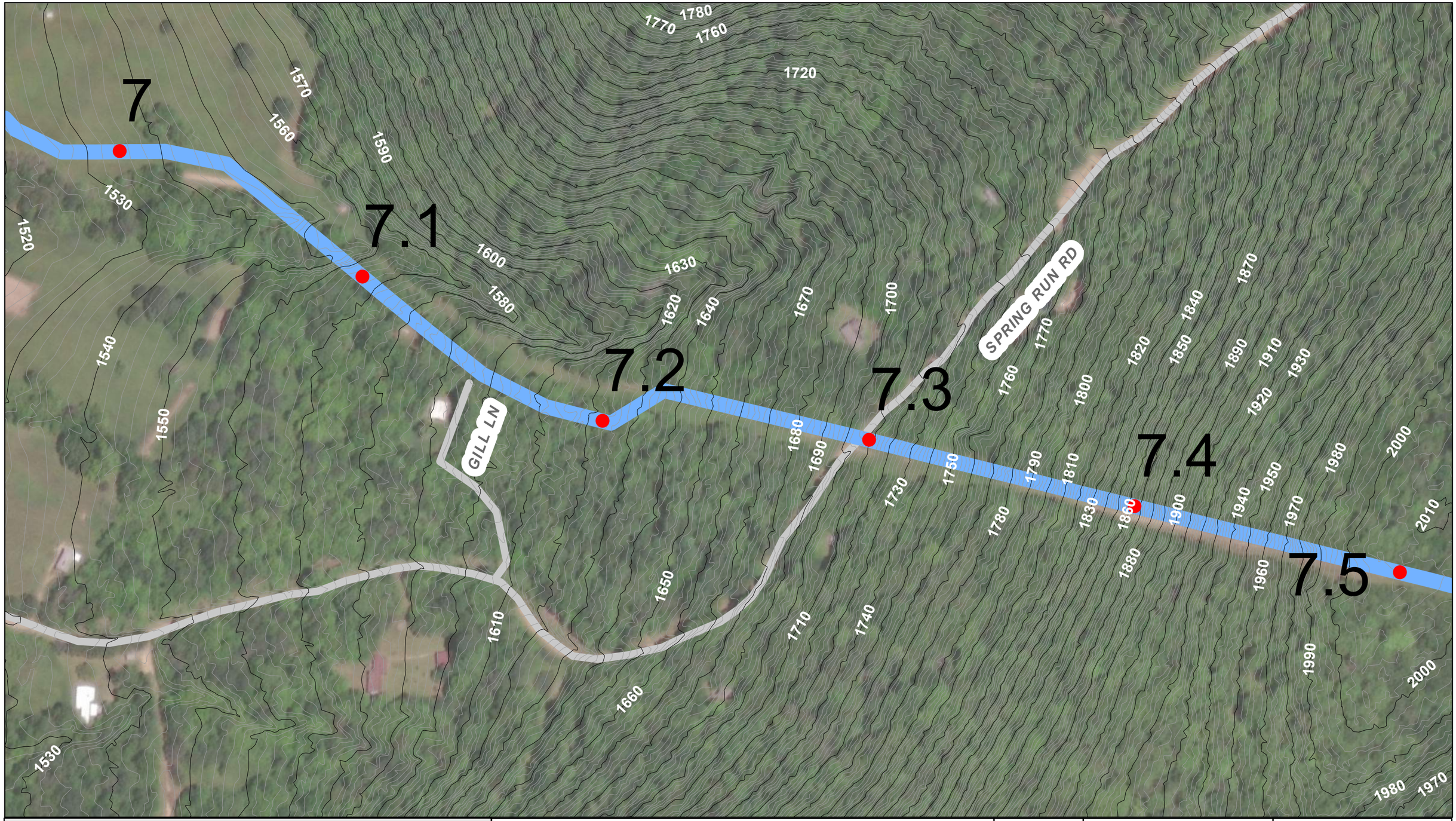

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

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FM100 PROJECT
Slope Four
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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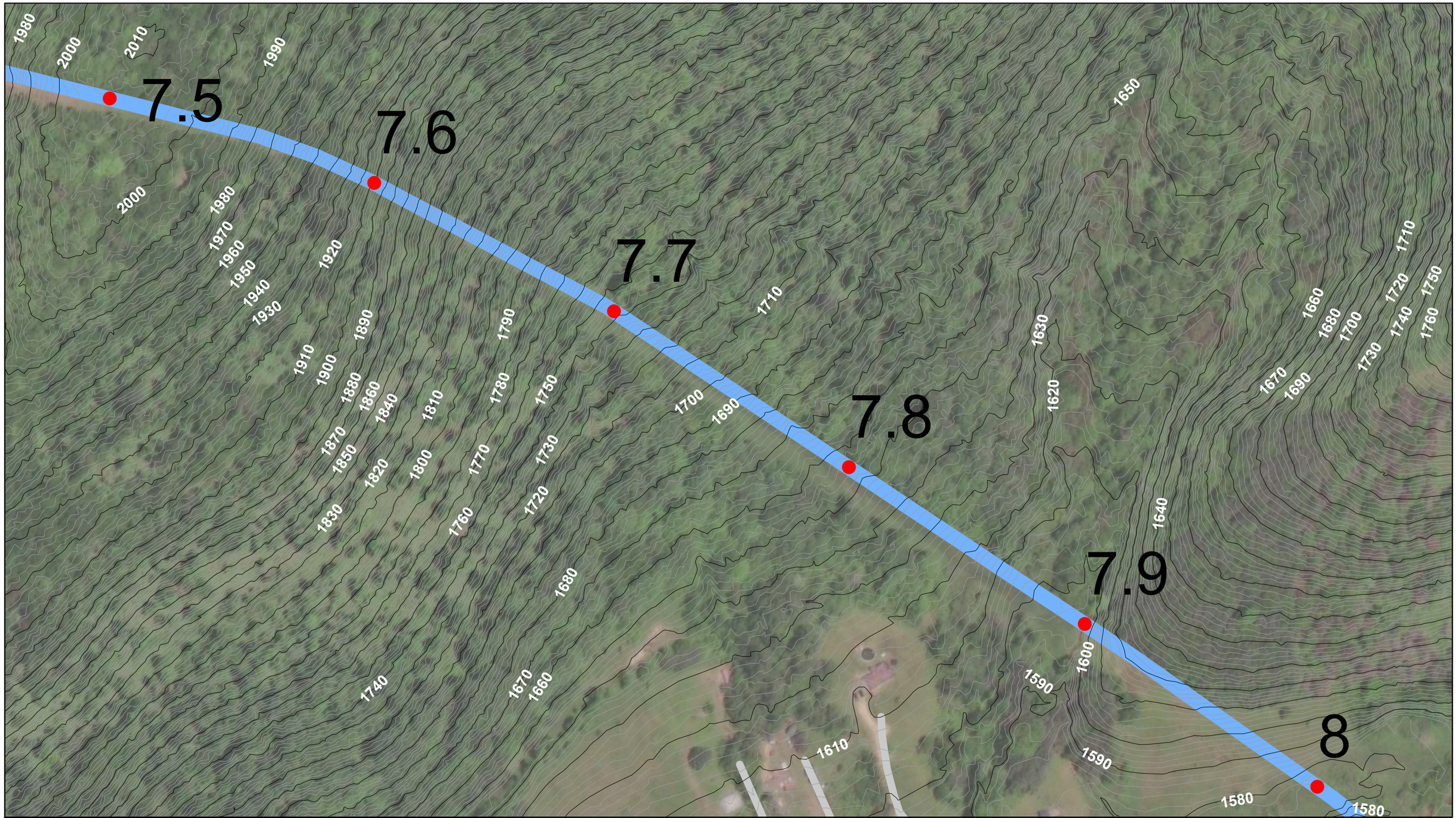

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

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FM100 PROJECT

Slope Five

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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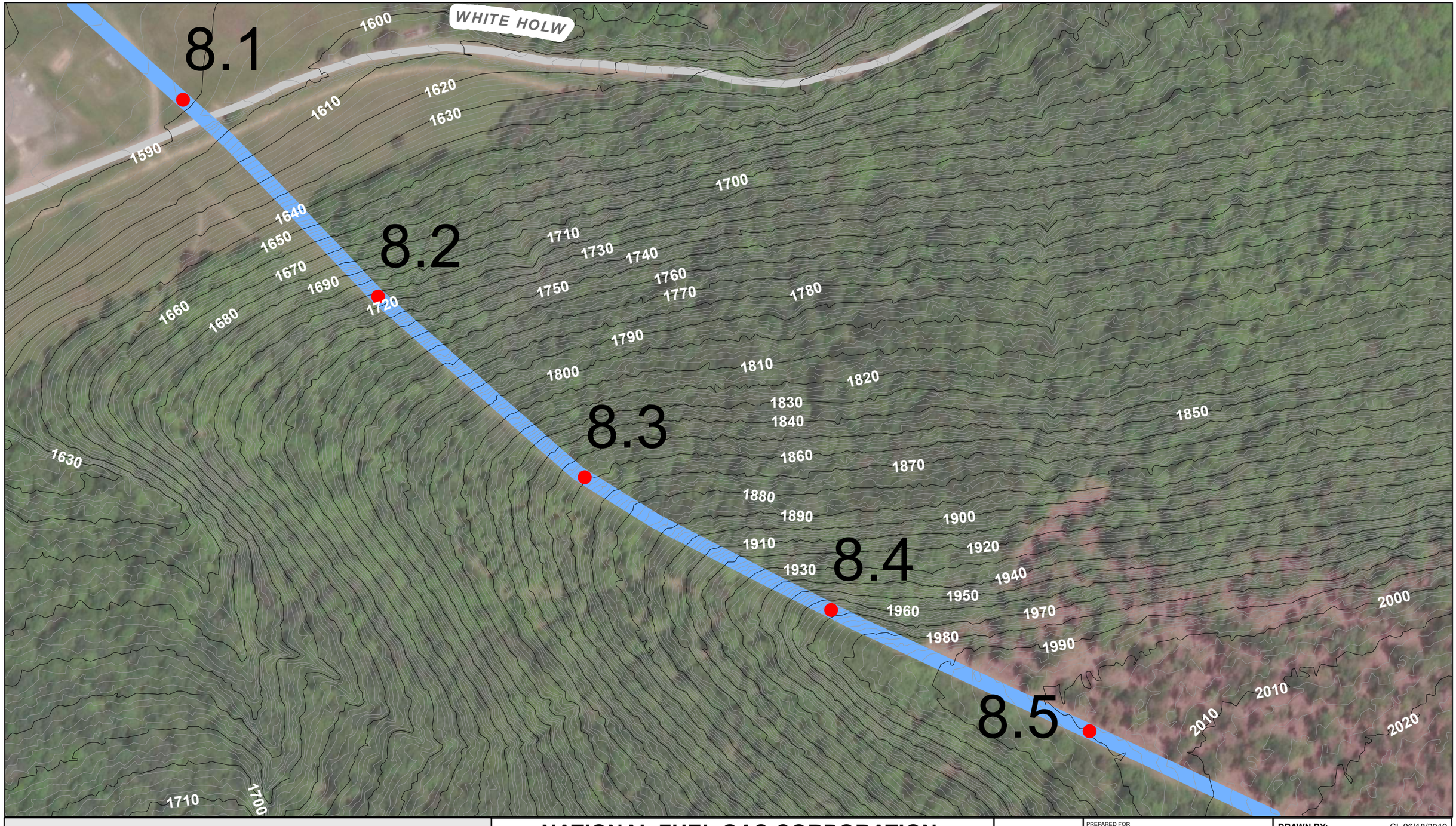

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Six
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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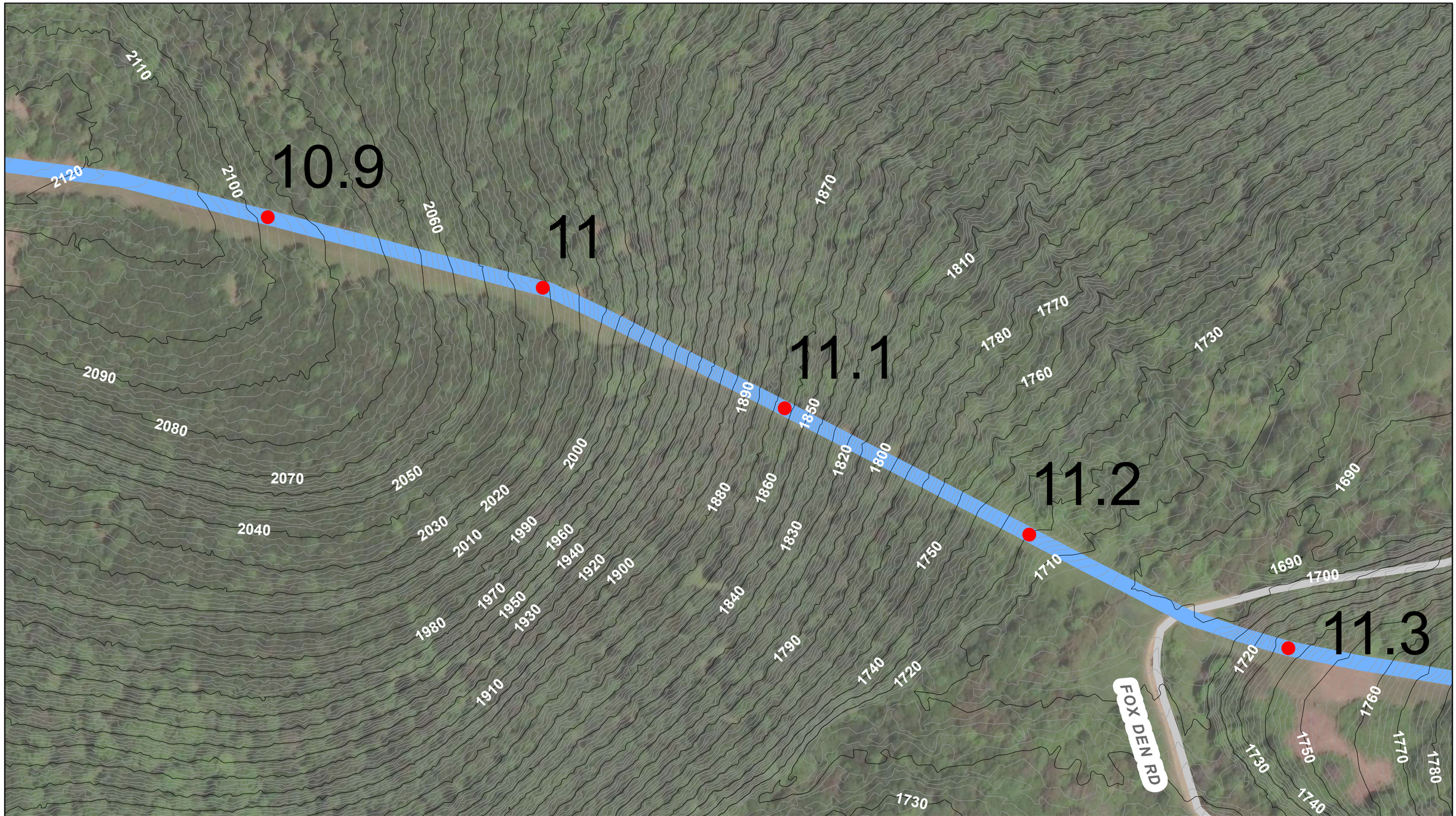

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Seven

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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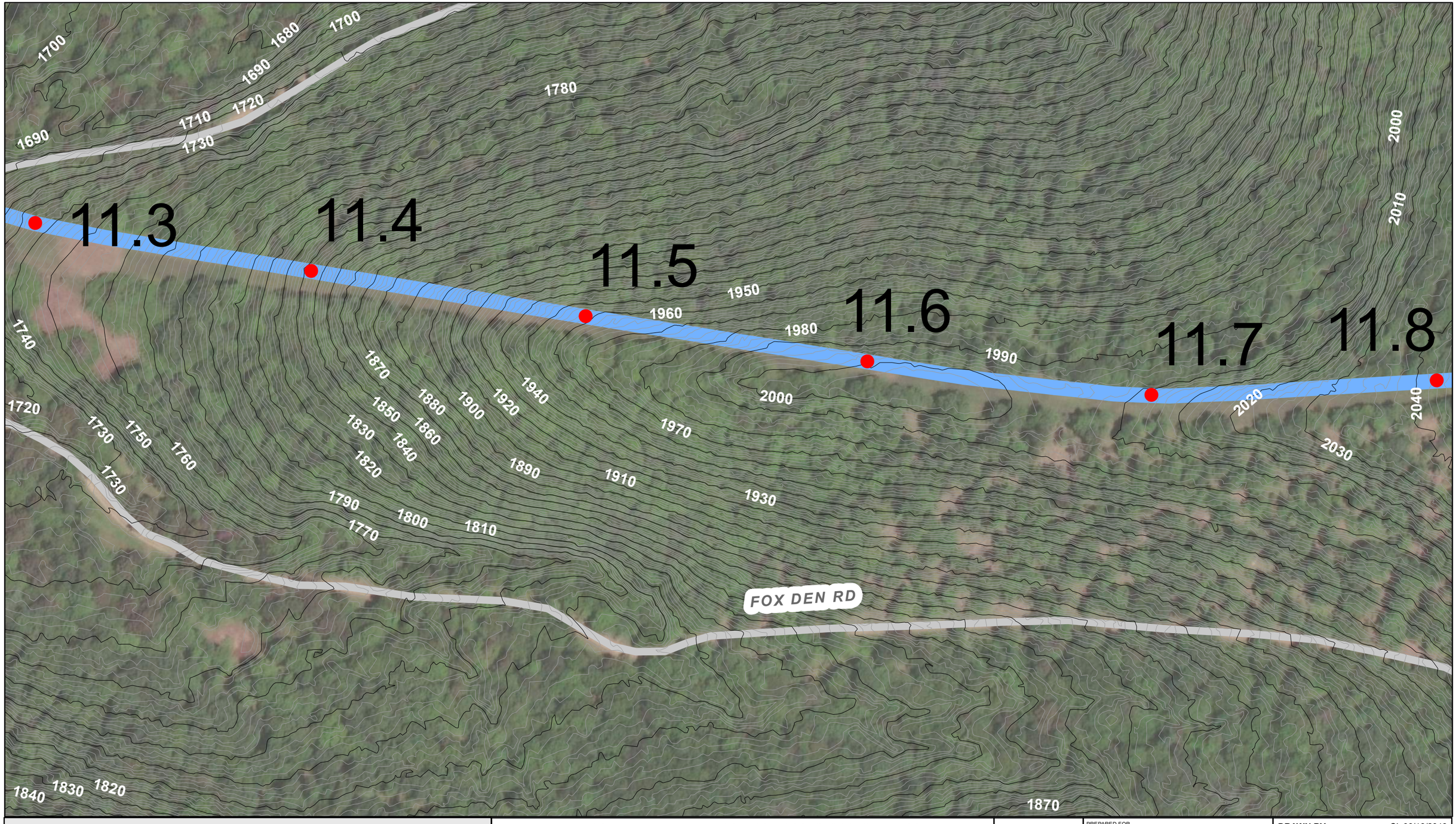

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Eight

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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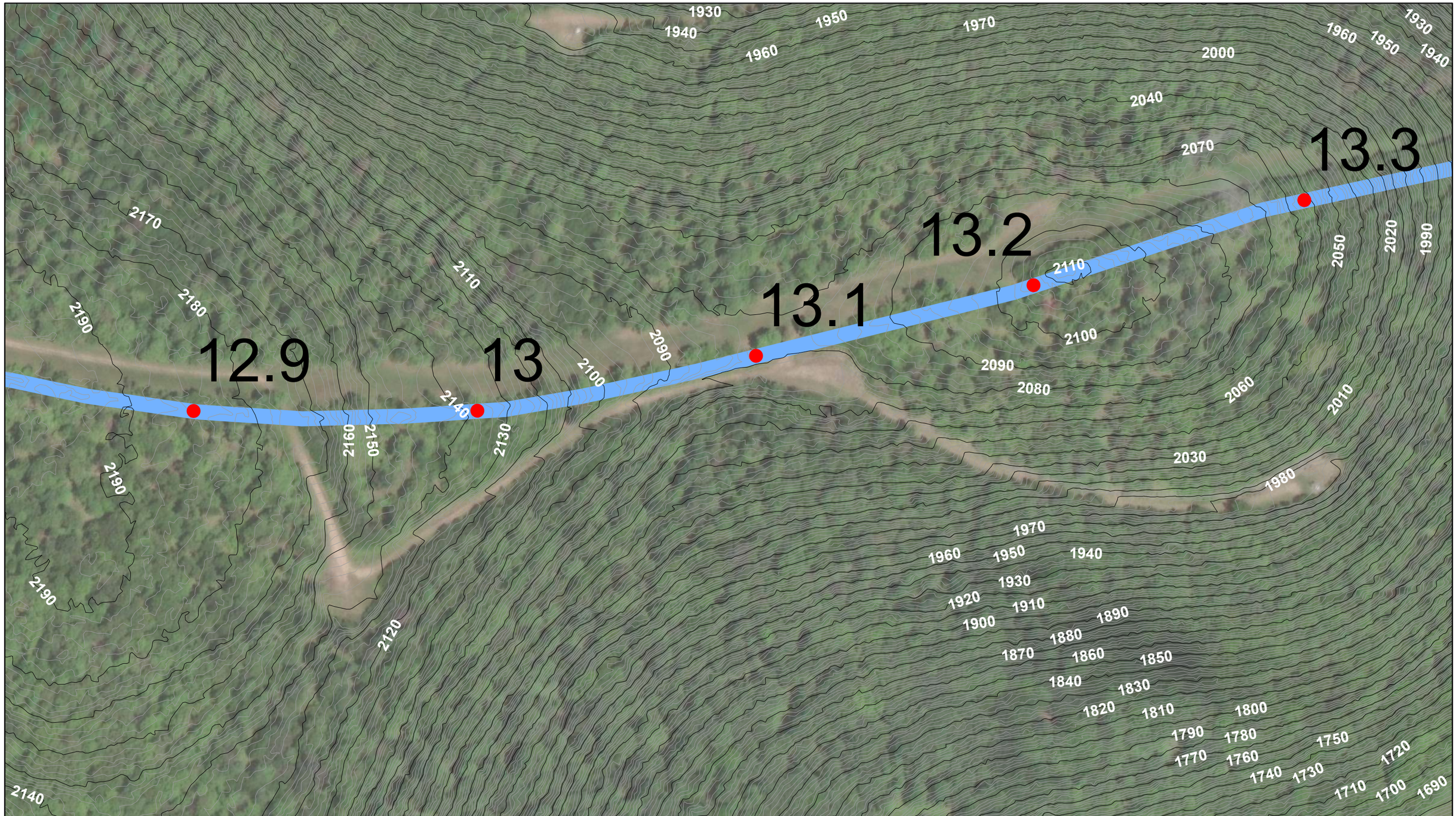

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

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NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Nine

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Ten

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Eleven
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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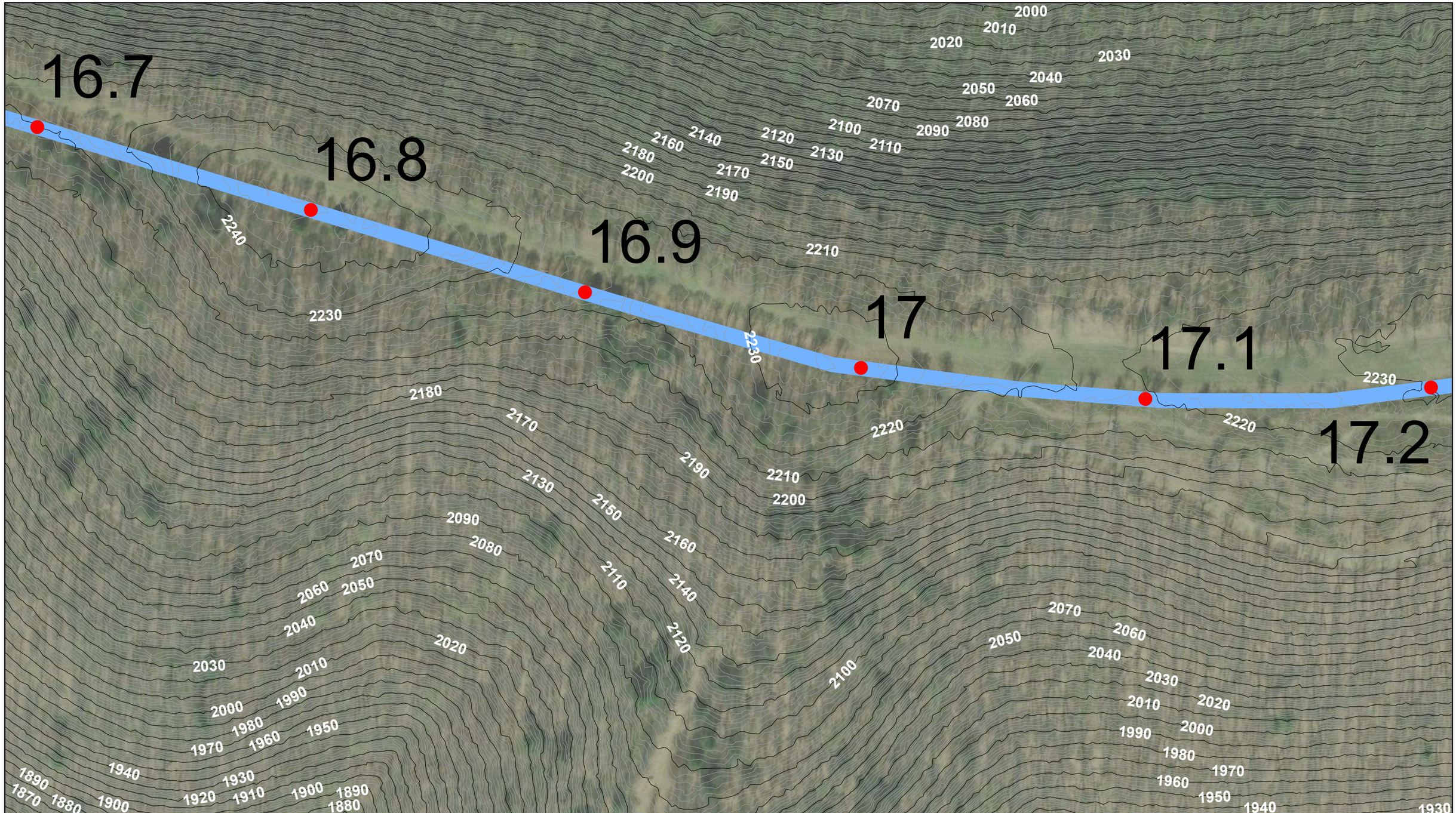

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Twelve
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

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NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Thirteen

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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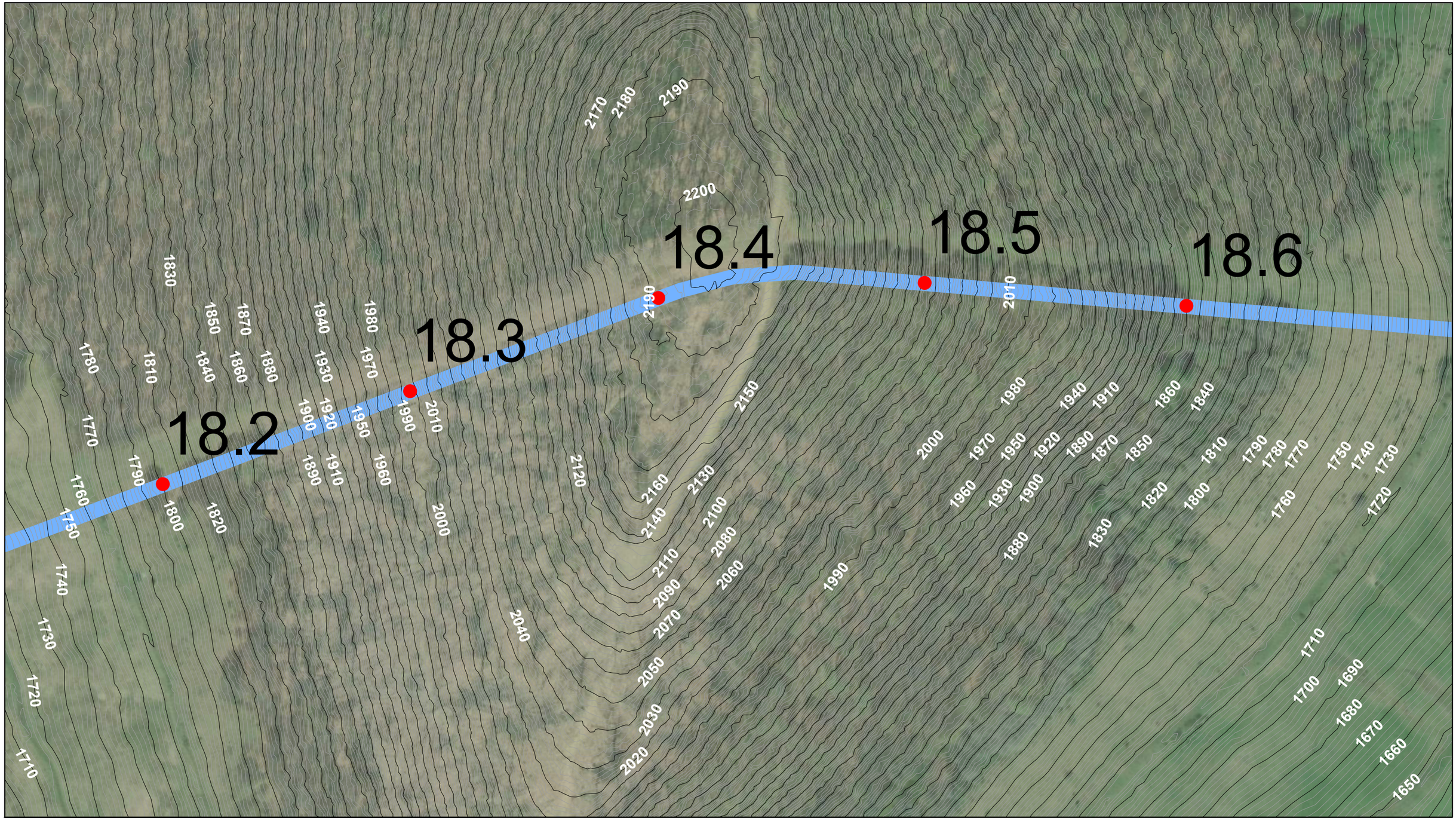

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

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NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Fourteen
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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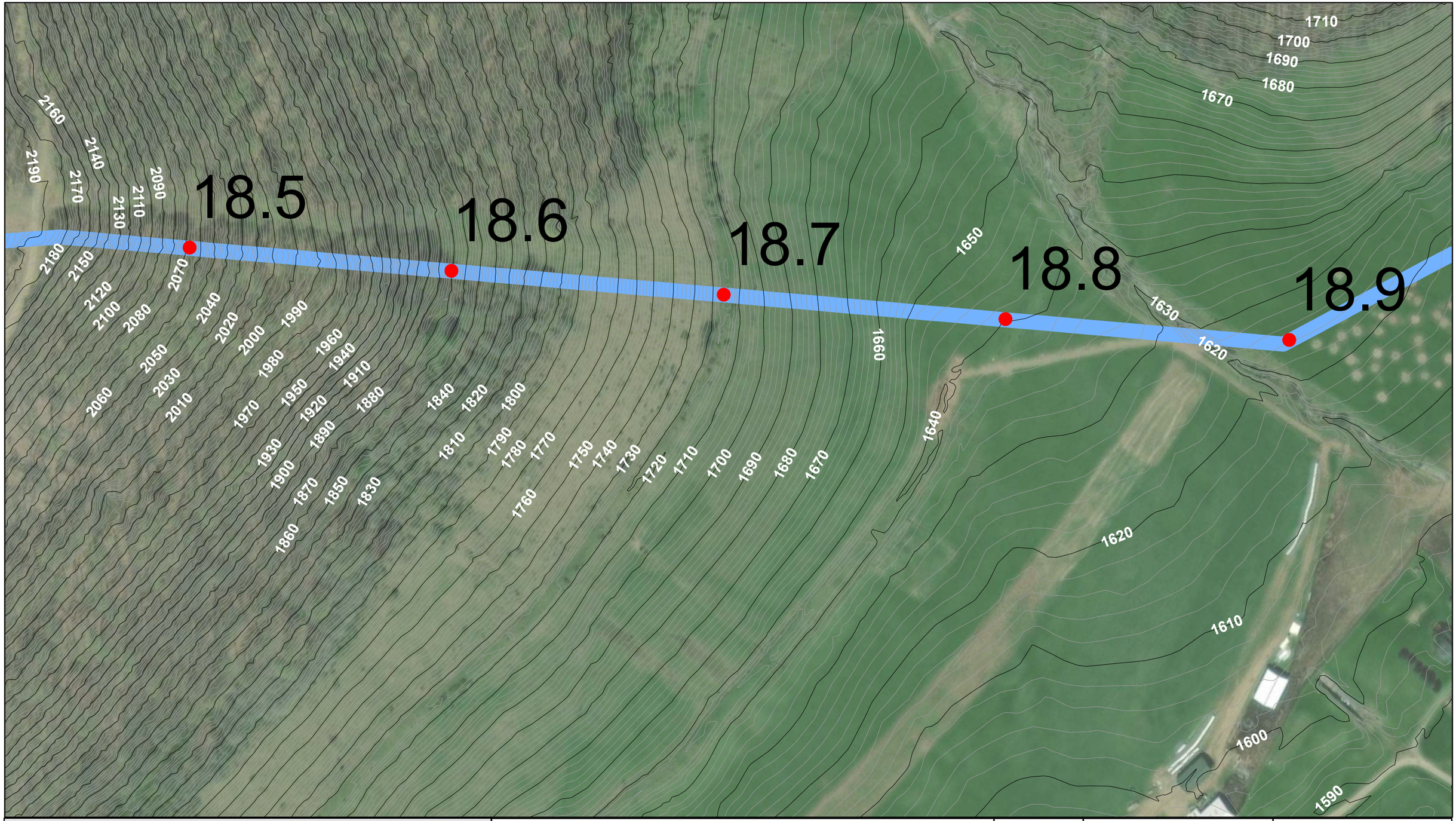

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

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NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Fifteen

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

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NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Sixteen
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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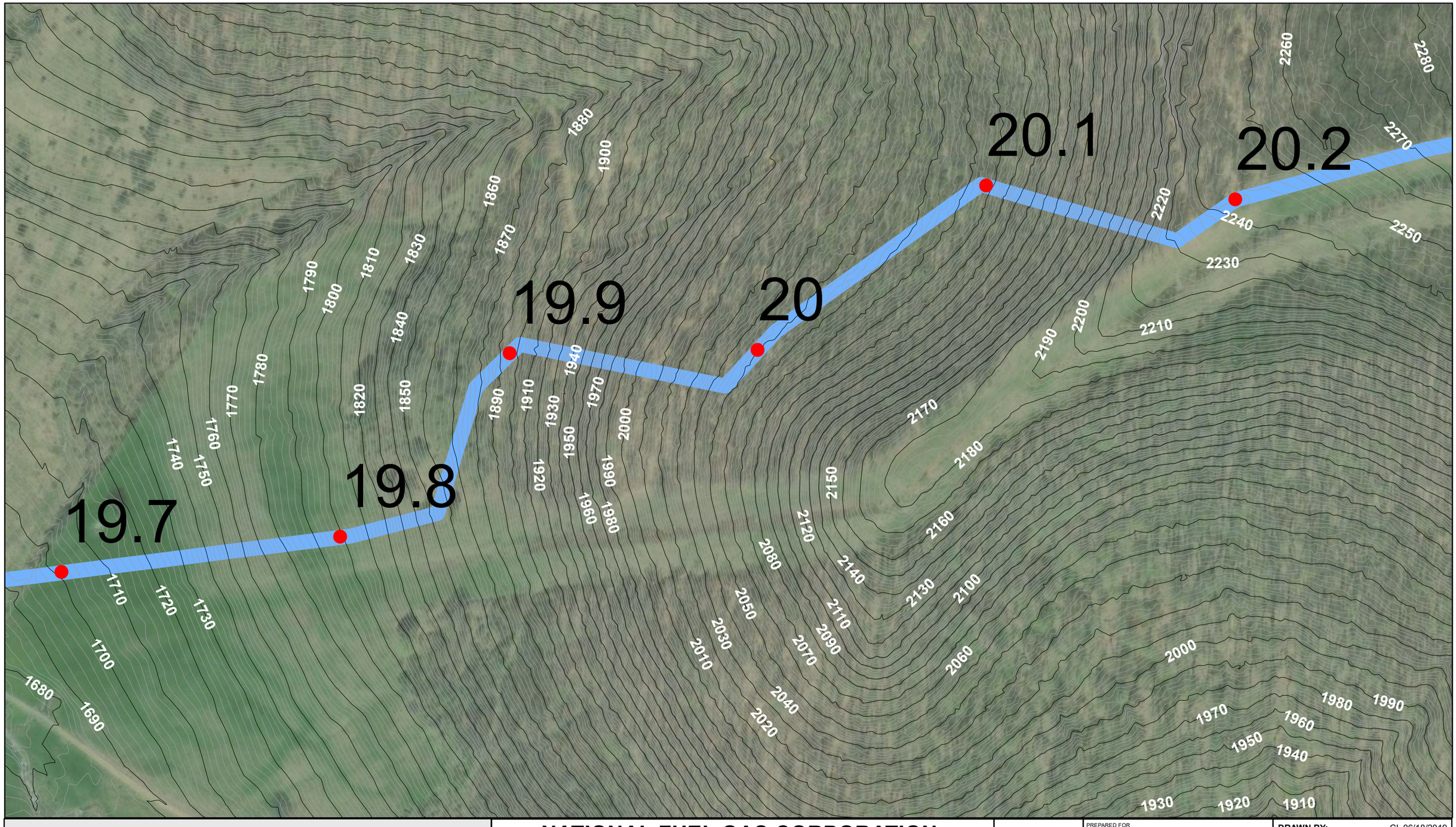

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Seventeen

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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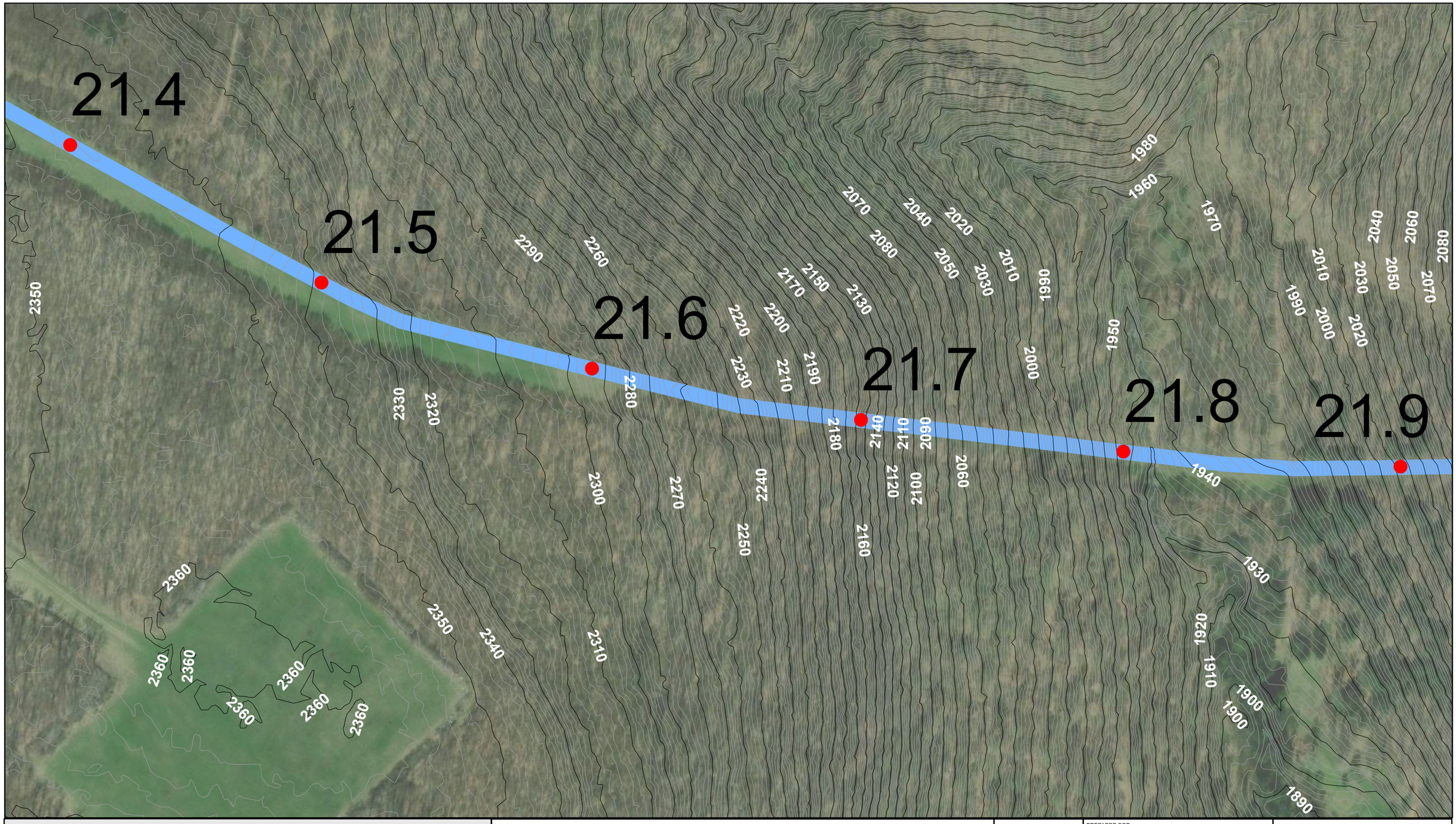

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Eighteen

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

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MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Nineteen
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

PREPARED FOR National Fuel

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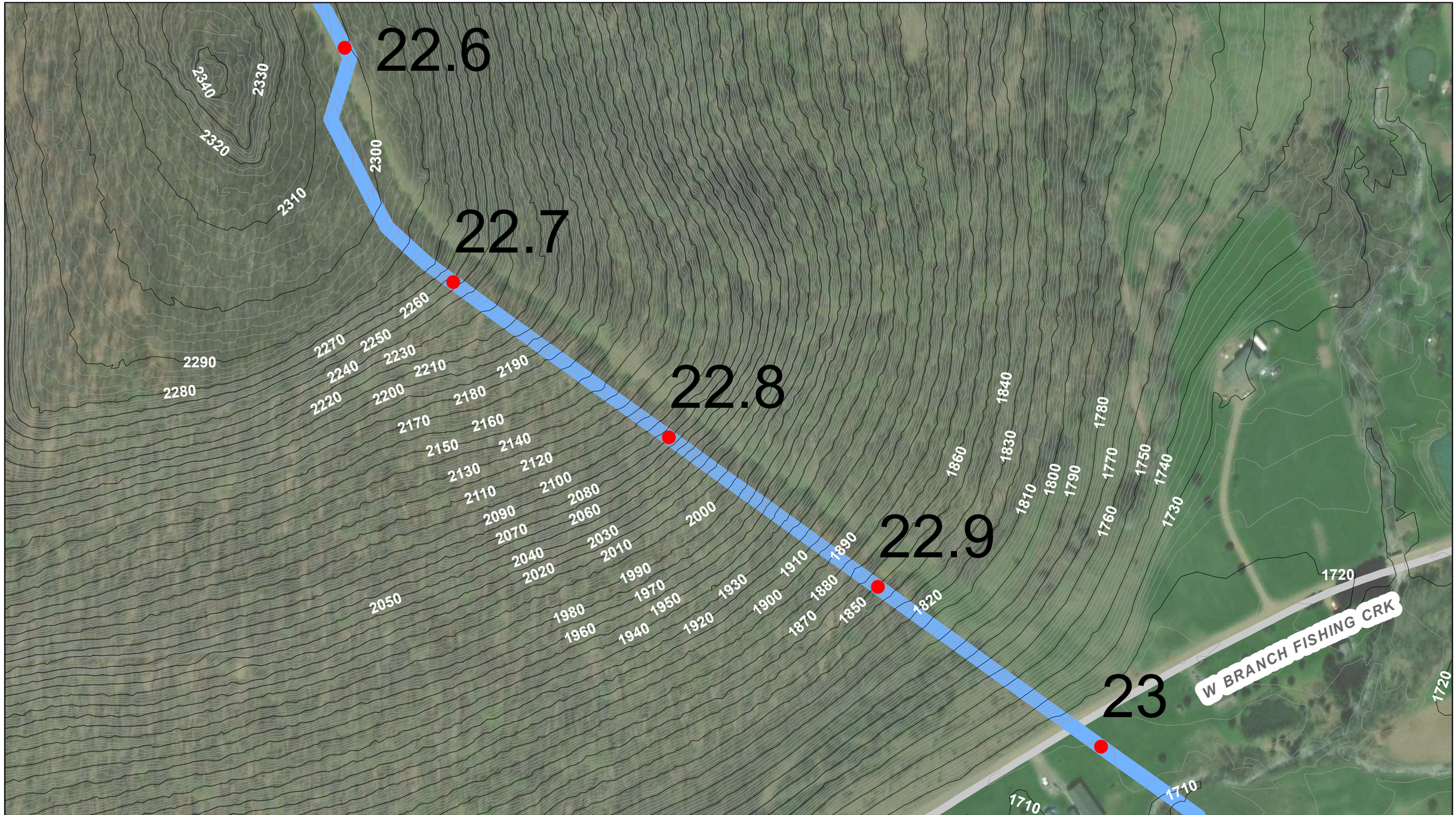

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Twenty
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

PREPARED FOR National Fuel

PREPARED BY MOTT MACDONALD

DRAWN BY:	CL 06/18/2019
CHECKED BY:	DNC 06/18/2019
APPROVED BY:	DG 07/02/2019
REV. DATE:	07/02/2019
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DESC:	DRAFT: ISSUED FOR FERC
DWG. NO.	Page 20 of 23

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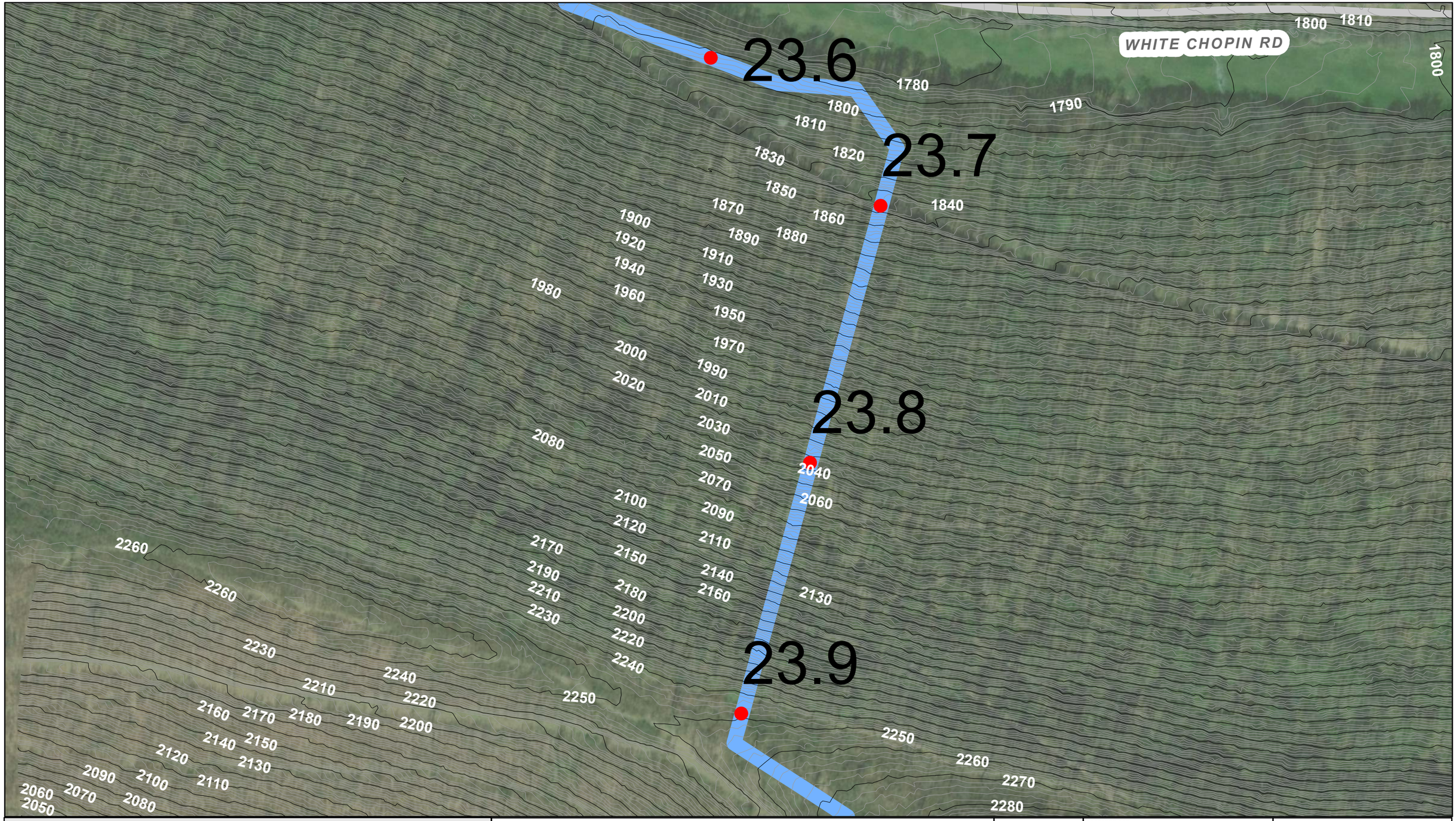

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Twenty-One

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

PREPARED FOR National Fuel

PREPARED BY MOTT MACDONALD

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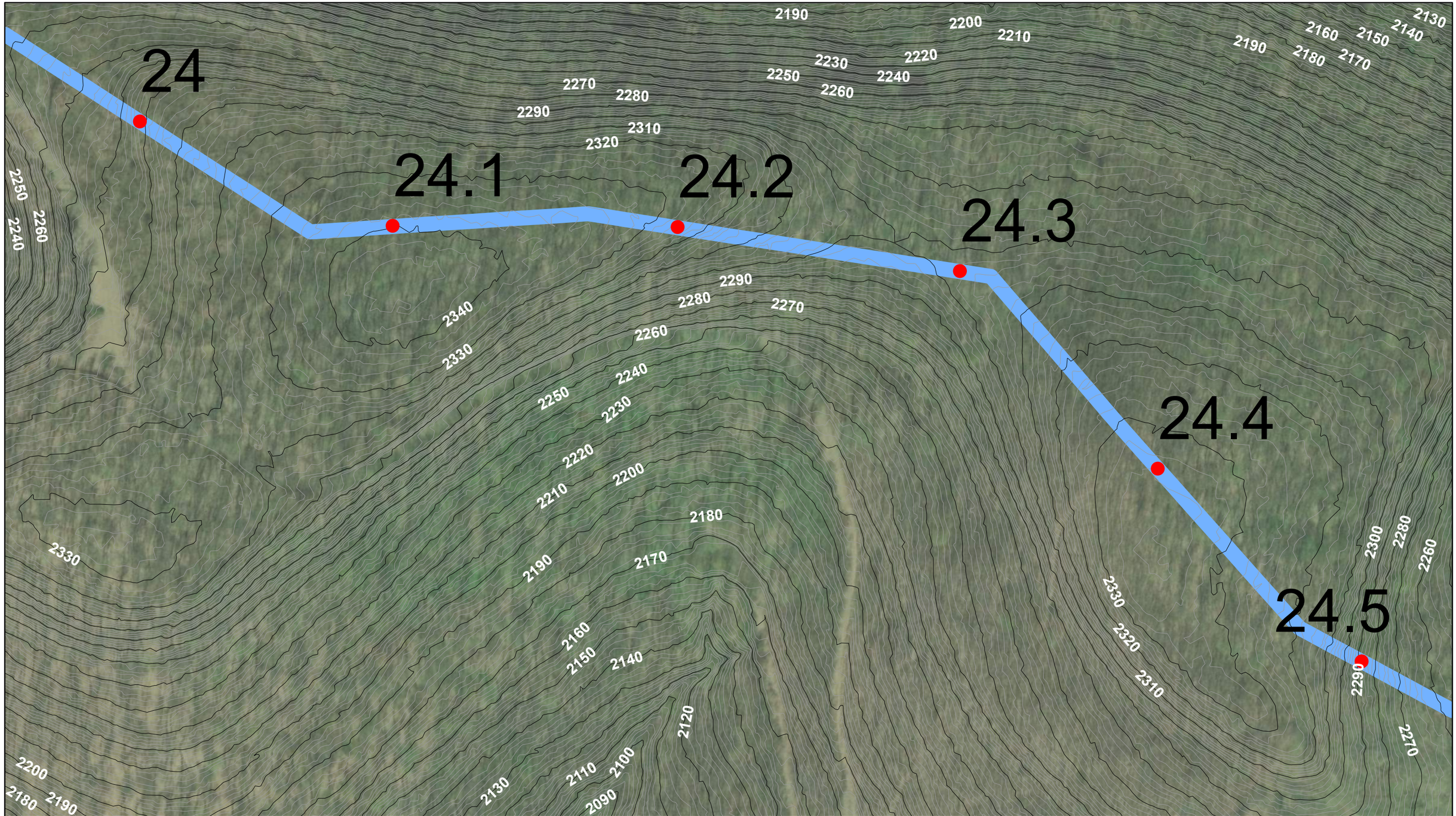

MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT
Slope Twenty-Two
TOPOGRAPHIC CONTOURS
FIGURE GH-004
SLOPE DETAIL SHEETS
PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

PREPARED FOR National Fuel

PREPARED BY MOTT MACDONALD M M

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MAJOR CONTOURS (10 ft)
MINOR CONTOURS (2 ft)
FM100 PIPELINE
ROAD
MILE POSTS

Imagery Source: ©ESRI World Imagery Layer; USDA NAIP acquired 9/16/2015 to 9/24/2015

NATIONAL FUEL GAS CORPORATION

FM100 PROJECT

Slope Twenty-Three

TOPOGRAPHIC CONTOURS

FIGURE GH-004

SLOPE DETAIL SHEETS

PENNSYLVANIA

0 250 500 Feet

ABSOLUTE SCALE: 1 : 2,400

REFERENCE SCALE: 1 IN = 200 FT

PREPARED FOR National Fuel

PREPARED BY MOTT MACDONALD M M

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DWG. NO.	Page 23 of 23

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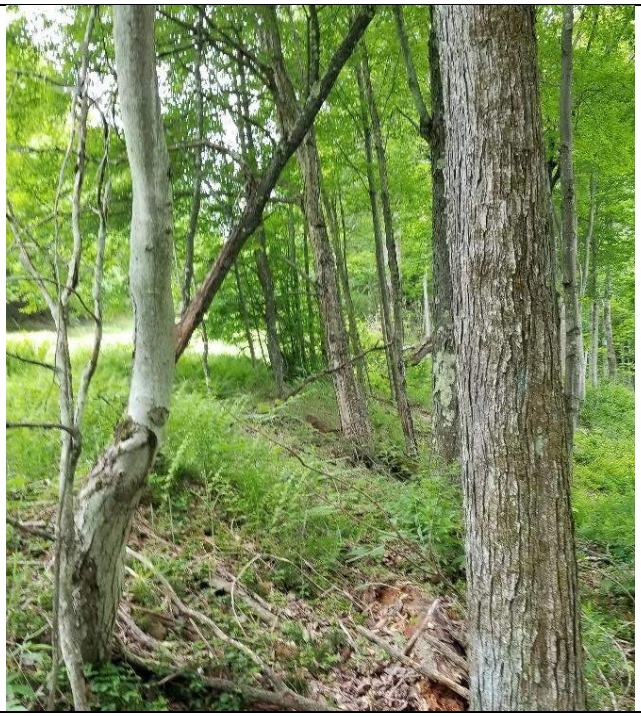
Project: FM 100
Project Number: 507388597

Survey Date: 6/10/2019	Slope Number 1

Looking up at slope 1



Parallel to current ROW, looking cross slope

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Project: FM 100
Project Number: 507388597

Survey Date: 6/10/2019	Slope Number 2

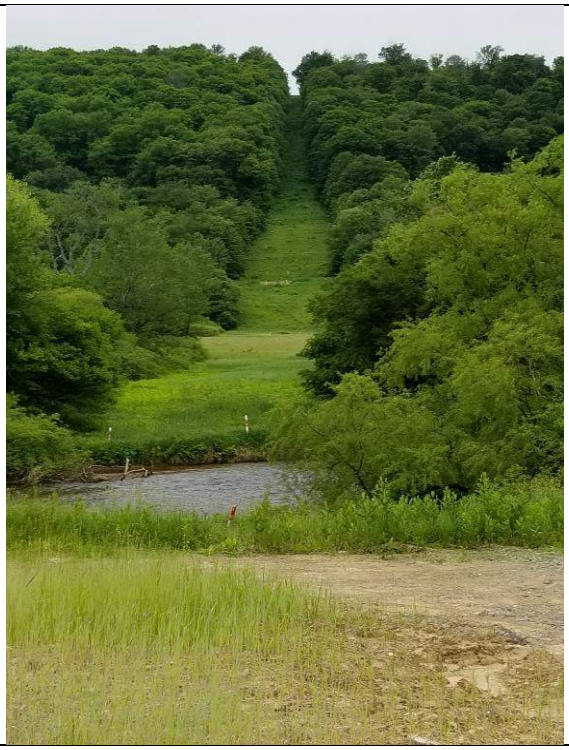
Looking up at slope 2

Perpendicular to slope 2, mid slope

MOTT MACDONALD

Project: FM 100
Project Number: 507388597

Survey Date: 6/10/2019	Slope Number 3



View from base of slope 3, looking up the slope

Perpendicular to slope 3 looking through a semi-densely wooded area outside current cleared ROW

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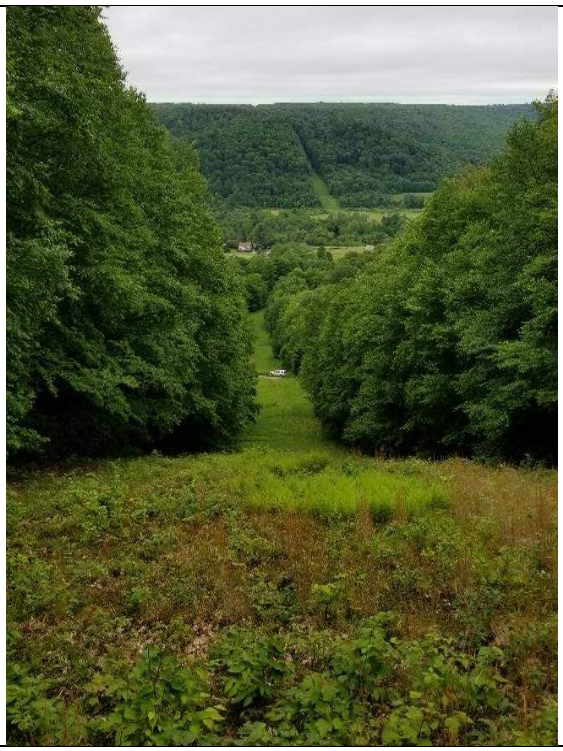
National Fuel

Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 4



View down from the top of slope 4, (white car is parked near bottom of slope) (slope 3 is in background of shot)

Saturated and muddy surface on lower 3rd of slope 4

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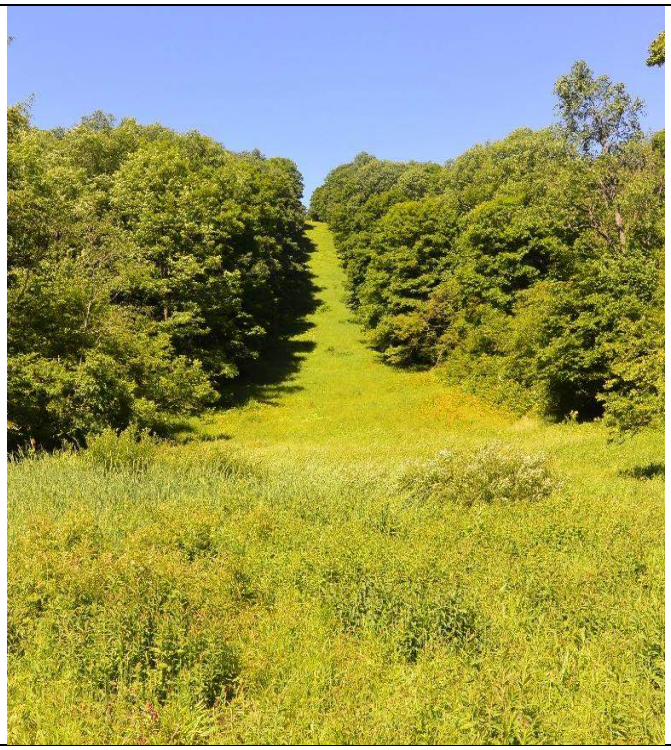
Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 5



View looking up at slope 5. Saturated ground near base of slope.

Understory perpendicular to the downslope

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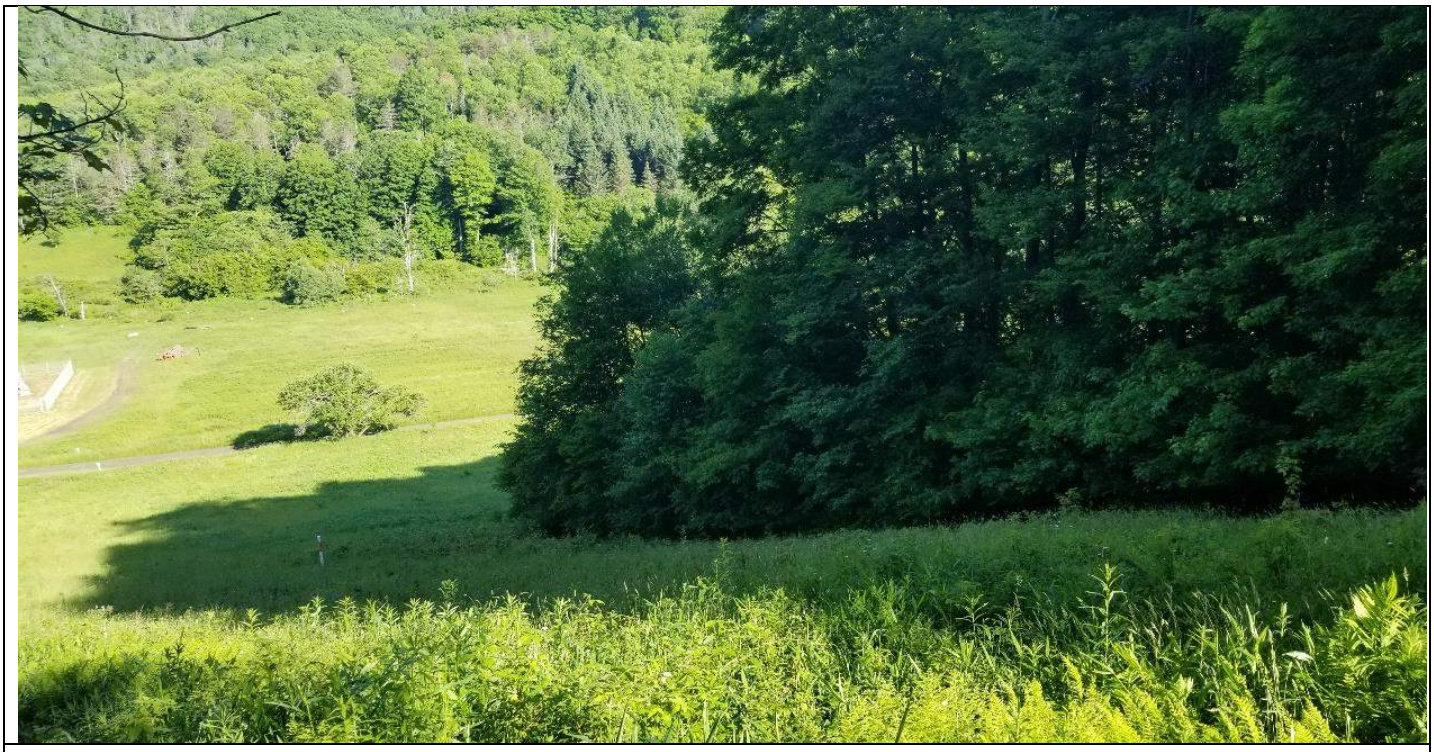
National Fuel

Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 6



Looking down slope 6

Perpendicular to slope 6 looking through a semi-densely wooded area

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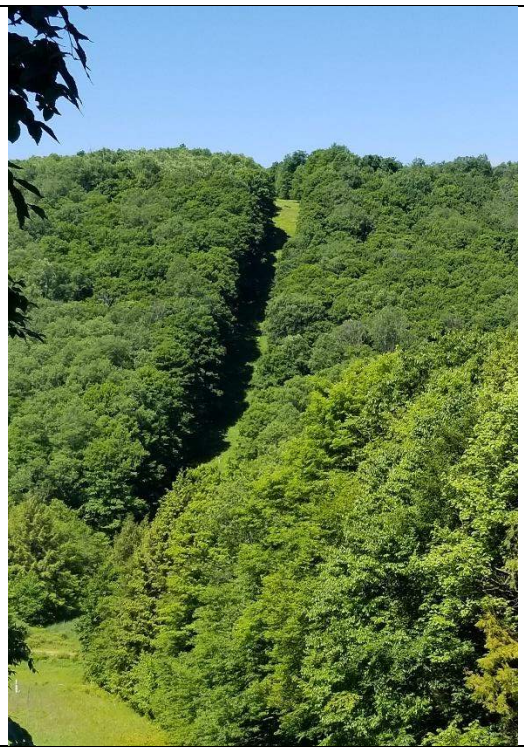
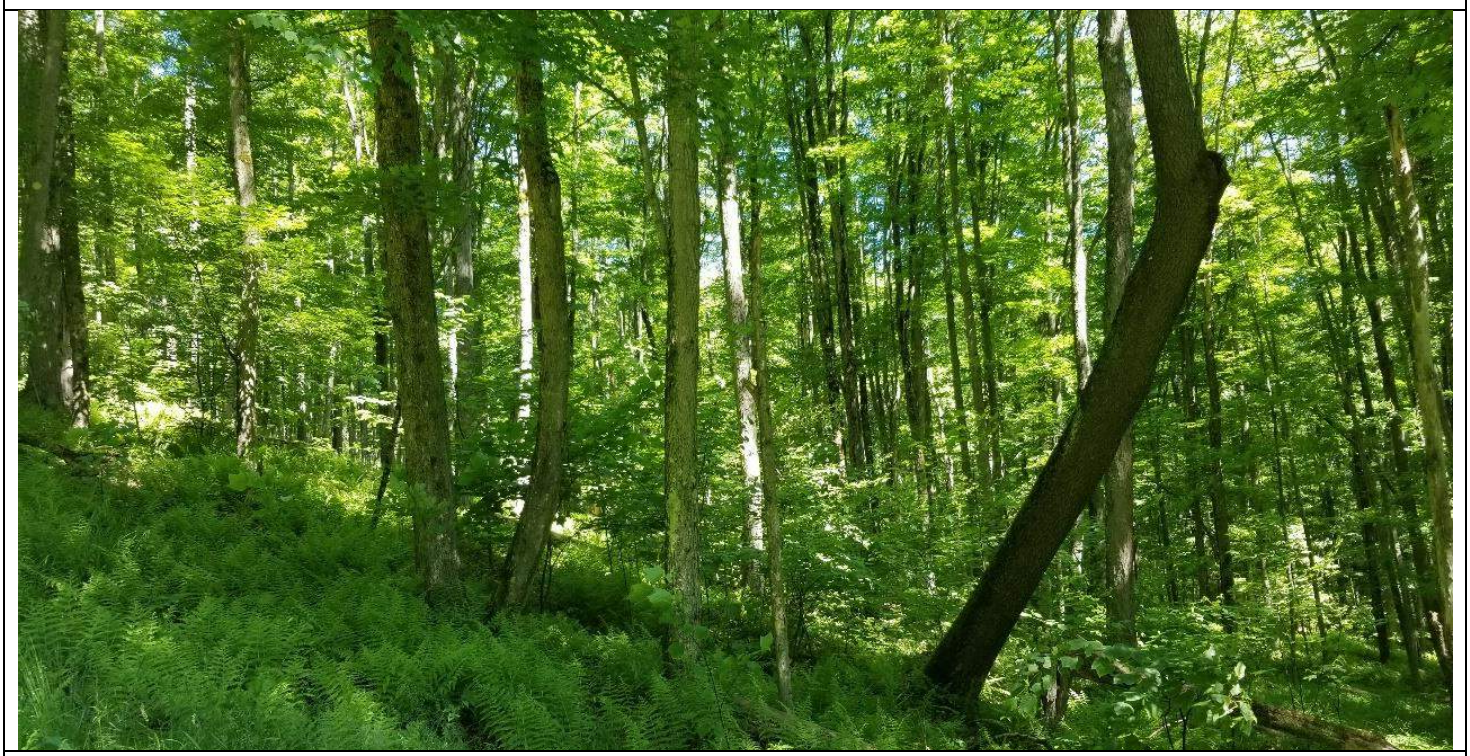
National Fuel

Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 7



Looking at Slope 7 (from slope 8)



One small area of disturbed trees indicating local disturbance, but larger scale or recent disturbance not observed.

Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 8

Base of slope 8 looking up. There are plateaus before the top of the slope.

Lower portion of slope 8 looking down

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Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 9

Side slope construction area, slope 9

Existing access track near top of slope 9

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Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 10

Top of slope 10 looking down

Looking perpendicular to the slope. One locally disturbed tree.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 11

View from the base of slope 11 featuring marker post from existing pipeline

Looking perpendicular to slope.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 12

View from the middle of the ridge line check with wooded areas on both sides (slope 12). No slope failures seen on side slopes adjacent to ridge line.

Looking back at south side of slope 12 with recently harvested forest.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 13

Looking at slope 13, (from slope 14)

Looking into forest from existing ROW

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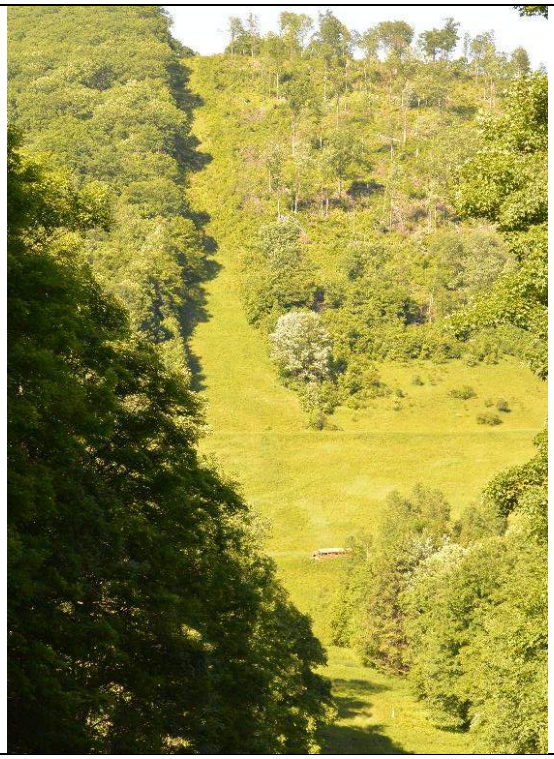
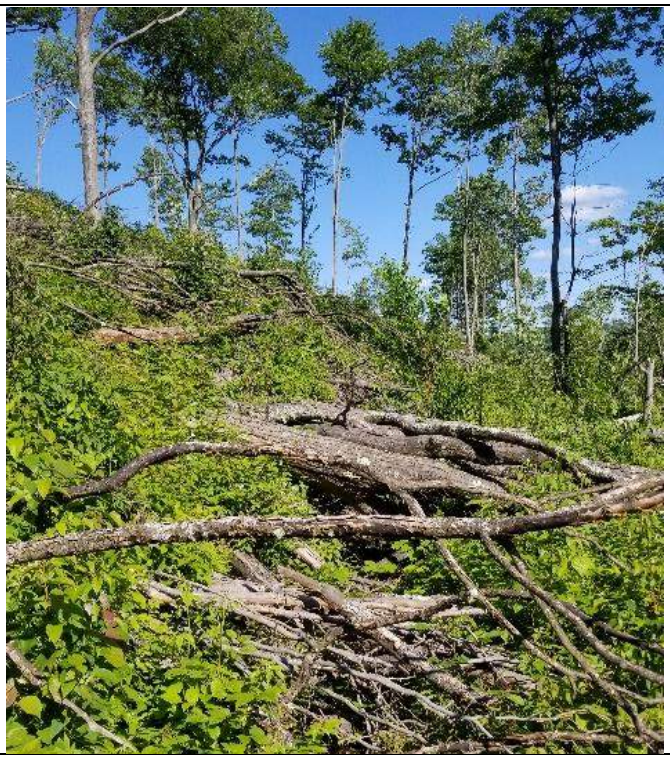
Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 14



Slope 14 (as seen from slope 13)



Recently harvested forest made walking and ground observations difficult.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/11/2019	Slope Number 15

Looking across current Right of Way (slope 15)

Slope 15 (viewed from slope 17)

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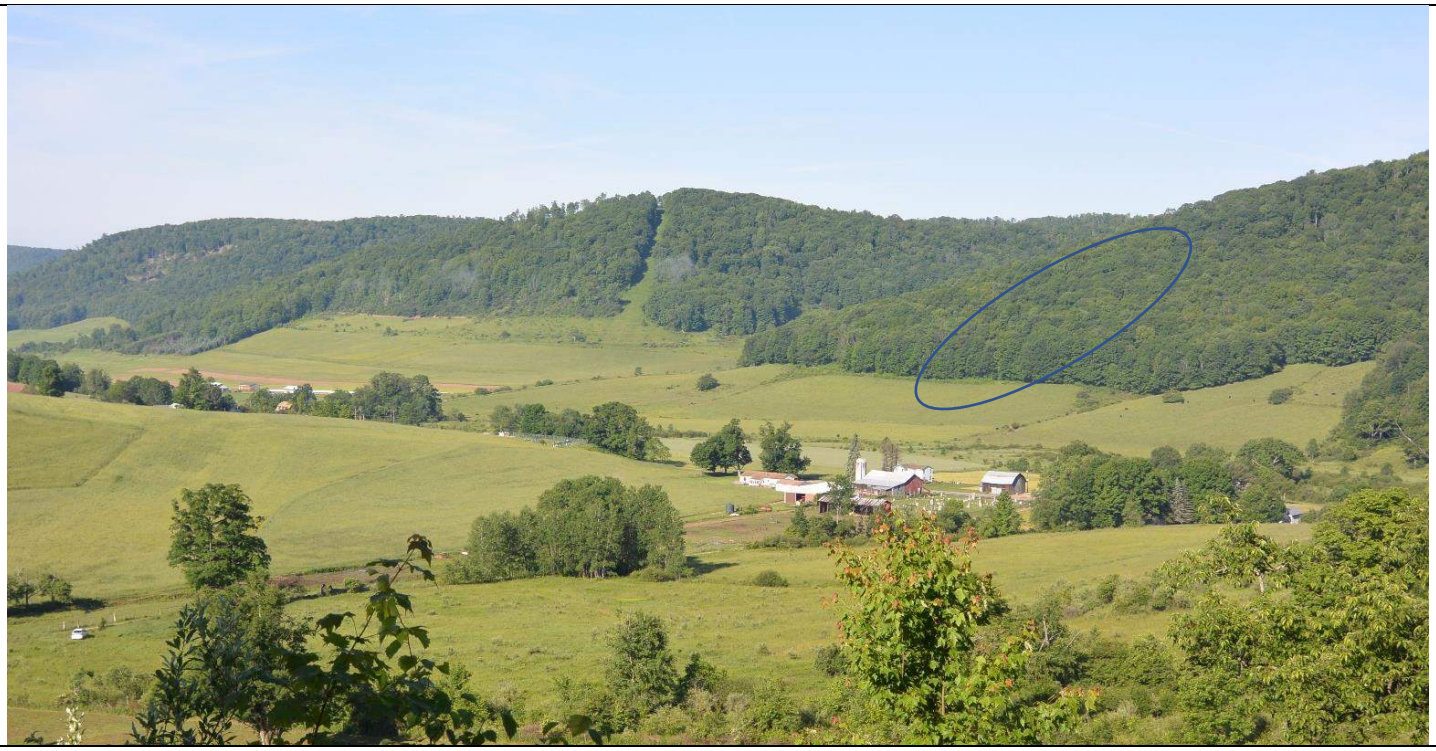
Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 16

Slope 16 as seen from a nearby road. Project is located in grass field at base of slope.



View from a higher angle looking down on slope 16 circled.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 17

Base of slope 17,

Historic logging tracks seen mid slope

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Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 18

Looking at slope 18

A small creek was found at the base of slope 18

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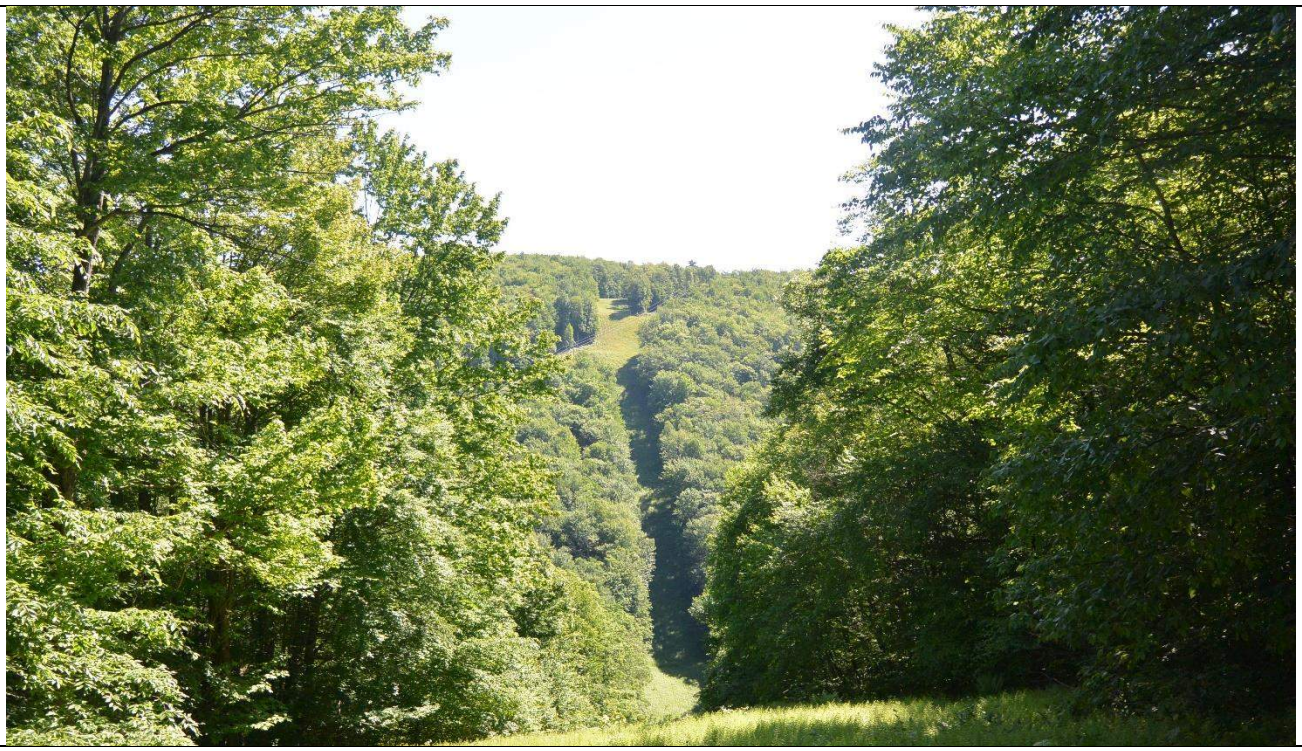
Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 19



Looking at slope 19

Perpendicular view to the slope

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Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 20

Looking at slope 20

Close up shot within slope 20 wooded area. Occasional individual bent tree.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 21

Historic logging tracks mid slope.

Laminated sandstone bedrock outcrop observed mid slope.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 22

Very thick vegetation on slope 22 prevented effective inspection.

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Project: FM 100
Project Number: 507388597

Survey Date: 6/12/2019	Slope Number 23

The top of slope 23 is the left side of photograph.

Existing track midway down slope 23.

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August 2020 Revision

EROSION AND SEDIMENT CONTROL PLAN

for the

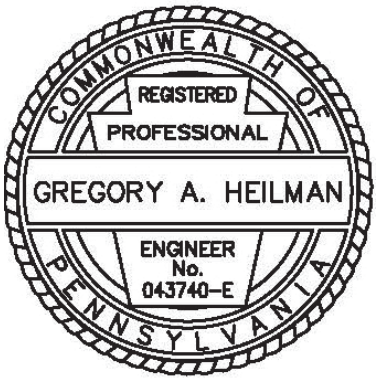
TAMARACK COMPRESSOR STATION

Leidy Township
Clinton County, Pennsylvania

Prepared for

National Fuel
SUPPLY CORPORATION

National Fuel Supply Corporation
1100 State Street
Erie, PA 16501



Prepared by

Michael Baker
INTERNATIONAL

Michael Baker International
Moon Twp., Pennsylvania

Tamarack Compressor Station
National Fuel Supply Corporation
Leidy Township
Clinton County, Pennsylvania

EROSION AND SEDIMENT CONTROL PLAN

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- b. Soil Characteristics
- c. Earth Disturbance Activity Characterization
- d. Project Site Runoff
- e. Surface Water Classification
- f. BMP Description Narrative
- g. BMP Installation Sequence Narrative
- h. Supporting Calculations and Measurements
- i. Plan Drawings
- j. Maintenance Program
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- l. Soil Conditions and Geologic Formations
- m. Thermal Impacts
- n. E&S Plan and PCSM/SR Plan Consistency
- o. Riparian Forest Buffer
- p. Antidegradation Requirements

2.0 Conclusion

Appendices

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Appendix B Soil Report
Appendix C Worksheets and Calculations
Appendix D Off-Site Discharge Analysis
Appendix E E&S Drawings

Tamarack Compressor Station
National Fuel Supply Corporation
Leidy Township
Clinton County, Pennsylvania

EROSION AND SEDIMENT CONTROL PLAN
PROJECT NARRATIVE

The project Erosion and Sediment Control (E&S) Plan implements best management practices (BMPs) that have been prepared in accordance with standards and specifications established in the Pennsylvania Department of Environmental Protection (PADEP) Technical Guidance Number 363-2134-008 *Erosion and Sediment Control Best Management Practice (BMP) Manual*, latest edition and the PADEP Technical Guidance Number 363-0300-002 *Pennsylvania Stormwater Best Management Practices Manual*, latest edition.

1.0 Project Description

National Fuel Supply Corporation is proposing the Tamarack Compressor Station project, which will consist of the construction of a compressor pad and permanent access road to support oil and gas activities. The project is located in Leidy Township, Clinton County, Pennsylvania. A Site Location Map is provided in Appendix A.

The total project area as a result of construction activity is approximately 15.6 acres. Earth disturbance and tree clearing will remain within the project limit-of-disturbance, as shown on the E&S Plan drawings located in Appendix E. The compressor pad and access road will include supporting E&S control BMPs and Post Construction Stormwater Management (PCSM) BMPs.

a. Topographic Features

Site topography varies across the project area. Generally, site contour is gentle to steep and ranges from approximately 3% to 8%. The site location and area surrounding the proposed access road and pad is primarily forested and meadow. Existing gasline right-of-way and other facilities are located adjacent to the project area.

b. Soil Characteristics

Soil type within and around the project area has been determined using the United States Department of Agriculture (USDA) Natural Resources Conservation Service Web Soil Survey. The Custom Soil Resource Report identifies two soil types within the project area. The names of the soil type and potential limiting characteristics that may be exhibited are defined in Table 1. A Custom Soil Resource Report has been provided in Appendix B. For the proposed project, it is anticipated that proposed BMPs will be sufficient to manage and control limitations that may be exhibited by the soils contained within the project site during and upon completion of construction. Specific soil limit resolutions for the site are provided in Appendix B.

Table 1
Limitations of Pennsylvania Soils Pertaining to Earthmoving Projects

Soil Name	Cutbanks Cave	Corrosive to Concrete / Steel	Droughty	Easily Erodible	Flooding	Depth to Saturated Zone / Seasonal High Water Table	Hydric / Hydric Inclusions	Low Strength / Landslide Prone	Slow Percolation	Piping	Poor Source of Topsoil	Frost Action	Shrink - Swell	Potential Sinkhole	Ponding	Wetness
Hustontown Silt Loam	X	C/S	X			X	X		X	X		X				
Ungers Loam	X	C		X				X	X			X				

Note: This is not necessarily an all-inclusive list. Absence of an X does not mean "No Potential Limitation".

c. Earth Disturbance Activity

For the purpose of this NOI, National Fuels Supply Corporation is proposing construction of a compressor pad and an approximately 1,460-foot long access road. The proposed access road will connect the pad to Stewart Hill Road. The total limit of disturbance associated with this NOI is anticipated to be approximately 15.6 acres.

d. Project Site Runoff

A hydrologic analysis has been conducted to determine impacts on stormwater runoff as a result of the proposed project. Technical Release No. 55 methodology was used to calculate the peak runoff flow rate and volume for the pre-development and post-development site conditions. Proposed stormwater management BMPs will be implemented so that the volume difference from the 2-year, 24-hour storm event (pre- to post-) will be stored and so no increase in the post-development total runoff rate for all storms up to and including the 100-year, 24-hour storm event will occur. An off-site discharge analysis is has been prepared and is provided in Appendix D.

e. Surface Water Classification

Mott MacDonald performed a stream and wetland delineation in the project area as part of the FM100 Modernization project. No aquatic resources were identified within the limits of disturbance or adjacent to the proposed site; however, Tamarack Swamp is approximately 2,300 feet south of proposed site. The project site drains generally to the south and west and is tributary to Drury Run and nearby wetlands. The Drury Run watershed has a Chapter 93 designated use of Exceptional Value (EV). No disturbance will occur to streams or wetlands due to the proposed project.

f. BMP Description Narrative

The project E&S Plan proposes BMPs that will be implemented as temporary and permanent control devices to prevent pollution that may be caused by erosion and sedimentation. BMPs will

be installed to prevent erosion via surface stabilization and to filter sediment from stormwater runoff prior to downstream discharge. All BMPs shall be installed and maintained in accordance with specifications defined in the PADEP *Erosion and Sediment Best Management Practice (BMP) Manual*, latest edition. BMP worksheets and calculations are provided in Appendix C and are described as follows:

1. Appropriate planning and staging shall insure that construction activities will be completed as quickly as possible to minimize the time duration and amount of earth disturbance at a given time. Areas where construction activities have been completed will immediately be stabilized with seed and mulch to minimize the potential for accelerated erosion.

2. An extended rock construction entrance will be installed where construction access connects with a public road. The rock construction entrance will be built with crushed stone and regularly maintained so that the entrance remains in a condition that will prevent tracking mud or flowing of sediment onto the public roadway. A 100 foot long rock construction entrance is proposed instead of the standard 50 foot rock construction entrance to provide additional control in the special protection watershed.

3. Compost filter sock will be installed in the locations shown on the E&S Plan drawings. Compost filter sock will be installed adjacent to the down slope perimeter of the active project area along the edge of disturbed areas. Installation will include staking the barriers on a level grade conforming well to existing surface contour with the ends turned upslope such that the bottom of the upturned barrier is equal in elevation to the top of its level portion. Sediment barriers may also be used at locations not shown on the plan drawings if such use is deemed appropriate to control sedimentation caused by stormwater runoff.

4. Bio-sock diversion berms will be used to divert runoff from undisturbed upslope areas and convey it around areas of earth disturbance.

5. Pumped water filter bags will be used to pump accumulated water within the disturbed areas of the project site during construction. The pumped water will be filtered prior to downstream discharge. Filter bags will be placed on the down slope side of the earthwork, as needed, and discharge into well vegetated areas. A compost filter sock will be installed below the bag for additional sediment removal capacity. The use of filter bags will continue as needed until the construction has been stabilized with vegetation.

6. A sediment basin will be installed in the location shown on the E&S plan to intercept and retain sediment-laden water to allow the majority of sediment to settle out prior to the water being discharged. Sediment deposits will be cleaned when accumulations each the specified sediment storage elevation.

7. Temporary Seeding will be applied upon temporary cessation of earth disturbance activity or any stage of an activity exceeding four days. The site shall immediately be seeded, mulched, or otherwise protected from accelerated erosion pending future earth disturbance activities. For earth disturbance activity, or any stage of an activity, to be considered temporary stabilized, the disturbed areas shall be covered with one of the following: a minimum uniform coverage of mulch and seed, with a density capable of resisting accelerated erosion, or an acceptable BMP that temporarily minimizes accelerated erosion. Temporary stabilization will not occur on active vehicular travel ways within the project limit of disturbance. The onsite environmental inspector will log daily activity within the project limit of disturbance and notify the Contractor of areas requiring temporary stabilization (i.e. areas where work has ceased for at least 4 days). These areas will be temporarily stabilized in accordance with the plan drawings and the Seed Mixture Table included in Appendix C.

8. Flexterra Flexible Growth Medium (FGM) will be installed in accordance with the manufacturer recommendations on all disturbed slope areas 3H:1V or steeper. These areas will be re-vegetated as soon as possible in accordance with the project permanent vegetative stabilization measures.

9. Riprap aprons will be used to prevent scour at channel and culvert outfalls.

10. Filter sock sediment traps will be installed in the locations shown on the E&S plan drawings in order to filter water prior to leaving the site.

11. Appropriately designed linings, including erosion control blankets, turf reinforcement mats, and riprap, will be installed in the ditches to prevent erosion and protect the channels.

12. Other temporary controls, as specified in the PADEP *Erosion and Sediment Best Management Practice (BMP) Manual* may be used at the operator's discretion to control erosion and sedimentation caused by stormwater runoff on a temporary basis.

13. Installation of BMPs is only the first step in proper stormwater management and erosion and sedimentation pollution control. Maintenance of BMPs is necessary to ensure that controls are functioning as designed.

g. BMP Installation Sequence Narrative

A copy of the approved drawings must be available at the project site at all times. At least seven days prior to starting any earth disturbance activities, the owner and/or operator shall invite all

contractors, the landowner, appropriate municipal officials, the E&S Plan preparer, the Post Construction Stormwater Management Plan preparer, and a representative from the local conservation district and/or PADEP to the onsite pre-construction meeting. At least three (3) days prior to starting earth disturbance activities or expanding into areas previously unmarked, the Pennsylvania One Call System, Inc. shall be notified at 1-800-242-1776 for the locations of existing underground utilities.

All BMPs shall be installed in accordance with: the E&S Plan standard details; specifications defined in the PADEP *Erosion and Sediment Best Management Practice (BMP) Manual*, latest edition; and, where applicable, the product manufacturer's recommendations. Each step of the sequence shall be completed before proceeding to the next step except where noted.

Sequence:

1. Clearly delineate the limits of disturbance and mark pertinent site features (i.e. protected features, BMP locations, etc.).

2. Install an extended rock construction entrance in the location identified on the plan drawings. Install Culvert 1.

3. Install compost filter sock in the locations identified on the plan drawings.

4. Install the filter sock trap.

5. Install the bio-sock diversion berms in the locations identified on the plan drawings.

6. Begin clearing of trees and vegetation, as necessary. Clear only within the limit of disturbance defined. No grubbing or earth disturbance shall occur until BMPs are installed down slope of tributary areas. Existing vegetation and trees shall be left undisturbed to the greatest extent practical in the areas around the proposed infiltration berm.

7. Prepare temporary contractor laydown area, including installation of air bridge. Utilize the temporary stockpile shown on the plans as needed.

8. Install the bypass culvert system; including Culverts 2, 3A, 3B, and 3C, and Channels 4 and 5.

9. Install the Sediment Basin and Channel 3.

10. Grubbing shall commence as necessary within the limit of clearing no more than four days prior to construction of the access road and pad. Minor grading within the limit of

disturbance may be necessary to provide an even surface for safe and efficient operation of construction equipment. Existing vegetation and trees shall be left undisturbed to the greatest extent practical in the areas around the proposed infiltration berm.

11. For the duration of construction, wetness or pooling water encountered within the construction area shall be dewatered by using pumps, hoses, and pumped water filter bags that discharge into well vegetated areas.

12. Apply soil supplements, and temporary seed and mulch to soil stockpiles and disturbed areas that will receive no construction activity within four days.

13. Construct the Access Road and Channel 6. Install gravel on the access road immediately after final grade is established. Apply soil supplements and permanent seed and mulch to disturbed areas that have achieved final grade and will no longer be subject to construction activity. For slope areas 3H:1V and steeper, the area shall be vertically tracked and FGM shall be installed once soil supplements, seed, and mulch have been applied.

14. Construct the compressor pad. Install gravel on the pad area when final grade is established. Install Channels 1 and 2. Apply soil supplements and permanent seed and mulch to disturbed areas that have achieved final grade and will no longer be subject to construction activity. For slope areas 3H:1V and steeper, the area shall be vertically tracked and FGM shall be installed once soil supplements, seed, and mulch have been applied.

15. Upon completion of construction activity and stabilization of disturbed areas, the site conditions shall be prepared in accordance with the project Post Construction Stormwater Management/Site Restoration Plan, including installation of the infiltration berm and conversion of the sediment basin into a wet pond. Care shall be taken to leave existing vegetation and trees undisturbed in the areas around the berms to the greatest extent practical.

16. Apply soil supplements and permanent seed and mulch to any remaining disturbed areas. Re-seed, as necessary, any areas that become disturbed or where vegetation has not been established within thirty (30) days.

17. Remove all temporary BMPs once a uniform 70% perennial vegetative cover has established on all previously disturbed areas.

h. Supporting Calculations and Measurements

Supporting calculations and measurements are provided in Appendix C.

i. Plan Drawings

Erosion and Sediment Control Plan drawings are provided in Appendix E.

j. Maintenance Program

After construction is completed and site has reached final grade, all temporary BMPs will be removed and any land disturbed by removal will be permanently stabilized, unless otherwise specified, all maintenance must be completed immediately after an inspection identifies that a BMP is not functioning.

1. If concentrated flow areas form due to any storm event and any area becomes unstable, the area shall be stabilized by installing additional BMPs in the concentrated flow areas. Any required repairs or maintenance shall be made immediately.

2. The Contractor shall assess the working condition of the E&S measures at least weekly and after each measurable rain event (greater than one-half inch in 24 hours or any significant thaw event). Damaged, blocked, or otherwise compromised measures observed during the inspection shall be repaired immediately.

3. Compost filter sock shall be inspected weekly and after each measurable rain event. The filter sock shall be inspected to ensure they have not been dislodged or broken. Accumulated sediment shall be removed when accumulations reach one-half the aboveground height of the sock. Damaged barriers shall be repaired in accordance with the manufacturer recommendations, or replaced within twenty-four hours of inspection.

4. If used during construction, biodegradable filter sock shall be replaced after six months; photodegradable sock after one year; polypropylene socks shall be replaced in accordance with the manufacturer recommendations. Stakes shall be removed from socks upon stabilization of the areas tributary to a sock. The sock may be left in place and vegetated or removed. If left in place, the mesh shall be cut open and the mulch spread as a soil supplement.

5. Pumped water filter bags shall be inspected daily for breaks or leaks. The filter bag and underlying erosion protection materials (e.g. straw bales, geotextile) shall be closely monitored for stability. Bags shall be disposed of in accordance with the project E&S Plan and replaced when the bag becomes one-half full of sediment. Spare bags and underlying materials shall be kept available for replacement. Erosion and undercutting of filter bags shall be promptly repaired. The pumping rate to filter bags for pumped water shall be one-half the maximum pumping rate recommended by the manufacturer.

6. Trap sediment shall be removed when it reaches one-third the height of the socks. Material removed from the trap shall be spread and dried on-site, within the limit-of-disturbance and upslope of erosion and sediment control devices. Damaged socks shall be immediately replaced and restored to the design specifications.

7. The sediment basin shall be inspected on at least a weekly basis and after each runoff event. A cleanout stake shall be placed near the center of the basin. Accumulated sediment shall be removed when it has reached the clean out elevation on the stake and the basin restored to its original dimensions. Silt removed from the sediment basin shall be spread on the topsoil stockpile or other areas with the limit of disturbance. Excess materials that cannot be spread on-site must be disposed of at a PADEP approved site. Basin embankments, spillways, and outlets shall be inspected for erosion, piping and settlement. Necessary repairs shall be made promptly. Displaced riprap within the outlet energy dissipater shall be replaced. Accumulated sediment shall be removed and disturbed areas shall be stabilized inside the basin before conversion to a stormwater management facility.

8. Riprap aprons shall be inspected for displaced riprap. Any displaced riprap shall be replaced immediately.

9. Channels shall be maintained to ensure that the specified design dimensions and protective linings are available at all times. A channel should be cleaned whenever total channel depth is reduced by 25% at any location. Damaged channel linings should be repaired or replaced immediately.

10. Rock construction entrances will be regularly maintained so that the entrance remains in a condition that will prevent tracking mud or flowing of sediment onto the public roadways. All sediment spilled, dropped, washed, or tracked onto public roadways must be removed immediately.

11. A log showing dates that E&S BMPs were inspected as well as all deficiencies found and the date they were corrected shall be maintained on the site and be made available to regulatory agency officials at the time of inspection.

12. Re-vegetated areas shall be inspected for adequate vegetative cover. Areas exhibiting stressed vegetation or signs of erosion shall have the seedbed prepared and have seed and mulch re-applied. Additional maintenance items are outlined in the "Standard Erosion and Sediment Pollution Control Notes."

13. All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Whenever inspection and/or monitoring reveals that

the BMPs identified in the E&S Plan are inadequate, the E&S Plan shall be modified, as appropriate, in a timely manner. Damaged BMPs will be repaired or replaced as soon as practicable, but no more than 24 to 48 hours after discovering the damage. Any spillage or discharge of pollutants shall be reported within twenty-four hours.

14. Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into surface water runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Contaminated soil must be disposed of properly. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle.

15. The E&S Plan shall be retained on-site. The E&S Plan shall be modified whenever there is a significant change in the design, construction, operation, or maintenance of any BMP. The Conservation District or PADEP must be notified of any changes. Depending on the significance of the revision, a permit modification may need to be submitted to the Conservation District or PADEP or area line modification with notification and inspector can be used if change occurs within permit limit-of-disturbance.

16. After final site stabilization has been achieved or after temporary BMPs are no longer needed, temporary erosion and sedimentation controls must be removed within thirty days. Accumulated sediment shall be removed or stabilized on site. Areas disturbed during removal of the controls must be stabilized immediately.

17. When encountering a washout of FGM used on slopes, re-grade, re-seed and re-mulch per manufacturer's specifications. When encountering FGM failure, re-grade, re-seed, and re-mulch per manufacturer's specifications.

18. Inspect discharge locations to ascertain effectiveness of controls. Implement additional control measures as needed.

19. Upon final completion of an earth disturbance activity or any stage or phase of an activity, the site shall immediately have topsoil restored, replaced, or amended, seeded, mulched or otherwise permanently stabilized and protected from accelerated erosion and sedimentation.

k. Material Recycling and Disposal

Persons Responsible for Recycling and Disposal

It will be the responsibility of the Contractor to provide satisfactory erosion and sedimentation control, and to interface with applicable regulatory agencies. The Contractor is responsible for having an approved E&S Plan and for verifying that an operating permit approved by the Conservation District or PADEP exists for all offsite borrow and disposal area locations. If an offsite disposal location is necessary, the site must be approved by the Conservation District or PADEP and the Contractor must provide proof of permit approval for the location to the owner and applicable regulatory agencies prior to use. All fill material must be in accordance with PADEP Document No. 258-2182-773 for Management of Fill. Environmental due diligence is defined as: investigative techniques, including, but not limited to, visual property inspections, electronic data base searches, review of property ownership, review of property use history, Sanborn Maps, environmental questionnaires, transaction screens, analytical testing, environmental assessments or audits.

In the event that the Contractor wishes to modify the E&S Plan, a copy of the revised plan must be submitted to the Engineer and to the Conservation District or PADEP for approval. The use of the term 'Engineer' in this report shall refer to the professional engineer who signed and sealed the ESCGP-3 for the proposed project.

Offsite Disposal Requirements

No earth disturbance activities shall occur outside of the project limit of disturbance. The Contractor must retain records of maintenance logs and inspection reports for the E&S measures at the site. The Contractor shall comply with the maintenance schedule shown on the plans and shall immediately rectify all non-compliance issues observed or cited by inspection report(s).

Excess soil from surface excavations will be removed promptly after excavation to a permitted facility with a fully implemented and PADEP approved E&S Plan. Temporary controls that are replaced or removed after stabilization will also be removed for proper disposal. Any sediment collected by the erosion and sedimentation BMPs will be placed back into the construction area in a dry, up-gradient portion of the site.

All garbage disposal will be managed through a local waste management provider or facility. The Contractor will have a dumpster available onsite for the duration of the project, which will be disposed of at a licensed/permitted municipal landfill. The project site will be inspected at the end of each working day for any loose litter or construction materials that may require recycling/disposal. All waste materials found during inspection will immediately be recycled or disposed of at a properly licensed/permitted facility. The Contractor will be responsible for all permits and/or disposal fees and for assuring that all materials are handled and disposed of in

accordance with applicable laws, rules, and regulations, including, but not limited to those issued by the U.S. Environmental Protection Agency, PADEP and OSHA.

With regard to site cleanup and handling, storage control, disposal and recycling of waste (including but not limited to fuels, oils, lubricants and other materials brought to the site or used in the process of drilling), all waste, or excess materials not suitable for the onsite stockpiling or backfill, shall be disposed of at the PADEP-approved waste site in accordance with the PADEP solid waste management regulations at 25 PA Code chapter 260, §260.1 et seq., 271.1, and 287.1 et. seq. Where feasible, construction waste materials shall be recycled or taken to the nearest PADEP-approved facility for disposal. Excess soil material, if any, will be spread within the limit-of-disturbance and re-vegetated. Off-site spoil and/or borrow sites must be operated under a current NPDES permit. No wastes shall be burned, buried, dumped, or discharged at the site.

l. Soil Conditions and Geologic Formations

As per 102.4.(b)(5)(xii) of the PA Code, the project E&S Plan shall identify naturally occurring geologic formations or soil conditions that may have the potential to cause pollution during earth disturbance activities and include BMPs to avoid or minimize potential pollution and its impacts from the formations. For the proposed project, it is anticipated that proposed BMPs will be sufficient to manage and control limitations that may be exhibited by the soils contained within the project site during and upon completion of construction - refer to Appendix B for site specific soil limit resolutions.

At a minimum, BMPs will be installed where indicated on the plan drawings to prevent erosion and sedimentation during and upon completion of construction. Severe erosion hazard limitations will be reduced by soil stabilization through the application of FGM and temporary/permanent vegetative stabilization. Sedimentation and siltation limitations will be prevented through installation and maintenance of filtration BMPs, such as compost filter sock. Special measures to be implemented during earth disturbance activities associated with construction will include the segregation of topsoil. Soils disturbed during construction activities will be replaced, re-vegetated and stabilized.

No acid-producing rock formations are anticipated to be present or encountered. However, if any material is found to be present at the site, the material will be handled in accordance with PADEP Fact Sheet 5600-FS-DEP4284.

m. Thermal Impacts

As per 102.4.(b)(5)(xiii) of the PA Code, the project E&S Plan shall identify potential thermal impacts to surface waters as a result of earth disturbance activities. For the proposed project, thermal impacts have been avoided, minimized, or mitigated to the greatest extent possible due to the nature of the project scope. No permanent pools are anticipated as a result of proposed earth disturbance activities. Runoff from the site will flow over long stretches of vegetated areas before

reaching receiving streams, which will provide for additional cooling and infiltration. Additionally, shade areas will be preserved to the greatest extent possible.

n. E&S Plan and PCSM/SR Plan Consistency

As per 102.4.(b)(5)(xiv) of the PA Code, the project E&S Plan has been prepared as a separate document from the project Post Construction Stormwater Management/Site Restoration Plan and each plan has been prepared, designed, and implemented for consistency with one another.

o. Riparian Forest Buffers

The project is located in an exceptional value watershed; however, no site activities proposed as part of this project are within 150 feet of any streams.

p. Antidegradation Requirements

Receiving streams are classified as EV; therefore, treatment and pollution prevention ABACT BMPs will be utilized during and upon completion of construction to prevent degradation of downstream receiving waters. During construction, BMPs such as compost filter sock, filter sock sediment traps, sediment basin, and an extended rock construction entrance will be installed to prevent and control erosion and sedimentation. Upon completion of construction, BMPs such as a wet pond, an infiltration berm, and restoration of native vegetation will control runoff discharge flow rate and volume and promote water quality. For the duration of the construction, a Pollution Prevention and Contingency Plan will be available onsite for implementation in the event of a spill or release of associated substances.

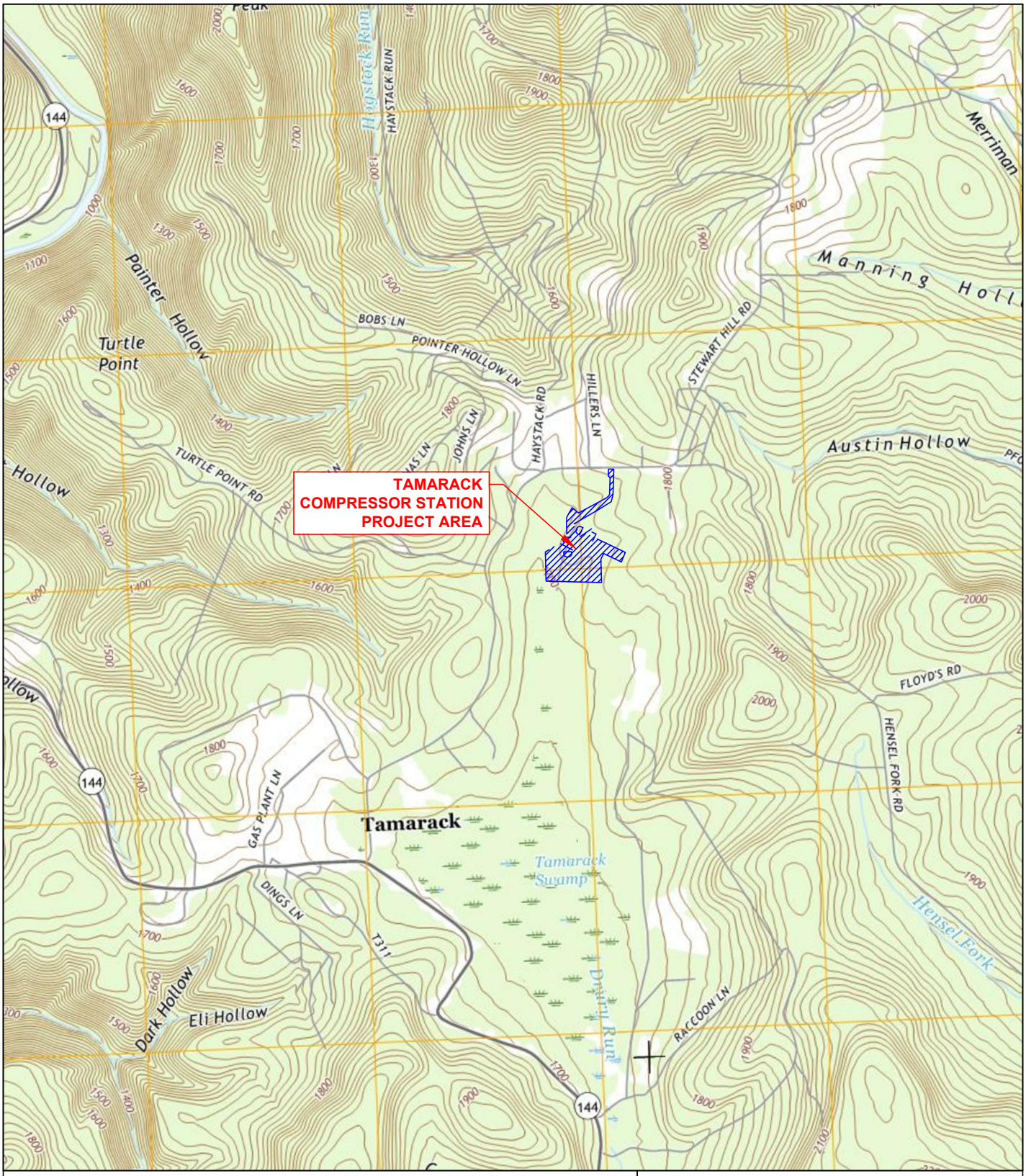
2.0 Conclusion

This E&S Plan has been prepared in accordance with standards and specifications defined by the PADEP. It is anticipated that BMPs proposed within this plan will be sufficient to manage and control erosion and sedimentation that may be exhibited by the soils contained within the project site during construction activity and upon achieving stabilization.

Additionally, pursuant to PA Chapter 78 requirements, a Preparedness Prevention and Contingency Plan has been prepared for the project and will be available on site for associated use and/or storage of fuels, chemicals, solvents, or other waste or materials during earth moving activities.

APPENDIX A

Site Location Map



SITE LOCATION MAP
TAMARACK COMPRESSOR STATION
NATIONAL FUEL SUPPLY CORPORATION

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

FIGURE 1

REFERENCE:
U.S. GEOLOGICAL SURVEY
TAMARACK, PA QUADRANGLE
7.5 MINUTE SERIES

N

Michael Baker INTERNATIONAL

SCALE: 1"=2000'

APPENDIX B

Soil Report

Tamarack Compressor Station
Soil Limitation Resolutions

Cutbanks Cave
All applicable OSHA standards and regulations will be implemented to safeguard workers during trenching and excavation operations. Trench boxes will be used, where required, during subsurface pipeline installation. Cut slopes will be stabilized as soon as possible with seed and mulch or erosion control blankets/flexible growth medium to help prevent sliding. Compressor site slopes are designed to not exceed 2H:1V.

Corrosive to Concrete/Steel
All subsurface pipes shall be either HDPE or steel pipes coated with a fusion bonded epoxy to help prevent corrosion. Cathodic protection shall also be implemented as necessary. If concrete corrosion is determined to be a potential site concern, Contractor shall apply the necessary site-specific concrete coatings prior to exposure to the local soil conditions.

Droughty
Drought tolerant seed mixes are used to ensure adequate establishment of perennial vegetation. Erosion control blankets or flexible growth medium shall be used as necessary to help hold soil particles, retain moisture and promote seed germination. Areas not achieving adequate vegetative cover will be re-seeded and re-mulched.

Easily Erodible
Disturbed soils will be stabilized in accordance with the temporary and permanent stabilization specifications prescribed in the E&S Plan. ABACT controls will be implemented. Erosion control matting or flexible growth medium will be installed on slopes greater than 3:1. Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the operator shall implement appropriate Best Management Practices to minimize the potential for accelerated erosion and/or sediment pollution.

Depth to Saturated Zone/Seasonal High-Water Table
If water is encountered during excavation, all trenches will be dewatered in accordance with the E&S Plan. Trench water will be pumped out and discharged through a filter bag. Filter bags will be located in well-vegetated areas and discharge onto stable, erosion resistant areas. If necessary, a geotextile underlayment and flowpath will be provided. Locations of proposed infiltration BMPs have been investigated to confirm adequate separation from seasonal high-water table.

Hydric/Hydric Inclusions
A wetland delineation has been performed at the project site to determine the presence of wetlands. No wetlands are present within the project's limit of disturbance. All delineated wetlands shall be avoided and no wetland impacts are anticipated.

Low strength/Landslide Prone
Soils shall be stabilized with seed or stone immediately after earthmoving activities cease. Turf reinforcement matting or erosion control blanket or flexible growth medium will be applied where necessary. Cut and fill slopes will be no steeper than 2:1 grades. Fill material shall be free of brush, roots, sod, frozen particles, and all other foreign or objectionable material. All fills shall be

compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems.

Slow Percolation
Site BMPs shall be inspected after runoff events and adequate surface area shall be provided for pumped water discharge.

Piping
Any planned embankments or impoundments susceptible to piping shall utilize anti-seep collars.

Frost Action
The heaving and subsequent collapsing of the soil due to frost action can damage roads, buildings and plant roots. Site construction is monitored daily and any impacts due to frost action shall be identified and corrected.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Clinton County, Pennsylvania

September 19, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

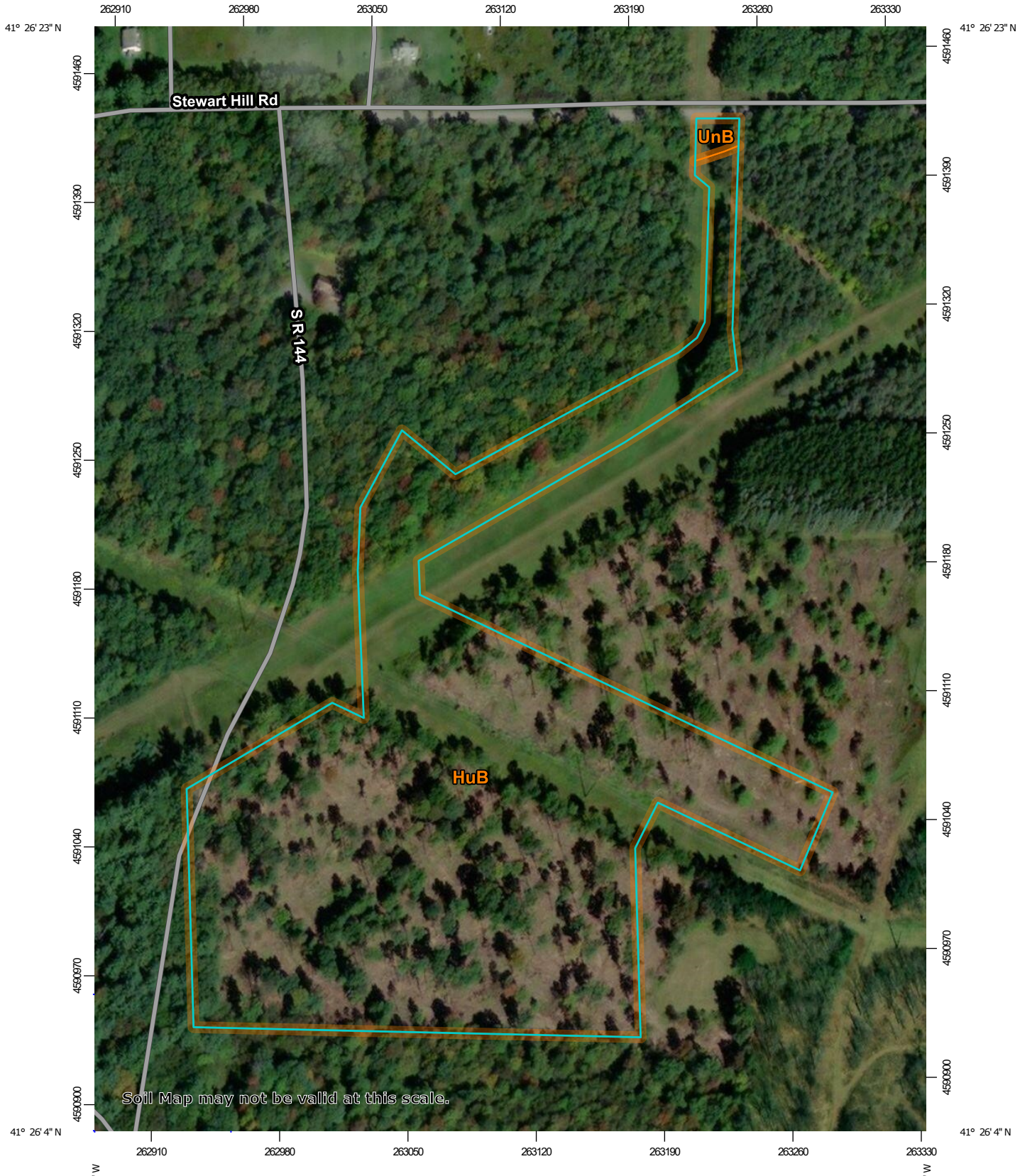
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,920 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 40 80 160 240

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clinton County, Pennsylvania
Survey Area Data: Version 14, Sep 18, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 4, 2012—Sep 10, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HuB	Hustontown silt loam, 3 to 8 percent slopes	15.5	99.3%
UnB	Ungers loam, 3 to 8 percent slopes	0.1	0.7%
Totals for Area of Interest		**15.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Clinton County, Pennsylvania

HuB—Hustontown silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l835
Elevation: 600 to 2,800 feet
Mean annual precipitation: 34 to 48 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 110 to 170 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Hustontown and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hustontown

Setting

Landform: Valley sides
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainbase
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Red residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 24 inches: silt loam
Bt - 24 to 30 inches: channery silt loam
Btx - 30 to 65 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 32 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 26 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Meckesville

Percent of map unit: 10 percent
Landform: Mountain valleys

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ungers
Percent of map unit: 5 percent

Unnamed
Percent of map unit: 5 percent

Leck kill
Percent of map unit: 5 percent

UnB—Ungers loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l863
Elevation: 900 to 2,200 feet
Mean annual precipitation: 38 to 48 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 110 to 170 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ungers and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ungers

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 9 inches: loam
Bt - 9 to 33 inches: channery clay loam
BC - 33 to 48 inches: very channery clay loam
R - 48 to 58 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Meckesville

Percent of map unit: 10 percent
Hydric soil rating: No

Leck kill

Percent of map unit: 5 percent
Hydric soil rating: No

Hustontown

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

AOI Inventory

This folder contains a collection of tabular reports that present a variety of soil information. Included are various map unit description reports, special soil interpretation reports, and data summary reports.

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Clinton County, Pennsylvania

Map Unit: HuB—Hustontown silt loam, 3 to 8 percent slopes

Component: Hustontown (75%)

The Hustontown component makes up 75 percent of the map unit. Slopes are 3 to 8 percent. This component is on valley sides. The parent material consists of red residuum weathered from sandstone and shale. Depth to a root restrictive layer, fragipan, is 18 to 32 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 19 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Component: Meckesville (10%)

Generated brief soil descriptions are created for major soil components. The Meckesville soil is a minor component.

Component: Ungers (5%)

Generated brief soil descriptions are created for major soil components. The Ungers soil is a minor component.

Component: Unnamed (5%)

Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Component: Leck Kill (5%)

Generated brief soil descriptions are created for major soil components. The Leck Kill soil is a minor component.

Map Unit: UnB—Ungers loam, 3 to 8 percent slopes

Component: Ungers (75%)

The Ungers component makes up 75 percent of the map unit. Slopes are 3 to 8 percent. This component is on mountain slopes. The parent material consists of residuum weathered from sandstone and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Component: Meckesville (10%)

Generated brief soil descriptions are created for major soil components. The Meckesville soil is a minor component.

Component: Unnamed (5%)

Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Component: Leck Kill (5%)

Generated brief soil descriptions are created for major soil components. The Leck Kill soil is a minor component.

Component: Hustontown (5%)

Generated brief soil descriptions are created for major soil components. The Hustontown soil is a minor component.

Soil Qualities and Features

This folder contains tabular reports that present various soil qualities and features. The reports (tables) include all selected map units and components for each map unit. Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and

air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Features–Clinton County, Pennsylvania									
Map symbol and soil name	**Restrictive Layer**				**Subsidence**		**Potential for frost action**	**Risk of corrosion**	
	Kind	**Depth to top**	**Thickness**	**Hardness**	**Initial**	**Total**		**Uncoated steel**	**Concrete**
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
		In	*In*		*In*	*In*			
HuB—Hustontown silt loam, 3 to 8 percent slopes									
Hustontown	Fragipan	18-30-32	—	Noncemented	0	—	High	High	Moderate
Meckesville	Fragipan	30-39-48	—		0	—	Moderate	High	High
	Lithic bedrock	61-91-120	—		0	—	Moderate	High	High
Leck kill	Lithic bedrock	40-42-60	—	Very strongly cemented	—	—			
Ungers		—	—		—	—			
Unnamed		—	—		—	—			
UnB—Ungers loam, 3 to 8 percent slopes									
Ungers	Lithic bedrock	40-48-60	—	Very strongly cemented	0	—	Moderate	Moderate	High
Meckesville		—	—		—	—			
Hustontown		—	—		—	—			
Leck kill	Lithic bedrock	40-42-60	—	Very strongly cemented	—	—			
Unnamed		—	—		—	—			

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Clinton County, Pennsylvania			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
HuB—Hustontown silt loam, 3 to 8 percent slopes			
Hustontown	75	Medium	C/D
Meckesville	10	Medium	C
Leck kill	5	—	—
Ungers	5	—	—
Unnamed	5	—	—
UnB—Ungers loam, 3 to 8 percent slopes			
Ungers	75	Medium	B
Meckesville	10	—	—
Hustontown	5	—	—
Leck kill	5	—	—
Unnamed	5	—	—

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APPENDIX C

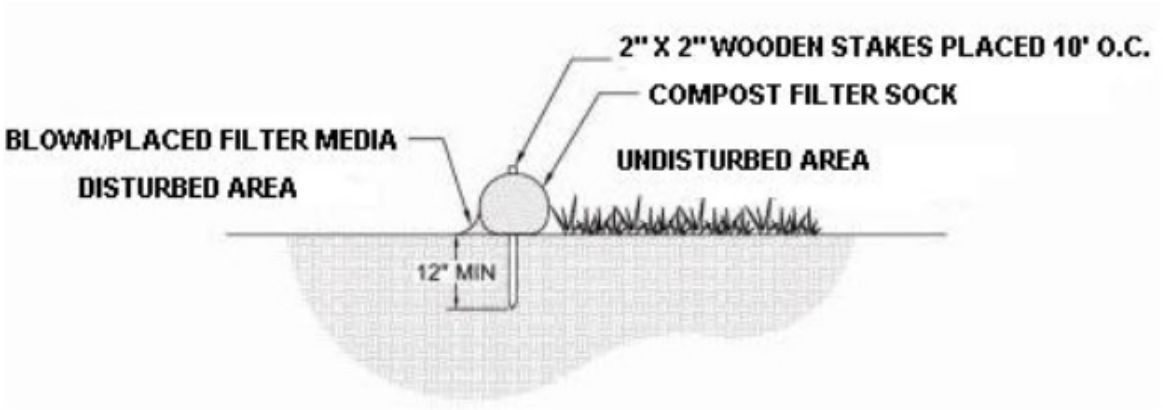
Worksheets and Calculations

Compost Filter Sock

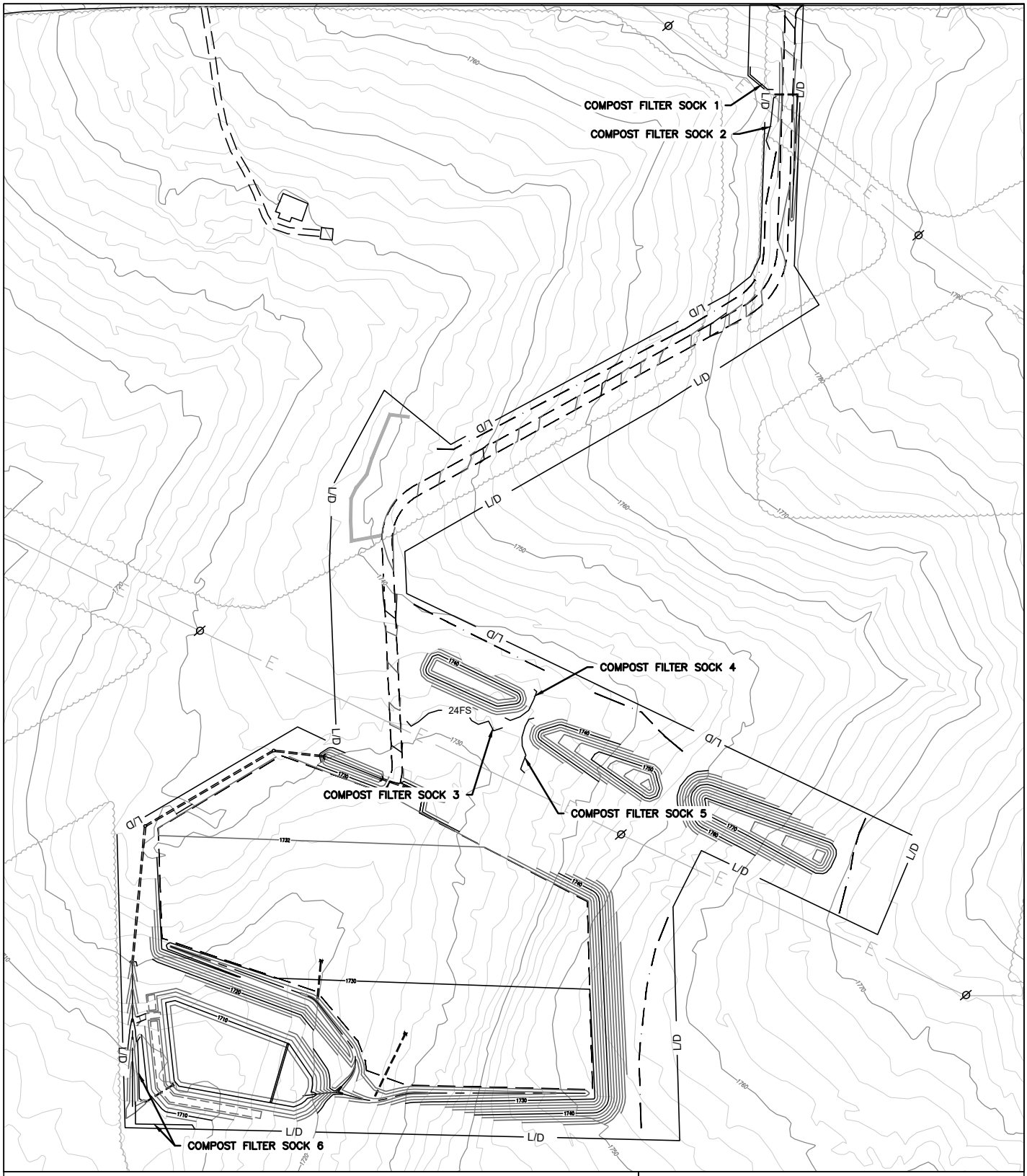
STANDARD E&S WORKSHEET #1

Compost Filter Socks

PROJECT NAME:	Tamarack Compressor Station		
LOCATION:	Leidy Township, Clinton County, PA		
PREPARED BY:	APH	DATE:	8/4/2020
CHECKED BY:	BRF	DATE:	8/4/2020



SOCK No.	DIA. (IN)	LOCATION	SLOPE	SLOPE LENGTH ABOVE BARRIER (FT)
1	12	West of Access Road	9%	115
2	12	West of Access Road	16%	25
3	24	South of Topsoil Stockpile	30%	35
4	24	East of Topsoil Stockpile	35%	25
5	24	West of Topsoil Stockpile	34%	40
6	24	Southwest of Infiltration Basin	15%	50



COMPOST FILTER SOCK EXHIBIT
TAMARACK COMPRESSOR STATION
NATIONAL FUEL SUPPLY CORPORATION

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

FIGURE 1

Michael Baker INTERNATIONAL

SCALE: 1"=2000'

Temporary and Permanent Stabilization

STANDARD E&S WORKSHEET #21
Temporary and Permanent Stabilization Specifications

PROJECT NAME: Tamarack Compressor Station
LOCATION: Leidy Township, Clinton County, Pennsylvania
PREPARED BY: BRF DATE: Revised Aug 2020
CHECKED BY: GAH DATE: Aug 2020

SPECIFICATIONS: The Department recommends the use of the Penn State publication "EROSION CONTROL & Conservation Plantings on Noncropland" as the standard to use for the selection of species, seed specifications, mixtures, liming and fertilizing, time of seeding, and seeding methods. Specifications for these items may also be obtained from PennDOT's Publication # 408, Section 804 or by contacting the applicable county conservation district. Upon selection of a reference, that reference must be used to provide all specifications for seeding, mulching, and soil amendments. The following specification will be used for this project:

(TEMPORARY)	SPECIES:	Winter Rye, 10/15 – 03/01
	% PURE LIVE SEED:	80.75 %
	APPLICATION RATE:	170 LB./ACRE
	FERTILIZER TYPE:	10-10-10 (X-X-X)
	FERTILIZER APPL. RATE:	500 LB./ACRE
	LIMING RATE:	1 T./ACRE
	MULCH TYPE:	straw
	MULCHING RATE:	3 T./ACRE
(PERMANENT)	SPECIES:	Seed Mixture 1
	% PURE LIVE SEED:	per manufacturer recommendations %
	APPLICATION RATE	40 LB./ACRE
	FERTILIZER TYPE:	10-20-20 (X-X-X)
	FERTILIZER APPL. RATE:	1000 LB./ACRE
	LIMING RATE:	6 (or liquid Neutra-Lime, 10-15 gal/acre) T./ACRE
	MULCH TYPE:	straw
	MULCHING RATE:	3 T./ACRE
	ANCHOR MATERIAL:	n/a
	ANCHORING METHOD:	mechanically anchored
	RATE OF ANCHOR MATERIAL APPL.:	n/a LB./ACRE
	SEEDING SEASON DATES:	per manufacturers recommendations
(PERMANENT – STEEP SLOPE)	SPECIES:	Seed Mixture 2
	% PURE LIVE SEED:	per manufacturer recommendations %
	APPLICATION RATE	50 LB./ACRE
	FERTILIZER TYPE:	10-20-20 (X-X-X)
	FERTILIZER APPL. RATE:	1000 LB./ACRE
	LIMING RATE:	6 (or liquid Neutra-Lime, 10-15 gal/acre) T./ACRE
	MULCH TYPE:	straw
	MULCHING RATE:	3 T./ACRE
	ANCHOR MATERIAL:	n/a
	ANCHORING METHOD:	mechanically anchored
	RATE OF ANCHOR MATERIAL APPL.:	n/a LB./ACRE
	SEEDING SEASON DATES:	per manufacturers recommendations

*If more than one species is used, indicate application rate for each species.
Note: This worksheet should be added to the plan drawings.

(WETLANDS**)	SPECIES:	N/A
	% PURE LIVE SEED:	%
	APPLICATION RATE:	LB./ACRE
	FERTILIZER TYPE:	(X-X-X)
	FERTILIZER APPL. RATE:	LB./ACRE
	LIMING RATE:	T./ACRE
	MULCH TYPE:	
	MULCHING RATE:	T./ACRE
	SEEDING SEASON DATES:	

**Ernst Conservation Seeds – OBL Wetland Seed Mix – ERNMX-131

(Seed Mixture 1)	SPECIES:	Fawn Tall Fescue	30%
		Annual Ryegrass	25%
		Timothy	15%
		Birdsfoot Trefoil	10%
		Alsike Clover	10%
		Yellow Blossom Clover	5%
		Red Top	5%
(Seed Mixture 2)	SPECIES:	Perennial Ryegrass	40%
		Lathco Flatpea (2 x inoculm)	40%
		Birdsfoot Trefoil	20%

Profile
Solutions for your Environment™

Flexterra® HP-FGM™

High Performance Flexible Growth Medium

GREEN DESIGN ENGINEERING™
EARTH-FRIENDLY SOLUTIONS FOR SUSTAINABLE RESULTS™

Description

Flexterra® HP-FGM™ is a fully biodegradable, High Performance-Flexible Growth Medium (HP-FGM) composed of 100% recycled and Thermally Refined™ wood fibers, crimped interlocking biodegradable fibers, micro-pore granules, naturally derived cross-linked biopolymers and water absorbents. The HP-FGM is phyto-sanitized, free from weed seeds, free from plastic netting, requires no curing period and upon application forms an intimate bond with the soil surface to create a continuous, porous, absorbent and flexible erosion resistant blanket that allows for rapid germination and accelerated plant growth.

Recommended Applications

- Erosion control for slopes ranging from mild to severe (≤0.25H:1V)
- Rough graded slopes
- Superior performance over rolled erosion control blankets
- Enhancement of vegetation establishment
- Ideal infill material to create the GreenArmor™ System

Technical Data

Physical Properties*	Test Method	Units	Minimum Value
Mass/Unit Area	ASTM D6566[1]	g/m^2 (oz/yd^2)	407 (12)
Thickness	ASTM D6525[1]	mm (in)	5.6 (0.22)
Ground Cover	ASTM D6567[1]	%	99
Water Holding Capacity	ASTM D7367	%	1700
Material Color	Observed	n/a	Green
Performance Properties*	**Test Method**	**Units**	**Value**
Cover Factor[2]	Large Scale[4]	n/a	< 0.01
Percent Effectiveness[3]	Large Scale[4]	%	> 99
Cure Time	Observed	hours	0 - 2
Vegetation Establishment	ASTM D7322[1]	%	800
Environmental Properties*	**Test Method**	**Units**	**Typical Value**
Functional Longevity[5]	ASTM D5338	n/a	Up to 18 months
Ecotoxicity	EPA 2021.0	%	48-hr LC_{50} > 100%
Effluent Turbidity	Large Scale[4]	NTU	< 250
Biodegradability	ASTM D5338	%	100
Product Composition			**Typical Value**
Thermally Processed Wood Fiber[6] (within a pressurized vessel)			80 % ± 3 %
Crosslinked Biopolymers and Water Absorbents			10 % ± 1%
Crimped, Biodegradable Interlocking Fibers			5 % ± 1 %
Micro-Pore Granules			5 % ± 1 %

* When uniformly applied at a rate of 3500 pounds per acre (3900 kilograms/hectare) under laboratory conditions. 1. ASTM test methods developed for Rolled Erosion Control Products that have been modified to accommodate Hydraulic Erosion Control Products. 2. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface. 3. % Effectiveness = One minus Cover Factor multiplied by 100%. 4. Large scale testing conducted at Utah Water Research Laboratory. For specific testing information please contact a Profile technical service representative at 866-325-6262 or +1-847-215-3464. 5. Functional Longevity is the estimated time period, based upon field observations, that a material can be anticipated to provide erosion control and agronomic benefits as influenced by composition, as well as site-specific conditions, including; but not limited to – temperature, moisture, light conditions, soils, biological activity, vegetative establishment and other environmental factors. 6. Heated to a temperature greater than 380 degrees Fahrenheit (193 degrees Celsius) for 5 minutes at a pressure greater than 50 psi (345 kPa) in order to be Thermally Refined™/Processed and to achieve phyto-sanitization.

Packaging Data

Properties	Test Method	Units	Nominal Value
Bag Weight	Scale	kg (lb)	22.7 (50)
Bags per Pallet	Observed	#	40

UV and weather-resistant plastic bags. Pallets are weather-proof stretch wrapped with UV resistant pallet cover.

Profile Products
750 Lake Cook Road, Ste. 440
Buffalo Grove, IL 60089
800-508-8681 or +1-847-215-3464
www.profileproducts.com

To the best of our knowledge, the information contained herein is accurate. However, Profile Products cannot assume any liability whatsoever for the accuracy or completeness thereof. Final determination of the suitability of any information or material for the use contemplated, of its manner of use and whether the suggested use infringes any patents is the sole responsibility of the user.
Profile Products 2014©

Sediment Trap Calculations

REVISIONS

100 0 100 200
SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

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CONSULTING ENGINEERS
MOON TOWNSHIP, PENNSYLVANIA

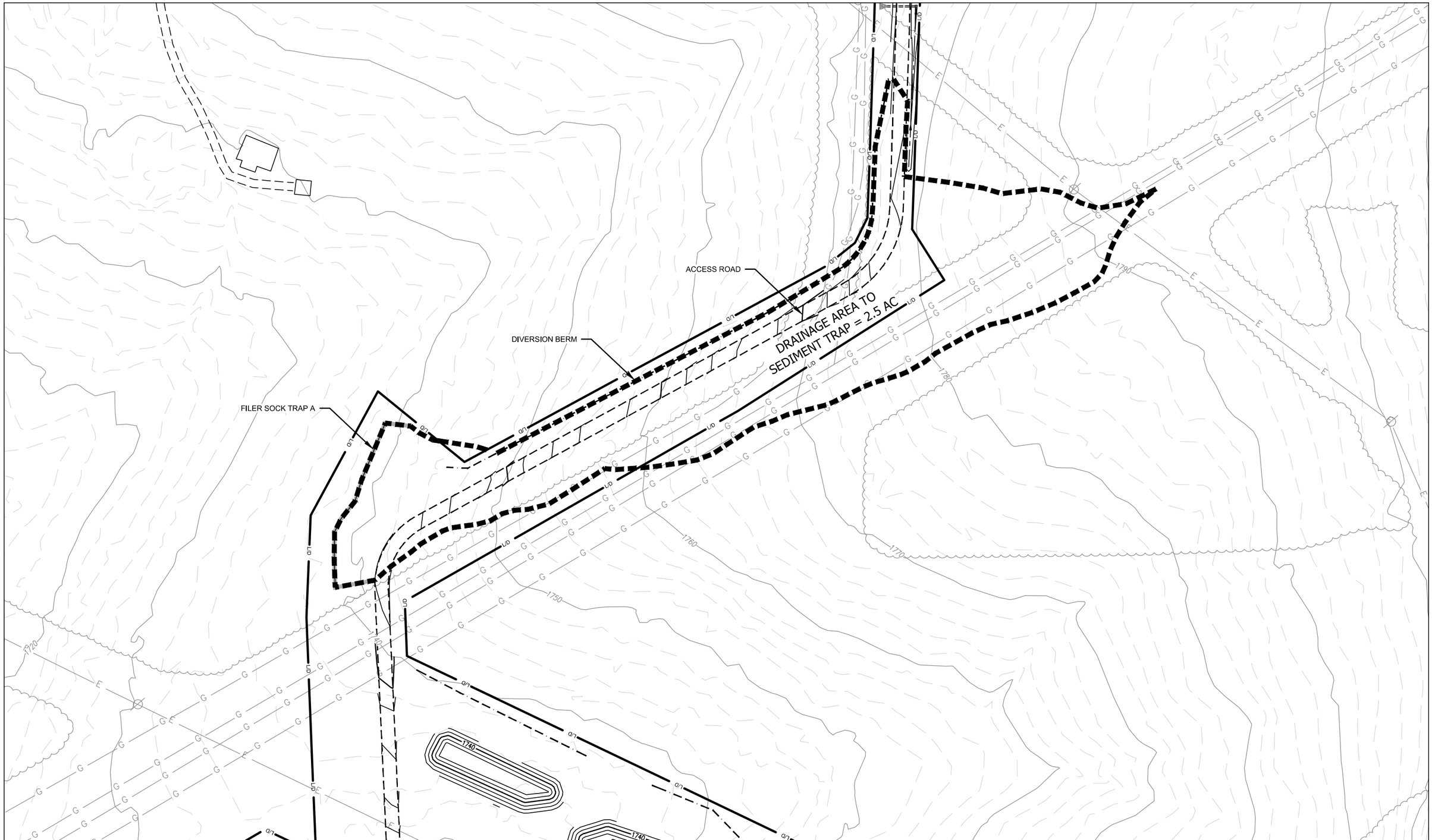
TAMARACK COMPRESSOR STATION

PRE DEVELOPMENT
TRAP DRAINAGE AREAS
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEMPTEMBER 2019

SHEET NO.
1
OF 2



REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

50 0 50 100

SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

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MOON TOWNSHIP, PENNSYLVANIA

TAMARACK COMPRESSOR STATION

POST DEVELOPMENT TRAP DRAINAGE AREAS

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO. 2 OF 2

Subject: Tamarack Compressor Station
Compost Filter Sock Traps

Michael Baker INTERNATIONAL

Computed by: BRF **Checked by:** GAH **Date:** Rev. Aug 2020

COMPOST FILTER SOCK TRAP A

TRAP LENGTH (ft):	270
TRAP SIZE:	2-24",1-18"

STORAGE VOLUME BEHIND TRAP:

CONTOUR ELEVATION (ft)	CONTOUR AREA (ft^2)	AVERAGE CONTOUR AREA (ft^2)	INCR. VOLUME (ft^3)	TOTAL VOLUME (c.f.)
1,739.00	0	-	-	-
1,740.00	3,584	1792	1,792	1,792
1,740.67	6,456	5020	3,347	5,139
1,741.00	7,892	5738	5,738	7,530
1,741.50	9,850	8871	4,435	11,965
1,741.67	10,502	10176	1,696	13,661
1,742.00	11,807	10828	5,414	17,380
1,742.17	12,304	12056	2,009	19,389

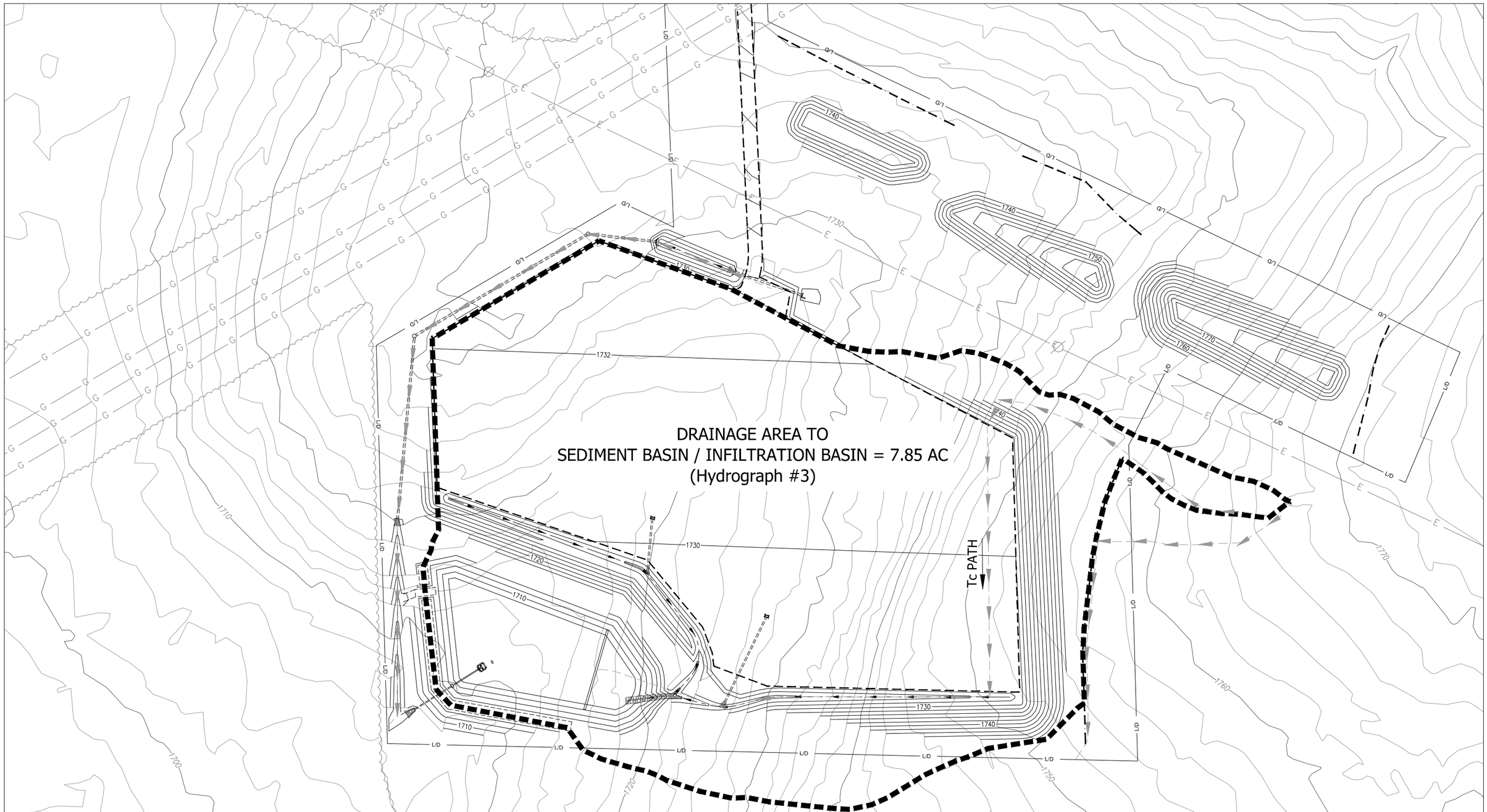
REQUIRED STORAGE VOLUME

Maximum Drainage Area = 2.50 acres
Required Storage Volume = 2000 cf/ac + 12" freeboard
= 2000 cf/ac x 2.50 acres
= 5,000 cf

@ elev 1741.00, storage provided is 7,530 cf, therefore > 12" freeboard provided.

Height of trap has been adjusted to allow for settlement of the sock material.

Sediment Basin Calculations



REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

50 0 50 100
SCALE IN FEET

NORTH

DESIGNED	MJL
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MOON TOWNSHIP, PENNSYLVANIA

TAMARACK COMPRESSOR STATION

POST DEVELOPMENT
SEDIMENT BASIN DA
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: AUGUST 2019

SHEET NO.
1
OF 1

STANDARD E&S WORKSHEET #12
Sediment Basin Capacity Requirements

Project Name: Tamarack Compressor Station
Location: Leidy Township, Clinton County, PA
Prepared By: BRF Date: Rev. Aug 2020
Checked By: GAH Date: Aug 2020

BASIN NUMBER	SEDIMENT BASIN #1	
PERMANENT OR TEMPORARY BASIN?	Permanent	
SPECIAL PROTECTION WATERSHED? (YES OR NO)	Yes	
(A) MAXIMIUM TOTAL DRAINAGE AREA (AC)	7.9	
IS DRAINAGE AREA (A) MORE THAN 10% LARGER THAN THE UNDISTURBED CONDITION? (YES OR NO)	No	
(A_1) DISTURBED ACRES IN DRAINAGE AREA (AC)	7.9	
(I) INITITAL REQ'D DEWATERING ZONE (5,000 X A) (CF)	39,500	
(T) REDUCTION FOR TOP DEWATERING (-700 X A) (CF)	-	
(P) REDUCTION FOR PERMANENT POOL (-700 X A) (CF)	-	
(L) RED. FOR 4:1 FLOW LENGTH:WIDTH (-350 X A) (CF)	-	
(D) RED. FOR 4 TO 7 DAY DEWATERING (-350 X A) (CF)	-	
(Sv) REQUIRED DEWATERING ZONE [I-(T+P+L+D)][1] (CF)	39,500	
MINIMUM DEWATERING ZONE CAPACITY (3600 X A)	28,440	
(Sd) REQUIRED SEDIMENT STORAGE VOLUME (1000 X A_1)	7,900	
(St) TOTAL REQUIRED STORAGE VOLUME (Sv+Sd) (CF)	47,400	
TOTAL STORAGE VOLUME PROVIDED (@ ELEV 3)[2] (CF)	61,165	
DEWATERING TIME FOR DEWATERING ZONE (DAYS)	5.00	
REQUIRED DISCHARGE CAPACITY (2 X A) (CFS)	15.80	
PRINCIPAL SPILLWAY TYPE (PERFORATED RISER, SKIMMER, etc.)	Skimmer	
PEAK FLOW FROM 10 YR/24 HR STORM FOR DRAINAGE AREA (A)	19.57	
PRINCIPAL SPILLWAY CAPACITY (@ ELEV 5) (CFS)	2.30	
EMERGENCY SPILLWAY CAPACITY (@ ELEV 5)[3] (CFS)	0.00	
TOTAL BASIN DISCHARGE CAPACITY (@ ELEV 5) (CFS)	2.30	
EMERGENCY SPILLWAY PROTECTIVE LINING[4]	P300, Vegetated	
OUTLET TO A SURFACE WATER? (YES OR NO)[5]	NO	
PEAK FLOW FROM 100 YR/24 HR STORM FOR DRAINAGE AREA (A)	33.24	

1. The minimum dewatering zone capacity for sediment basins is (3600 X A). No reduction is permitted in Special Protection (HQ & EV) Watersheds.

2. Total Storage Volume provided at riser crest.

3. Provide supporting computations.

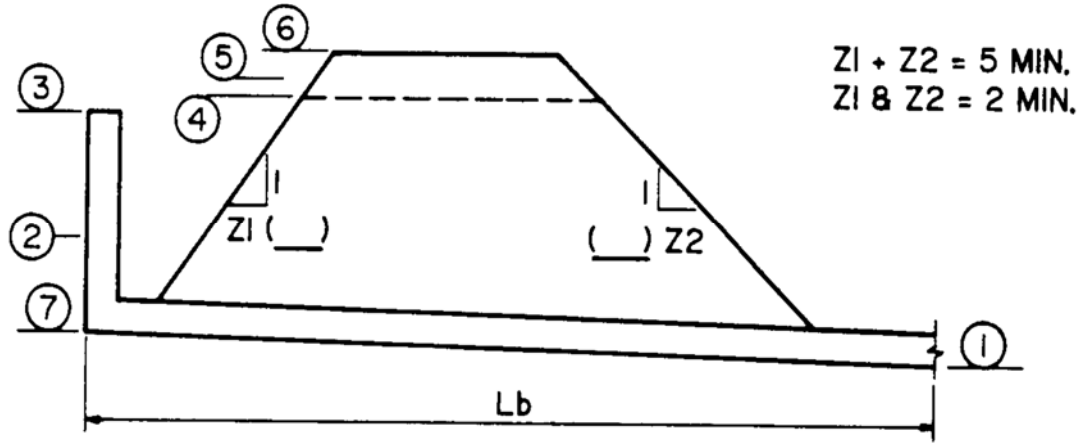
4. If grass lining is proposed, spillway must be constructed in original ground unless a suitable TRM lining is used. Wherever a TRM is used, Riprap shall be placed at the bottom of the embankment to prevent scour.

5. If no, and basin is permanent or drainage area is more than 10% larger than pre-construction, provide supporting calculations to show accelerated erosion will not result from the proposed discharge. For discharges increasing volume or rate of flow onto a neighboring property prior to entering a surface water, an easement should be obtained prior to plan submittal.

6. Pond designed to have greater than 1 ft of freeboard for the 100-year storm. Calculations show 1.6 ft of freeboard is provided for 100-year storm under worst case conditions, with starting water surface elevation at lowest riser orifice elevation (i.e., assuming skimmer is not functioning).

STANDARD E&S WORKSHEET #13
Sediment Basin Dimensions and Elevations

PROJECT NAME: Tamarack Compressor Station
LOCATION: Leidy Township, Clinton County, PA
PREPARED BY: BRF DATE: Rev. Aug 2020
CHECKED BY: GAH DATE: Aug 2020



BASIN NUMBER	1
1. DISCHARGE PIPE ELEVATION	1707.0
2. ELEVATION AT TOP OF SEDIMENT STORAGE ZONE (@ Sd) (FT) (MIN. 1.0' ABOVE ELEVATION 7)	1709.5
3. ELEVATION AT TOP OF DEWATERING ZONE (St) (FT) (CREST OF PRINCIPAL SPILLWAY)	1711.5
4. EMERGENCY SPILLWAY CREST ELEVATION (FT) (MIN. 0.5' ABOVE ELEVATION 3)	1713.8
5. 2 CFS/ACRE OR **25-YR/24-HR** FLOW ELEVATION-See note **A** (FT)	1712.3
6. TOP OF EMBANKMENT ELEVATION (FT) (MIN. 24" ABOVE ELEVATION 5 OR 12" WITH ROUTED 100-YR/24-HR STORM)	1715.0
7. BASIN BOTTOM ELEVATION (FT)	1708.5
AVERAGE BOTTOM WIDTH (FT)	80'
AVERAGE BOTTOM LENGTH (FT)	185'
(SAmin) REQUIRED SURFACE AREA AT ELEVATION 3 (SQ FT)	NA
SURFACE AREA PROVIDED AT ELEVATION 3 (SQ FT)	23,137
AVERAGE BASIN WIDTH (W) AT ELEVATION 3 (FT)	70'
FLOW LENGTH (L) AT ELEVATION 3 (FT)	198'
FLOW LENGTH:WIDTH RATIO AT ELEVATION 3 (L/W)	2.48
SILT CURTAIN OR FOREBAY? (IF YES, INDICATE WHICH)	Forebay
EMBANKMENT TOP WIDTH (FT, 8' MIN)	10'
EMBANKMENT SOIL TYPE(S)	GC, GM, SC, SM, CL, or ML
KEY TRENCH DEPTH (FT, 2' MIN)	2'
KEY TRENCH WIDTH (FT, 4' MIN)	4'
RISER DIAMETER/TYPE (15" MIN)	2'X4' Type M
BARREL DIAMETER/TYPE (12" MIN)	15"
Lb (BARREL LENGTH) (FT)	50'
EMERGENCY SPILLWAY WIDTH (FT)	8'
EMERGENCY SPILLWAY SIDE SLOPES (H:V)	2:1
EMERGENCY SPILLWAY DEPTH (FT)	1.20'

For irregular shaped traps, provide stage storage data

A) MAX 100-YR FLOW ELEVATION = 1713.14

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Tuesday, 08 / 18 / 2020

Pond No. 1 - Sediment Basin

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1708.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1708.50	17,708	0	0
0.50	1709.00	18,565	9,068	9,068
1.00	1709.50	19,438	9,501	18,569
1.50	1710.00	20,384	9,956	28,525
3.00	1711.50	23,137	32,641	61,165
3.50	1712.00	24,103	11,810	72,975
4.70	1713.20	26,480	30,349	103,324
5.30	1713.80	26,646	15,939	119,263
5.50	1714.00	28,033	5,468	124,731
6.50	1715.00	30,119	29,076	153,807

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	Inactive	6.00	0.00
Span (in)	= 15.00	1.00	6.00	0.00
No. Barrels	= 1	1	2	0
Invert El. (ft)	= 1708.00	1709.50	1711.50	0.00
Length (ft)	= 50.00	1.00	1.00	0.00
Slope (%)	= 2.00	1.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	12.00	8.00	0.00
Crest El. (ft)	= 0.00	1713.30	1713.80	0.00
Weir Coeff.	= 3.33	3.33	2.70	3.33
Weir Type	= 1	Rect	Ciplti	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1708.50	0.00	0.00	0.00	---	---	0.00	0.00	---	---	---	0.000
0.50	9,068	1709.00	1.13 ic	0.00	0.00	---	---	0.00	0.00	---	---	---	0.000
1.00	18,569	1709.50	1.13 ic	0.00	0.00	---	---	0.00	0.00	---	---	---	0.000
1.50	28,525	1710.00	1.13 ic	0.00	0.00	---	---	0.00	0.00	---	---	---	0.000
3.00	61,165	1711.50	1.13 ic	0.00	0.00	---	---	0.00	0.00	---	---	---	0.000
3.50	72,975	1712.00	1.13 ic	0.00	0.95 ic	---	---	0.00	0.00	---	---	---	0.945
4.70	103,324	1713.20	2.31 ic	0.00	2.28 ic	---	---	0.00	0.00	---	---	---	2.277
5.30	119,263	1713.80	13.10 ic	0.00	0.97 ic	---	---	12.13 s	0.00	---	---	---	13.09
5.50	124,731	1714.00	13.56 ic	0.00	0.61 ic	---	---	12.95 s	1.93	---	---	---	15.49
6.50	153,807	1715.00	14.90 ic	0.00	0.20 ic	---	---	14.71 s	28.39	---	---	---	43.30

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	2.879	6.339	-------	13.07	19.92	31.25	41.95	54.43	PRE_Drury Run_South
3	SCS Runoff	------	9.349	12.17	-------	16.20	19.57	24.46	28.65	33.24	Flow to SedBasin
4	Reservoir	3	0.000	0.043	-------	0.394	0.790	1.362	1.820	2.226	POST_Through SedBasin
5	SCS Runoff	------	0.392	0.739	-------	1.338	1.894	2.770	3.571	4.499	POST_Diversion Berm Flow
6	SCS Runoff	------	1.769	4.088	-------	8.756	13.60	21.70	29.43	38.47	Drury Run South Bypass
7	SCS Runoff	------	0.899	1.380	-------	2.123	2.783	3.784	4.695	5.728	POST_Drury Run South Uncontrolled
8	Combine	4, 5, 6, 7	2.003	4.594	-------	9.615	14.80	24.34	33.11	43.11	POST_Total Drury Run South
11	Reservoir	3	1.216	1.593	-------	1.939	2.194	4.423	9.452	15.15	SedBasn Spillway Check

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	19.92	2	748	139,312	------	------	------	PRE_Drury Run_South
3	SCS Runoff	19.57	2	728	72,613	------	------	------	Flow to SedBasin
4	Reservoir	0.790	2	918	29,930	3	1711.93	71,212	POST_Through SedBasin
5	SCS Runoff	1.894	2	730	7,421	------	------	------	POST_Diversion Berm Flow
6	SCS Runoff	13.60	2	748	97,245	------	------	------	Drury Run South Bypass
7	SCS Runoff	2.783	2	718	5,572	------	------	------	POST_Drury Run South Uncontrolled
8	Combine	14.80	2	746	140,168	4, 5, 6, 7	------	------	POST_Total Drury Run South
11	Reservoir	2.194	2	774	72,521	3	1713.10	100,708	SedBasn Spillway Check

Hydrograph Report

Hyd. No. 4

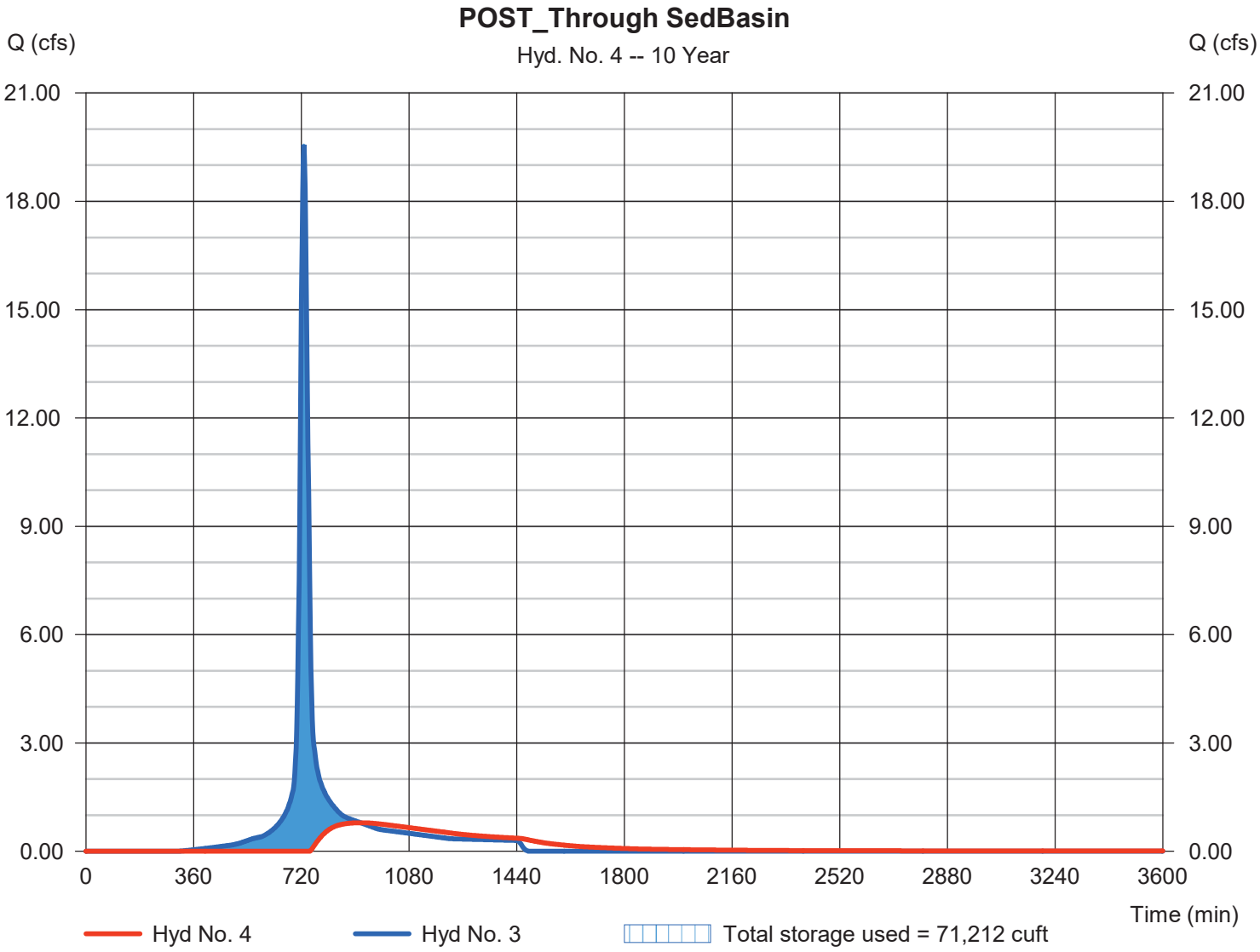
POST_Through SedBasin

Hydrograph type	= Reservoir	Peak discharge	= 0.790 cfs
Storm frequency	= 10 yrs	Time to peak	= 918 min
Time interval	= 2 min	Hyd. volume	= 29,930 cuft
Inflow hyd. No.	= 3 - Flow to SedBasin	Max. Elevation	= 1711.93 ft
Reservoir name	= Sediment Basin	Max. Storage	= 71,212 cuft

Storage Indication method used. Wet pond routing start elevation = 1709.50 ft.

Sediment Storage Elevation

No Flow through Emergency Spillway



Hydrograph Report

Hyd. No. 4

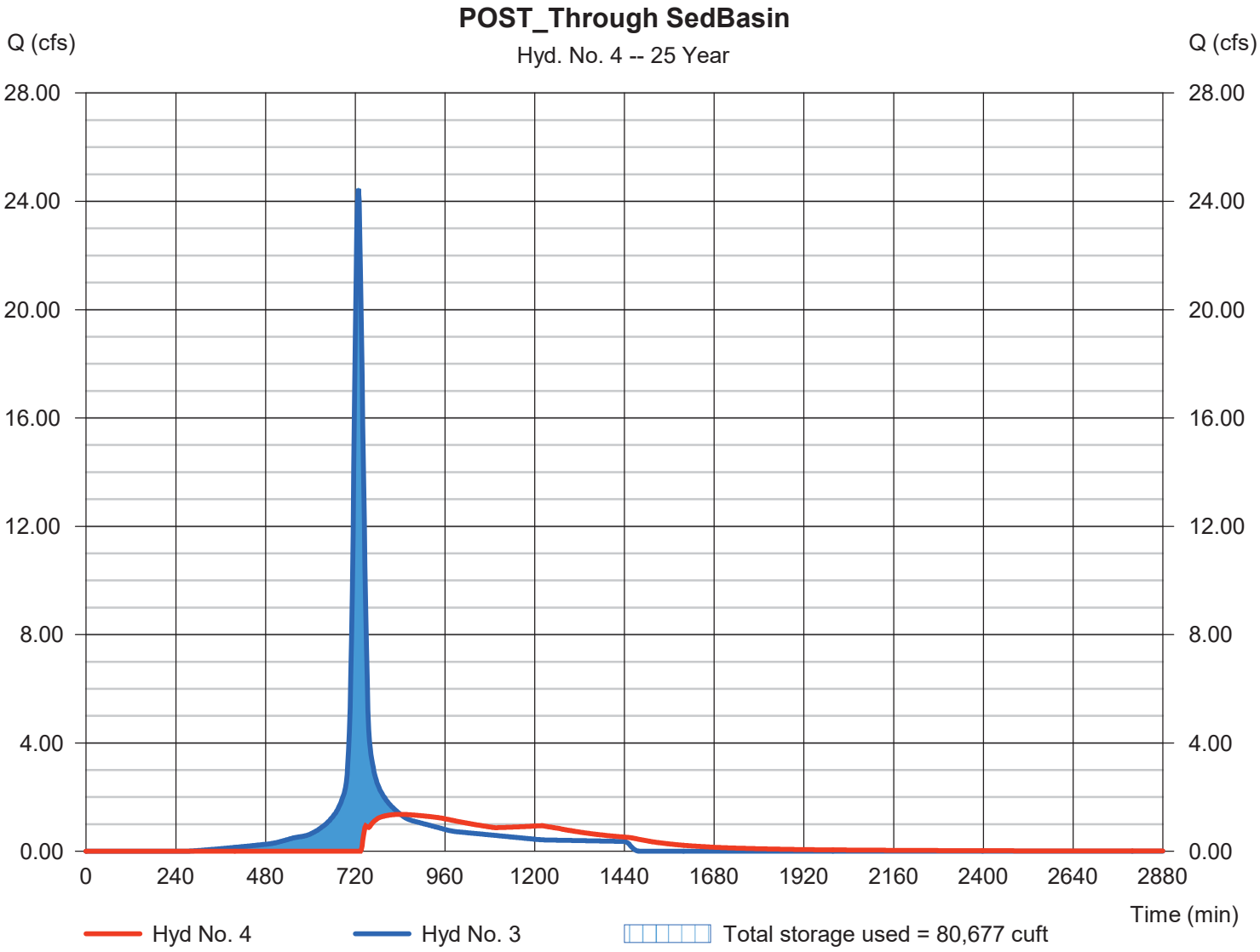
POST_Through SedBasin

Hydrograph type	=	Reservoir	Peak discharge	=	1.362 cfs
Storm frequency	=	25 yrs	Time to peak	=	842 min
Time interval	=	2 min	Hyd. volume	=	48,810 cuft
Inflow hyd. No.	=	3 - Flow to SedBasin	Max. Elevation	=	1712.30 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	80,677 cuft

Storage Indication method used. Wet pond routing start elevation = 1709.50 ft.

Sediment Storage Elevation

2.7 ft of freeboard



Hydrograph Report

Hyd. No. 11

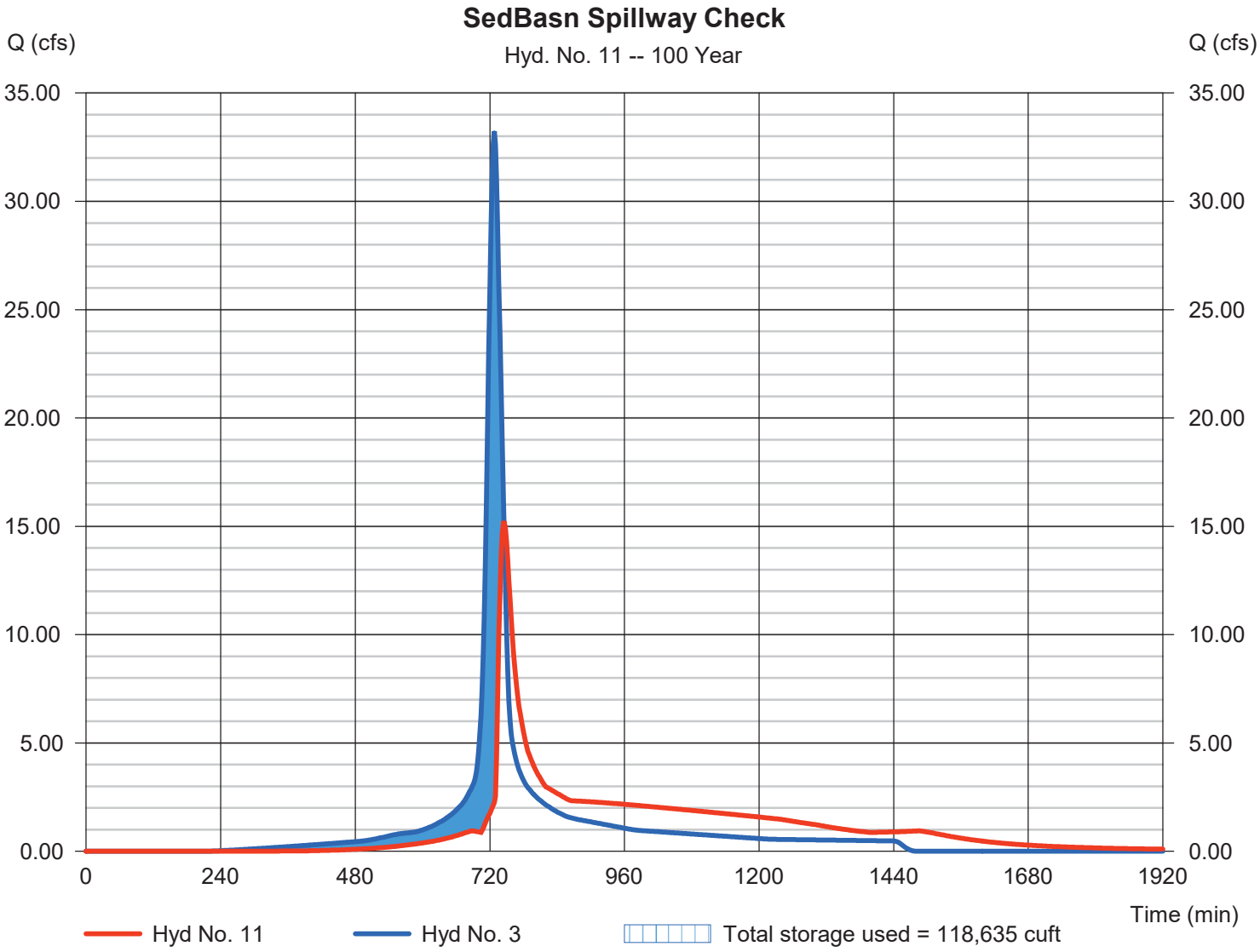
SedBasn Spillway Check

Hydrograph type	=	Reservoir	Peak discharge	=	15.15 cfs
Storm frequency	=	100 yrs	Time to peak	=	746 min
Time interval	=	2 min	Hyd. volume	=	126,007 cuft
Inflow hyd. No.	=	3 - Flow to SedBasin	Max. Elevation	=	1713.76 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	118,635 cuft

Storage Indication method used. Wet pond routing start elevation = 1711.50 ft.

Starting elevation assumes skimmer is clogged, drainage begins at lowest orifice

>1 foot of freeboard provided



Calculate Skimmer Size

Basin Volume in Cubic Feet	61,165	Cu.Ft	**Skimmer Size**	**4.0**	Inch
Days to Drain*	5	Days	Orifice Radius	**1.6**	Inch[es]
			Orifice Diameter	**3.1**	Inch[es]

*

S.O. No. 169277

Subject: Tamarack Anti-Seep Collar Design

Computed by: CE **Checked by:** BRF **Date:** 09/24/19

Michael Baker INTERNATIONAL

ANTI-SEEP COLLAR DESIGN

BMP: 1 Sediment Basin

D=	1.25	ft	barrel diameter
n=	2	ea	number of collars
y=	4.8	ft	distance from upstream invert of principal spillway riser to top of dewatering volume
z=	3	ft	horizontal component of upstream embankment slope
s=	0.02	ft/ft	slope of pipe

Temp or Perm? (T/P) P

1. Determine the length of pipe in the saturated zone

$$L_s = y(z+4)[1+(s/(0.25-s))]$$

L_s = **36.52 ft**

2. Determine the required increase in flow path.

Temporary Basin $L_f = 1.1*L_s$

Permanent Basin $L_f = 1.15*L_s$

L_f = **42.00 ft**

3. Find minimum collar projection Vmin

$V_{min} = (L_f-L_s)/(2n)$

V_{min} = **1.37 ft**

4. Spacing

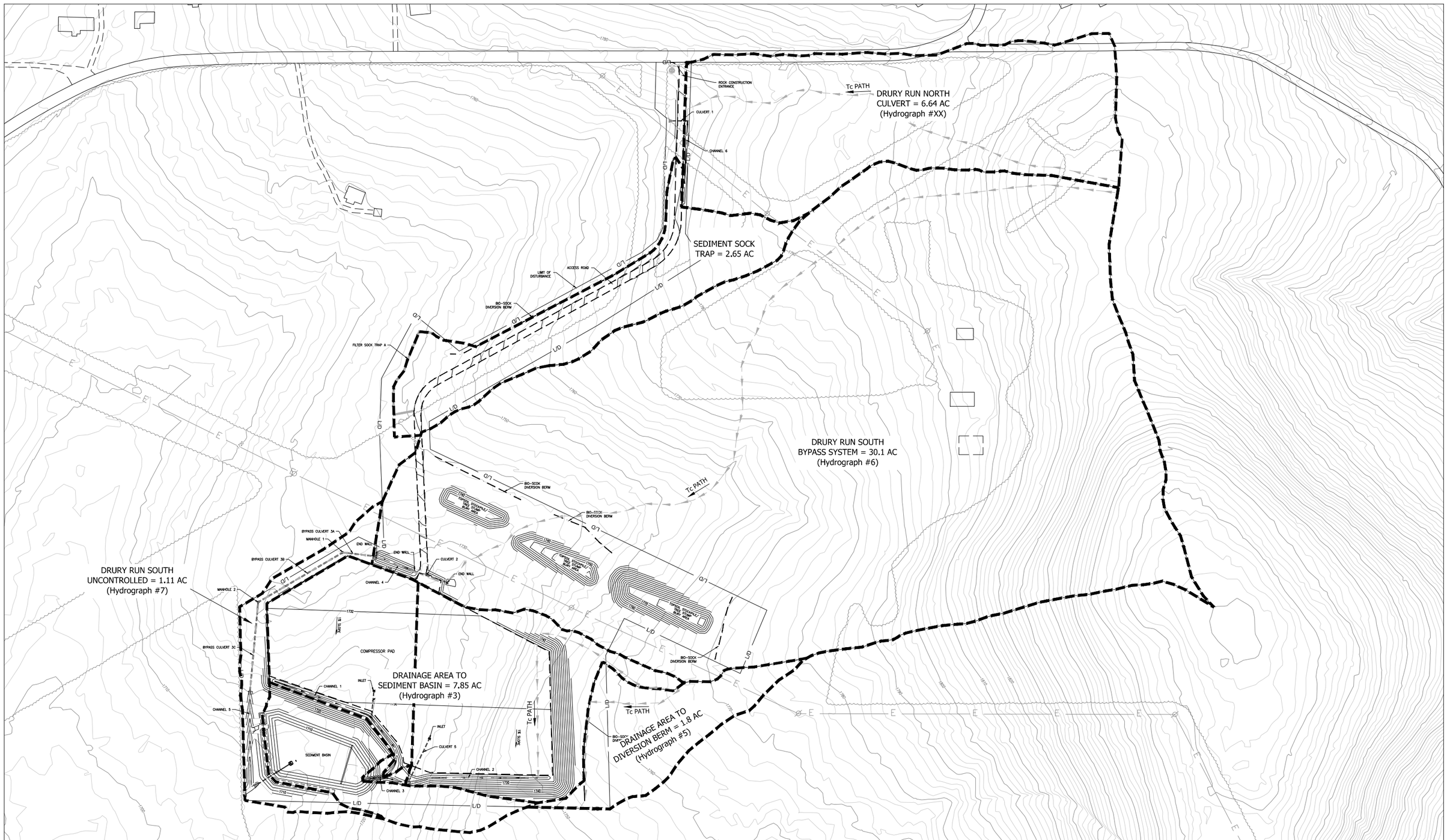
Max Spacing =	17* Vmin	=	**23.28 ft**
Min Spacing =	5*Vmin	=	**6.85 ft**

5. Dimension of 1 side of each collar S

$S = 2*V_{min}+D$

S= **3.99 ft** **47.87 in**

Ditch Calculations



REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

100 0 100 200

SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
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CONSULTING ENGINEERS
MOON TOWNSHIP, PENNSYLVANIA

TAMARACK COMPRESSOR STATION

EROSION AND SEDIMENT CONTROL STORMWATER CALCULATION PLAN

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: FEBRUARY 2019

SHEET NO. 1 OF 1

STANDARD E&S WORKSHEET #11
Channel Design Data

Project Name: Tamarack Compressor Station
Location: Leidy Township, Clinton County, PA
Prepared By: BRF Date: Rev. Aug 2020
Checked By: GAH Date: Aug 2020

Channel Or Channel Section		Ditch 1 0+00 - 3+31 (unveg)	Ditch 1 0+00 - 3+31 (vegetated)	Ditch 1 3+31 - 3+51 (unveg)	Ditch 1 3+31 - 3+51 (vegetated)
Temporary or Permanent?	(T or P)	T	P	T	P
Design Storm	(2, 5 or 10-yr)	5	10	5	10
Acres	(AC)	2.54	2.54	2.54	2.54
Multiplier	(1.6, 2.25 or 2.75)	2.25	2.75	2.25	2.75
Q_r (Required Capacity)	(CFS)	5.7	7.0	5.7	7.0
Q (calculated at Flow Depth d)	(CFS)	5.7	7.0	5.7	7.0
Protective Lining[2]		S75	Veg	P550	P550 w/veg
n (manning's coefficient)[2]		0.048	0.069	0.041	0.031
V_a (allowable velocity)	(ft/s)	n/a	n/a	n/a	n/a
V (calculated at Flow Depth d)	(ft/s)	1.984	1.612	6.361	8.204
τ_a (max allowable Shear Stress)	(lb/ft^2)	1.55	1.00	3.25	12.00
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	0.50	0.66	3.97	3.79
Channel Bottom Width	(ft)	2	2	2	2
Channel Side Slopes	(H:V)	2	2	2	2
D (total depth)	(ft)	2.00	2.00	2.00	2.00
Channel Top Width @ D	(ft)	10.00	10.00	10.00	10.00
d (calculated Flow Depth)	(ft)	0.80	1.06	0.34	0.32
d (assumed Flow Depth)	(ft)	0.80	1.06	0.34	0.32
Channel Top Width @ Flow Depth d	(ft)	5.20	6.24	3.34	3.28
Bottom Width:Flow Depth ratio	(12:1 max)	2.5	1.9	6.0	6.3
d_{50} Stone Size	(in)	n/a	n/a	n/a	n/a
A (cross-sectional area)	(ft^2)	2.88	4.37	0.89	0.84
WP (wetted perimeter)	(ft)	5.58	6.74	3.50	3.43
R (hydraulic radius)		0.52	0.65	0.26	0.25
S (bed slope)[3]	(ft/ft)	0.010	0.010	0.190	0.190
S_c (critical slope)	(ft/ft)	0.045	0.087	0.040	0.023
0.7 S_c	(ft/ft)	0.0317	0.0606	0.0283	0.0163
1.3 S_c	(ft/ft)	0.0588	0.1125	0.0525	0.0304
Stable Flow?	(Y/N)	Y	Y	Y	Y
Freeboard based on Unstable Flow	(ft)	n/a	n/a	n/a	n/a
Freeboard based on Stable Flow	(ft)	0.20	0.27	0.08	0.08
Minimum Required Freeboard[4]	(ft)	0.50	0.50	0.50	0.50
Freeboard (F) Required		0.50	0.50	0.50	0.50
Freeboard (F) Provided		1.20	0.94	1.67	1.68
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		S	S	S	S

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET #11

Channel Design Data

Project Name: Tamarack Compressor Station

Location: Leidy Township, Clinton County, PA

Prepared By: BRF Date: Rev. Aug 2020

Checked By: GAH Date: Aug 2020

Channel Or Channel Section		Ditch 1 3+51 - 3+87 (unveg)	Ditch 1 3+51 - 3+87 (vegetated)
Temporary or Permanent?	(T or P)	T	P
Design Storm	(2, 5 or 10-yr)	5	10
Acres	(AC)	2.54	2.54
Multiplier	(1.6, 2.25 or 2.75)	2.25	2.75
Q_r (Required Capacity)	(CFS)	5.7	7.0
Q (calculated at Flow Depth d)	(CFS)	5.7	7.0
Protective Lining[2]		P550	P550 w/veg
n (manning's coefficient)[2]		0.039	0.057
V_a (allowable velocity)	(ft/s)	n/a	n/a
V (calculated at Flow Depth d)	(ft/s)	2.869	2.295
τ_a (max allowable Shear Stress)	(lb/ft^2)	3.25	12.00
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	0.69	0.93
Channel Bottom Width	(ft)	2	2
Channel Side Slopes	(H:V)	2	2
D (total depth)	(ft)	2.00	2.00
Channel Top Width @ D	(ft)	10.00	10.00
d (calculated Flow Depth)	(ft)	0.62	0.83
d (assumed Flow Depth)	(ft)	0.62	0.83
Channel Top Width @ Flow Depth d	(ft)	4.46	5.32
Bottom Width:Flow Depth ratio	(12:1 max)	3.3	2.4
d_{50} Stone Size	(in)	n/a	n/a
A (cross-sectional area)	(ft^2)	1.99	3.04
WP (wetted perimeter)	(ft)	4.75	5.71
R (hydraulic radius)		0.42	0.53
S (bed slope)[3]	(ft/ft)	0.018	0.018
S_c (critical slope)	(ft/ft)	0.031	0.063
0.7 S_c	(ft/ft)	0.0219	0.0439
1.3 S_c	(ft/ft)	0.0407	0.0815
Stable Flow?	(Y/N)	Y	Y
Freeboard based on Unstable Flow	(ft)	n/a	n/a
Freeboard based on Stable Flow	(ft)	0.15	0.21
Minimum Required Freeboard[4]	(ft)	0.50	0.50
Freeboard (F) Required		0.50	0.50
Freeboard (F) Provided		1.39	1.17
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		S	S

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET #11

Channel Design Data

Project Name: Tamarack Compressor Station

Location: Leidy Township, Clinton County, PA

Prepared By: BRF Date: Rev. Aug 2020

Checked By: GAH Date: Aug 2020

Channel Or Channel Section		Ditch 2 0+00 - 3+20 (unveg)	Ditch 2 0+00 - 3+20 (vegetated)
Temporary or Permanent?	(T or P)	T	P
Design Storm	(2, 5 or 10-yr)	5	10
Acres	(AC)	3.73	3.73
Multiplier	(1.6, 2.25 or 2.75)	2.25	2.75
Q_r (Required Capacity)	(CFS)	8.4	10.3
Q (calculated at Flow Depth d)	(CFS)	8.4	10.3
Protective Lining[2]		S75	Veg
n (manning's coefficient)[2]		0.045	0.068
V_a (allowable velocity)	(ft/s)	n/a	n/a
V (calculated at Flow Depth d)	(ft/s)	2.359	1.848
τ_a (max allowable Shear Stress)	(lb/ft^2)	1.55	1.00
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	0.62	0.82
Channel Bottom Width	(ft)	2	2
Channel Side Slopes	(H:V)	2	2
D (total depth)	(ft)	2.00	2.00
Channel Top Width @ D	(ft)	10.00	10.00
d (calculated Flow Depth)	(ft)	0.93	1.24
d (assumed Flow Depth)	(ft)	0.93	1.24
Channel Top Width @ Flow Depth d	(ft)	5.72	6.96
Bottom Width:Flow Depth ratio	(12:1 max)	2.2	1.6
d_{50} Stone Size	(in)	n/a	n/a
A (cross-sectional area)	(ft^2)	3.59	5.56
WP (wetted perimeter)	(ft)	6.16	7.55
R (hydraulic radius)		0.58	0.74
S (bed slope)[3]	(ft/ft)	0.011	0.011
S_c (critical slope)	(ft/ft)	0.038	0.080
0.7 S_c	(ft/ft)	0.0269	0.0558
1.3 S_c	(ft/ft)	0.0500	0.1035
Stable Flow?	(Y/N)	Y	Y
Freeboard based on Unstable Flow	(ft)	n/a	n/a
Freeboard based on Stable Flow	(ft)	0.23	0.31
Minimum Required Freeboard[4]	(ft)	0.50	0.50
Freeboard (F) Required		0.50	0.50
Freeboard (F) Provided		1.07	0.76
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		S	S

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET #11
Channel Design Data

Project Name: Tamarack Compressor Station
Location: Leidy Township, Clinton County, PA
Prepared By: SAM Date: Rev. Aug 2020
Checked By: GAH Date: Aug 2020

Channel Or Channel Section		Ditch 3 0+00 - 0+50 (Riprap Lined)				
Temporary or Permanent?	(T or P)	P				
Design Storm	(2, 5 or 10-yr)	10				
Acres	(AC)	6.10				
Multiplier	(1.6, 2.25 or 2.75)	2.75				
Q_r (Required Capacity)	(CFS)	16.8				
Q (calculated at Flow Depth d)	(CFS)	16.8				
Protective Lining[2]		R-5				
n (manning's coefficient)[2]		0.077				
V_a (allowable velocity)	(ft/s)	11.50				
V (calculated at Flow Depth d)	(ft/s)	5.1				
τ_a (max allowable Shear Stress)	(lb/ft^2)	*				
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	n/a				
Channel Bottom Width	(ft)	4				
Channel Side Slopes	(H:V)	2				
D (total depth)	(ft)	1.50				
Channel Top Width @ D	(ft)	10.00				
d (Flow Depth)	(ft)	0.63				
Channel Top Width @ Flow Depth d	(ft)	6.52				
Bottom Width:Flow Depth ratio	(12:1 max)	6.3				
d_{50} Stone Size	(in)	9				
A (cross-sectional area)	(ft^2)	3.31				
WP (wetted perimeter)	(ft)	6.82				
R (hydraulic radius)		0.49				
S (bed slope)[3]	(ft/ft)	0.180				
S_c (critical slope)	(ft/ft)	0.115				
0.7 S_c	(ft/ft)	0.080				
1.3 S_c	(ft/ft)	0.149				
Stable Flow?	(Y/N)	Y				
Freeboard based on Unstable Flow	(ft)	n/a				
Freeboard based on Stable Flow	(ft)	0.16				
Minimum Required Freeboard[4]	(ft)	0.50				
Freeboard (F) Required		0.50				
Freeboard (F) Provided		0.87				
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		*				

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

* See attached calculations. Flow calculations shown are prior to accounting for riprap void spaces.

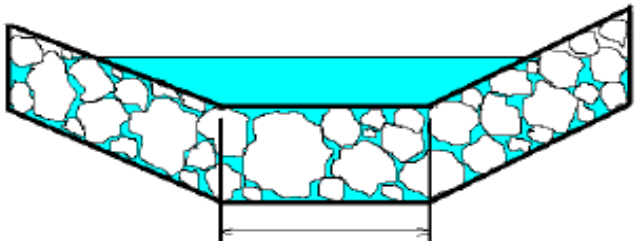
S.O. No. 169277

Subject: Tamarack Compressor Station
Riprap Channel Calcs

Computed by: SAM **Checked by:** GAH **Date:** Aug 2020

Riprap Channel Design

FIGURE 6.4
Void Space in Riprap Channel Bottom



Channel	Ditch 3 (Permanent)	
Riprap Size	R-5	
Max stone size =	18	"
Minimum rirap thickness =	27	"
Channel bottom width =	4	'
Bottom area of riprap =	9	sf
40% void space =	3.60	sf
Originally calculated flow area =	3.31	sf
Recalculated area above riprap, after 40% void space reduction =	-0.29	sf
Corresponding new flow depth =	0.00	'
Calculated shear stress at new flow depth =	n/a	lb/sf

In accordance with the PADEP E&S Manual, if the resulting flow depth is less than 0, use the maximum velocity to size the riprap. The maximum velocity in the channel before the void reduction is 5.1 fps, so R-5 is okay (<11.5 fps).

STANDARD E&S WORKSHEET #11

Channel Design Data

Project Name: Tamarack Compressor Station

Location: Leidy Township, Clinton County, PA

Prepared By: BRF Date: September 2019

Checked By: GAH Date: September 2019

Channel Or Channel Section		Ditch 4 0+00 - 0+90 (unveg)	Ditch 4 0+00 - 0+90 (vegetated)			
Temporary or Permanent?	(T or P)	T	P			
Design Storm	(2, 5 or 10-yr)	5	10			
Acres	(AC)	30.10	30.10			
Multiplier	(1.6, 2.25 or 2.75)	ES Calcs	PC Calcs			
Q_r (Required Capacity)	(CFS)	8.8	12.5			
Q (calculated at Flow Depth d)	(CFS)	8.8	12.5			
Protective Lining[2]		S75	Veg			
n (manning's coefficient)[2]		0.045	0.066			
V_a (allowable velocity)	(ft/s)	n/a	n/a			
V (calculated at Flow Depth d)	(ft/s)	2.353	1.935			
τ_a (max allowable Shear Stress)	(lb/ft^2)	1.55	1.00			
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	0.60	0.85			
Channel Bottom Width	(ft)	2	2			
Channel Side Slopes	(H:V)	2	2			
D (total depth)	(ft)	2.00	2.00			
Channel Top Width @ D	(ft)	10.00	10.00			
d (calculated Flow Depth)	(ft)	0.96	1.37			
d (assumed Flow Depth)	(ft)	0.96	1.37			
Channel Top Width @ Flow Depth d	(ft)	5.82	7.46			
Bottom Width:Flow Depth ratio	(12:1 max)	2.1	1.5			
d_{50} Stone Size	(in)	n/a	n/a			
A (cross-sectional area)	(ft^2)	3.73	6.46			
WP (wetted perimeter)	(ft)	6.27	8.10			
R (hydraulic radius)		0.60	0.80			
S (bed slope)[3]	(ft/ft)	0.010	0.010			
S_c (critical slope)	(ft/ft)	0.037	0.074			
0.7 S_c	(ft/ft)	0.0261	0.0520			
1.3 S_c	(ft/ft)	0.0484	0.0966			
Stable Flow?	(Y/N)	Y	Y			
Freeboard based on Unstable Flow	(ft)	n/a	n/a			
Freeboard based on Stable Flow	(ft)	0.24	0.34			
Minimum Required Freeboard[4]	(ft)	0.50	0.50			
Freeboard (F) Required		0.50	0.50			
Freeboard (F) Provided		1.05	0.64			
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		S	S			

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET #11
Channel Design Data

Project Name: Tamarack Compressor Station
Location: Leidy Township, Clinton County, PA
Prepared By: BRF Date: Rev. Aug 2020
Checked By: GAH Date: Aug 2020

Channel Or Channel Section		Ditch 5 0+00 - 0+65 (unveg)	Ditch 5 0+00 - 0+65 (vegetated)	Ditch 5 0+65 - 1+00 (unveg)	Ditch 5 0+65 - 1+00 (vegetated)	
Temporary or Permanent?	(T or P)	T	P	T	P	
Design Storm	(2, 5 or 10-yr)	5	10	5	10	
Acres	(AC)	30.10	30.10	30.10	30.10	
Multiplier	(1.6, 2.25 or 2.75)	ES Calcs	ES Calcs	ES Calcs	ES Calcs	
Q_r (Required Capacity)	(CFS)	8.8	12.5	8.8	12.5	
Q (calculated at Flow Depth d)	(CFS)	8.8	12.5	8.8	12.5	
Protective Lining[2]		P550	P550 w/veg	P550	P550 w/veg	
n (manning's coefficient)[2]		0.041	0.040	0.041	0.040	
V_a (allowable velocity)	(ft/s)	n/a	n/a	n/a	n/a	
V (calculated at Flow Depth d)	(ft/s)	5.265	5.993	5.374	6.092	
τ_a (max allowable Shear Stress)	(lb/ft^2)	3.25	12.00	3.25	12.00	
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	2.41	2.92	2.52	3.02	
Channel Bottom Width	(ft)	3	3	3	3	
Channel Side Slopes	(H:V)	2	2	2	2	
D (total depth)	(ft)	2.00	2.00	2.00	2.00	
Channel Top Width @ D	(ft)	11.00	11.00	11.00	11.00	
d (calculated Flow Depth)	(ft)	0.43	0.52	0.43	0.51	
d (assumed Flow Depth)	(ft)	0.43	0.52	0.43	0.51	
Channel Top Width @ Flow Depth d	(ft)	4.72	5.08	4.70	5.04	
Bottom Width:Flow Depth ratio	(12:1 max)	7.0	5.8	7.1	5.9	
d_{50} Stone Size	(in)	n/a	n/a	n/a	n/a	
A (cross-sectional area)	(ft^2)	1.66	2.10	1.64	2.05	
WP (wetted perimeter)	(ft)	4.92	5.33	4.90	5.28	
R (hydraulic radius)		0.34	0.39	0.33	0.39	
S (bed slope)[3]	(ft/ft)	0.090	0.090	0.095	0.095	
S_c (critical slope)	(ft/ft)	0.037	0.033	0.037	0.033	
0.7 S_c	(ft/ft)	0.0257	0.0233	0.0258	0.0234	
1.3 S_c	(ft/ft)	0.0477	0.0433	0.0478	0.0435	
Stable Flow?	(Y/N)	Y	Y	Y	Y	
Freeboard based on Unstable Flow	(ft)	n/a	n/a	n/a	n/a	
Freeboard based on Stable Flow	(ft)	0.11	0.13	0.11	0.13	
Minimum Required Freeboard[4]	(ft)	0.50	0.50	0.50	0.50	
Freeboard (F) Required		0.50	0.50	0.50	0.50	
Freeboard (F) Provided		1.57	1.48	1.58	1.49	
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		S	S	S	S	

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET #11
Channel Design Data

Project Name: Tamarack Compressor Station
Location: Leidy Township, Clinton County, PA
Prepared By: BRF Date: Rev. Aug 2020
Checked By: GAH Date: Aug 2020

Channel Or Channel Section		Ditch 5 1+00 - 1+70 (unveg)	Ditch 5 1+00 - 1+70 (vegetated)	Ditch 5 1+70 - 2+40 (unveg)	Ditch 5 1+70 - 2+40 (vegetated)	
Temporary or Permanent?	(T or P)	T	P	T	P	
Design Storm	(2, 5 or 10-yr)	5	10	5	10	
Acres	(AC)	30.10	30.10	30.10	30.10	
Multiplier	(1.6, 2.25 or 2.75)	ES Calcs	ES Calcs	ES Calcs	ES Calcs	
Q_r (Required Capacity)	(CFS)	8.8	12.5	8.8	12.5	
Q (calculated at Flow Depth d)	(CFS)	8.8	12.5	8.8	12.5	
Protective Lining[2]		P550	P550 w/veg	P550	P550 w/veg	
n (manning's coefficient)[2]		0.041	0.045	0.037	0.068	
V_a (allowable velocity)	(ft/s)	n/a	n/a	n/a	n/a	
V (calculated at Flow Depth d)	(ft/s)	4.354	4.538	2.783	1.988	
τ_a (max allowable Shear Stress)	(lb/ft^2)	3.25	12.00	3.25	12.00	
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	1.63	2.08	0.53	0.87	
Channel Bottom Width	(ft)	3	3	3	3	
Channel Side Slopes	(H:V)	2	2	2	2	
D (total depth)	(ft)	2.00	2.00	2.00	2.00	
Channel Top Width @ D	(ft)	11.00	11.00	11.00	11.00	
d (calculated Flow Depth)	(ft)	0.50	0.64	0.71	1.18	
d (assumed Flow Depth)	(ft)	0.50	0.64	0.71	1.18	
Channel Top Width @ Flow Depth d	(ft)	5.00	5.56	5.84	7.70	
Bottom Width:Flow Depth ratio	(12:1 max)	6.0	4.7	4.2	2.6	
d_{50} Stone Size	(in)	n/a	n/a	n/a	n/a	
A (cross-sectional area)	(ft^2)	2.00	2.74	3.14	6.29	
WP (wetted perimeter)	(ft)	5.24	5.86	6.18	8.25	
R (hydraulic radius)		0.38	0.47	0.51	0.76	
S (bed slope)[3]	(ft/ft)	0.052	0.052	0.012	0.012	
S_c (critical slope)	(ft/ft)	0.035	0.040	0.027	0.079	
0.7 S_c	(ft/ft)	0.0247	0.0280	0.0186	0.0553	
1.3 S_c	(ft/ft)	0.0459	0.0521	0.0345	0.1027	
Stable Flow?	(Y/N)	Y	Y	Y	Y	
Freeboard based on Unstable Flow	(ft)	n/a	n/a	n/a	n/a	
Freeboard based on Stable Flow	(ft)	0.13	0.16	0.18	0.29	
Minimum Required Freeboard[4]	(ft)	0.50	0.50	0.50	0.50	
Freeboard (F) Required		0.50	0.50	0.50	0.50	
Freeboard (F) Provided		1.50	1.36	1.29	0.83	
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		S	S	S	S	

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

STANDARD E&S WORKSHEET #11

Channel Design Data

Project Name: Tamarack Compressor Station

Location: Leidy Township, Clinton County, PA

Prepared By: BRF Date: Rev. Aug 2020

Checked By: GAH Date: Aug 2020

Channel Or Channel Section		Ditch 6 3+10 - 1+80 (unveg)	Ditch 6 3+10 - 1+80 (vegetated)	Ditch 6 1+80 - 1+30 (unveg)	Ditch 6 1+80 - 1+30 (vegetated)	
Temporary or Permanent?	(T or P)	T	P	T	P	
Design Storm	(2, 5 or 10-yr)	5	10	5	10	
Acres	(AC)	1.20	1.20	1.20	1.20	
Multiplier	(1.6, 2.25 or 2.75)	ES Calcs	ES Calcs	ES Calcs	ES Calcs	
Q_r (Required Capacity)	(CFS)	1.8	2.9	1.8	2.9	
Q (calculated at Flow Depth d)	(CFS)	1.8	2.9	1.8	2.9	
Protective Lining[2]		S75	Veg	S75	Veg	
n (manning's coefficient)[2]		0.055	0.075	0.055	0.055	
V_a (allowable velocity)	(ft/s)	n/a	n/a	n/a	n/a	
V (calculated at Flow Depth d)	(ft/s)	1.308	1.230	1.948	2.271	
τ_a (max allowable Shear Stress)	(lb/ft^2)	1.55	1.00	1.55	1.00	
τ_d (calc'd Shear Stress at Flow Depth d)	(lb/ft^2)	0.27	0.43	0.64	0.83	
Channel Bottom Width	(ft)	3	3	3	3	
Channel Side Slopes	(H:V)	2	2	2	2	
D (total depth)	(ft)	1.50	1.50	1.50	1.50	
Channel Top Width @ D	(ft)	9.00	9.00	9.00	9.00	
d (calculated Flow Depth)	(ft)	0.36	0.56	0.26	0.34	
d (assumed Flow Depth)	(ft)	0.36	0.56	0.26	0.34	
Channel Top Width @ Flow Depth d	(ft)	4.44	5.26	4.04	4.36	
Bottom Width:Flow Depth ratio	(12:1 max)	8.3	5.3	11.5	8.8	
d_{50} Stone Size	(in)	n/a	n/a	n/a	n/a	
A (cross-sectional area)	(ft^2)	1.34	2.33	0.92	1.25	
WP (wetted perimeter)	(ft)	4.61	5.52	4.16	4.52	
R (hydraulic radius)		0.29	0.42	0.22	0.28	
S (bed slope)[3]	(ft/ft)	0.012	0.012	0.039	0.039	
S_c (critical slope)	(ft/ft)	0.069	0.115	0.075	0.070	
0.7 S_c	(ft/ft)	0.0483	0.0803	0.0526	0.0491	
1.3 S_c	(ft/ft)	0.0898	0.1492	0.0978	0.0911	
Stable Flow?	(Y/N)	Y	Y	Y	Y	
Freeboard based on Unstable Flow	(ft)	n/a	n/a	n/a	n/a	
Freeboard based on Stable Flow	(ft)	0.09	0.14	0.07	0.09	
Minimum Required Freeboard[4]	(ft)	0.50	0.50	0.50	0.50	
Freeboard (F) Required		0.50	0.50	0.50	0.50	
Freeboard (F) Provided		1.14	0.94	1.24	1.16	
Design Method for Protective Lining[5] Permissible Velocity (V) or Shear Stress (S)		S	S	S	S	

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged
4. Minimum Freeboard is 0.5 ft or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet – EroNet™ S75® Erosion Control Blanket

DESCRIPTION

The short-term single net erosion control blanket shall be a machine-produced mat of 100% agricultural straw with a functional longevity of up to 12 months. (NOTE: functional longevity may vary depending upon climatic conditions, soil, geographical location, and elevation). The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with a lightweight photodegradable polypropylene netting having an approximate 0.50 x 0.50 in. (1.27 x 1.27 cm) mesh. The blanket shall be sewn together on 1.50 inch (3.81 cm) centers with degradable thread. The blanket shall be manufactured with a colored thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) as an overlap guide for adjacent mats.

The S75 shall meet Type 2.C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.17

Material Content		
Matrix	100% Straw Fiber	0.5 lbs/sq yd (0.27 kg/sm)
Netting	Top side only, lightweight photodegradable	1.5 lb/1000 sq ft (0.73 kg/100 sm)
Thread	Degradable	

Standard Roll Sizes			
Width	6.67 ft (2.03 m)	8.0 ft (2.4 m)	16 ft (4.87 m)
Length	108 ft (32.92 m)	112 ft (34.14 m)	112 ft (34.14 m)
Weight ± 10%	40 lbs (18.14 kg)	50 lbs (22.68 kg)	100 lbs (45.36 kg)
Area	80 sq yd (66.9 sm)	100 sq yd (83.61 sm)	200 sq yd (167.22 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.50 in. (12.7 mm)
Resiliency	ECTC Guidelines	78.8%
Water Absorbency	ASTM D1117	301%
Mass/Unit Area	ASTM D6475	9.76 oz/sy (332 g/sm)
Swell	ECTC Guidelines	15%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	6.31 oz-in
Light Penetration	ASTM D6567	6.0%
Tensile Strength - MD	ASTM D6818	122.4 lbs/ft (1.81 kN/m)
Elongation - MD	ASTM D6818	36.1%
Tensile Strength - TD	ASTM D6818	79.2 lbs/ft (1.17 kN/m)
Elongation - TD	ASTM D6818	26.8%
Biomass Improvement	ASTM D7322	301%

Design Permissible Shear Stress	
Unvegetated Shear Stress	1.55 psf (74 Pa)
Unvegetated Velocity	5.00 fps (1.52 m/s)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.029	N/A	N/A
20-50 ft	0.11	N/A	N/A
≥ 50 ft (15.2 m)	0.19	N/A	N/A

NTPEP Large-Scale Slope Testing
ASTM D6459 - C-factor = 0.012

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.055
0.50 – 2.0 ft	0.055-0.021
≥ 2.0 ft (0.60 m)	0.021

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ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet – EroNet™ P300® Permanent Erosion Control Blanket

DESCRIPTION

The permanent erosion control blanket shall be a machine-produced mat of 100% UV stable polypropylene fiber. The matting shall be of consistent thickness with the synthetic fibers evenly distributed over the entire area of the mat. The matting shall be covered on the top side with black heavyweight UV-stabilized polypropylene netting having ultraviolet additives to delay breakdown and an approximate 0.50 x 0.50 inch (1.27 x 1.27 cm) mesh. The bottom net shall also be UV-stabilized polypropylene with a 0.63 x 0.63 inch (1.57 x 1.57 cm) mesh size. The blanket shall be sewn together on 1.5 inch (3.81 cm) centers with non-degradable thread. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats. The P300 shall meet Type 5A, 5B, specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	100% UV stable Polypropylene Fiber	0.7 lbs/sq yd (0.38 kg/sm)
Netting	Top: UV-stabilized Polypropylene	5 lbs/1000 sq ft (24.4 g/sm)
	Bottom: UV-stabilized Polypropylene	3 lbs/1000 sq ft (14.7 g/sm)
Thread	Polypropylene, UV stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44 m)
Length	108 ft (32.92 m)	112 ft (35.14 m)
Weight ± 10%	61 lbs (27.66 kg)	76.25 lbs (34.59 kg)
Area	80 sq yd (66.0 sm)	100 sq yd (83.61 sm)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2.1	≥ 2:1
≤ 20 ft (6 m)	0.001	0.029	0.082
20-50 ft	0.036	0.060	0.086
≥ 50 ft (15.2 m)	0.070	0.090	0.110

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.47 in. (11.94 mm)
Resiliency	ASTM D6524	91.5%
Density	ASTM D792	0.916 g/cm^3
Mass/Unit Area	ASTM 6566	13.03 oz/sy (443 g/m2)
UV Stability	ASTM D4355/ 1000 hr	90%
Porosity	ECTC Guidelines	95.89%
Stiffness	ASTM D1388	0.94 in-lb (1085378 mg-cm)
Light Penetration	ASTM D6567	17.9%
Tensile Strength - MD	ASTM D6818	438 lbs/ft (6.49 kN/m)
Elongation - MD	ASTM D6818	28.1%
Tensile Strength - TD	ASTM D6818	291.9 lbs/ft (4.32 kN/m)
Elongation - TD	ASTM D6818	26.7%
Biomass Improvement	ASTM D7322	497%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.0 psf (96 Pa)
Phase 2: Partially Veg.	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Veg.	8.0 psf (383 Pa)	8.0 PSF (383 Pa)
Unvegetated Velocity	9.0 fps (2.7 m/s)	
Vegetaged Velocity	16 fps (4.9 m/s)	

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.034
0.50 – 2.0 ft	0.034-0.020
≥ 2.0 ft (0.60 m)	0.020

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ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet – VMax® P550® Turf Reinforcement Mat

DESCRIPTION

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 100% UV stable polypropylene fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a ultra heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an ultra heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

The P550 shall meet Type 5A, 5B, and 5C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	100% UV stable polypropylene fiber	0.5 lb/sy (0.27 kg/sm)
Netting	Top and Bottom, UV-Stabilized Polypropylene	24 lb/1000 sf (11.7 kg/100 sm)
	Middle, Corrugated UV-Stabilized Polypropylene	24 lb/1000 sf (11.7 kg/100 sm)
Thread	Polypropylene, UV Stable	

Standard Roll Sizes	
Width	6.5 ft (2.0 m)
Length	55.5 ft (16.9 m)
Weight ± 10%	52 lbs (23.59 kg)
Area	40 sy (33.4 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.72 in. (18.29 mm)
Resiliency	ASTM 6524	95%
Density	ASTM D792	0.892 g/cm^3
Mass/Unit Area	ASTM 6566	21.25 oz/sy (723 g/sm)
UV Stability	ASTM D4355/ 1000 HR	100%
Porosity	ECTC Guidelines	96%
Stiffness	ASTM D1388	366.3 oz-in.
Light Penetration	ASTM D6567	16.5%
Tensile Strength – MD	ASTM D6818	1421 lbs/ft (21.07 kN/m)
Elongation – MD	ASTM D6818	40.5%
Tensile Strength – TD	ASTM D6818	1191.6 lbs/ft (17.67 kN/m)
Elongation – TD	ASTM D6818	28.8%
Biomass Improvement	ASTM D7322	378%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	4.0 psf (191 Pa)	3.25 psf (156 Pa)
Phase 2: Partially Veg.	12.0 psf (576 Pa)	12.0 psf (576 Pa)
Phase 3: Fully Veg.	14.0 psf (672 Pa)	12.0 psf (576 Pa)
Unvegetated Velocity	12.5 fps (3.8 m/s)	
Vegetated Velocity	25 fps (7.6 m/s)	

NTPEP ASTM D6460 Large Scale Channel	
Vegetated Shear Stress	>13.2 psf (632 Pa)
Vegetated Velocity	>24.5 fps (7.47 m/s)

Slope Design Data: C Factors

	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2.1	≥ 2:1
≤ 20 ft (6 m)	0.0005	0.015	0.043
20-50 ft	0.0173	0.031	0.050
≥ 50 ft (15.2 m)	0.035	0.047	0.057

Roughness Coefficients – Unveg.

Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.041
0.50 – 2.0 ft	0.040-0.013
≥ 2.0 ft (0.60 m)	0.013

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Culvert Calculations

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Sep 19 2019

Drury Run North Culvert - Culvert #1 - 10 YEAR

Invert Elev Dn (ft)	=	1772.46
Pipe Length (ft)	=	32.00
Slope (%)	=	7.53
Invert Elev Up (ft)	=	1774.87
Rise (in)	=	12.0
Shape	=	Circular
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	CPP
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

Top Elevation (ft)	=	1776.69
Top Width (ft)	=	15.00
Crest Width (ft)	=	100.00

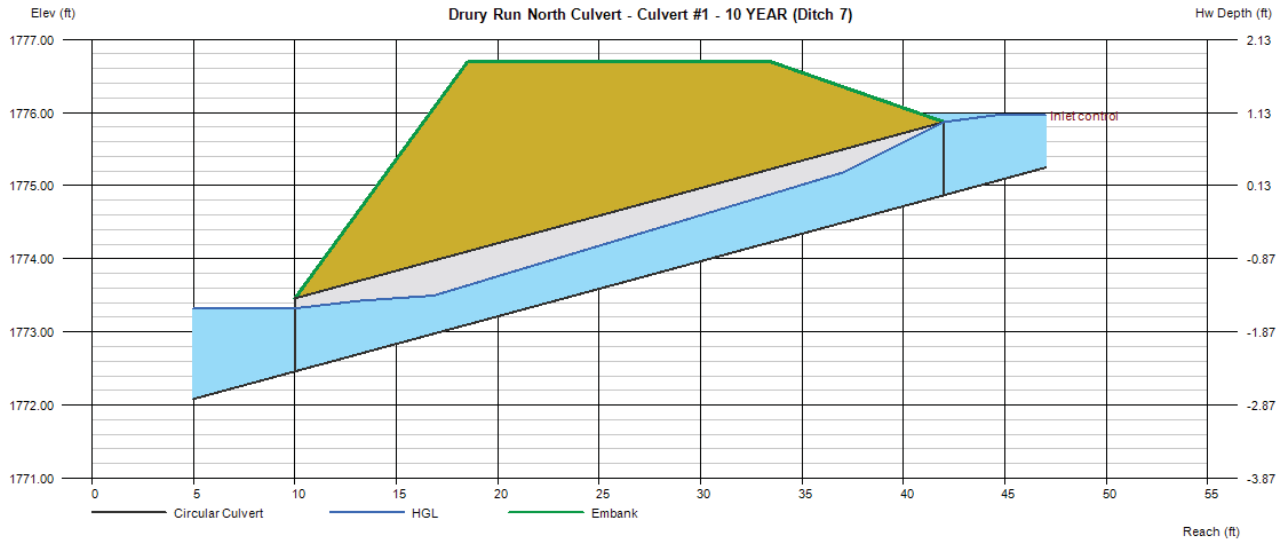
Calculations

Qmin (cfs)	=	2.87
Qmax (cfs)	=	2.87
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.87
Qpipe (cfs)	=	2.87
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.98
Veloc Up (ft/s)	=	4.70
HGL Dn (ft)	=	1773.32
HGL Up (ft)	=	1775.60
Hw Elev (ft)	=	1775.96
Hw/D (ft)	=	1.09
Flow Regime	=	Inlet Control

Flow from Ditch 6 calculations



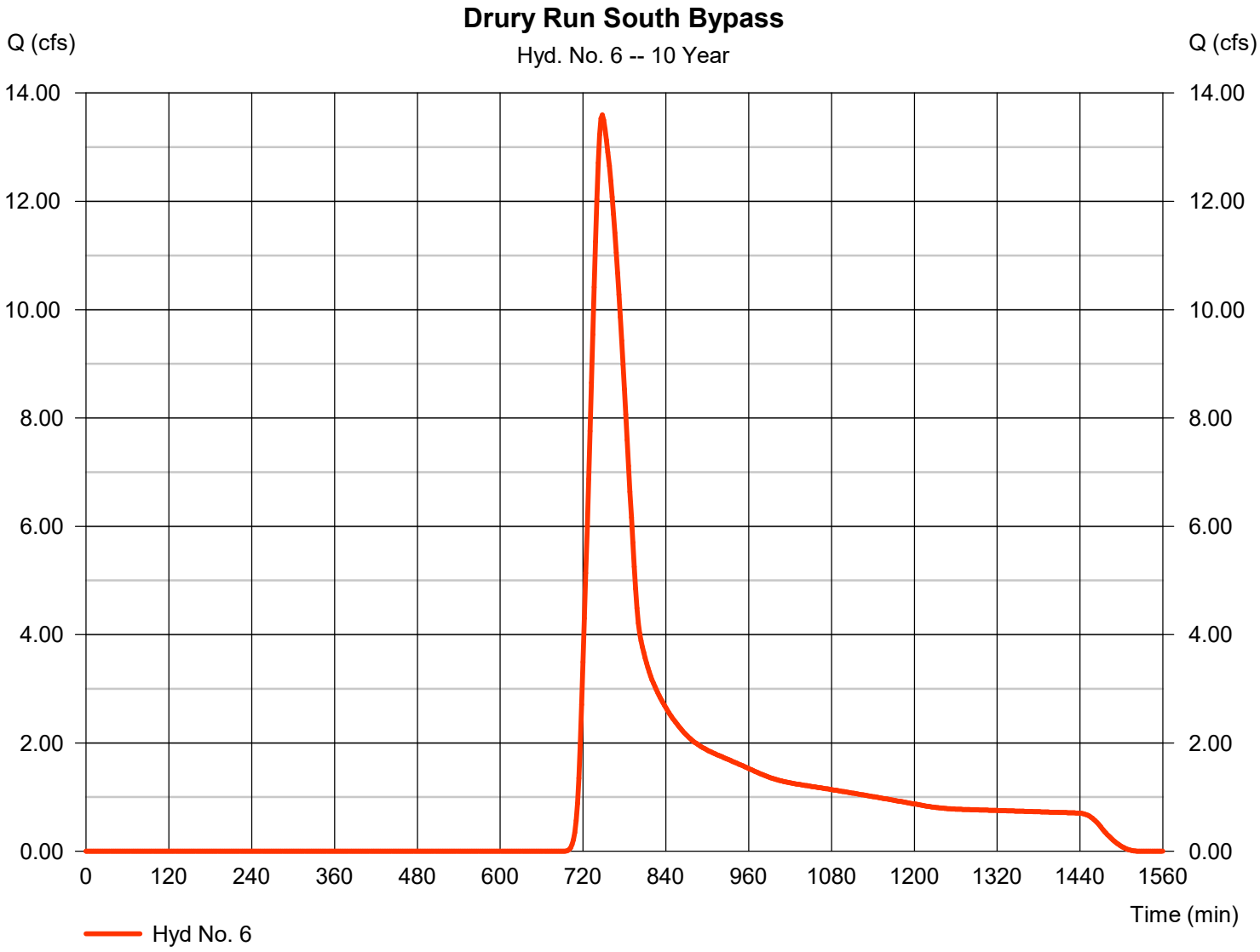
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Wednesday, 08 / 19 / 2020

Hyd. No. 6

Drury Run South Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.60 cfs
Storm frequency	=	10 yrs	Time to peak	=	748 min
Time interval	=	2 min	Hyd. volume	=	97,245 cuft
Drainage area	=	30.100 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	53.00 min
Total precip.	=	3.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Culvert Report

Drury Run South Culvert - Culvert #2 - 10 YEAR

Post Drury Run South Bypass 10 yr runoff

Invert Elev Dn (ft)	= 1723.38
Pipe Length (ft)	= 46.00
Slope (%)	= 1.00
Invert Elev Up (ft)	= 1723.84
Rise (in)	= 18.0
Shape	= Circular
Span (in)	= 18.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Groove end projecting (C)
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2

Embankment

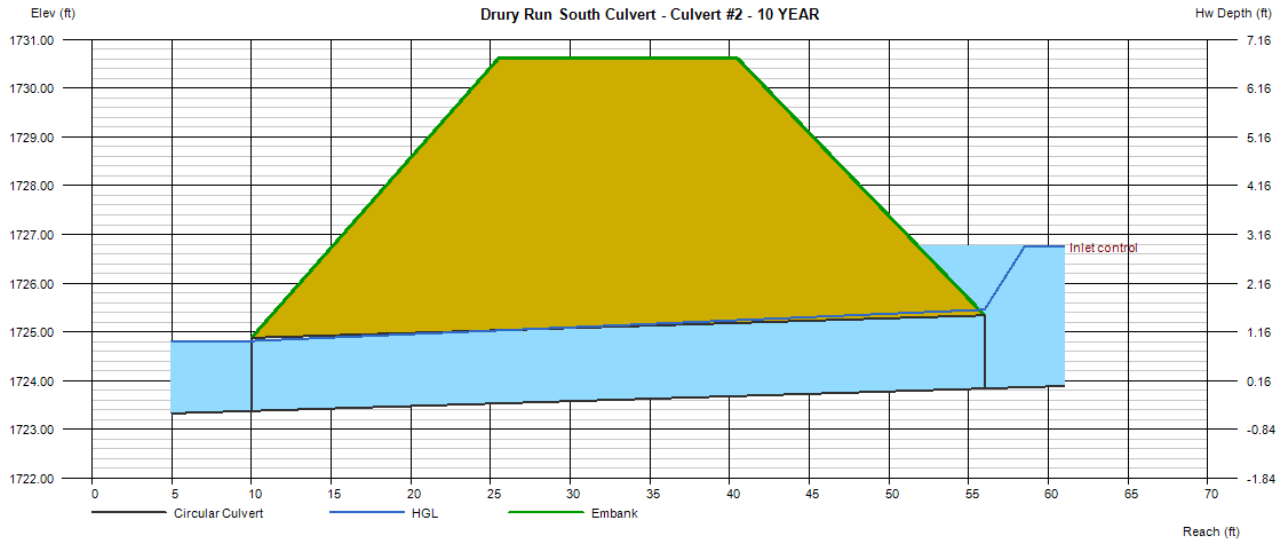
Top Elevation (ft)	= 1730.61
Top Width (ft)	= 15.00
Crest Width (ft)	= 100.00

Calculations

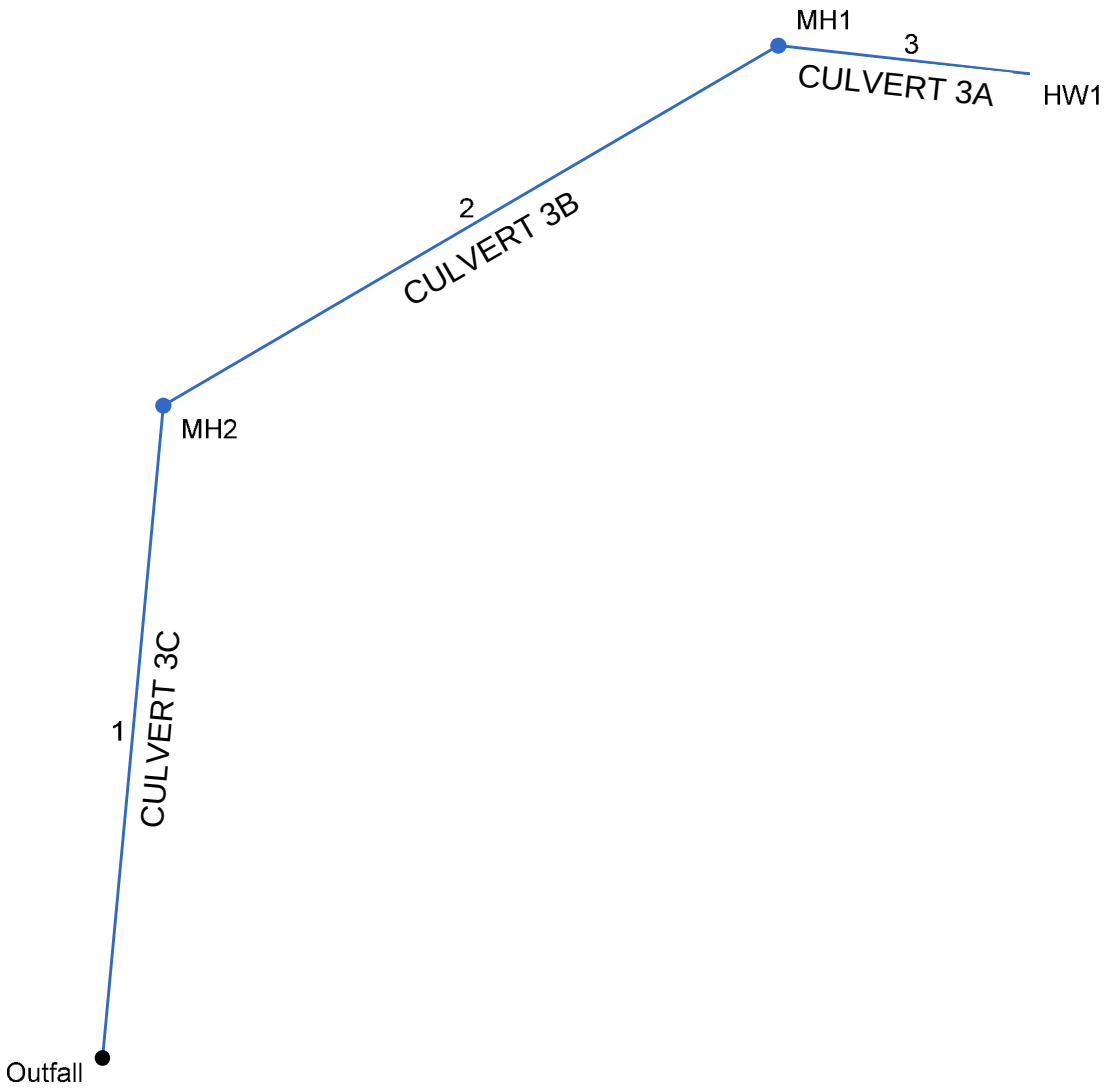
Qmin (cfs)	= 13.60
Qmax (cfs)	= 13.60
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 13.60
Qpipe (cfs)	= 13.60
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 7.81
Veloc Up (ft/s)	= 7.70
HGL Dn (ft)	= 1724.82
HGL Up (ft)	= 1725.46
Hw Elev (ft)	= 1726.75
Hw/D (ft)	= 1.94
Flow Regime	= Inlet Control



Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Culvert-BypassPipe.stm	Number of lines: 3	Date: 4/19/2019

Storm Sewer Tabulation

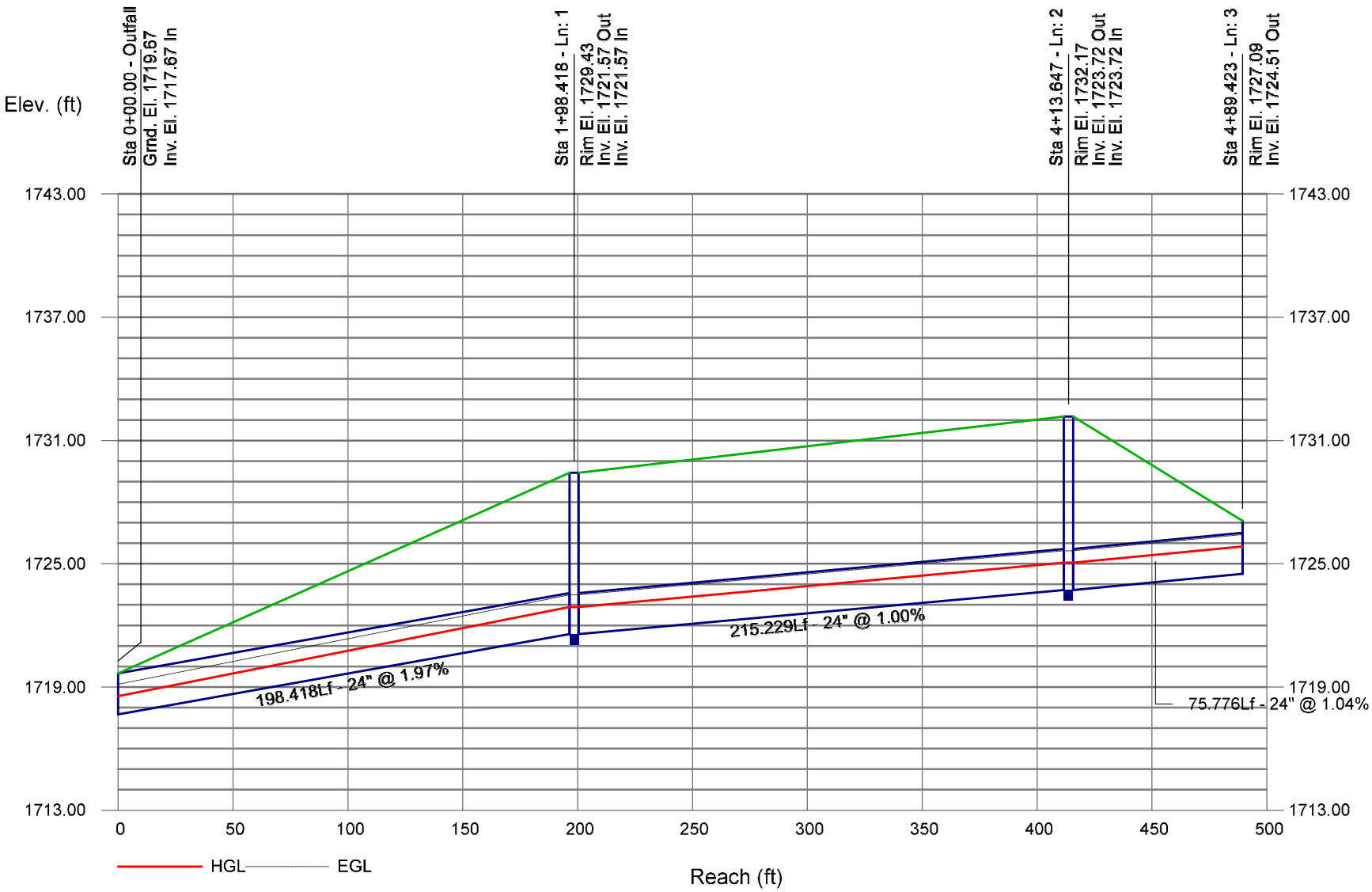
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	198.418	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	13.60	34.35	8.18	24	1.97	1717.67	1721.57	1718.55	1722.90	1719.67	1729.43	Pipe - (23)
2	1	215.229	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	13.60	24.49	6.15	24	1.00	1721.57	1723.72	1722.90	1725.05	1729.43	1732.17	Pipe - (22)
3	2	75.776	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	13.60	25.02	6.15	24	1.04	1723.72	1724.51	1725.05	1725.84	1732.17	1727.09	Pipe - (21)

Project File: Culvert-BypassPipe.stm | Number of lines: 3 | Run Date: 8/19/2020

NOTES:Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Profile

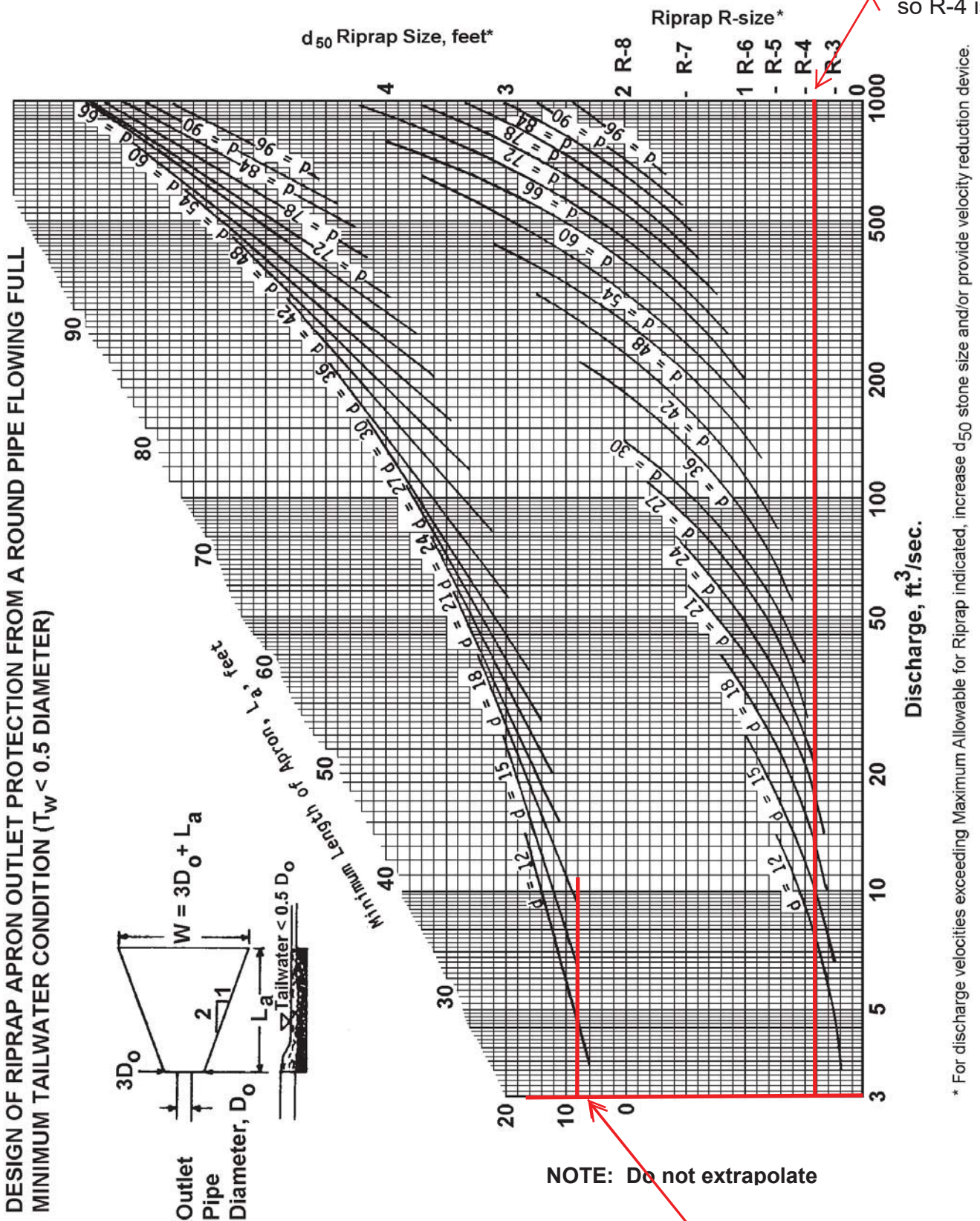
Proj. file: Culvert-BypassPipe.stm



Rock Apron Calculations

CULVERT #1

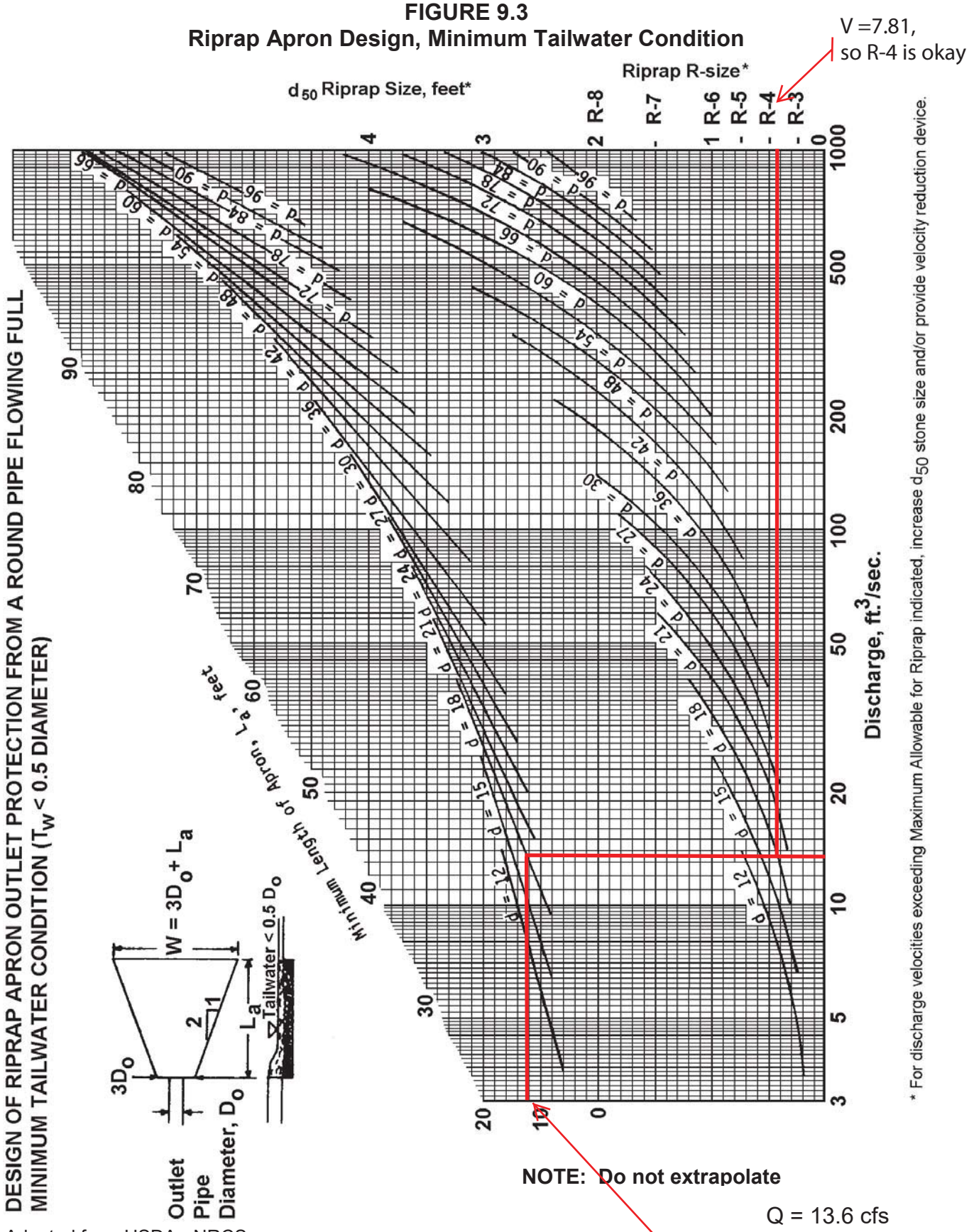
FIGURE 9.3
Riprap Apron Design, Minimum Tailwater Condition



Adapted from USDA - NRCS

Not to be used for Box Culverts

FIGURE 9.3
Riprap Apron Design, Minimum Tailwater Condition



Adapted from USDA - NRCS

Not to be used for Box Culverts

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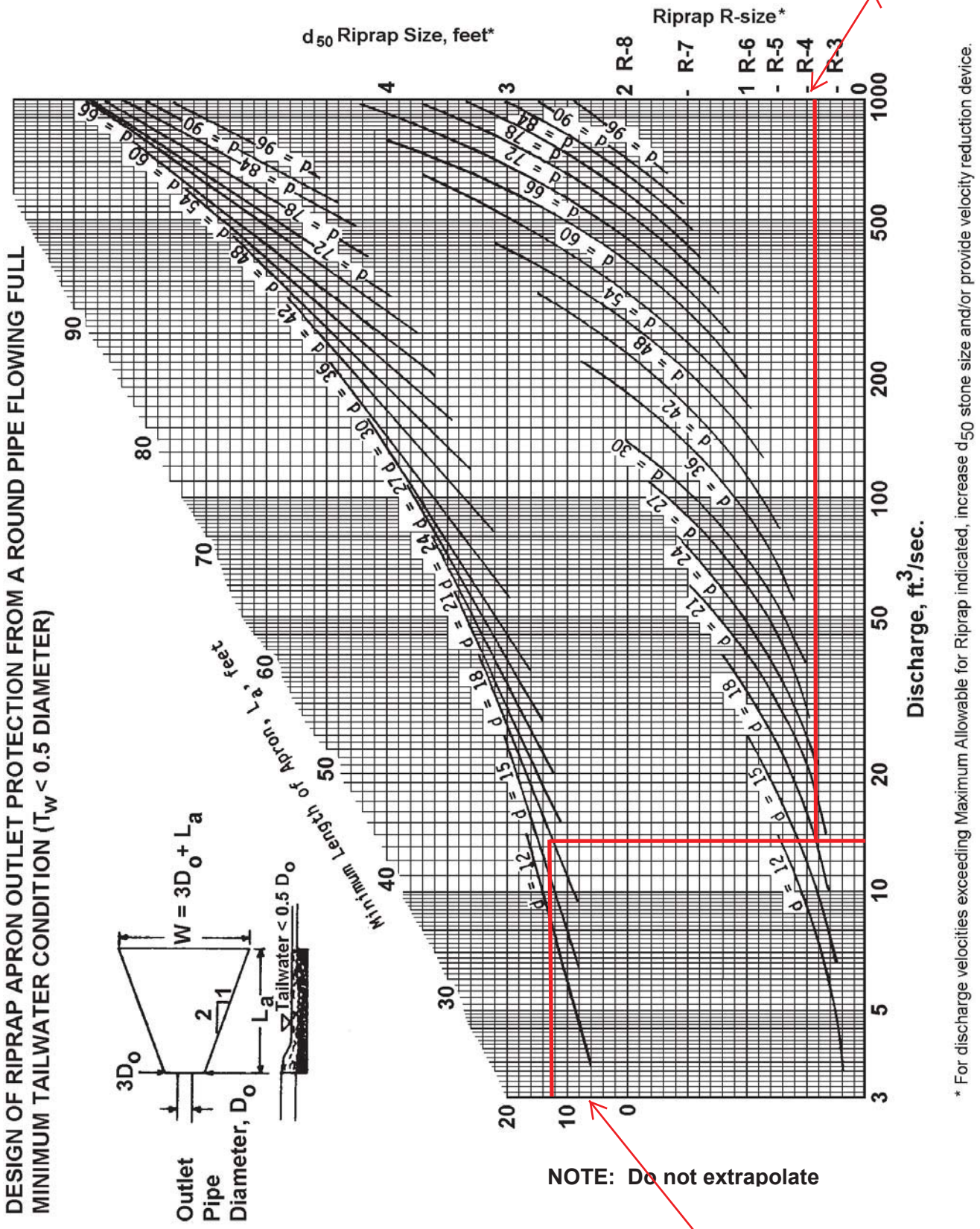

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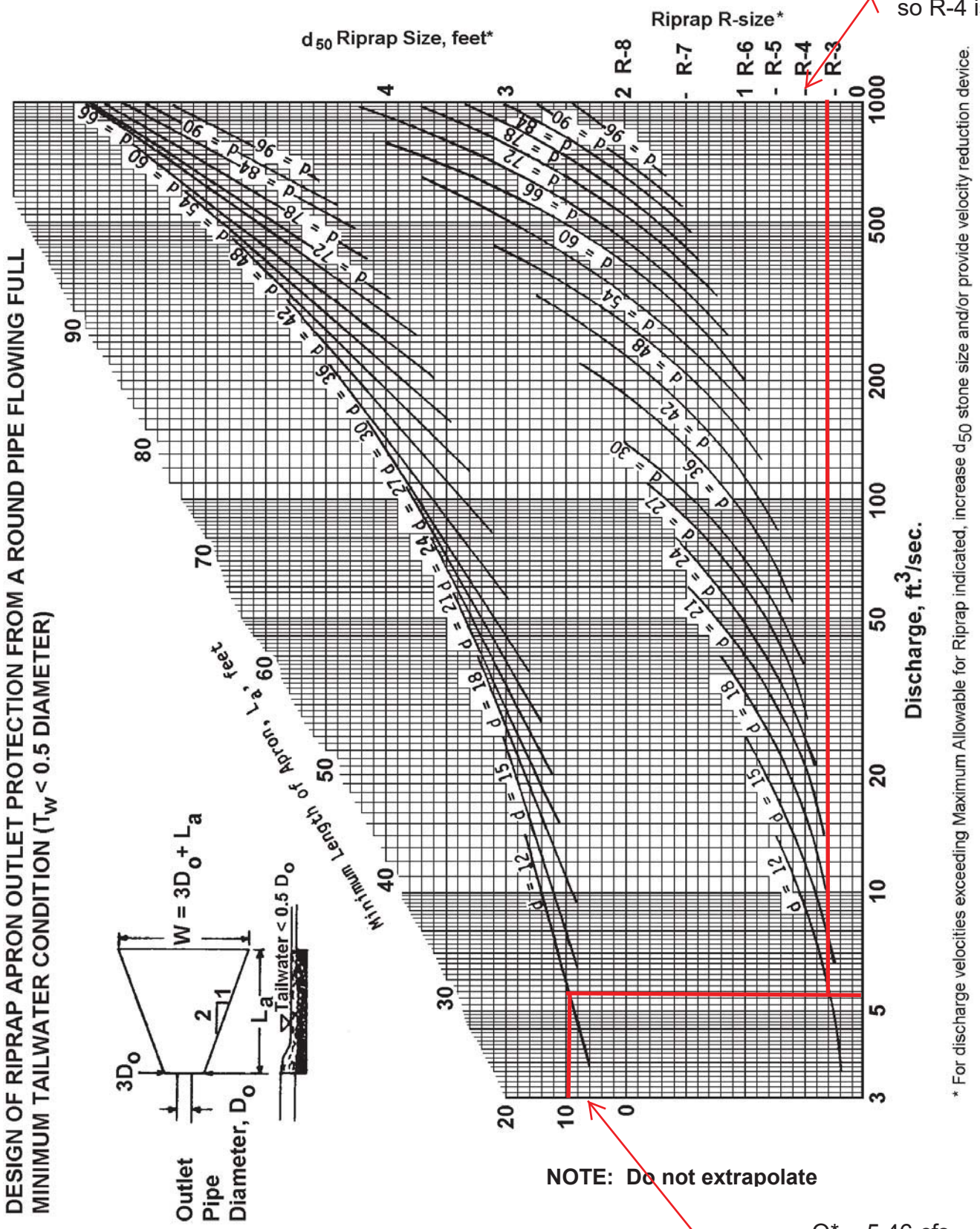

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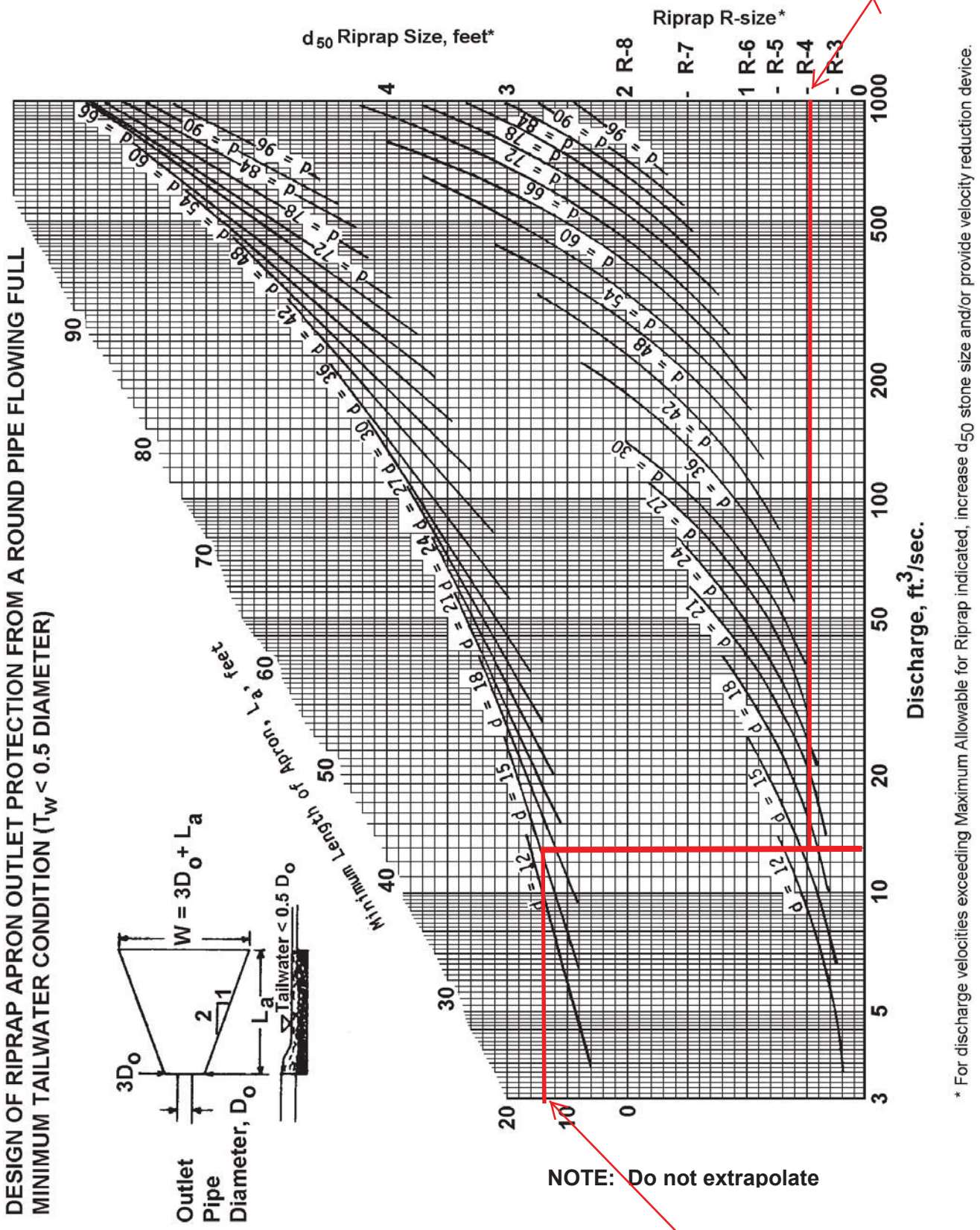


Adapted from USDA - NRCS

Not to be used for Box Culverts

APPENDIX D

Off-Site Discharge Analysis

TAMARACK COMPRESSOR STATION
National Fuels Gas Supply Corporation
Leidy Township, Clinton County, Pennsylvania

OFF-SITE DISCHARGE ANALYSIS

This Off-Site Discharge Analysis has been prepared in accordance with PADEP Fact Sheet 3930-FS-DEP4214 "Off-Site Discharges of Stormwater to Areas That Are Not Surface Waters", the Erosion and Sediment Pollution Control Program Manual (TDG 363-2134-008), and the PADEP Stormwater Best Management Practices Manual (TDG 363-0300-002).

Due to site constraints, the outlet from the sediment pond/infiltration basin cannot discharge into a surface water. Instead, the pond will discharge into a natural swale at the southwest corner of the Limit of Disturbance (LOD). The proposed bypass storm sewer system also outlets at this location. This location is referred to as Point of Interest (POI) A. From this point, the swale flows in a southwest direction for approximately 375 feet at a gentle slope (~3%), where it outlets into a wetland and the headwaters of Drury Run. The swale is located on Hunstontown silt loam (HuB) soil units and is well vegetated. The swale downstream of the project LOD is located on Sproul State Forest property owned by the PA Department of Environmental Resources. Refer to Figures 1 and 2 for a site map showing pre-development and post-development conditions, respectively.

As part of the Post-Construction Stormwater Management Plan for the project, a detailed hydrologic and hydraulic analysis was performed to compare pre-development peak discharges to post-development discharges at final conditions at Point of Interest A. This analysis took into account all areas within the project LOD and upslope of the LOD that drain to the natural swale. Refer to Appendix C of the PCSM Report for specific details on the analysis. A summary of the pre-development and post-development peak discharges is provided in Table 1 below.

Table 1
Summary of Peak Flows at POI A – Final Conditions

Storm Event	Pre-Development Peak Flow (CFS)	Post-Development Peak Flow (CFS)	Difference (CFS)
1-year	2.9	1.9	-1.0
2-year	6.3	4.3	-2.0
5-year	13.1	9.2	-3.9
10-year	19.9	14.2	-5.7
25-year	31.2	23.3	-7.9
50-year	42.0	33.9	-8.1
100-year	54.4	45.2	-9.2

The PCSM Report also analyzed the project's impacts on runoff volume for the 2-year 24-hour storm event in this watershed in accordance with the PADEP Stormwater BMP Manual. A summary of runoff volumes is provided in Table 2 below.

Table 2
Summary of Runoff Volumes at POI A - Final Conditions

Storm Event	Pre-Development Runoff Volume (CF)	Post-Development Runoff Volume (CF)	Difference (CF)
2-year	24,703	23,427	-1,276

As shown on Tables 1 and 2 above, the proposed project will not result in an increase in either peak runoff rates or runoff volumes at POI A during final conditions.

In accordance with Chapter 7 of the E&S Manual, the peak discharge leaving the site at POI A during the construction phase was also computed and compared to pre-development conditions. Detailed calculations for the sediment pond design are provided in Appendix C of the Project Erosion and Sediment Control Plan. A summary of the pre-development and construction phase peak discharges is provided in Table 3 below.

Table 3
Summary of Peak Flows at POI A – Construction Phase

Storm Event	Pre-Development Peak Flow (CFS)	Construction Phase Peak Flow (CFS)	Difference (CFS)
1-year	2.9	2.0	-0.9
2-year	6.3	4.6	-1.7
5-year	13.1	9.6	-3.5
10-year	19.9	14.8	-5.1
25-year	31.2	24.3	-6.9
50-year	42.0	33.1	-8.9
100-year	54.4	43.1	-11.3

The project maintains existing drainage patterns, and as indicated above; the project will not increase peak discharges for any storm event when compared to pre-development conditions. The project will also not increase the volume of runoff for the 2-year storm event. As per Chapter 7 of the E&S Manual, an easement is only required if there are increases in the peak discharge rates flowing onto an adjoining property. Since the project will result in decreases to peak flow rates and runoff volumes downstream of POI A, the project will not result in accelerated erosion or other adverse impacts downstream.

UPI #18-8427
N/F RONALD & CATHLEEN HINE

Drury Run Watershed South
40.7 AC

FLOW PATH

UPI #18-8464
N/F JACOB & LAURIE CLEVENGER

N/F DEPARTMENT OF
ENVIRONMENT RESOURCE
(SPROUL STATE FOREST)

UPI #18-29835
NATIONAL FUEL GAS SUPPLY CORP

DRURY RUN

POINT OF
INTEREST A

NWI WETLAND

NATURAL SWALE

UPI #18-8465
N/F LAVONNE HILLYER

REVISIONS

100 0 100 200
SCALE IN FEET

NORTH

National Fuel SUPPLY CORPORATION

NATIONAL FUEL SUPPLY CORPORATION

Michael Baker INTERNATIONAL

MICHAEL BAKER INTERNATIONAL
CONSULTING ENGINEERS
MOON TOWNSHIP, PENNSYLVANIA

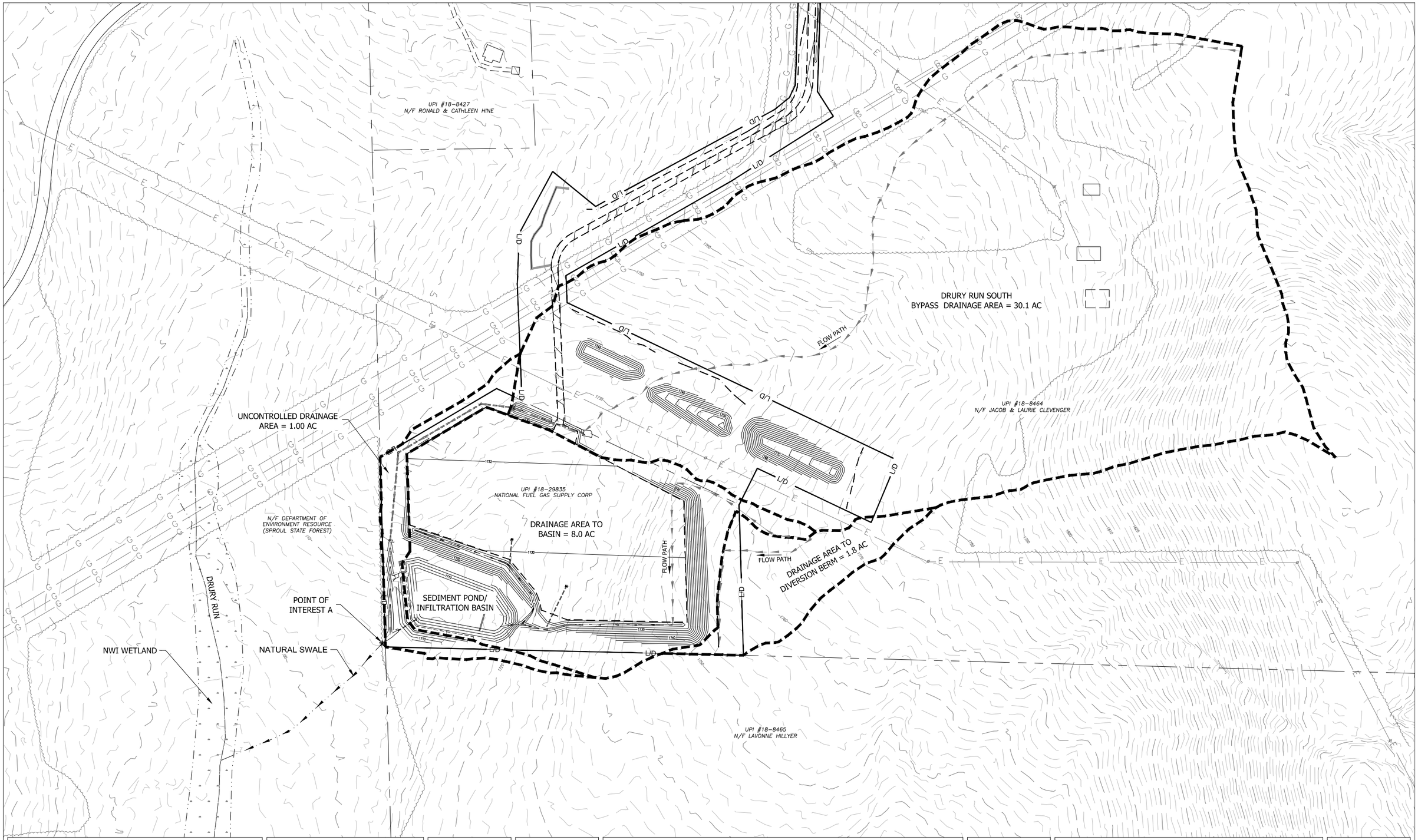
TAMARACK COMPRESSOR STATION

OFF-SITE DISCHARGE ANALYSIS
PRE-DEVELOPMENT CONDITIONS
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: AUGUST 2020

SHEET NO.
1
OF 2



REVISIONS

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SCALE IN FEET

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MOON TOWNSHIP, PENNSYLVANIA

TAMARACK COMPRESSOR STATION

OFF-SITE DISCHARGE ANALYSIS
POST-DEVELOPMENT CONDITIONS

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: AUGUST 2020

SHEET NO.
2
OF 2

APPENDIX E

E&S Drawings

Revised August 2020

POST CONSTRUCTION STORMWATER MANAGEMENT / SITE RESTORATION PLAN

for the

TAMARACK COMPRESSOR STATION

Leidy Township
Clinton County, Pennsylvania

Prepared for

National Fuel
SUPPLY CORPORATION

National Fuel Supply Corporation
1100 State Street
Erie, PA 16501

Prepared by

Michael Baker
INTERNATIONAL

Michael Baker International
Moon Twp., Pennsylvania

Tamarack Compressor Station
National Fuel Supply Corporation
Leidy Township
Clinton County, Pennsylvania

POST CONSTRUCTION STORMWATER / SITE RESTORATION PLAN

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- g. BMP Installation Sequence Narrative
- h. Supporting Calculations
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- l. Geologic Formations and Soil Conditions
- m. Thermal Impacts
- n. Riparian Forest Buffer Management Plan
- o. Antidegradation Requirements

2.0 Conclusion

Appendices

Appendix A - Site Location Map
Appendix B - Soil Report
Appendix C - Worksheets and Calculations
Appendix D - Site Evaluation and Soil Infiltration Testing Report
Appendix E - PCSM/Site Restoration Drawings

Tamarack Compressor Station
National Fuel Supply Corporation
Leidy Township
Clinton County, Pennsylvania

POST CONSTRUCTION STORMWATER / SITE RESTORATION PLAN PROJECT NARRATIVE

The Post Construction Stormwater Management/Site Restoration (PCSM/SR) Plan has been prepared in accordance with requirements of Section E and Section F of the Notice of Intent (NOI) for Coverage under the ESCGP-3 for Earth Disturbance Associated with Oil and Gas Exploration, Production, Processing or Treatment Operations or Transmission Facilities. The PCSM/SR Plan implements best management practices (BMPs) that have been prepared in accordance with guidance and standards established in the Pennsylvania Department of Environmental Protection (PADEP) *Stormwater Best Management Practice Manual (2012)* and is a supplemental document to the ESCGP-3 NOI application that addresses stormwater management for the proposed project site.

1.0 Project Description

National Fuel Supply Corporation is proposing the Tamarack Compressor Station project, which will consist of the construction of a compressor pad and permanent access road to support oil and gas activities. The project is located in Leidy Township, Clinton County, Pennsylvania. A Site Location Map is provided in Appendix A.

The total project area as a result of construction activity is approximately 15.6 acres. Earth disturbance and tree clearing will remain within the project limit-of-disturbance. The compressor pad and access road will include supporting PCSM BMPs, while site restoration has been planned for the surrounding area.

An Erosion and Sediment Control (E&S) Plan has also been prepared for the proposed project that implements BMPs in accordance with standards and specifications defined by PADEP Technical Guidance Number 363-2134-008 *Erosion and Sediment Control Best Management Practice (BMP) Manual*.

a. Topographic Features

Site topography varies across the project area. Generally, site contour is gentle to steep and ranges from approximately 3% to 8%. The site location and area surrounding the proposed access road and pad is primarily forested and meadow. Existing gasline right-of-way and other facilities are located adjacent to the project area.

b. Soil Characteristics

Soil type within and around the project area has been determined using the United States Department of Agriculture (USDA) Natural Resources Conservation Service Web Soil Survey. The Custom Soil Resource Report identifies two soil types within the project area. The names of the soil type and potential limiting characteristics that may be exhibited are defined in Table 1. A Custom Soil Resource Report has been provided in Appendix B. For the proposed project, it is anticipated that proposed BMPs will be sufficient to manage and control limitations that may be exhibited by the soils contained within the project site during and upon completion of construction. Specific soil limit resolutions for the site are provided in Appendix B.

Table 1
Limitations of Pennsylvania Soils Pertaining to Earthmoving Projects

Soil Name	Cutbanks Cave	Corrosive to Concrete / Steel	Droughty	Easily Erodible	Flooding	Depth to Saturated Zone / Seasonal High Water Table	Hydric / Hydric Inclusions	Low Strength / Landslide Prone	Slow Percolation	Piping	Poor Source of Topsoil	Frost Action	Shrink - Swell	Potential Sinkhole	Ponding	Wetness
Hustontown Silt Loam	X	C/S	X			X	X		X	X		X				
Ungers Loam	X	C		X				X	X			X				

Note: This is not necessarily an all-inclusive list. Absence of an X does not mean "No Potential Limitation".

c. Earth Disturbance Activity Characterization

For the purpose of this NOI, National Fuels Supply Corporation is proposing construction of compressor pad and an approximately 1,460-foot long access road. The proposed access road will connect the pad to Stewart Hill Road. The total limit of disturbance associated with this NOI is anticipated to be approximately 15.6 acres.

d. Net Change in Volume and Rate of Runoff

A hydrologic analysis has been conducted to determine impacts on stormwater runoff as a result of the proposed project. Gravel areas are proposed with the construction of the access road and compressor pad. Proposed stormwater management BMPs will be implemented so that the volume difference from the 2-year, 24-hour storm event (pre- to post-) will be stored and so no increase in the post-development total runoff rate for all storms up to and including the 100-year, 24-hour storm event will occur. The BMPs consist of an infiltration basin and a bioretention sock infiltration berm located downslope of the gravel areas.

Volume Analysis

Technical Release No. 55 methodology was used to calculate the pre-development runoff volume, as well as the post development impacts of stormwater runoff within the limit of disturbance. Hydrologic calculations for the areas within the limit of disturbance are provided in Appendix C. A summary of the runoff volumes is provided in the tables below.

Drury Run North Watershed
Volume Summary

2-Year Storm	Runoff Volume (with no BMPs)	Runoff Volume (with BMPs)
Pre-Dev (cf)	4,733	4,733
Post-Dev (cf)	7,283	1,355
Difference (cf)	2,550	-3,378

Drury Run South Watershed
Volume Summary

2-Year Storm	Runoff Volume (with no BMPs)	Runoff Volume (with BMPs)
Pre-Dev (cf)	24,703	24,703
Post-Dev (cf)	51,517	23,427
Difference (cf)	26,814	-1,276

Peak Rate Analysis

A hydrologic analysis was completed for the watershed where the project is located to ensure that the peak discharge rate of runoff leaving the limit of disturbance is not increased. The infiltration berm and infiltration basin will mitigate the increase in the peak rate. The points of interest chosen were just downstream of the LOD on Drury Run. The analysis has only been conducted for the area within and draining onto the LOD to determine the effects specifically caused by the project. This encompasses all proposed earth disturbance. A summary of pre- and post-development peak discharges is provided in the following table:

Drury Run North Watershed
Peak Discharge Summary

Storm Event	Pre-Dev	Post-Dev	Difference
year	cfs	cfs	cfs
1	0.66	0.59	-0.07
2	1.55	1.17	-0.38
5	3.33	2.42	-0.91
10	5.17	3.75	-1.42
25	8.26	6.04	-2.22
50	11.18	8.21	-2.97
100	14.60	10.77	-3.83

Drury Run South Watershed
Peak Discharge Summary

Storm Event	Pre-Dev	Post-Dev	Difference
year	cfs	cfs	cfs
1	2.88	1.91	-0.97
2	6.34	4.34	-2.00
5	13.07	9.16	-3.91
10	19.92	14.18	-5.74
25	31.25	23.33	-7.92
50	41.95	33.90	-8.05
100	54.43	45.17	-9.26

e. Surface Water Classification

Mott MacDonald performed a stream and wetland delineation in the project area as part of the FM100 Modernization project. No aquatic resources were identified within the limits of disturbance or adjacent to the proposed site; however, Tamarack Swamp is approximately 2,300 feet south of proposed site. The project site drains generally to the south and west and is tributary to Drury Run and nearby wetlands. The Drury Run watershed has a Chapter 93 designated use of Exceptional Value (EV). No disturbance will occur to streams or wetlands due to the proposed project.

f. BMP Description Narrative

Temporary BMPs will be implemented during construction at the proposed project site to protect water quality. BMPs will include site specific erosion and sedimentation control methods. Control methods include, but are not limited to the implementation of filtration devices such as sediment barriers (compost filter sock), a filter sock sediment trap, pumped water filter bags, a sediment basin, and the application of stabilization methods such as establishment of vegetative stabilization, aggregate surfacing, and flexible growth medium.

Permanent BMPs implemented upon completion of construction to protect water quality, and reduce peak discharge and runoff volume will include:

Minimize Total Disturbed Area – Grading: Minimizing total disturbed areas is a non-structural BMP which preserves water quality by minimizing site grading, removal of existing vegetation (clearing and grubbing) and total soil disturbance. This eliminates the need for re-establishment of a new maintained landscape and results in surface conditions that better fit the existing landscape. Refer to additional information on this BMP provided on the Drawings and in Appendix C.

Re-vegetate Disturbed Areas, Using Native Species: Re-vegetated disturbed areas using native species is a non-structural BMP which improves water quality by minimizing application of fertilizers and pesticides/herbicides at newly created and maintained vegetated areas. Reduced fertilizer application is of key importance in improving stormwater quality with this BMP. Reduced landscape maintenance and reduced chemical application to the site are quality improving considerations as well. Refer to additional information on this BMP provided on the Drawings and in Appendix C.

Infiltration Basins: An infiltration basin is a structural BMP proposed for installation at the project site as a means of reducing peak discharge and promoting volume reduction of stormwater runoff. An infiltration basin is a shallow, impounded area designed to temporarily store and infiltrate stormwater runoff. Basins use the existing soil mantle to reduce the volume of stormwater runoff by infiltration and evapotranspiration. The quality of the runoff is also improved by the natural cleansing process of the existing soil mantle and also by the vegetation planted in the basins. Details on the infiltration basin are provided on the Drawings in Appendix E. Infiltration test results are provided in Appendix D.

Infiltration Berms: An infiltration berm is a structural BMP proposed for installation at the project site as a means of reducing peak discharge and promoting volume reduction of stormwater runoff. Infiltration berms are designed to attenuate and infiltrate the net volume increase of runoff volume produced by the 2-year storm event. Details on the infiltration

berm is provided on the Drawings in Appendix E. Infiltration test results are provided in Attachment D.

g. BMP Installation Sequence Narrative

Minimize Total Disturbed Area – Grading: During construction, disturbed areas will be minimized and earthmoving activities will be limited during precipitation events and spring thaw. Tree clearing will be limited to the areas shown on the plan drawings.

Re-vegetate Disturbed Areas, Using Native Species: Upon completion of earthmoving activities, disturbed areas will seeded and considered stable once uniform 70 percent perennial vegetative cover will has achieved. Erosion and sedimentation BMPs will be removed once tributary areas have achieved stabilization. Restoration of vegetative stabilization will prevent accelerated erosion while controlling sedimentation through filtration.

Infiltration basin: Convert the sediment basin into an infiltration basin once the site is fully stabilized. Drain the sediment basin using a filter bag, remove all accumulated sediment, and excavate bottom of basin to the proposed infiltration elevation. Remove the skimmer and close skimmer outlet pipe opening in riser. Remove seal covering 6" x 6" orifice. Plant seed mix in accordance with the planting plan.

Infiltration Berm: Protect infiltration berm area from compaction prior to installation. Once the area draining to the infiltration berm is stabilized, the filter sock trap can be removed and the infiltration berm can be installed. Remove all sediment that has accumulated behind the filter sock trap. Care shall be taken to minimize disturbance, leave existing trees in place, and protect the berm ponding area from compaction during sediment removal. Compaction in the berm ponding area shall be treated by scarification of the subsoil. Begin installing the infiltration berm. The berm must be installed at a constant elevation. Stabilize/vegetate all areas disturbed during the berm installation. After installation, prevent sediment- laden water from entering the berm. Do not remove erosion and sediment control measures until the site is fully stabilized.

Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the operator shall implement appropriate best management practices to eliminate the potential for accelerated erosion and/or sediment pollution.

Before implementing any revisions to the approved PCSM Plan, or revisions to other plans which may affect the effectiveness of the approved PCSM Plan, the operator must receive approval of the revision from the PADEP.

h. Supporting Calculations

Supporting worksheets and calculations are provided in Appendix C.

i. Plan Drawings

PCSM and Site Restoration Plan drawings are provided in Appendix E.

j. Long Term Operation and Maintenance Schedule

The project site will be operated by National Fuels Supply Corporation. The following maintenance guidelines are proposed to ensure that stormwater management BMPs operate efficiently and as designed. National Fuels Supply Corporation shall be responsible for coordinating inspection and maintenance, which shall include, but is not limited to the following recommendations:

General

- Personnel performing inspections shall be qualified, trained, and experienced in application of erosion, sedimentation, and stormwater management BMPs.
- Stormwater management BMPs shall be inspected after each major rainfall event – defined as an event with more than 2-inches of rainfall in 24-hours; but no less than two (2) times per year.
- Stormwater management BMPs shall be maintained in accordance with: the project PCSM/SR Plan, requirements of governing municipal ordinances, guidance of authorities having jurisdiction, and, where applicable, product manufacturer recommendations.
- Sediment removed from BMPs shall be disposed of by spreading onsite and stabilizing.

Minimize Total Disturbed Area - Grading

- Upon completion of construction, any activity that will result in a significant amount of earthwork should be evaluated to minimize associated impacts.

Re-vegetate Disturbed Areas, Using Native Species

- Vegetation shall be maintained to promote soil stability. During routine inspections, revegetated areas shall be inspected for bare spots, washouts and healthy grow. Identified bare spots and washouts shall be repaired within 10 business days upon inspection, weather permitting. Revegetated areas will have necessary soil supplements, permanent seed and mulch applied until a uniform 70% cover regrowth has been achieved. If necessary, soil testing may be performed to determine proper application rates of soil amendments prior to additional seeding.
- Do not use chemical applications or chemical based pest controls in revegetated areas.
- Minimize mowing in revegetated areas.
- Restored areas shall be evaluated for invasive species during routine maintenance activities. If invasive species are found, they will be mowed down to the ground and or removed by hand to the extent practicable. If mowing or mechanical removal is to be conducted, all equipment shall be thoroughly cleaned via power wash or similar, prior to departure from Contractor yard to reduce the spread of invasive species. If a particular invasive becomes established and mechanical means are ineffective in the control of the species, chemical

agents may be needed, but consultation with the Department should be completed for any recommendation or alternative methods that may be applicable to the species of concern.

Infiltration basin

- The vegetation along the surface of the infiltration basins will be maintained in good condition, and any bare spots will be re-vegetated as soon as possible.
- Vehicles will not be parked or driven on the infiltration basins, and care should be taken to avoid excessive compaction by mowers.
- Inspect the basins after runoff events containing greater than 2 inches in a 24-hour period to make sure that runoff drains down within 72 hours.
- Inspect the basin for accumulation of sediment, damage to outlet control structures, erosion control measures, signs of water contamination/spills, and slope stability.
- Mow only as appropriate for vegetative cover species.
- Remove accumulated sediment from basin as required. Restore original cross section and infiltration rate. Properly dispose of sediment.

Infiltration Berm

- The vegetation along the surface of the berm should be maintained in good condition, and any bare spots re-vegetated as soon as possible.
- Inspect the berms regularly to ensure they are infiltrating.
- Avoid running heavy equipment over the infiltration area at the base of the berms.
- Routinely remove accumulated trash and debris.
- Remove invasive plants as needed.
- Inspect for signs of flow channelization; restore level gradient immediately after deficiencies are observed.
- No mowing required. Berms shall grow wild.

k. Material Recycling and Disposal

Persons Responsible for Recycling and Disposal

It will be the responsibility of the Contractor to provide satisfactory erosion and sedimentation control, and to interface with applicable regulatory agencies.

The Contractor is responsible for having an approved E&S Plan and for verifying that an operating permit approved by the Conservation District or PADEP exists for all offsite borrow and disposal area locations. If an offsite disposal location is necessary, the site must be approved by the Conservation District or PADEP and the Contractor must provide proof of permit approval for the location to the owner and applicable regulatory agencies prior to use. All fill material must be in accordance with PADEP Document No. 258-2182-773 for Management of Fill. Environmental due diligence is defined as: investigative techniques, including, but not limited to, visual property inspections, electronic data base searches, review of property ownership, review of property use history, Sanborn Maps, environmental questionnaires, transaction screens, analytical testing, environmental assessments or audits.

In the event that the Contractor wishes to modify the PCSM/SR Plan, a copy of the revised plan must be submitted to the Engineer and to the Conservation District or PADEP for approval. The use of the term 'Engineer' in this report shall refer to the professional engineer who signed and sealed the ESCGP-3 for the proposed project.

Offsite Disposal Requirements

No earth disturbance activities shall occur outside of the project limit of disturbance. The Contractor must retain records of maintenance logs and inspection reports for the E&S measures at the site. The Contractor shall comply with the maintenance schedule shown on the plans and shall immediately rectify all non-compliance issues observed or cited by inspection report(s).

Excess soil from surface excavations will be removed promptly after excavation to a permitted facility with a fully implemented and PADEP approved E&S Plan. Temporary controls that are replaced or removed after stabilization will also be removed for proper disposal. Any sediment collected by the erosion and sedimentation BMPs will be placed back into the construction area in a dry, up-gradient portion of the site.

All garbage disposals will be managed through a local waste management provider or facility. The Contractor will have a dumpster available onsite for the duration of the project, which will be disposed of at a licensed/permitted municipal landfill. The project site will be inspected at the end of each working day for any loose litter or construction materials that may require recycling/disposal. All waste materials found during inspection will immediately be recycled or disposed of at a properly licensed/permitted facility. The Contractor will be responsible for all permits and/or disposal fees and for assuring that all materials are handled and disposed of in accordance with applicable laws, rules, and regulations, including, but not limited to those issued by the U.S. Environmental Protection Agency, PADEP and OSHA.

With regard to site cleanup and handling, storage control, disposal and recycling of waste (including but not limited to fuels, oils, lubricants and other materials brought to the site or used in the process of drilling), all waste, or excess materials not suitable for the onsite stockpiling or backfill, shall be disposed of at the PADEP-approved waste site in accordance with the PADEP solid waste management regulations at 25 PA Code chapter 260, §260.1 et seq., 271.1, and 287.1 et. seq. Where feasible, construction waste materials shall be recycled or taken to the nearest PADEP-approved facility for disposal. Excess soil material, if any, will be spread within the limit-of-disturbance and re-vegetated. Off-site spoil and/or borrow sites must be operated under a current NPDES permit. No wastes shall be burned, buried, dumped or discharged at the site.

l. Geologic Formations and Soil Conditions

As per 102.8(f)(12) of the PA Code, the project PCSM Plan shall identify naturally occurring geologic formations or soil conditions that may have the potential to cause pollution during earth

disturbance activities and include BMPs to avoid or minimize potential pollution and its impacts from the formations. For the proposed project, it is anticipated that proposed BMPs will be sufficient to manage and control limitations that may be exhibited by the soils contained within the project site during and upon completion of construction. Refer to Appendix B for site specific soil limit resolutions.

At a minimum, BMPs will be installed where indicated on the plan drawings to prevent erosion and sedimentation during and upon completion of construction. Severe erosion hazard limitations will be reduced by soil stabilization through the application of flexible growth medium and temporary/permanent vegetative stabilization. Sedimentation and siltation limitations will be prevented through installation and maintenance of filtration BMPs, such as compost filter sock. Special measures to be implemented during earth disturbance activities associated with construction will include the segregation of topsoil. Soils disturbed during construction activities will be replaced, re-vegetated and stabilized.

No acid-producing rock formations are anticipated to be present or encountered. However, if any material is found to be present at the site, the material will be handled in accordance with PADEP Fact Sheet 5600-FS-DEP4284.

m. Thermal Impacts

As per 102.8(f)(13) of the PA Code, the project PCSM Plan shall identify potential thermal impacts to surface waters as a result of earth disturbance activities. For the proposed project, thermal impacts have been avoided, minimized, or mitigated to the greatest extent possible due to the nature of the project scope. No permanent pools are anticipated as a result of proposed earth disturbance activities. Runoff from the site will flow over long stretches of vegetated areas before reaching receiving streams, which will provide for additional cooling and infiltration. Additionally, shade areas will be preserved to the greatest extent possible.

n. Riparian Forest Buffer Management Plan

The project is located in an exceptional value watershed; however, no site activities proposed as part of this project are within 150 feet of any streams.

o. Antidegradation Requirements

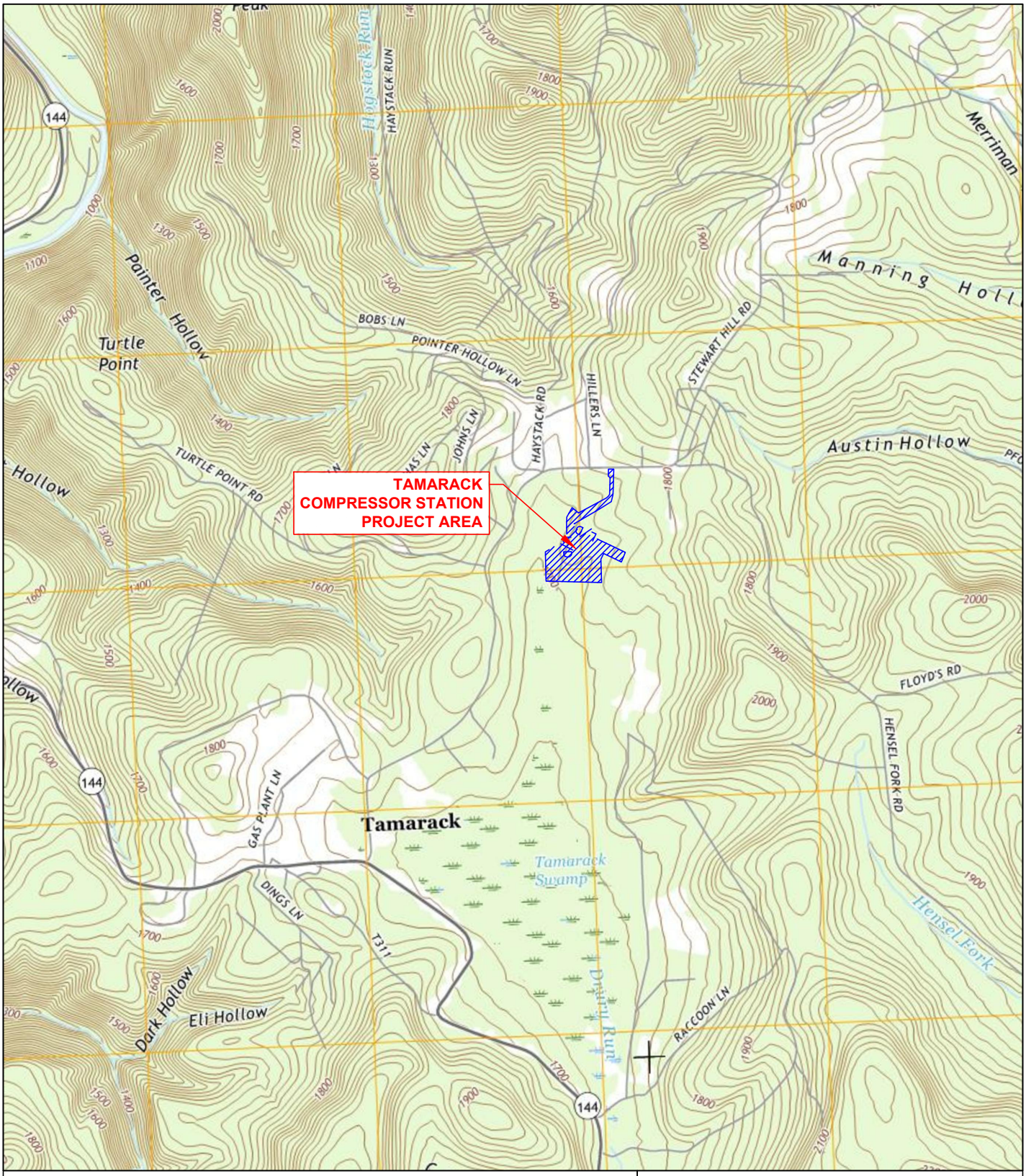
Receiving streams are classified as EV; therefore, treatment and pollution prevention ABACT BMPs will be utilized during and upon completion of construction to prevent degradation of downstream receiving waters. During construction, BMPs such as compost filter sock, filter sock sediment traps, and an extended rock construction entrance will be installed to prevent and control erosion and sedimentation. Upon completion of construction, BMPs such as an infiltration basin, infiltration berm, and restoration of native vegetation will control runoff discharge flow rate and volume and promote water quality. For the duration of the construction, a Pollution Prevention and Contingency Plan will be available onsite for implementation in the event of a spill or release of associated substances.

2.0 Conclusion

The project PCSM/SR Plan has been prepared in accordance with standards and specifications defined by the PADEP. Re-establishment of vegetative stabilization upon completion of earth disturbance and installation of BMPs will provide for stormwater runoff flow rate and volume conditions that are similar to those of the pre-development site conditions. It is anticipated that proposed BMPs will be sufficient to manage and control runoff in accordance with PADEP requirements so that no net increase in stormwater runoff will occur as a result of construction. The project PCSM/SR Plan shall be updated as necessary to remain consistent with applicable changes within the E&S Plan, project permits, and/or other project associated documents.

APPENDIX A

Site Location Map



SITE LOCATION MAP
TAMARACK COMPRESSOR STATION
NATIONAL FUEL SUPPLY CORPORATION

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

FIGURE 1

REFERENCE:
U.S. GEOLOGICAL SURVEY
TAMARACK, PA QUADRANGLE
7.5 MINUTE SERIES

N

Michael Baker INTERNATIONAL

SCALE: 1"=2000'

APPENDIX B

Soil Report

Tamarack Compressor Station
Soil Limitation Resolutions

Cutbanks Cave
All applicable OSHA standards and regulations will be implemented to safeguard workers during trenching and excavation operations. Trench boxes will be used, where required, during subsurface pipeline installation. Cut slopes will be stabilized as soon as possible with seed and mulch or erosion control blankets/flexible growth medium to help prevent sliding. Compressor site slopes are designed to not exceed 2H:1V.

Corrosive to Concrete/Steel
All subsurface pipes shall be either HDPE or steel pipes coated with a fusion bonded epoxy to help prevent corrosion. Cathodic protection shall also be implemented as necessary. If concrete corrosion is determined to be a potential site concern, Contractor shall apply the necessary site-specific concrete coatings prior to exposure to the local soil conditions.

Droughty
Drought tolerant seed mixes are used to ensure adequate establishment of perennial vegetation. Erosion control blankets or flexible growth medium shall be used as necessary to help hold soil particles, retain moisture and promote seed germination. Areas not achieving adequate vegetative cover will be re-seeded and re-mulched.

Easily Erodible
Disturbed soils will be stabilized in accordance with the temporary and permanent stabilization specifications prescribed in the E&S Plan. ABACT controls will be implemented. Erosion control matting or flexible growth medium will be installed on slopes greater than 3:1. Immediately upon discovering unforeseen circumstances posing the potential for accelerated erosion and/or sediment pollution, the operator shall implement appropriate Best Management Practices to minimize the potential for accelerated erosion and/or sediment pollution.

Depth to Saturated Zone/Seasonal High-Water Table
If water is encountered during excavation, all trenches will be dewatered in accordance with the E&S Plan. Trench water will be pumped out and discharged through a filter bag. Filter bags will be located in well-vegetated areas and discharge onto stable, erosion resistant areas. If necessary, a geotextile underlayment and flowpath will be provided. Locations of proposed infiltration BMPs have been investigated to confirm adequate separation from seasonal high-water table.

Hydric/Hydric Inclusions
A wetland delineation has been performed at the project site to determine the presence of wetlands. No wetlands are present within the project's limit of disturbance. All delineated wetlands shall be avoided and no wetland impacts are anticipated.

Low strength/Landslide Prone
Soils shall be stabilized with seed or stone immediately after earthmoving activities cease. Turf reinforcement matting or erosion control blanket or flexible growth medium will be applied where necessary. Cut and fill slopes will be no steeper than 2:1 grades. Fill material shall be free of brush, roots, sod, frozen particles, and all other foreign or objectionable material. All fills shall be

compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems.

Slow Percolation
Site BMPs shall be inspected after runoff events and adequate surface area shall be provided for pumped water discharge.

Piping
Any planned embankments or impoundments susceptible to piping shall utilize anti-seep collars.

Frost Action
The heaving and subsequent collapsing of the soil due to frost action can damage roads, buildings and plant roots. Site construction is monitored daily and any impacts due to frost action shall be identified and corrected.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Clinton County, Pennsylvania

September 20, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

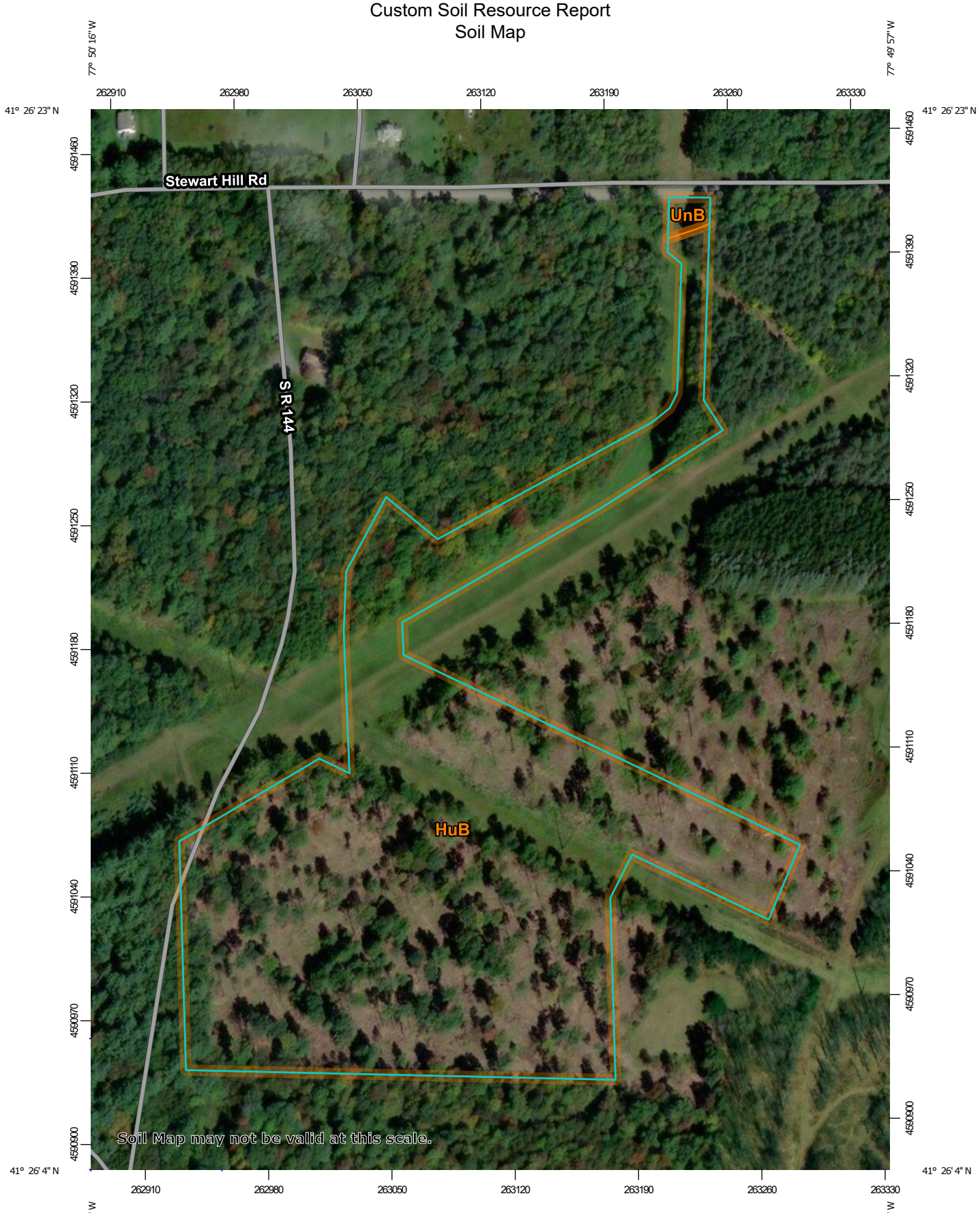
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,920 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 40 80 160 240

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clinton County, Pennsylvania
Survey Area Data: Version 14, Sep 18, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 4, 2012—Sep 10, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HuB	Hustontown silt loam, 3 to 8 percent slopes	15.5	99.3%
UnB	Ungers loam, 3 to 8 percent slopes	0.1	0.7%
Totals for Area of Interest		**15.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Clinton County, Pennsylvania

HuB—Hustontown silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l835
Elevation: 600 to 2,800 feet
Mean annual precipitation: 34 to 48 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 110 to 170 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Hustontown and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hustontown

Setting

Landform: Valley sides
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainbase
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Red residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 24 inches: silt loam
Bt - 24 to 30 inches: channery silt loam
Btx - 30 to 65 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 32 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 26 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Meckesville

Percent of map unit: 10 percent
Landform: Mountain valleys

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ungers
Percent of map unit: 5 percent

Unnamed
Percent of map unit: 5 percent

Leck kill
Percent of map unit: 5 percent

UnB—Ungers loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: l863
Elevation: 900 to 2,200 feet
Mean annual precipitation: 38 to 48 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 110 to 170 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ungers and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ungers

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 9 inches: loam
Bt - 9 to 33 inches: channery clay loam
BC - 33 to 48 inches: very channery clay loam
R - 48 to 58 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Meckesville

Percent of map unit: 10 percent
Hydric soil rating: No

Leck kill

Percent of map unit: 5 percent
Hydric soil rating: No

Hustontown

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

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APPENDIX C

Worksheets and Calculations

Appendix C. Worksheets

Worksheet 1. General Site Information

INSTRUCTIONS: Fill out Worksheet 1 for each watershed

Date: September 2019

Project Name: Tamarack Compressor Station

Municipality: Leidy Township

County: Clinton

Total Area (acres): 15.6

Major River Basin: Susquehanna

Watershed: West Branch Susquehanna River

Sub-Basin: Kettle - McElhattan Creek

Nearest Surface Water(s) to Receive Runoff: Drury Run

Chapter 93 – Designated Water Use/Existing Water Use: Exceptional Value

Impaired according to Category 4 or 5 of the Integrated Water Quality Monitoring and Assessment Report? Yes ☐ No ☒

List Causes of Impairment:

Is there an established TMDL that applies: Yes ☐ No ☒

Total Maximum Daily Loads (TMDLS)

Is project subject to, or part of:

Municipal Separate Storm Sewer System (MS4) Requirements? Yes ☐ No ☒

Existing or planned drinking water supply? Yes ☐ No ☒

If yes, distance from proposed discharge (miles):

Approved Act 167 Plan? Yes ☐ No ☒

Existing River Conservation Plan? Yes ☐ No ☒

Worksheet 2. Sensitive Natural Resources from PA Stormwater Best Management Practices Chapter 5

INSTRUCTIONS

1. Provide Sensitive Resources Map according to non-structural BMP 5.4.1 in Chapter 5. This map should identify wetlands, woodlands, natural drainage ways, steep slopes, and other sensitive natural areas.

2. Summarize the existing extent of each sensitive resource in the Existing Sensitive Resources Table (below, using Acres). If none present, insert 0.

3. Summarize Total Protected Area as defined under BMPs in Chapter 5.

4. Do not count any area twice. For example, an area that is both a floodplain and a wetland may only be considered once.

EXISTING NATURAL SENSITIVE RESOURCE	MAPPED? Yes/no/n/a	TOTAL AREA (Ac.)	PROTECTED AREA (Ac.)
Waterbodies			
Floodplains			
Riparian Areas			
Wetlands			
Woodlands			
Natural Drainage Ways			
Steep Slopes, 15% - 25%			
Steep Slopes, over 25%			
Other:			
Other:			
TOTAL EXISTING:		**0**	**0**

Worksheet 3. Nonstructural BMP Credits from PA Stormwater Best Management Practices Manual (SW BMP Manual)

PROTECTED AREA

1.1 Area of Protected Sensitive/Special Value Features (see WS 2) 0 **Ac.**

1.2 Area of Riparian Forest Buffer Protection (see WS 2) 0 **Ac.**

3.1 Area of Minimum Disturbance/Reduced Grading (See Chapter 8, page 21 – SW BMP Manual) 0 **Ac**

TOTAL 0 **Ac**

Site Area	Minus	Protected Area	=	Stormwater Management Area
15.6	-	0	=	15.6

This is the area that requires stormwater management

VOLUME CREDITS

3.1 Minimum Soil Compaction (See Chapter 8, page 22 – SW BMP Manual)

Lawn _____ ft^2 x 1/4" x 1/12 = 0 ft^3

Meadow _____ ft^2 x 1/3" x 1/12 = 0 ft^3

3.3 Protect Existing Trees (See Chapter 8, page 23 – SW BMP Manual)

For Trees within 100 feet of impervious area:

Tree Canopy _____ ft^2 x 1/2" x 1/12 = 0 ft^3

0

5.1 Disconnect Roof Leaders to Vegetated Areas (See Chapter 8 page 25 – SW BMP Manual)

For runoff directed to areas protected under 5.8.1 and 5.8.2

Roof Area _____ ft^2 x 1/3" x 1/12 = 0 ft^3

For all other disconnected roof areas

Roof Area _____ ft^2 x 1/4" x 1/12 = 0 ft^3

5.2 Disconnect Non-Roof impervious to Vegetated Areas (See Chapter 8, page 26 – SW BMP Manual)

For Runoff directed to areas protected under 5.8.1 and 5.8.2

Impervious Area _____ ft^2 x 1/3" x 1/12 = 0 ft^3

For all other disconnected roof areas

Impervious Area _____ ft^2 x 1/4" x 1/12 = 0 ft^3

TOTAL NON-STRUCTURAL VOLUME CREDIT* 0 ft

**For use on Worksheet 5*

Worksheet 4. Change in Runoff Volume for 2-YR Storm Event

PROJECT: Tamarack Compressor Station
Drainage Area: Drury Run - North
2-Year Rainfall: 2.57 (in)

Total Site Area: 15.6 acres
Protected Site Area: 0 acres
Managed Area: 15.6 acres

Existing Conditions:

Cover Type / Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woodland, good/fair	B	2,555	0.06	55	8.18	1.64	0.10	20
Woodland, good/fair	C	72,757	1.67	70	4.29	0.86	0.49	2,965
Meadow, good	B	2,292	0.05	58	7.24	1.45	0.15	29
Meadow, good	C	39,179	0.90	71	4.08	0.82	0.53	1,719
TOTAL:		116,783	2.68					4,733

*20% of the existing impervious area has been considered meadow, good condition in accordance with the PADEP Stormwater BMP Manual guidance.

Developed Conditions:

Cover Type / Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Meadow, good	B	3,959	0.09	58	7.24	1.45	0.15	50
Meadow, good	C	94,786	2.18	71	4.08	0.82	0.53	4,159
Gravel	B	887	0.02	96	0.42	0.08	2.13	157
Gravel	C	16,439	0.38	96	0.42	0.08	2.13	2,918
TOTAL:		116,071	2.66					7,283

2-Year Volume Increase (ft^3): 2,550

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P + 0.8S)$ where
   P = 2-Year Rainfall (in)
   S = (1000 / CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land use area (ft^2)

Worksheet 4. Change in Runoff Volume for 2-YR Storm Event

PROJECT: Tamarack Compressor Station
Drainage Area: Drury Run - South
2-Year Rainfall: 2.57 (in)

Total Site Area: 15.6 acres
Protected Site Area: 0 acres
Managed Area: 15.6 acres

Existing Conditions:

Cover Type / Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woodland, good/fair	C		0.00	70	4.29	0.86	0.49	0
Meadow, good	C	563,049	12.93	71	4.08	0.82	0.53	24,703
Impervious*	C		0.00	96	0.42	0.08	2.13	0
TOTAL:		563,049	12.93					24,703

*20% of the existing impervious area has been considered meadow, good condition in accordance with the PADEP Stormwater BMP Manual guidance.

Developed Conditions:

Cover Type / Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Meadow, good	C	365,184	8.38	71	4.08	0.82	0.53	16,022
Impervious	-	14,000	0.32	98	0.20	0.04	2.34	2,730
Gravel	C	184606	4.24	96	0.42	0.08	2.13	32,764
TOTAL:		563,790	12.94					51,517

2-Year Volume Increase (ft^3): 26,814

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P + 0.8S)$ where
   P = 2-Year Rainfall (in)
   $S = (1000 / CN) - 10$

2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land use area (ft^2)

Worksheet 5. Structural BMP Volume Credits

PROJECT: Tamarack Compressor Station
SUB-BASIN: Drury Run North

Required Control Volume (ft^3) – *from Worksheet 4*: 2,550

Non-structural Volume Credit (ft^3) – *from Worksheet 3*: - 0
(maximum is 25% of required volume)

Structural Volume Reqmt (ft^3) 2,550

(Required Control Volume minus Non-structural Credit)

Proposed BMPs from PA Stormwater Best Management Practices Manual Chapter 6		Area (ft^2)	Volume Reduction Permanently Removed (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm	7,055	5,928
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin		
6.7.1	Riparian Buffer/Riparian Forest Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

Total Structural Volume (ft^3): 5,928

Structural Volume Requirement (ft^3): 2,550

DIFFERENCE 3,378

Worksheet 5. Structural BMP Volume Credits

PROJECT: Tamarack Compressor Station
SUB-BASIN: Drury Run South

Required Control Volume (ft^3) – *from Worksheet 4*: 26,814

Non-structural Volume Credit (ft^3) – *from Worksheet 3*: - 0
(maximum is 25% of required volume)

Structural Volume Reqmt (ft^3) 26,814

(Required Control Volume minus Non-structural Credit)

Proposed BMPs from PA Stormwater Best Management Practices Manual Chapter 6		Area (ft^2)	Volume Reduction Permanently Removed (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin	14,437	28,090
6.4.3	Infiltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well / Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond / Retention Basin		
6.7.1	Riparian Buffer/Riparian Forest Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
Other			

Total Structural Volume (ft^3): 28,090
Structural Volume Requirement (ft^3): 26,814
DIFFERENCE 1,276

Worksheet 10 – Water Quality Compliance for Nitrate		
Does the site design incorporate the following BMPs to address nitrate pollution? A summary "yes" rating is achieved if at least 2 Primary BMPs for nitrate are provided across the site or 4 secondary BMPs for nitrate are provided across the site (or the equivalent) "provided across the site" is taken to mean the specifications for that BMP set forward in Sections 5 and 6 are satisfied. Proposed BMPs from PA Stormwater Best Management Practices Manual Chapter 5 & 6		
	Yes	**No**
Primary BMPs for Nitrate:	☐	☐
NS BMP 5.4.2 – Protect/Conserve/Enhance Riparian Buffers	☐	☐
NS BMP 5.5.4 – Cluster Uses at Each Site	☐	☐
NS BMP 5.6.1 – Minimize Total Disturbed Area	☒	☐
NS BMP 5.6.3 – Re-Vegetate/Re-Forest Disturbed Areas (Native Species)	☒	☐
NS BMP 5.9.1 – Street Sweeping/Vacuuming	☐	☐
Structural BMP 6.7.1 – Riparian Buffer Restoration	☐	☐
Structural BMP 6.7.2 – Landscape Restoration	☐	☐
	☐	☐
Secondary BMPs for Nitrate:	☐	☐
NS BMP 5.4.1 – Protect Sensitive/Special Value Features	☐	☐
NS BMP 5.4.3 – Protect/Utilize Natural Drainage Features	☐	☐
NS BMP 5.6.2 – Minimize Soil Compaction	☐	☐
Structural BMP 6.4.5 – Rain Garden/Bioretention	☐	☐
Structural BMP 6.4.8 – Vegetated Swale	☐	☐
Structural BMP 6.4.9 – Vegetated Filter Strip	☐	☐
Structural BMP 6.6.1 – Constructed Wetland	☐	☐
Structural BMP 6.7.1 – Riparian Buffer Restoration	☐	☐
Structural BMP 6.7.2 – Landscape Restoration	☐	☐
Structural BMP 6.7.3 – Soils Amendment/Restoration	☐	☐

TAMARACK COMPRESSOR STATION
National Fuels Gas Supply Corporation
Leidy Township, Clinton County, Pennsylvania

Worksheet 10 Justification

PRIMARY BMPs FOR NITRATE:

NS BMP 5.6.1 – Minimize Total Disturbance Area

Summary:
Without changing the building program, you can reduce site grading, removal of existing vegetation (clearing and grubbing) and total soil disturbance. This eliminates the need for re-establishment of a new maintained landscape for the site and lot-by-lot, by modifying the proposed road system and other relevant infrastructure as well as the building location and elevations to better fit the existing topography.

Key Design Elements:

- **Identify and avoid special value and environmentally sensitive areas**
  - **Identify and map floodplains and riparian area**
    Drury Run is located a few hundred feet west of the site. Drury Run has a Chapter 93 designation of Exceptional Value. The project will not impact Drury Run or its riparian buffer.
  - **Identify and map wetlands**
    A large wetland is located a few hundred feet to the west of the site. The project will not impact this wetland.
  - **Identify and map woodlands**
    Woodlands have been shown on the mapping as treelines. Disturbance of the woodlands has been limited to the minimum possible while still having the site fulfill its intended use. The compressor pad is located on an area that is not woodlands. Also, disturbance of the woodlands in the proposed filter sock sediment trap and infiltration berm BMP area has been limited to cutting down isolated trees and not clear cutting.
  - **Identify and map natural flow pathways/drainage ways**
    Two natural drainage-ways pass through the site. The only impact to the northern drainage-way is an access road crossing. The compressor pad is location in the southern drainage-way. The site design includes a bypass system to carry upstream flows around the compressor station. The site was designed to maintain existing drainage patterns, not increase peak runoff rates, infiltrate increases in stormwater runoff volume, and not increase erosion in downstream watercourses.
  - **Identify and map steep slopes**
    No steep slopes were identified on the site.
  - **Identify and map other sensitive resources**
    No other sensitive resources were identified on the site.
- **Minimize overall disturbance at the site**
  The proposed limits of disturbance have been carefully chosen and the construction sequence created so as to limit the amount of earth disturbance to only what is required for construction. Limits of clearing and grading are located inside of the limits of disturbance. The limits of clearing and grading will be delineated with a visible barrier and the contractor will be required to minimize topsoil stripping, removal of existing vegetation, and soil compaction beyond this limit. The proposed limit of disturbance and limit of tree clearing/grading allow for the installation of the necessary road and pad associated with the project as well as for the proper installation and maintenance of proposed temporary and permanent BMPs associated with the site.

- **Minimize disturbance at the individual lot level**
  This project only consists of one lot and the disturbance has been minimized as described above.
- **Maximize soil restoration to restore permeabilities**
  Soil restoration is proposed through scarification of the subsoils in accordance with General Note 18 on Sheet 6.
- **Minimize construction-traffic locations**
  Construction traffic will be limited to the proposed access road during site development as well as once the site reaches its final stabilized condition. While vehicles may be required to leave the access road to complete grading work, BMP maintenance, etc. the access road is designed to be the main point of access for vehicles to enter and exit the site by.
- **Minimize stockpiling and storage areas**
  There is only one stockpile and temporary workspace proposed for the site. These are located in an area that will not impact woodlands, wetlands, or other sensitive resources. These areas have been defined so that excess staging and stockpiling limit the amount of site disturbance and soil compaction.

NS BMP 5.6.3 – Re-Vegetate / Re-Forest Disturbed Areas (Native Species)

Summary:
Sites that require landscaping and re-vegetation should select and use vegetation (i.e., native species) that does not require significant chemical maintenance by fertilizers, herbicides, and pesticides.

Key Design Elements:
- **Preserve all existing high-quality plant materials and soil mantle wherever possible.**
  All areas outside of the limits of grading are proposed to be preserved to the maximum extent possible.
- **Protect these areas during construction**
  The plan notes indicate that the contractor shall minimize compaction of soils and removal of existing vegetation to the maximum extent possible outside of the proposed limits of grading.
- **Develop landscape plan using native species**
  The restoration plan proposes that all disturbed areas will be restored to a meadow, good condition or better using a native seed mix. Specific requirements to achieve this are provided on Sheet 13.
- **Reduce landscape maintenance, especially grass mowing**
  Landscape maintenance has been reduced as much as possible by restoring areas outside proposed gravel surfaces to a meadowlike condition. The meadow is also proposed to have minimal mowing and maintenance.
- **Reduce or eliminate chemical applications to the site, wherever possible.**
  The site proposes to replant a meadowlike mixture that will require little to no chemical applications once the plantings establish themselves.
- **Reduce or eliminate fertilizer and chemical-based pest control programs, wherever possible**
  The site proposes to replant a meadowlike mixture that will require little to no fertilizer or chemical pest control applications once the plantings establish themselves.

Michael Baker INTERNATIONAL

Subject: Tamarack Compressor Station
Stage Storage

Computed by: BRF **Checked by:** GAH **Date:** Rev. Aug 2020

BMP 6.4.10: INFILTRATION BERM & RETENTIVE GRADING

INFILTRATION BERM

INFILTRATION BERM LENGTH (ft):	270

CONTOUR ELEVTION (ft)	CONTOUR AREA (ft^2)	AVERAGE CONTOUR AREA (ft^2)	INCR. VOLUME (ft^3)	TOTAL VOLUME (c.f.)
1,739.00	0	-	-	-
1,741.00	7,055	3528	7,055	7,055

TRAVEL TIME/Tc ADJUSTMENT:

(Per Chapter 8, page 39 of the PADEP Stormwater BMP Manual)

Total Storage =	7,055
2 year peak flow rate (from Hydraflow) =	1.41
Tc Unadjusted =	24.70
Extended Travel Time = (total storage / 2 year peak flow rate) + Tc	108.21 min

DEWATERING TIME:

Infiltration Area (measured in AutoCAD) =	7,055 sf
Infiltration Rate = 4.5 in/hr / factor of safety of 2 =	2.25 in/hr
Dewatering Time = (storage provided / infiltration area) x (12 in / 1 ft) / infiltration rate =	5 hr

Michael Baker INTERNATIONAL

Subject: Tamarack Compressor Station
Stage Storage

Computed by: APH **Checked by:** GAH **Date:** Rev. Aug 2020

BMP 6.4.2: INFILTRATION BERM & RETENTIVE GRADING

INFILTRATION BASIN

CONTOUR ELEVTION (ft)	CONTOUR AREA (ft^2)	AVERAGE CONTOUR AREA (ft^2)	INCR. VOLUME (ft^3)	TOTAL VOLUME (c.f.)
1,708.00	14,437	-	-	-
1,708.50	15,081	14759	7,380	7,380
1,709.00	15,731	15406	7,703	15,083
1,709.50	16,390	16061	8,030	23,113
1,709.80	16,789	16590	4,977	28,090
1,710.00	17,115	16952	3,390	31,480
1,711.50	23,137	20126	30,189	61,669
1,712.00	24,103	23620	11,810	73,479
1,713.20	26,480	25292	30,350	103,829
1,714.00	28,033	27257	21,805	125,634
1,715.00	30,119	29076	29,076	154,710

Top of infiltration storage zone

DEWATERING TIME:

Infiltration Area = 14,437

Infiltration Rate = 0.90 in/hr / factor of safety of 2 = 0.45

Dewatering Time = (WQ storage provided / infiltration area) x (12 in / 1 ft) / infiltration rate = 51.88 hr

LEGEND

- L/D — LIMIT OF DISTURBANCE
- MEADOW, GOOD CONDITION, TYPE B
- MEADOW, GOOD CONDITION, TYPE C
- FOREST, GOOD CONDITION, TYPE B
- FOREST, GOOD CONDITION, TYPE C

DRAINAGE DIVIDE

DRURY RUN NORTH WATERSHED

DRURY RUN SOUTH WATERSHED

REVISIONS

100 0 100 200

SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

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MICHAEL BAKER INTERNATIONAL
CONSULTING ENGINEERS
MOON TOWNSHIP, PENNSYLVANIA

TAMARACK COMPRESSOR STATION

PRE DEVELOPMENT STORMWATER VOLUME CALCULATION PLAN

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

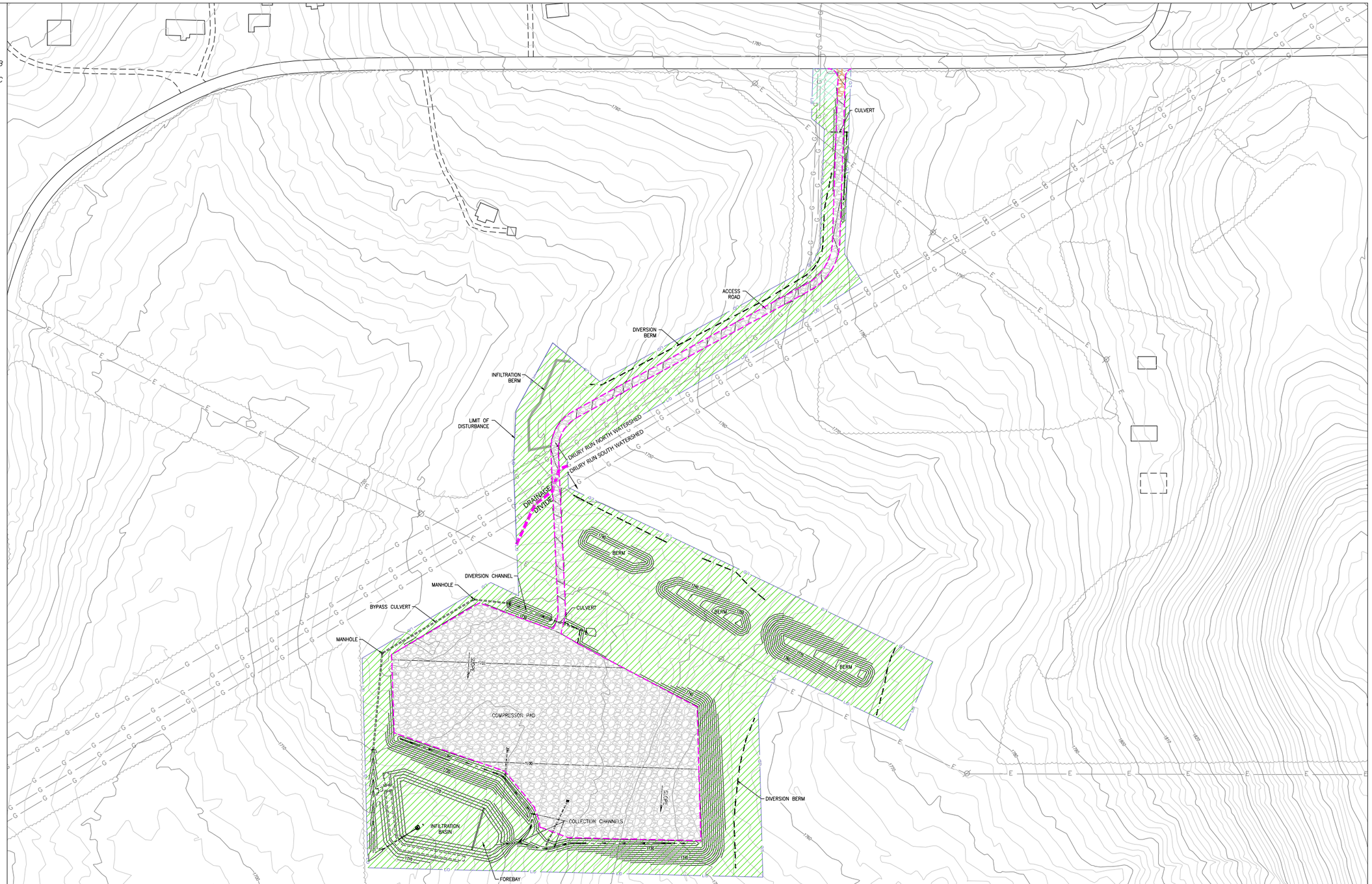
DATE: SEPTEMBER 2019

SHEET NO. 1 OF 2

LEGEND

- L/D — LIMIT OF DISTURBANCE
- MEADOW, GOOD CONDITION, TYPE B
- MEADOW, GOOD CONDITION, TYPE C
- IMPERVIOUS–GRAVEL, TYPE B
- IMPERVIOUS–GRAVEL, TYPE C

NOTE: IMPERVIOUS AREAS HAVE NOT BEEN SHOWN AS FINAL LOCATIONS HAVE NOT BEEN DETERMINED AT THIS TIME. HOWEVER, THE IMPERVIOUS AREAS WILL BE LOCATED WITHIN THE GRAVEL PAD AREA AND HAVE BEEN ACCOUNTED FOR WITHIN THE PCSM CALCULATIONS.



REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

100 0 100 200

SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
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MOON TOWNSHIP, PENNSYLVANIA

TAMARACK COMPRESSOR STATION

POST DEVELOPMENT STORMWATER VOLUME CALCULATION PLAN

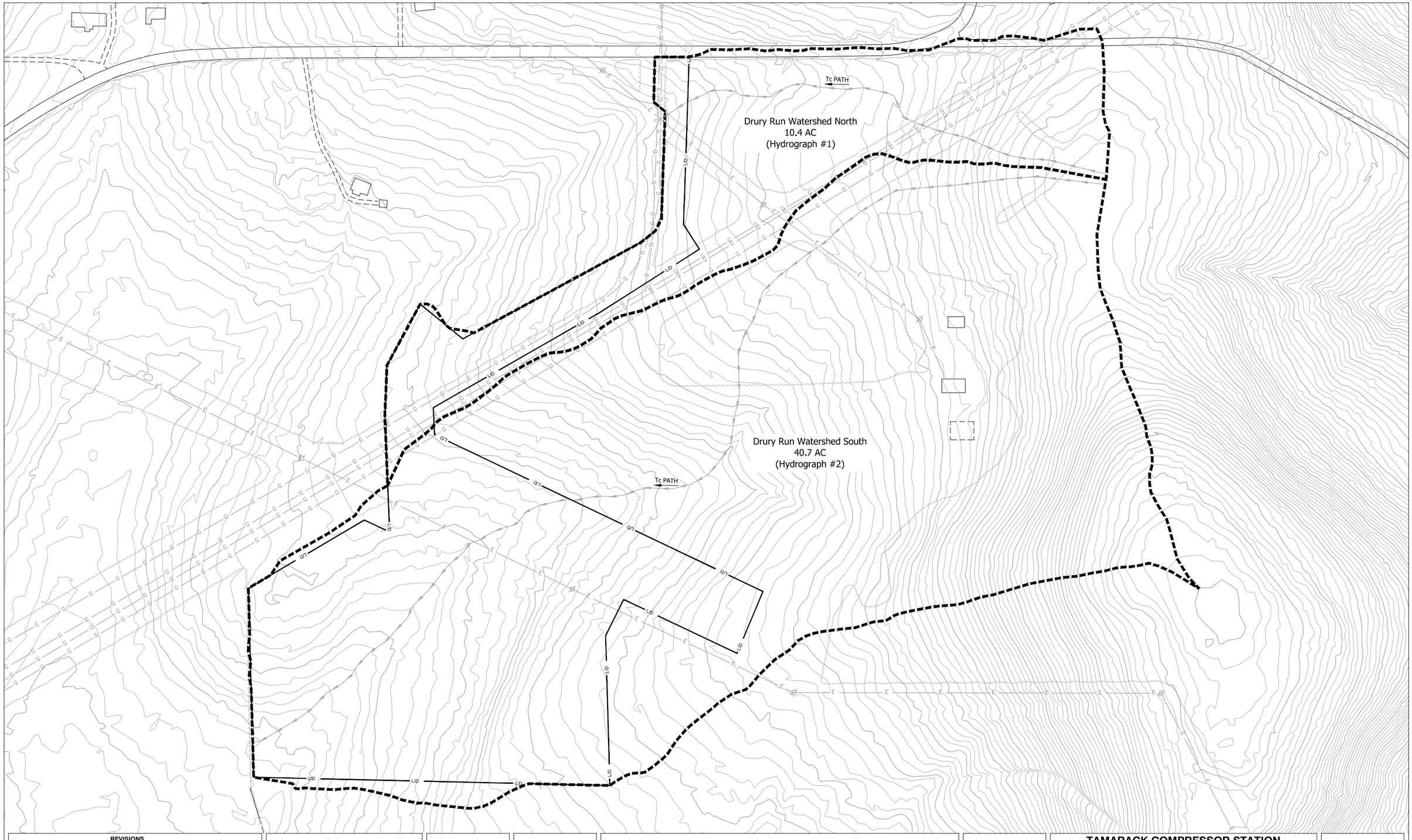
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO. 2 OF 2

Peak Rate Calculations



REVISIONS

100 0 100 200
SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
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TAMARACK COMPRESSOR STATION

PRE DEVELOPMENT STORMWATER RATE CALCULATION PLAN

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO.
1
OF 2

DRURY RUN NORTH
UNCONTROLLED DRAINAGE
AREA 2 = 0.18 AC
(Hydrograph #5)

Tc PATH

DRURY RUN NORTH
UNCONTROLLED DRAINAGE
AREA 1 = 6.85 AC
(Hydrograph #4)

Tc PATH

DRAINAGE AREA TO
INFILTRATION BERM = 2.5 AC
(Hydrograph #788)

DRURY RUN NORTH
UNCONTROLLED DRAINAGE
AREA 3 = 0.78 AC
(Hydrograph #6)

DRURY RUN SOUTH
BYPASS DRAINAGE AREA = 30.1 AC
(Hydrograph #14)

Tc PATH

DRURY RUN SOUTH
UNCONTROLLED DRAINAGE
AREA = 1.11 AC
(Hydrograph #15)

DRAINAGE AREA TO
Infiltration Basin = 7.85 AC
(Hydrograph #11)

Tc PATH

Tc PATH

DRAINAGE AREA TO
DIVERSION BERM = 1.8 AC
(Hydrograph #13)

REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

100 0 100 200
SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
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TAMARACK COMPRESSOR STATION

POST DEVELOPMENT STORMWATER RATE CALCULATION PLAN

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

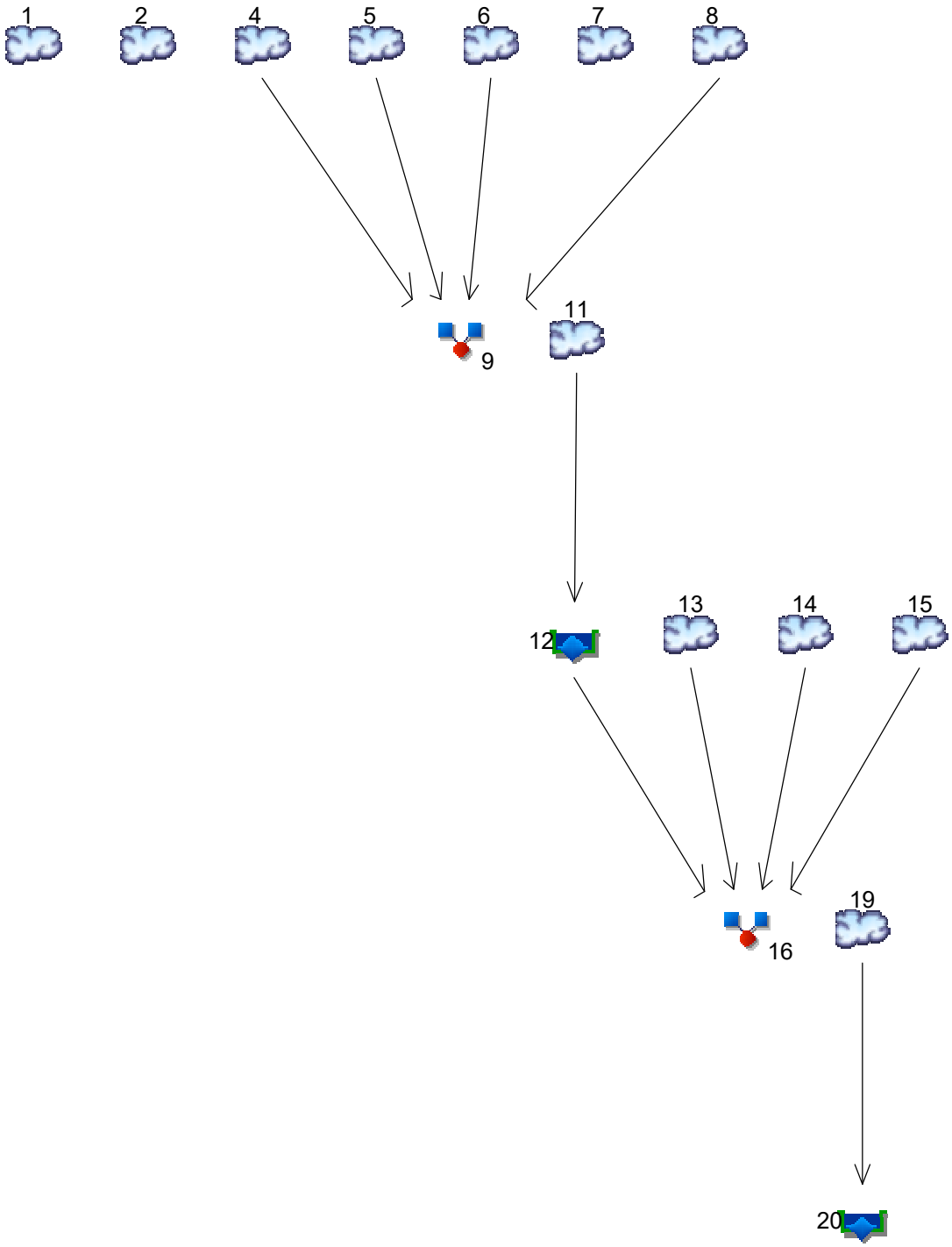
SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO.
2
OF 2

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2



Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	0.656	1.548	-------	3.333	5.173	8.259	11.18	14.60	PRE_Drury Run_North
2	SCS Runoff	------	2.879	6.339	-------	13.07	19.92	31.25	41.95	54.43	PRE_Drury Run_South
4	SCS Runoff	------	0.282	0.749	-------	1.770	2.868	4.753	6.584	8.743	POST_Drury Run North Uncontrolled
5	SCS Runoff	------	0.086	0.152	-------	0.258	0.354	0.504	0.640	0.794	POST_Drury Run North Uncontrolled
6	SCS Runoff	------	0.319	0.568	-------	0.970	1.338	1.910	2.431	3.036	POST_Drury Run North Uncontrolled
7	SCS Runoff	------	0.830	1.419	-------	2.365	3.225	4.557	5.775	7.163	POST_Flow to Infiltration Berm
8	SCS Runoff	------	0.301	0.508	-------	0.856	1.181	1.689	2.152	2.680	POST_Flow to Infiltration Berm_adj tc
9	Combine	4, 5, 6, 8	0.590	1.171	-------	2.415	3.752	6.038	8.213	10.77	POST_Total Drury Run North
11	SCS Runoff	------	7.259	9.899	-------	13.76	17.05	21.89	26.08	30.69	POST_Flow to Basin
12	Reservoir	11	0.334	0.429	-------	0.544	0.813	2.412	4.483	6.142	POST_Through Basin
13	SCS Runoff	------	0.392	0.739	-------	1.338	1.894	2.770	3.571	4.499	POST_Diversion Berm Flow
14	SCS Runoff	------	1.448	3.531	-------	7.887	12.50	20.32	27.85	36.71	POST_Drury Run South Bypass
15	SCS Runoff	------	0.533	0.939	-------	1.590	2.185	3.109	3.945	4.895	POST_Drury Run South Uncontrolled
16	Combine	12, 13, 14, 15	1.911	4.341	-------	9.164	14.18	23.33	33.90	45.17	POST_Total Drury Run South
19	SCS Runoff	------	0.301	0.508	-------	0.856	1.181	1.689	2.152	2.680	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	19	0.000	0.000	-------	0.121	0.556	1.401	2.015	2.653	POST_Infiltration Berm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.656	2	754	7,476	------	------	------	PRE_Drury Run_North
2	SCS Runoff	2.879	2	758	33,160	------	------	------	PRE_Drury Run_South
4	SCS Runoff	0.282	2	760	3,892	------	------	------	POST_Drury Run North Uncontrolled
5	SCS Runoff	0.086	2	718	201	------	------	------	POST_Drury Run North Uncontrolled
6	SCS Runoff	0.319	2	722	1,045	------	------	------	POST_Drury Run North Uncontrolled
7	SCS Runoff	0.830	2	730	3,862	------	------	------	POST_Flow to Infiltration Berm
8	SCS Runoff	0.301	2	786	3,908	------	------	------	POST_Flow to Infiltration Berm_adj tc
9	Combine	0.590	2	776	9,046	4, 5, 6, 8	------	------	POST_Total Drury Run North
11	SCS Runoff	7.259	2	728	27,044	------	------	------	POST_Flow to Basin
12	Reservoir	0.334	2	944	21,826	11	1710.43	40,039	POST_Through Basin
13	SCS Runoff	0.392	2	732	2,098	------	------	------	POST_Diversion Berm Flow
14	SCS Runoff	1.448	2	764	19,617	------	------	------	POST_Drury Run South Bypass
15	SCS Runoff	0.533	2	718	1,239	------	------	------	POST_Drury Run South Uncontrolled
16	Combine	1.911	2	762	44,781	12, 13, 14, 15	------	------	POST_Total Drury Run South
19	SCS Runoff	0.301	2	786	3,908	------	------	------	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	0.000	2	n/a	0	19	1740.11	3,908	POST_Infiltration Berm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.548	2	746	13,256	------	------	------	PRE_Drury Run_North
2	SCS Runoff	6.339	2	750	57,439	------	------	------	PRE_Drury Run_South
4	SCS Runoff	0.749	2	748	7,277	------	------	------	POST_Drury Run North Uncontrolled
5	SCS Runoff	0.152	2	718	322	------	------	------	POST_Drury Run North Uncontrolled
6	SCS Runoff	0.568	2	722	1,651	------	------	------	POST_Drury Run North Uncontrolled
7	SCS Runoff	1.419	2	730	5,928	------	------	------	POST_Flow to Infiltration Berm
8	SCS Runoff	0.508	2	782	5,998	------	------	------	POST_Flow to Infiltration Berm_adj tc
9	Combine	1.171	2	762	15,248	4, 5, 6, 8	------	------	POST_Total Drury Run North
11	SCS Runoff	9.899	2	728	36,490	------	------	------	POST_Flow to Basin
12	Reservoir	0.429	2	942	31,250	11	1710.75	46,527	POST_Through Basin
13	SCS Runoff	0.739	2	730	3,367	------	------	------	POST_Diversion Berm Flow
14	SCS Runoff	3.531	2	754	35,674	------	------	------	POST_Drury Run South Bypass
15	SCS Runoff	0.939	2	718	1,989	------	------	------	POST_Drury Run South Uncontrolled
16	Combine	4.341	2	748	72,280	12, 13, 14, 15	------	------	POST_Total Drury Run South
19	SCS Runoff	0.508	2	782	5,998	------	------	------	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	0.000	2	n/a	0	19	1740.70	5,998	POST_Infiltration Berm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.333	2	744	23,304	------	------	------	PRE_Drury Run_North
2	SCS Runoff	13.07	2	748	99,189	------	------	------	PRE_Drury Run_South
4	SCS Runoff	1.770	2	744	13,323	------	------	------	POST_Drury Run North Uncontrolled
5	SCS Runoff	0.258	2	718	523	------	------	------	POST_Drury Run North Uncontrolled
6	SCS Runoff	0.970	2	722	2,642	------	------	------	POST_Drury Run North Uncontrolled
7	SCS Runoff	2.365	2	730	9,251	------	------	------	POST_Flow to Infiltration Berm
8	SCS Runoff	0.856	2	780	9,361	------	------	------	POST_Flow to Infiltration Berm_adj tc
9	Combine	2.415	2	748	25,850	4, 5, 6, 8	------	------	POST_Total Drury Run North
11	SCS Runoff	13.76	2	728	50,501	------	------	------	POST_Flow to Basin
12	Reservoir	0.544	2	950	45,230	11	1711.25	56,619	POST_Through Basin
13	SCS Runoff	1.338	2	730	5,463	------	------	------	POST_Diversion Berm Flow
14	SCS Runoff	7.887	2	748	63,980	------	------	------	POST_Drury Run South Bypass
15	SCS Runoff	1.590	2	718	3,227	------	------	------	POST_Drury Run South Uncontrolled
16	Combine	9.164	2	748	117,899	12, 13, 14, 15	------	------	POST_Total Drury Run South
19	SCS Runoff	0.856	2	780	9,361	------	------	------	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	0.121	2	1030	2,306	19	1741.00	7,062	POST_Infiltration Berm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.173	2	744	33,041	------	------	------	PRE_Drury Run_North
2	SCS Runoff	19.92	2	748	139,312	------	------	------	PRE_Drury Run_South
4	SCS Runoff	2.868	2	744	19,278	------	------	------	POST_Drury Run North Uncontrolled
5	SCS Runoff	0.354	2	718	711	------	------	------	POST_Drury Run North Uncontrolled
6	SCS Runoff	1.338	2	722	3,563	------	------	------	POST_Drury Run North Uncontrolled
7	SCS Runoff	3.225	2	730	12,299	------	------	------	POST_Flow to Infiltration Berm
8	SCS Runoff	1.181	2	780	12,445	------	------	------	POST_Flow to Infiltration Berm_adj tc
9	Combine	3.752	2	744	35,997	4, 5, 6, 8	------	------	POST_Total Drury Run North
11	SCS Runoff	17.05	2	728	62,598	------	------	------	POST_Flow to Basin
12	Reservoir	0.813	2	890	57,305	11	1711.62	64,418	POST_Through Basin
13	SCS Runoff	1.894	2	730	7,421	------	------	------	POST_Diversion Berm Flow
14	SCS Runoff	12.50	2	748	91,616	------	------	------	POST_Drury Run South Bypass
15	SCS Runoff	2.185	2	718	4,383	------	------	------	POST_Drury Run South Uncontrolled
16	Combine	14.18	2	746	160,725	12, 13, 14, 15	------	------	POST_Total Drury Run South
19	SCS Runoff	1.181	2	780	12,445	------	------	------	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	0.556	2	860	5,390	19	1741.01	7,089	POST_Infiltration Berm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	8.259	2	742	48,910	------	------	------	PRE_Drury Run_North
2	SCS Runoff	31.25	2	746	204,322	------	------	------	PRE_Drury Run_South
4	SCS Runoff	4.753	2	742	29,108	------	------	------	POST_Drury Run North Uncontrolled
5	SCS Runoff	0.504	2	718	1,008	------	------	------	POST_Drury Run North Uncontrolled
6	SCS Runoff	1.910	2	722	5,015	------	------	------	POST_Drury Run North Uncontrolled
7	SCS Runoff	4.557	2	730	17,063	------	------	------	POST_Flow to Infiltration Berm
8	SCS Runoff	1.689	2	780	17,266	------	------	------	POST_Flow to Infiltration Berm_adj tc
9	Combine	6.038	2	744	52,398	4, 5, 6, 8	------	------	POST_Total Drury Run North
11	SCS Runoff	21.89	2	728	80,631	------	------	------	POST_Flow to Basin
12	Reservoir	2.412	2	778	75,332	11	1711.88	70,679	POST_Through Basin
13	SCS Runoff	2.770	2	730	10,527	------	------	------	POST_Diversion Berm Flow
14	SCS Runoff	20.32	2	748	136,933	------	------	------	POST_Drury Run South Bypass
15	SCS Runoff	3.109	2	718	6,217	------	------	------	POST_Drury Run South Uncontrolled
16	Combine	23.33	2	748	229,010	12, 13, 14, 15	------	------	POST_Total Drury Run South
19	SCS Runoff	1.689	2	780	17,266	------	------	------	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	1.401	2	814	10,211	19	1741.01	7,142	POST_Infiltration Berm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	11.18	2	742	63,878	------	------	------	PRE_Drury Run_North
2	SCS Runoff	41.95	2	746	265,356	------	------	------	PRE_Drury Run_South
4	SCS Runoff	6.584	2	742	38,472	------	------	------	POST_Drury Run North Uncontrolled
5	SCS Runoff	0.640	2	718	1,283	------	------	------	POST_Drury Run North Uncontrolled
6	SCS Runoff	2.431	2	720	6,350	------	------	------	POST_Drury Run North Uncontrolled
7	SCS Runoff	5.775	2	728	21,409	------	------	------	POST_Flow to Infiltration Berm
8	SCS Runoff	2.152	2	778	21,663	------	------	------	POST_Flow to Infiltration Berm_adj tc
9	Combine	8.213	2	744	67,768	4, 5, 6, 8	------	------	POST_Total Drury Run North
11	SCS Runoff	26.08	2	728	96,465	------	------	------	POST_Flow to Basin
12	Reservoir	4.483	2	758	91,163	11	1712.15	77,205	POST_Through Basin
13	SCS Runoff	3.571	2	730	13,393	------	------	------	POST_Diversion Berm Flow
14	SCS Runoff	27.85	2	746	179,887	------	------	------	POST_Drury Run South Bypass
15	SCS Runoff	3.945	2	718	7,909	------	------	------	POST_Drury Run South Uncontrolled
16	Combine	33.90	2	746	292,351	12, 13, 14, 15	------	------	POST_Total Drury Run South
19	SCS Runoff	2.152	2	778	21,663	------	------	------	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	2.015	2	796	14,608	19	1741.02	7,180	POST_Infiltration Berm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	14.60	2	742	81,449	------	------	------	PRE_Drury Run_North
2	SCS Runoff	54.43	2	746	336,765	------	------	------	PRE_Drury Run_South
4	SCS Runoff	8.743	2	742	49,543	------	------	------	POST_Drury Run North Uncontrolled
5	SCS Runoff	0.794	2	718	1,600	------	------	------	POST_Drury Run North Uncontrolled
6	SCS Runoff	3.036	2	720	7,888	------	------	------	POST_Drury Run North Uncontrolled
7	SCS Runoff	7.163	2	728	26,387	------	------	------	POST_Flow to Infiltration Berm
8	SCS Runoff	2.680	2	778	26,701	------	------	------	POST_Flow to Infiltration Berm_adj tc
9	Combine	10.77	2	742	85,731	4, 5, 6, 8	------	------	POST_Total Drury Run North
11	SCS Runoff	30.69	2	728	114,115	------	------	------	POST_Flow to Basin
12	Reservoir	6.142	2	756	108,809	11	1712.48	85,510	POST_Through Basin
13	SCS Runoff	4.499	2	728	16,704	------	------	------	POST_Diversion Berm Flow
14	SCS Runoff	36.71	2	746	230,487	------	------	------	POST_Drury Run South Bypass
15	SCS Runoff	4.895	2	718	9,865	------	------	------	POST_Drury Run South Uncontrolled
16	Combine	45.17	2	746	365,865	12, 13, 14, 15	------	------	POST_Total Drury Run South
19	SCS Runoff	2.680	2	778	26,701	------	------	------	POST_Flow to Infiltration Berm_adj tc
20	Reservoir	2.653	2	782	19,646	19	1741.02	7,219	POST_Infiltration Berm

2.52 ft Freeboard for 100-year storm

Pre-development
Peak Rate Calculations

TR55 Tc Worksheet

Hyd. No. 1

PRE_Drury Run_North

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.240		0.400		
Flow length (ft)	= 70.0		60.0		20.0		
Two-year 24-hr precip. (in)	= 2.57		2.57		2.57		
Land slope (%)	= 1.00		1.00		12.00		
Travel Time (min)	**= 23.77**	**+**	**13.96**	**+**	**3.23**	**=**	**40.96**
Shallow Concentrated Flow							
Flow length (ft)	= 920.00		0.00		0.00		
Watercourse slope (%)	= 6.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.95		0.00		0.00		
Travel Time (min)	**= 3.88**	**+**	**0.00**	**+**	**0.00**	**=**	**3.88**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 44.80 min

TR55 Tc Worksheet

Hyd. No. 2

PRE_Drury Run_South

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.240		0.400		
Flow length (ft)	= 95.0		35.0		20.0		
Two-year 24-hr precip. (in)	= 2.57		2.57		2.57		
Land slope (%)	= 1.00		1.00		12.00		
Travel Time (min)	**= 30.35**	**+**	**9.07**	**+**	**3.23**	**=**	**42.65**
Shallow Concentrated Flow							
Flow length (ft)	= 2385.00		0.00		0.00		
Watercourse slope (%)	= 5.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.61		0.00		0.00		
Travel Time (min)	**= 11.02**	**+**	**0.00**	**+**	**0.00**	**=**	**11.02**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 53.70 min

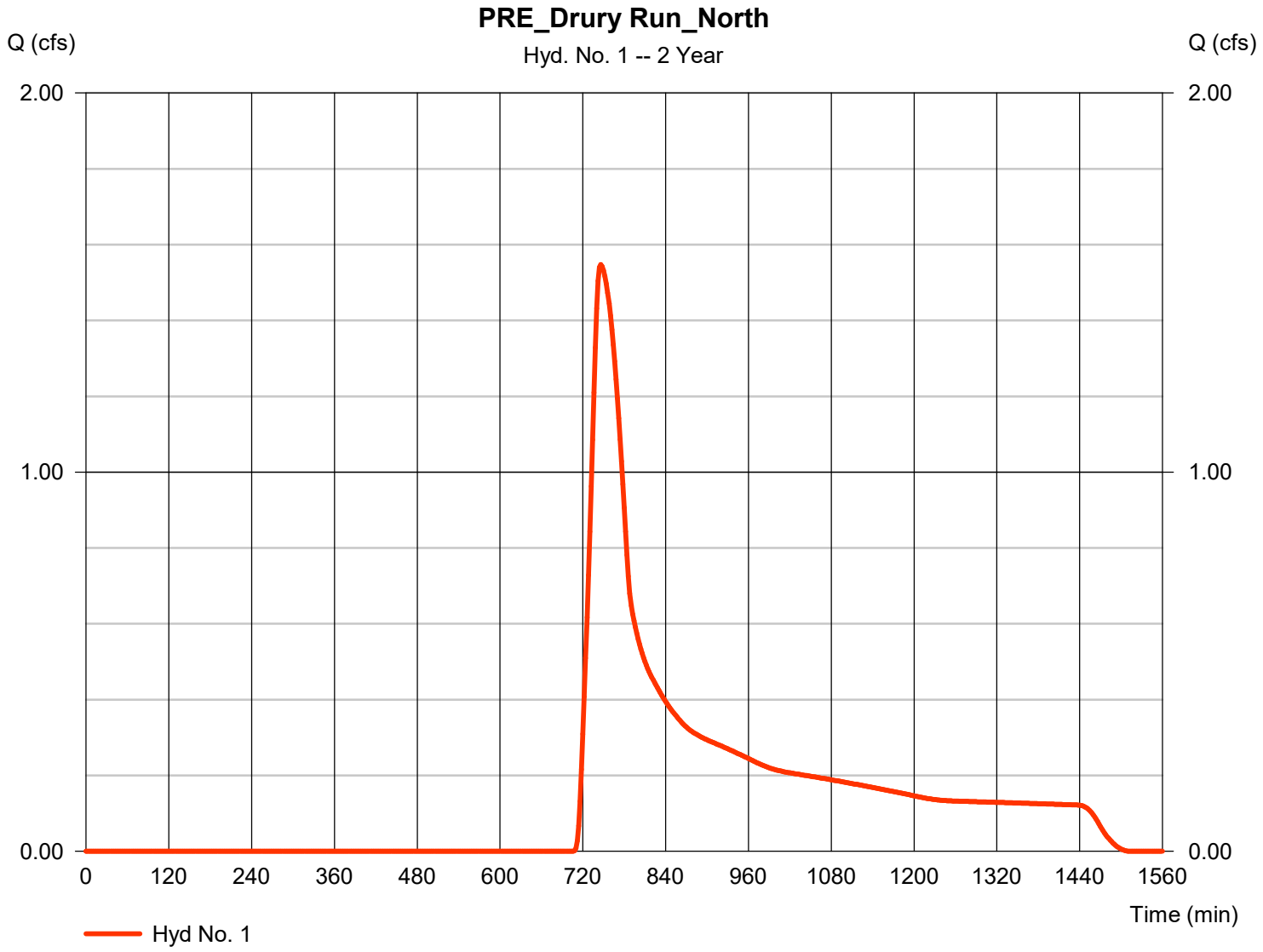
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 3 / 2019

Hyd. No. 1

PRE_Drury Run_North

Hydrograph type	= SCS Runoff	Peak discharge	= 1.548 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 13,256 cuft
Drainage area	= 10.400 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 44.80 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



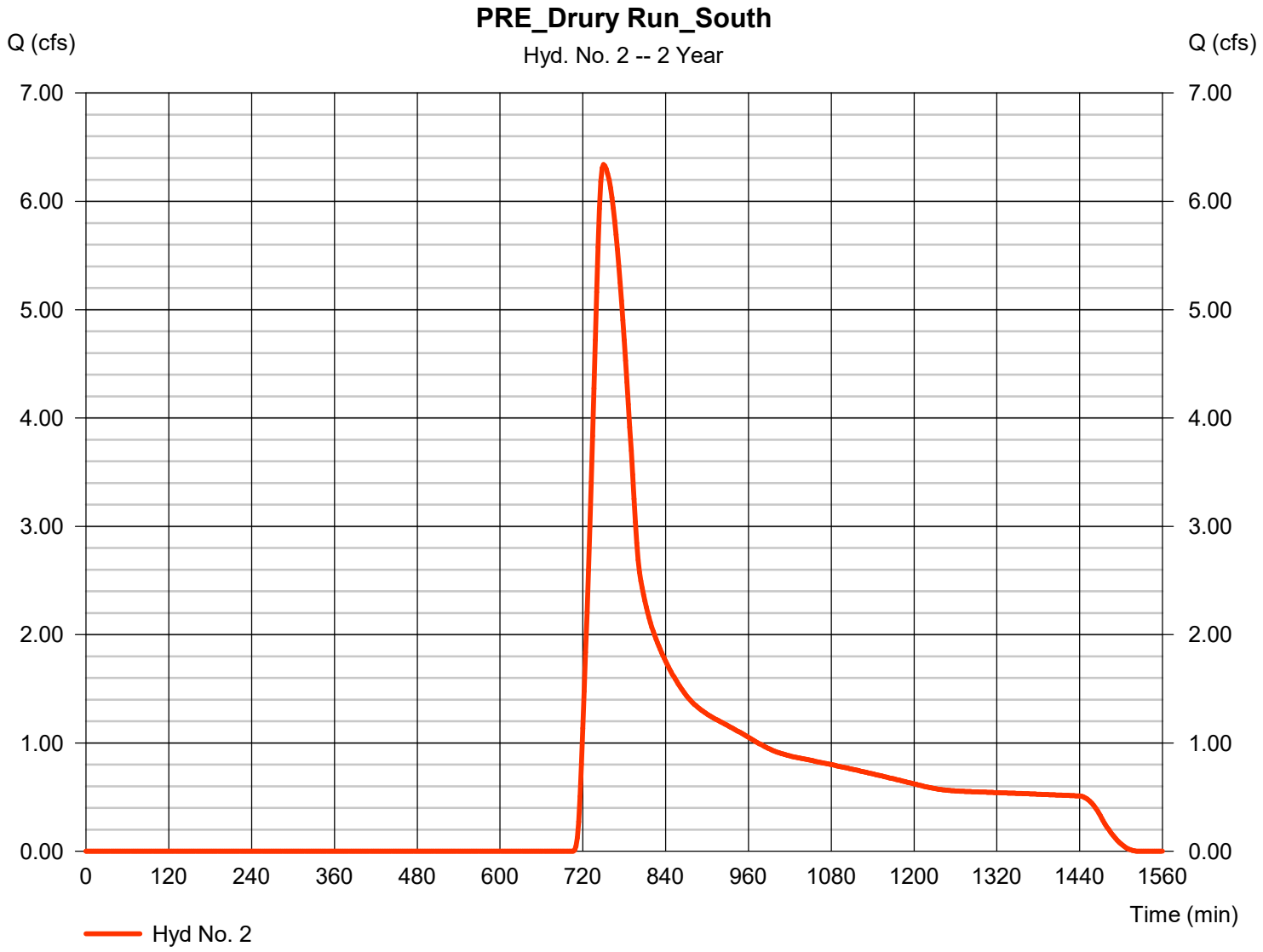
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 3 / 2019

Hyd. No. 2

PRE_Drury Run_South

Hydrograph type	= SCS Runoff	Peak discharge	= 6.339 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 57,439 cuft
Drainage area	= 40.700 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 53.70 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Post-development
Peak Rate Calculations

TR55 Tc Worksheet

Hyd. No. 4

POST_Drury Run North Uncontrolled 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.240		0.400		
Flow length (ft)	= 70.0		60.0		20.0		
Two-year 24-hr precip. (in)	= 2.57		2.57		2.57		
Land slope (%)	= 1.00		1.00		12.00		
Travel Time (min)	**= 23.77**	**+**	**13.96**	**+**	**3.23**	**=**	**40.96**
Shallow Concentrated Flow							
Flow length (ft)	= 865.00		25.00		0.00		
Watercourse slope (%)	= 6.00		6.00		0.00		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=3.95		3.95		0.00		
Travel Time (min)	**= 3.65**	**+**	**0.11**	**+**	**0.00**	**=**	**3.75**
Channel Flow							
X sectional flow area (sqft)	= 0.79		0.00		0.00		
Wetted perimeter (ft)	= 3.14		0.00		0.00		
Channel slope (%)	= 5.00		0.00		0.00		
Manning's n-value	= 0.024		0.015		0.015		
Velocity (ft/s)	=5.51						
			0.00				
					0.00		
Flow length (ft)	({0})40.0		0.0		0.0		
Travel Time (min)	**= 0.12**	**+**	**0.00**	**+**	**0.00**	**=**	**0.12**

Total Travel Time, Tc ..... 44.80 min

TR55 Tc Worksheet

Hyd. No. 5

POST_Drury Run North Uncontrolled 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.240		0.400		
Flow length (ft)	= 22.0		28.0		0.0		
Two-year 24-hr precip. (in)	= 2.57		2.57		0.00		
Land slope (%)	= 5.00		8.00		0.00		
Travel Time (min)	**= 0.28**	**+**	**3.30**	**+**	**0.00**	**=**	**3.58**
Shallow Concentrated Flow							
Flow length (ft)	= 232.00		0.00		0.00		
Watercourse slope (%)	= 8.50		0.00		0.00		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=4.70		0.00		0.00		
Travel Time (min)	**= 0.82**	**+**	**0.00**	**+**	**0.00**	**=**	**0.82**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.024		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.40 min

TR55 Tc Worksheet

Hyd. No. 6

POST_Drury Run North Uncontrolled 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.240		0.400		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.57		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 7.78**	**+**	**0.00**	**+**	**0.00**	**=**	**7.78**
Shallow Concentrated Flow							
Flow length (ft)	= 419.00		16.00		74.00		
Watercourse slope (%)	= 6.00		6.00		3.50		
Surface description	= Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=3.95		4.98		3.02		
Travel Time (min)	**= 1.77**	**+**	**0.05**	**+**	**0.41**	**=**	**2.23**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.024		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 10.00 min

TR55 Tc Worksheet

Hyd. No. 7

POST_Flow to Infiltration Berm

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.240		0.000		
Flow length (ft)	= 125.0		10.0		0.0		
Two-year 24-hr precip. (in)	= 2.57		2.57		0.00		
Land slope (%)	= 5.00		5.00		0.00		
Travel Time (min)	**= 19.86**	**+**	**1.75**	**+**	**0.00**	**=**	**21.60**
Shallow Concentrated Flow							
Flow length (ft)	= 20.00		20.00		650.00		
Watercourse slope (%)	= 5.00		10.00		5.00		
Surface description	= Paved		Unpaved		Unpaved		
Average velocity (ft/s)	=4.55		5.10		3.61		
Travel Time (min)	**= 0.07**	**+**	**0.07**	**+**	**3.00**	**=**	**3.14**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 24.70 min

TR55 Tc Worksheet

Hyd. No. 11

POST_Flow to Basin

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.240		0.011		
Flow length (ft)	= 110.0		40.0		0.0		
Two-year 24-hr precip. (in)	= 2.57		2.57		0.00		
Land slope (%)	= 6.00		5.00		0.00		
Travel Time (min)	**= 16.66**	**+**	**5.30**	**+**	**0.00**	**=**	**21.97**
Shallow Concentrated Flow							
Flow length (ft)	= 165.00		30.00		290.00		
Watercourse slope (%)	= 9.00		50.00		1.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=4.84		11.41		2.03		
Travel Time (min)	**= 0.57**	**+**	**0.04**	**+**	**2.38**	**=**	**2.99**
Channel Flow							
X sectional flow area (sqft)	= 7.50		7.50		0.00		
Wetted perimeter (ft)	= 8.70		8.70		0.00		
Channel slope (%)	= 1.00		6.00		0.00		
Manning's n-value	= 0.035		0.035		0.015		
Velocity (ft/s)	=3.85						
			9.44				
					0.00		
Flow length (ft)	({0})285.0		140.0		0.0		
Travel Time (min)	**= 1.23**	**+**	**0.25**	**+**	**0.00**	**=**	**1.48**

Total Travel Time, Tc ..... 26.40 min

TR55 Tc Worksheet

Hyd. No. 13

POST_Diversion Berm Flow

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.400	0.240	0.011	
Flow length (ft)	= 130.0	20.0	0.0	
Two-year 24-hr precip. (in)	= 2.57	2.57	0.00	
Land slope (%)	= 5.00	7.00	0.00	
Travel Time (min)	**= 20.49 +**	**2.66 +**	**0.00 =**	**23.15**
Shallow Concentrated Flow				
Flow length (ft)	= 55.00	240.00	0.00	
Watercourse slope (%)	= 5.00	3.00	0.00	
Surface description	= Unpaved	Unpaved	Paved	
Average velocity (ft/s)	=3.61	2.79	0.00	
Travel Time (min)	**= 0.25 +**	**1.43 +**	**0.00 =**	**1.69**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00			
		0.00		
			0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	**= 0.00 +**	**0.00 +**	**0.00 =**	**0.00**

Total Travel Time, Tc ..... 24.80 min

TR55 Tc Worksheet

Hyd. No. 14

POST_Drury Run South Bypass

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.240		0.400		
Flow length (ft)	= 95.0		35.0		20.0		
Two-year 24-hr precip. (in)	= 2.57		2.57		2.57		
Land slope (%)	= 1.00		1.00		12.00		
Travel Time (min)	**= 30.35**	**+**	**9.07**	**+**	**3.23**	**=**	**42.65**
Shallow Concentrated Flow							
Flow length (ft)	= 1810.00		0.00		0.00		
Watercourse slope (%)	= 5.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.61		0.00		0.00		
Travel Time (min)	**= 8.36**	**+**	**0.00**	**+**	**0.00**	**=**	**8.36**
Channel Flow							
X sectional flow area (sqft)	= 3.14		6.00		0.00		
Wetted perimeter (ft)	= 6.28		7.70		0.00		
Channel slope (%)	= 1.00		3.00		0.00		
Manning's n-value	= 0.013		0.035		0.015		
Velocity (ft/s)	=7.20						
			6.24				
					0.00		
Flow length (ft)	({0})620.0		225.0		0.0		
Travel Time (min)	**= 1.43**	**+**	**0.60**	**+**	**0.00**	**=**	**2.04**

Total Travel Time, Tc ..... 53.00 min

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 24 / 2020

Pond No. 1 - Infiltration Basin

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1708.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1708.00	14,437	0	0
0.50	1708.50	15,081	7,380	7,380
1.00	1709.00	15,731	7,703	15,083
1.50	1709.50	16,390	8,030	23,113
1.80	1709.80	16,790	4,978	28,091
2.00	1710.00	17,115	3,390	31,480
3.50	1711.50	23,137	30,189	61,669
4.00	1712.00	24,103	11,810	73,479
5.20	1713.20	26,480	30,349	103,828
6.00	1714.00	28,033	21,807	125,634
7.00	1715.00	30,119	29,076	154,710

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.00	8.00	0.00
Span (in)	= 15.00	3.00	8.00	0.00
No. Barrels	= 1	2	4	0
Invert El. (ft)	= 1708.00	1709.80	1711.50	0.00
Length (ft)	= 50.00	1.00	1.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	8.00	0.00	0.00
Crest El. (ft)	= 1713.20	1713.80	0.00	0.00
Weir Coeff.	= 3.33	2.70	3.33	3.33
Weir Type	= Rect	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1708.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.50	7,380	1708.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
1.00	15,083	1709.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
1.50	23,113	1709.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
1.80	28,091	1709.80	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
2.00	31,480	1710.00	0.13 ic	0.13 ic	0.00	---	0.00	0.00	---	---	---	---	0.128
3.50	61,669	1711.50	0.59 ic	0.59 ic	0.00	---	0.00	0.00	---	---	---	---	0.593
4.00	73,479	1712.00	3.40 ic	0.68 ic	2.72 ic	---	0.00	0.00	---	---	---	---	3.402
5.20	103,828	1713.20	8.60 ic	0.74 ic	7.86 ic	---	0.00	0.00	---	---	---	---	8.599
6.00	125,634	1714.00	13.63 ic	0.11 ic	1.59 ic	---	11.92 s	1.93	---	---	---	---	15.55
7.00	154,710	1715.00	14.91 ic	0.04 ic	0.61 ic	---	14.19 s	28.39	---	---	---	---	43.24

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Pond No. 3 - Infiltration Berm

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1739.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1739.00	00	0	0
2.00	1741.00	7,055	7,055	7,055
2.50	1741.50	7,055	3,528	10,583

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 196.00	0.00	0.00	0.00
Crest El. (ft)	= 1741.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1739.00	---	---	---	---	0.00	---	---	---	---	---	0.000
2.00	7,055	1741.00	---	---	---	---	0.00	---	---	---	---	---	0.000
2.50	10,583	1741.50	---	---	---	---	180.17	---	---	---	---	---	180.17

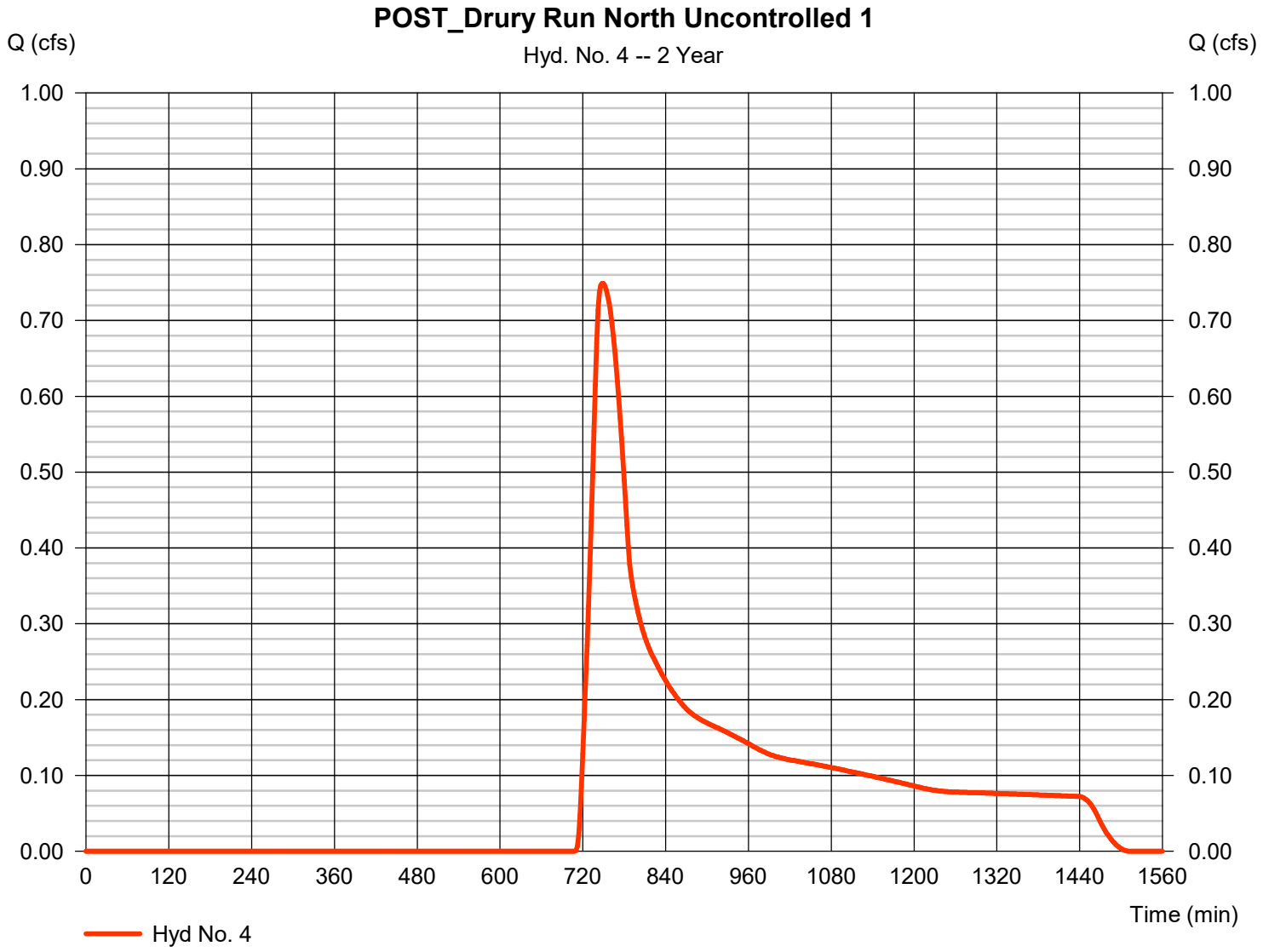
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 4

POST_Drury Run North Uncontrolled 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.749 cfs
Storm frequency	= 2 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 7,277 cuft
Drainage area	= 6.850 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 44.80 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



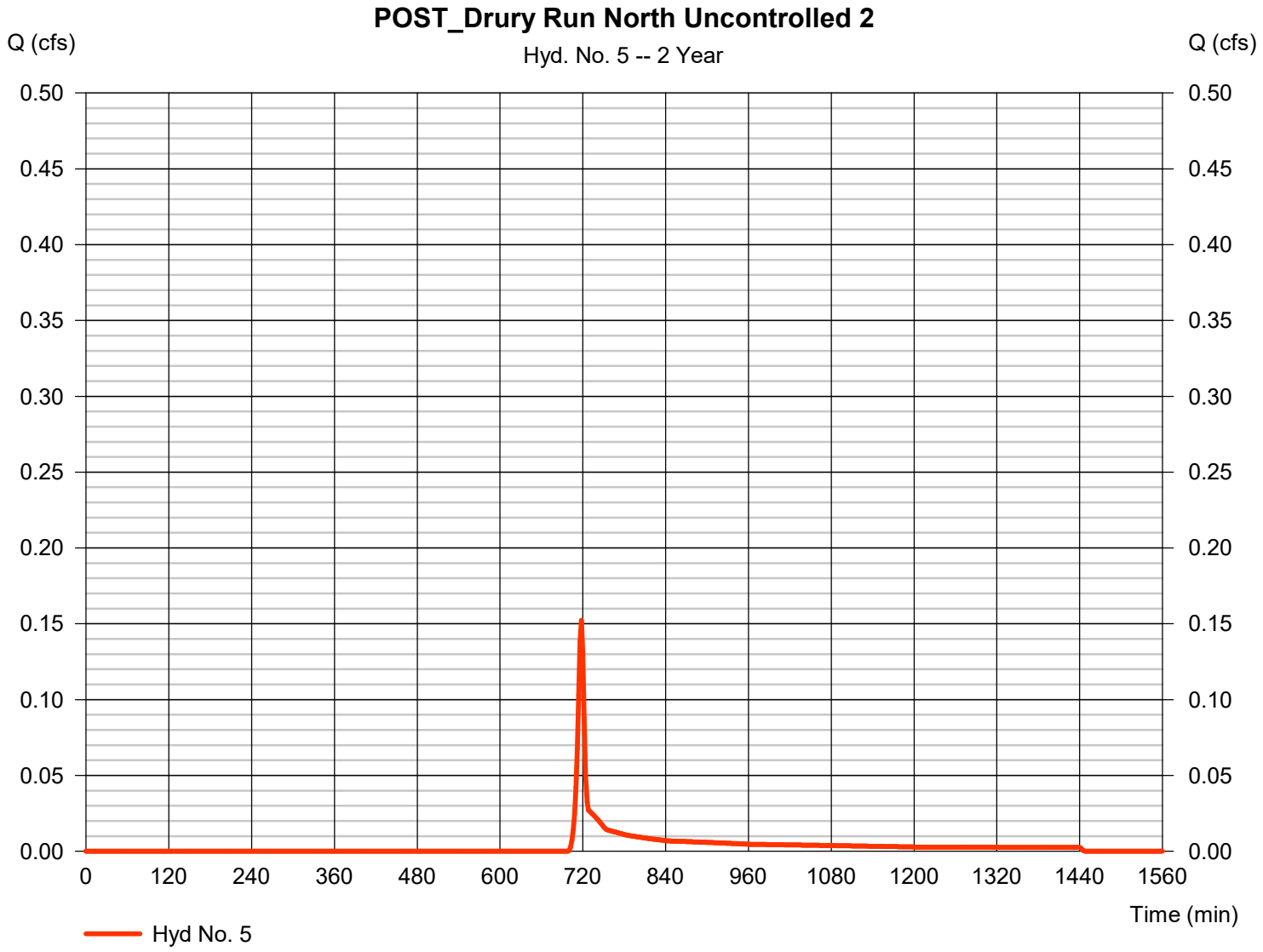
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 5

POST_Drury Run North Uncontrolled 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.152 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 322 cuft
Drainage area	= 0.180 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.40 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



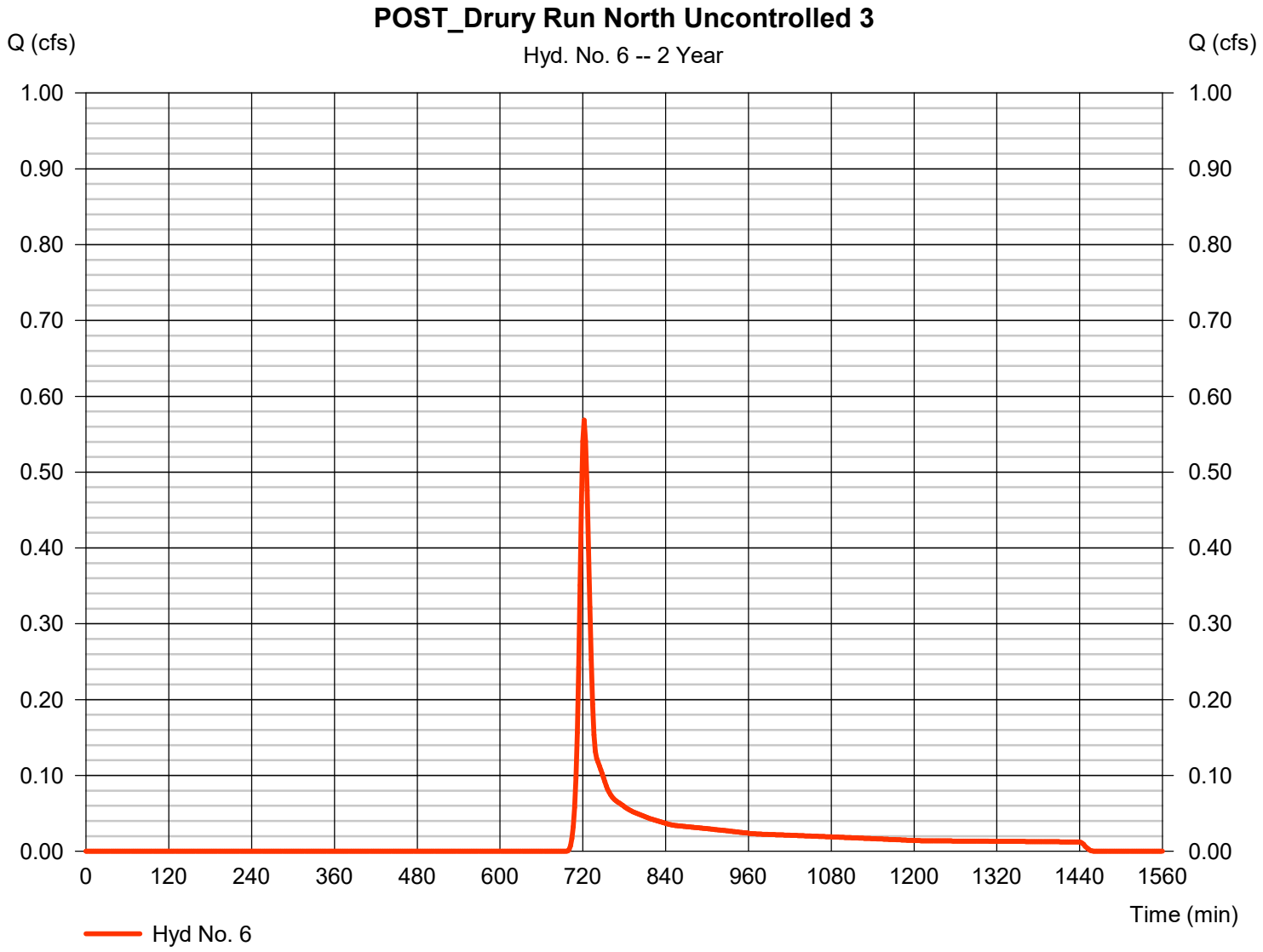
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 6

POST_Drury Run North Uncontrolled 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.568 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,651 cuft
Drainage area	= 0.780 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



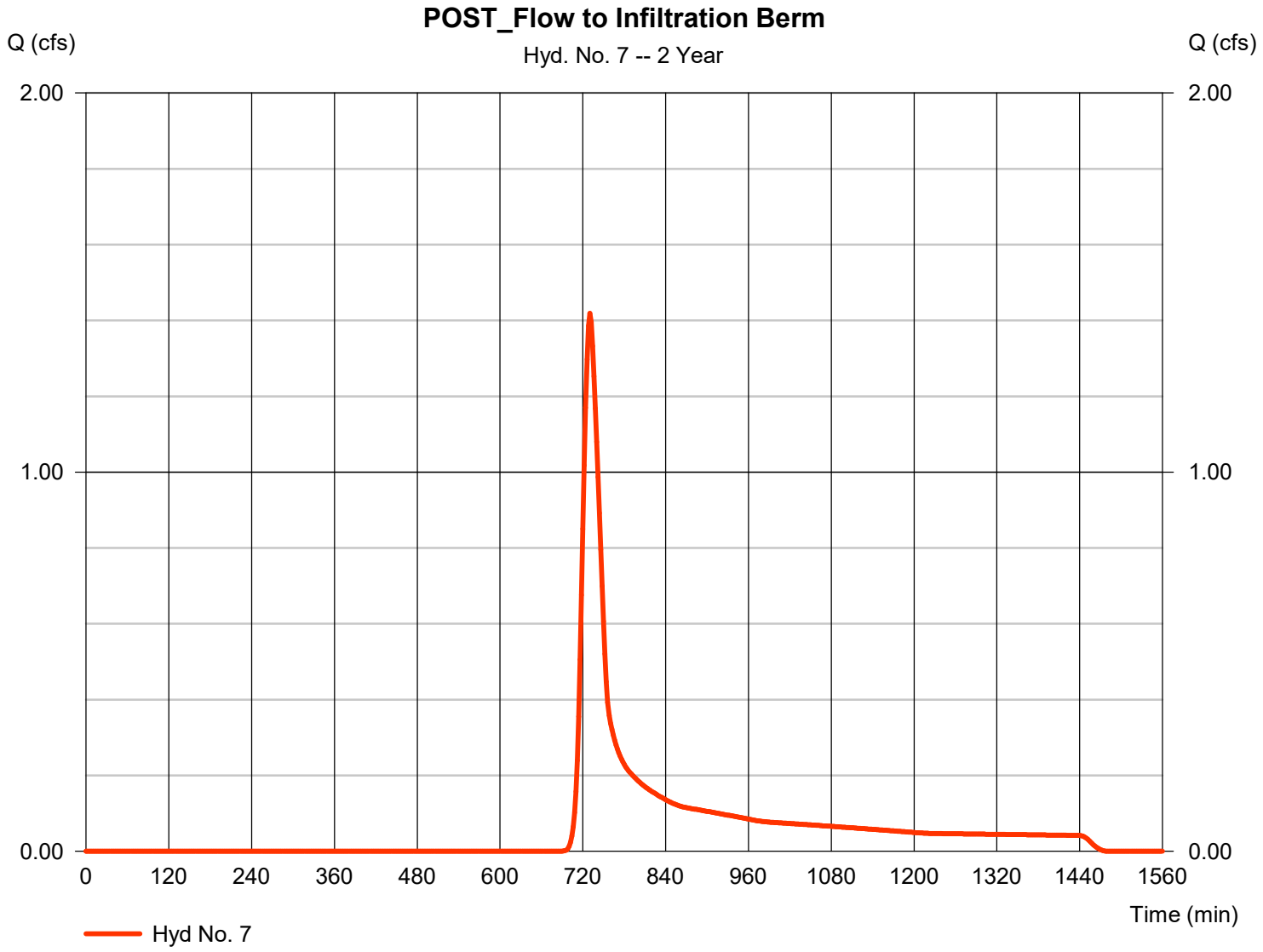
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 7

POST_Flow to Infiltration Berm

Hydrograph type	= SCS Runoff	Peak discharge	= 1.419 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 5,928 cuft
Drainage area	= 2.560 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.70 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

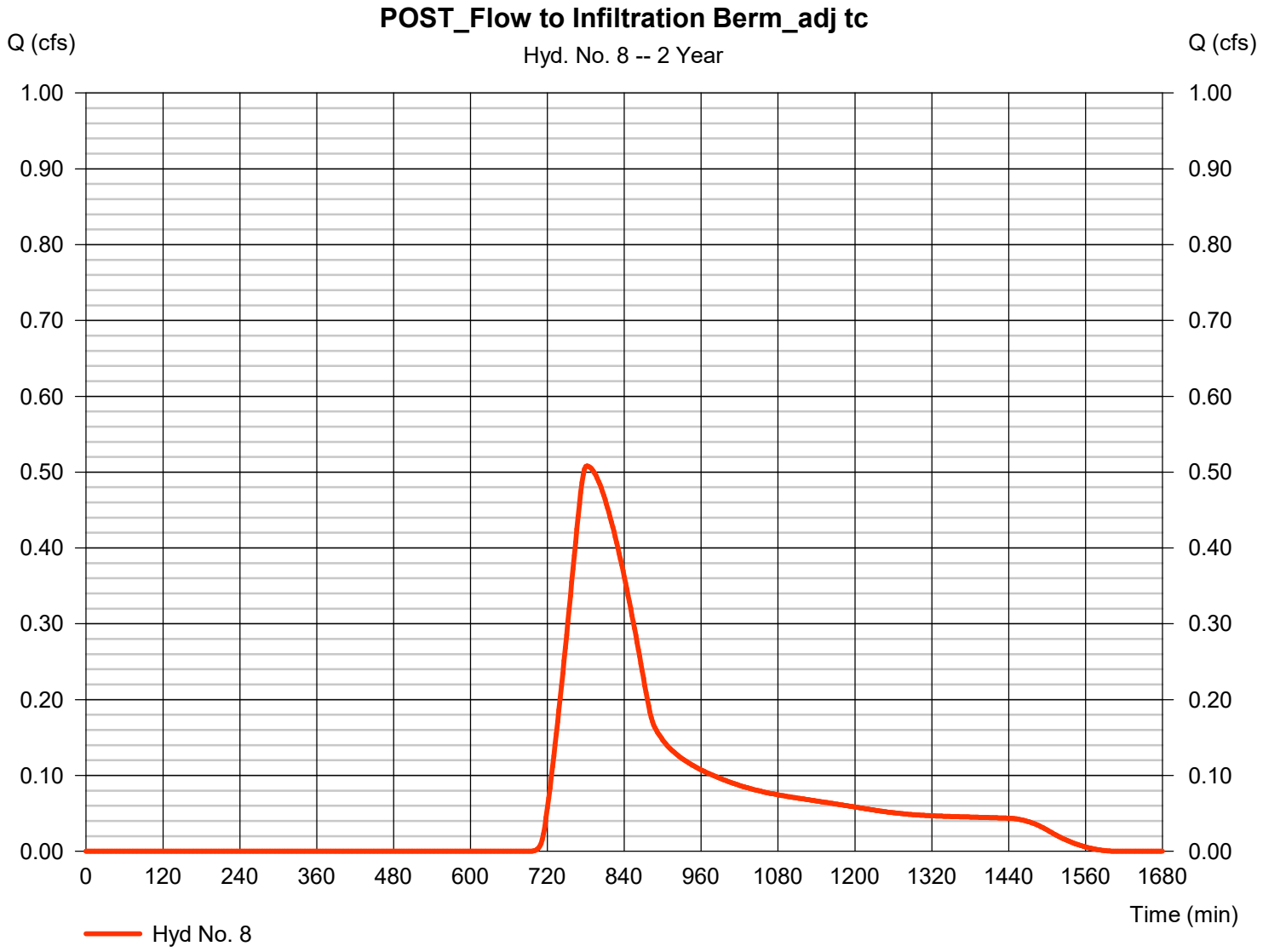


Hydrograph Report

Hyd. No. 8

POST_Flow to Infiltration Berm_adj tc

Hydrograph type	= SCS Runoff	Peak discharge	= 0.508 cfs
Storm frequency	= 2 yrs	Time to peak	= 782 min
Time interval	= 2 min	Hyd. volume	= 5,998 cuft
Drainage area	= 2.560 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 108.20 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



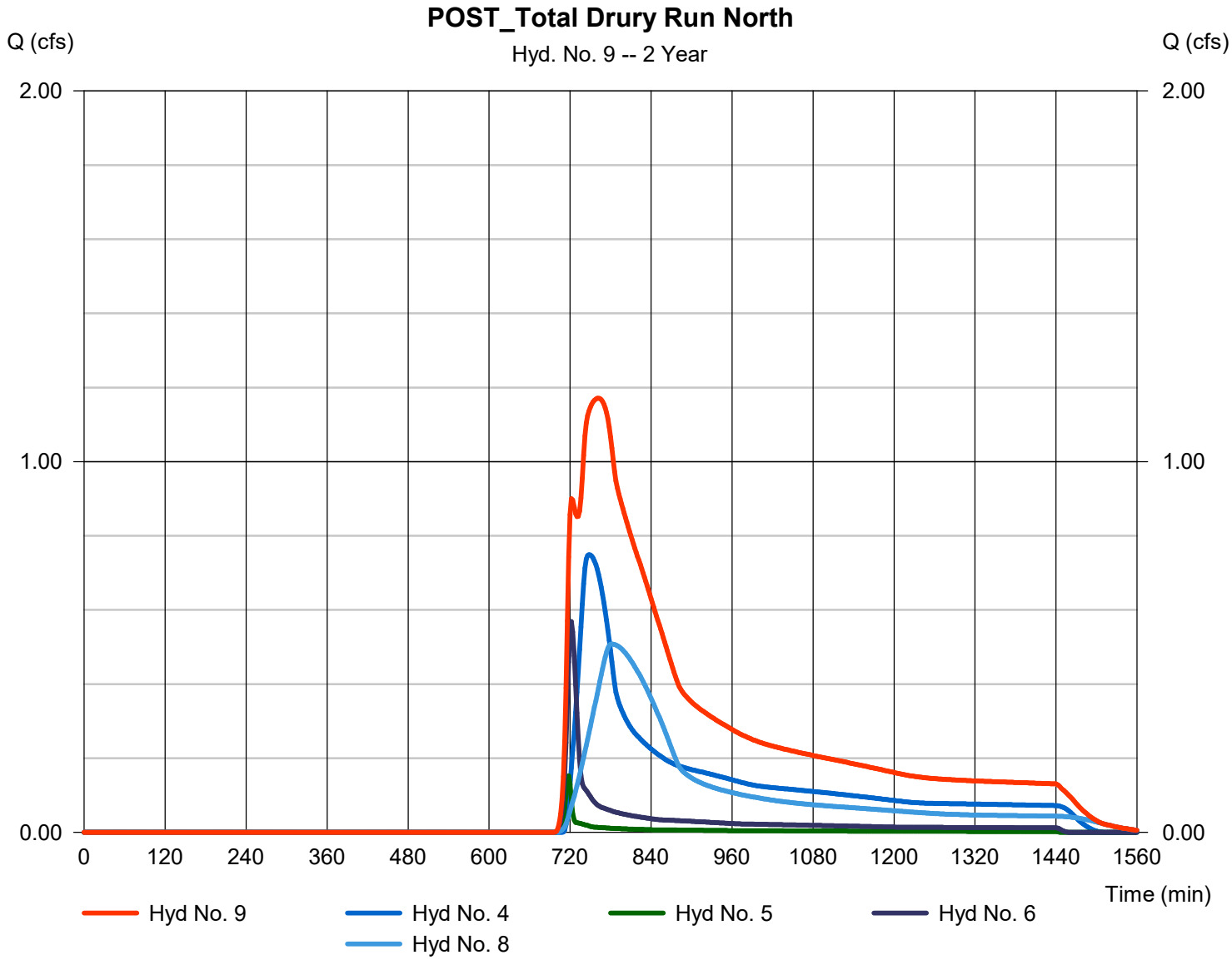
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 9

POST_Total Drury Run North

Hydrograph type	= Combine	Peak discharge	= 1.171 cfs
Storm frequency	= 2 yrs	Time to peak	= 762 min
Time interval	= 2 min	Hyd. volume	= 15,248 cuft
Inflow hyds.	= 4, 5, 6, 8	Contrib. drain. area	= 10.370 ac

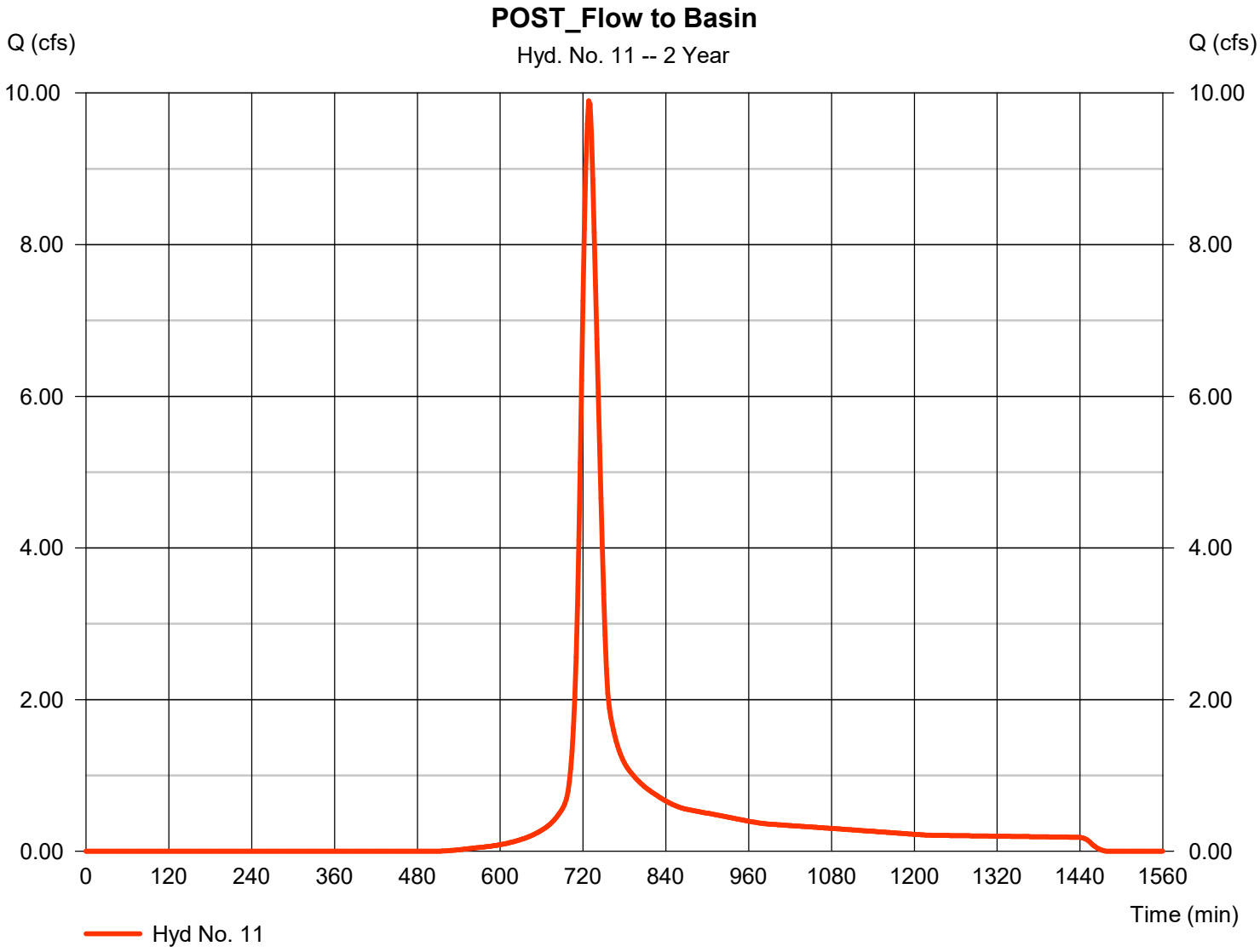


Hydrograph Report

Hyd. No. 11

POST_Flow to Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 9.899 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 36,490 cuft
Drainage area	= 7.850 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 26.40 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

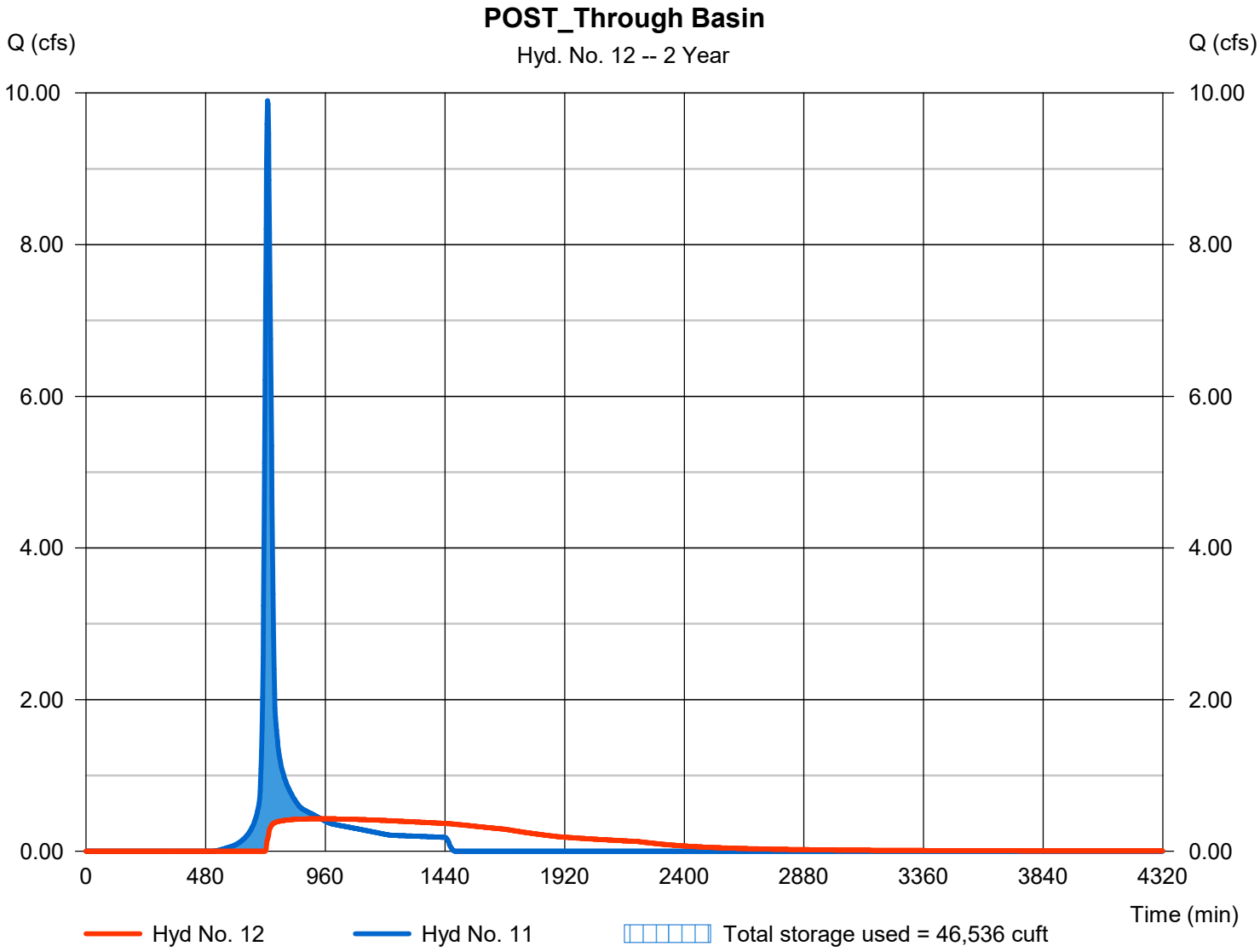
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 12

POST_Through Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.429 cfs
Storm frequency	= 2 yrs	Time to peak	= 942 min
Time interval	= 2 min	Hyd. volume	= 31,239 cuft
Inflow hyd. No.	= 11 - POST_Flow to Basin	Max. Elevation	= 1710.75 ft
Reservoir name	= Infiltration Basin	Max. Storage	= 46,536 cuft

Storage Indication method used. Wet pond routing start elevation = 1709.50 ft.



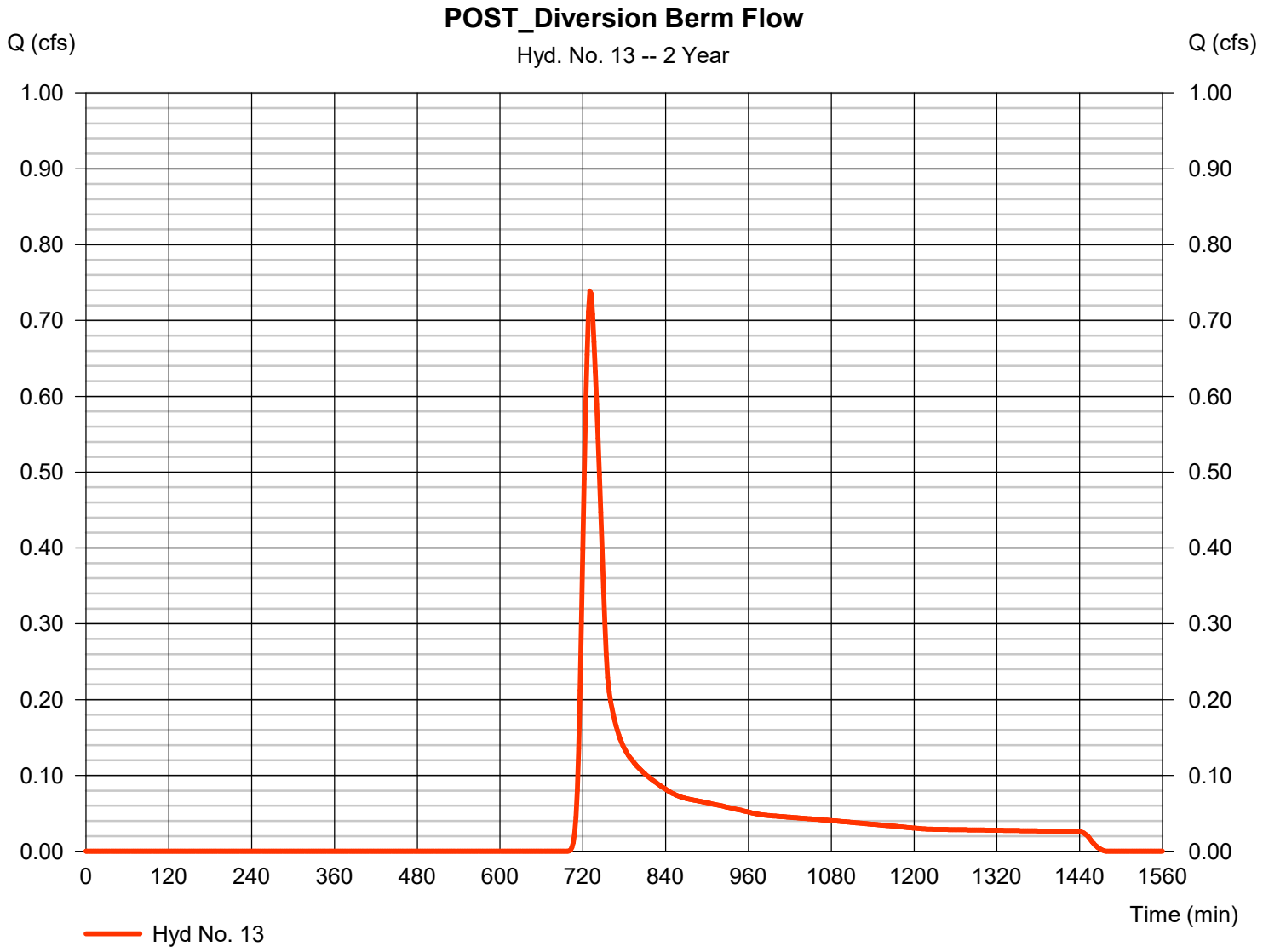
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 13

POST_Diversion Berm Flow

Hydrograph type	= SCS Runoff	Peak discharge	= 0.739 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,367 cuft
Drainage area	= 1.790 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.80 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



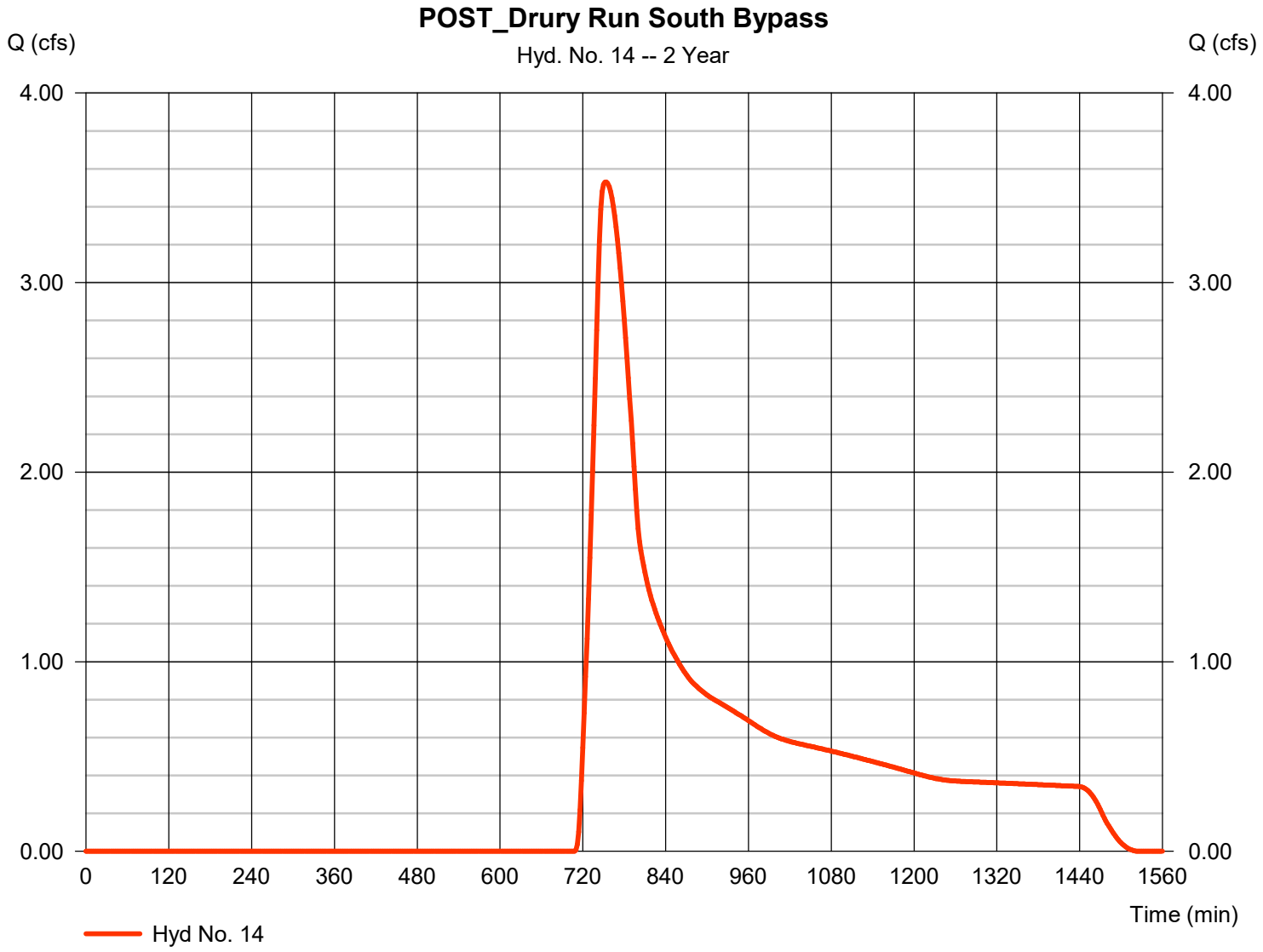
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 14

POST_Drury Run South Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.531 cfs
Storm frequency	=	2 yrs	Time to peak	=	754 min
Time interval	=	2 min	Hyd. volume	=	35,674 cuft
Drainage area	=	30.100 ac	Curve number	=	65
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	53.00 min
Total precip.	=	2.57 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



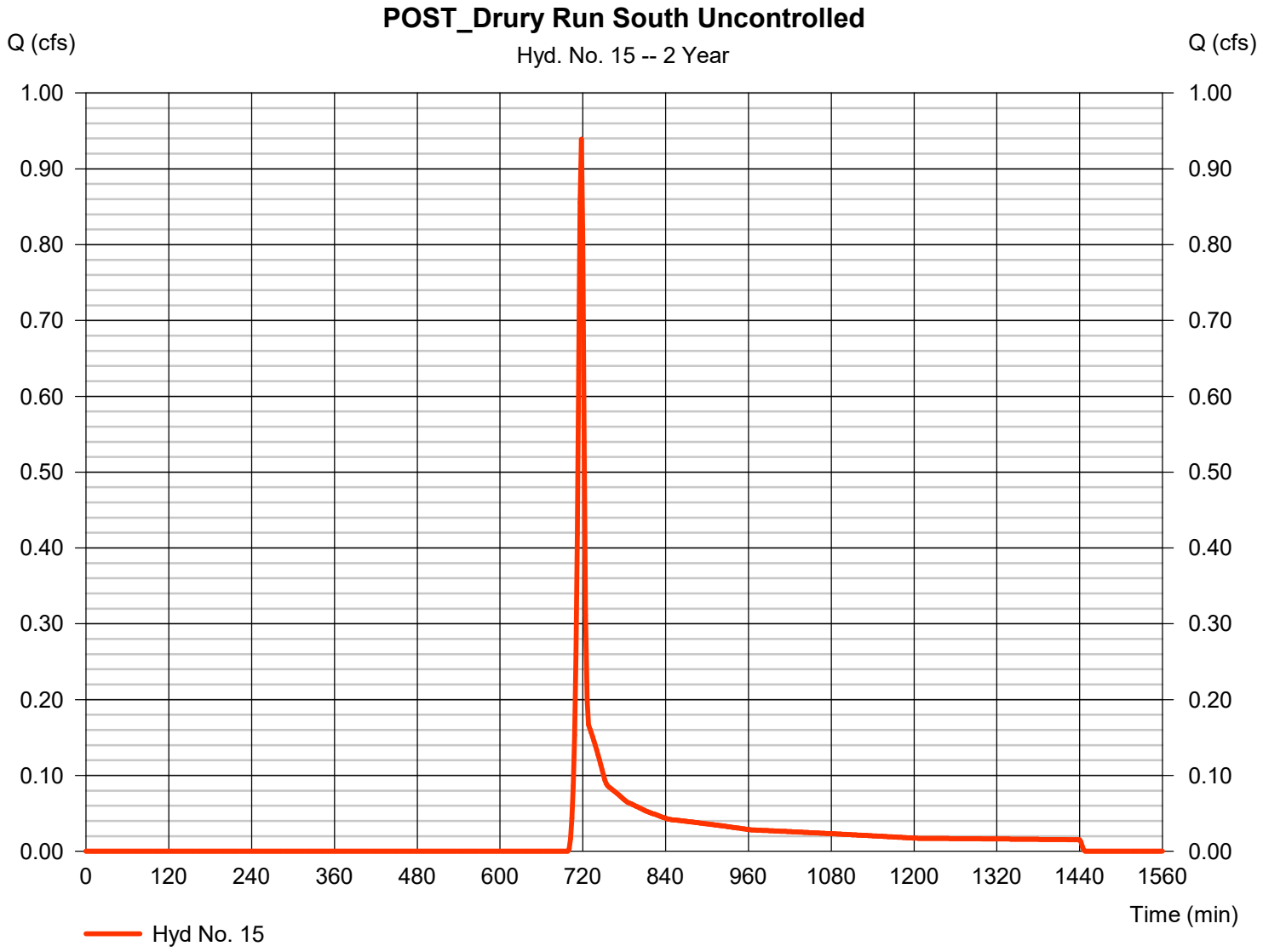
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Monday, 08 / 17 / 2020

Hyd. No. 15

POST_Drury Run South Uncontrolled

Hydrograph type	= SCS Runoff	Peak discharge	= 0.939 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,989 cuft
Drainage area	= 1.110 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 2.57 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

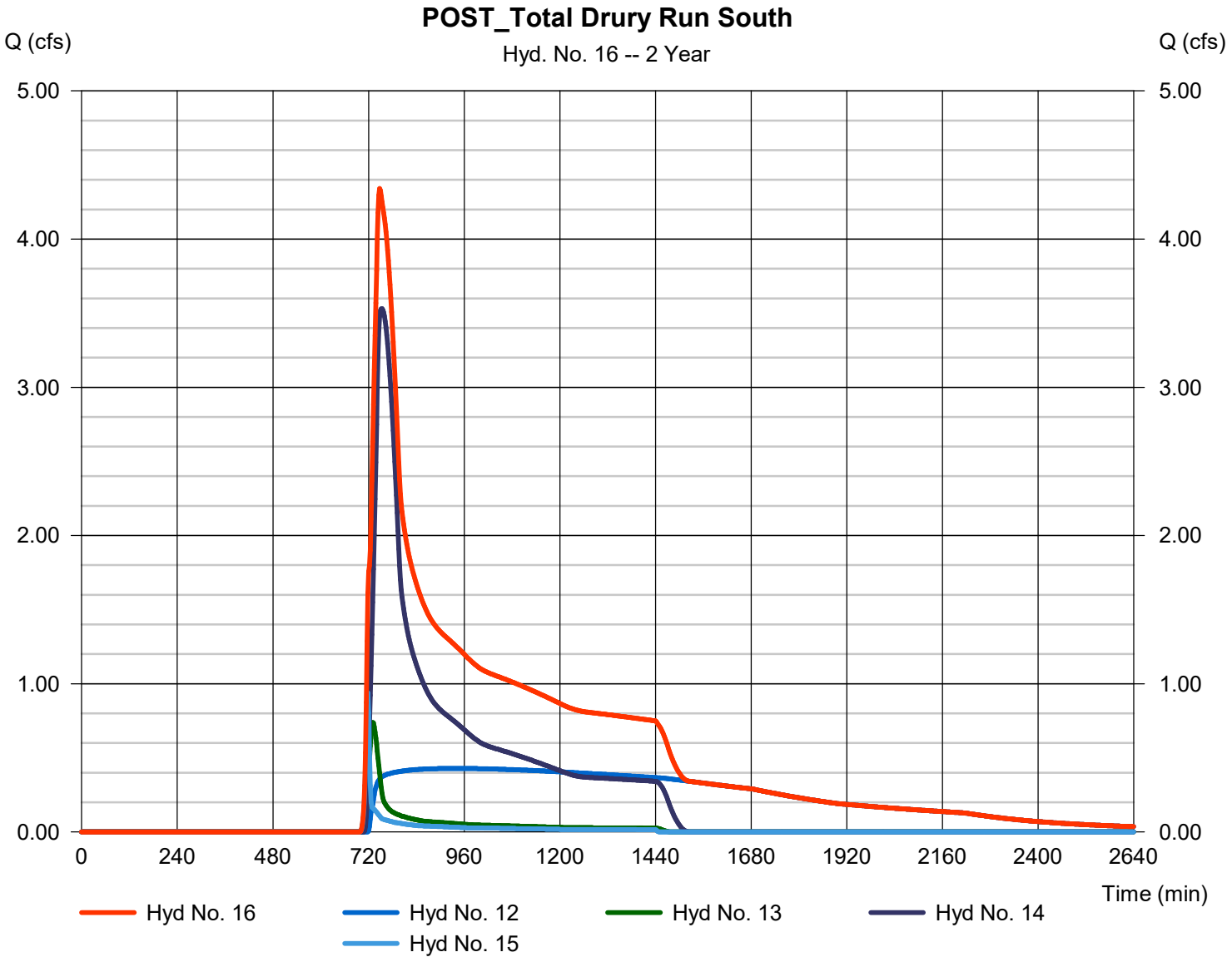


Hydrograph Report

Hyd. No. 16

POST_Total Drury Run South

Hydrograph type	= Combine	Peak discharge	= 4.341 cfs
Storm frequency	= 2 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 72,269 cuft
Inflow hyds.	= 12, 13, 14, 15	Contrib. drain. area	= 33.000 ac



References

NOAA Atlas 14, Volume 2, Version 3
Location name: Cross Fork, Pennsylvania, USA*
Latitude: 41.4355°, Longitude: -77.8355°
Elevation: 1731.87 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.290 (0.262–0.323)	0.346 (0.312–0.384)	0.417 (0.375–0.462)	0.472 (0.424–0.523)	0.546 (0.488–0.603)	0.602 (0.535–0.664)	0.660 (0.583–0.727)	0.720 (0.633–0.793)	0.806 (0.701–0.886)	0.871 (0.752–0.958)
10-min	0.451 (0.407–0.501)	0.540 (0.488–0.600)	0.648 (0.583–0.719)	0.729 (0.655–0.807)	0.834 (0.746–0.922)	0.912 (0.812–1.01)	0.993 (0.878–1.10)	1.08 (0.944–1.18)	1.18 (1.03–1.30)	1.27 (1.10–1.39)
15-min	0.553 (0.499–0.615)	0.660 (0.596–0.734)	0.796 (0.716–0.882)	0.897 (0.805–0.993)	1.03 (0.922–1.14)	1.13 (1.00–1.25)	1.23 (1.09–1.36)	1.34 (1.18–1.47)	1.48 (1.29–1.63)	1.59 (1.37–1.74)
30-min	0.731 (0.660–0.813)	0.883 (0.798–0.982)	1.09 (0.980–1.21)	1.25 (1.12–1.38)	1.46 (1.30–1.61)	1.61 (1.44–1.78)	1.78 (1.58–1.96)	1.95 (1.71–2.15)	2.19 (1.91–2.41)	2.38 (2.05–2.61)
60-min	0.893 (0.806–0.993)	1.08 (0.979–1.21)	1.37 (1.23–1.52)	1.58 (1.42–1.76)	1.89 (1.69–2.09)	2.13 (1.89–2.35)	2.38 (2.11–2.63)	2.65 (2.33–2.92)	3.03 (2.64–3.33)	3.34 (2.88–3.67)
2-hr	1.04 (0.933–1.15)	1.25 (1.13–1.39)	1.58 (1.42–1.75)	1.84 (1.65–2.03)	2.21 (1.97–2.44)	2.52 (2.24–2.78)	2.87 (2.53–3.14)	3.24 (2.84–3.55)	3.80 (3.28–4.16)	4.27 (3.66–4.68)
3-hr	1.13 (1.02–1.25)	1.36 (1.24–1.51)	1.70 (1.54–1.88)	1.98 (1.79–2.19)	2.38 (2.14–2.62)	2.73 (2.44–2.99)	3.10 (2.75–3.39)	3.52 (3.09–3.84)	4.14 (3.59–4.52)	4.67 (4.00–5.09)
6-hr	1.42 (1.30–1.56)	1.70 (1.56–1.87)	2.11 (1.93–2.32)	2.44 (2.22–2.67)	2.92 (2.65–3.19)	3.33 (3.00–3.63)	3.78 (3.38–4.11)	4.28 (3.79–4.64)	5.02 (4.38–5.45)	5.66 (4.89–6.14)
12-hr	1.79 (1.63–1.97)	2.14 (1.95–2.36)	2.63 (2.40–2.90)	3.05 (2.77–3.35)	3.66 (3.30–4.01)	4.18 (3.75–4.58)	4.77 (4.23–5.21)	5.42 (4.76–5.91)	6.42 (5.55–7.00)	7.28 (6.21–7.93)
24-hr	2.15 (1.98–2.38)	2.57 (2.37–2.84)	3.16 (2.90–3.49)	3.65 (3.34–4.02)	4.36 (3.97–4.79)	4.97 (4.50–5.45)	5.64 (5.07–6.17)	6.38 (5.68–6.96)	7.48 (6.59–8.16)	8.43 (7.35–9.19)
2-day	2.48 (2.29–2.72)	2.97 (2.74–3.24)	3.65 (3.36–3.98)	4.21 (3.87–4.59)	5.05 (4.61–5.49)	5.76 (5.22–6.25)	6.55 (5.89–7.09)	7.42 (6.62–8.02)	8.73 (7.68–9.44)	9.85 (8.57–10.6)
3-day	2.65 (2.45–2.88)	3.16 (2.93–3.44)	3.85 (3.57–4.18)	4.43 (4.09–4.81)	5.27 (4.84–5.71)	5.99 (5.47–6.47)	6.77 (6.14–7.31)	7.62 (6.86–8.23)	8.90 (7.90–9.62)	9.99 (8.78–10.8)
4-day	2.81 (2.61–3.05)	3.35 (3.12–3.63)	4.06 (3.77–4.39)	4.65 (4.31–5.03)	5.50 (5.08–5.94)	6.21 (5.71–6.70)	6.99 (6.38–7.53)	7.83 (7.10–8.44)	9.07 (8.13–9.80)	10.1 (9.00–10.9)
7-day	3.35 (3.12–3.59)	3.96 (3.70–4.26)	4.70 (4.39–5.05)	5.30 (4.94–5.69)	6.15 (5.71–6.59)	6.85 (6.34–7.33)	7.58 (6.98–8.12)	8.36 (7.65–8.95)	9.48 (8.60–10.2)	10.4 (9.35–11.2)
10-day	3.87 (3.62–4.15)	4.57 (4.27–4.89)	5.38 (5.03–5.76)	6.05 (5.64–6.47)	6.98 (6.49–7.47)	7.74 (7.18–8.28)	8.54 (7.88–9.13)	9.39 (8.61–10.0)	10.6 (9.64–11.3)	11.6 (10.5–12.4)
20-day	5.36 (5.04–5.70)	6.28 (5.91–6.69)	7.26 (6.83–7.72)	8.05 (7.57–8.56)	9.13 (8.57–9.71)	9.99 (9.36–10.6)	10.9 (10.1–11.6)	11.8 (11.0–12.5)	13.0 (12.0–13.9)	14.0 (12.9–15.0)
30-day	6.73 (6.37–7.13)	7.86 (7.44–8.33)	8.95 (8.46–9.48)	9.84 (9.29–10.4)	11.0 (10.4–11.7)	11.9 (11.2–12.6)	12.9 (12.1–13.6)	13.8 (12.9–14.6)	15.1 (14.0–16.0)	16.0 (14.9–17.0)
45-day	8.62 (8.19–9.09)	10.0 (9.54–10.6)	11.3 (10.8–11.9)	12.3 (11.7–13.0)	13.6 (12.9–14.4)	14.6 (13.8–15.4)	15.6 (14.7–16.4)	16.5 (15.6–17.4)	17.8 (16.7–18.7)	18.7 (17.5–19.7)
60-day	10.4 (9.90–11.0)	12.1 (11.5–12.8)	13.6 (12.9–14.3)	14.7 (14.0–15.5)	16.2 (15.3–17.0)	17.3 (16.3–18.2)	18.4 (17.3–19.3)	19.4 (18.3–20.4)	20.7 (19.5–21.8)	21.7 (20.4–22.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]	77	86	91	94	
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and I_a, = 0.2S.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

Table 3-1 Roughness coefficients (Manning's n) for sheet flow

Surface description	n [1]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses [2]	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods: [3]	
Light underbrush	0.40
Dense underbrush	0.80

1 The n values are a composite of information compiled by Engman (1986).

2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.

3 When selecting n, consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \qquad \text{[eq. 3-3]}$$

where:

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1)
L = flow length (ft)
P_2 = 2-year, 24-hour rainfall (in)
s = slope of hydraulic grade line (land slope, ft/ft)

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

Shallow concentrated flow

After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bankfull elevation.

1) Volume Diversion. Many computers models have components that allow a "diversion" or "abstraction". The total volume reduction provided by the applicable structural and non-structural BMPs can be diverted or abstracted from the modeled runoff before it is routed to the detention system(s). This approach is very conservative because it does not give any credut to the increased time of travel, ongoing infiltration, etc. associated with the BMPs.

2) Composite BMPs. For optimal stormwater management, this manual suggests widely distributed BMPs for volume, rate, and quality control. This approach, however, can be very cumbersome to evaluate in detail with common computer models. To facilitate modeling, similar types of BMPs can be combined within the model. For modeling purposes, the storage of the combined BMP is simply the sum of the BMP capacities that it represents. A stage-storage-discharge relationship can be developed for the combined BMP based on the configuration of the individual systems. The combined BMPs can then be routed normally and the results submitted.

3) Travel Time/ Time of Concentration Adjustment. The use of widely-distributed, volume-reducing BMPs can significantly increase the post-development runoff travel time and therefore decrease the peak rate of discharge. The Delaware Urban Runoff Management Model (DURMM) calculates the extended travel time through storage elements, even at flooded depths, to adjust peak flow rates (Lucas, 2001). The extended travel time is essentially the residence time of the storage elements, found by dividing the total storage by the 2-year peak flow rate. This increased travel timecan be added to the time of concentration of the area to account for the slowing effect of the volume-reducing BMPs. This can reduce the amount of detention storage required for peak rate control.

4) Other Methods. Other methods, such as adjusting runoff curve numbers based on the runoff volume left after BMP application, or reducing net precipitation based on the volume captured, can be applied as appropriate.

APPENDIX D

Site Evaluation and Soil Infiltration Testing Report

Michael Baker
INTERNATIONAL

SITE EVALUATION AND SOIL INFILTRATION TESTING REPORT

FOR THE
TAMARACK COMPRESSOR STATION

Prepared for:

National Fuel
Supply Corporation

1100 State Street
Erie, PA 16512

August, 2020

Introduction

This report presents the methodology and results of the site evaluation and soil testing performed in support of the Tamarack Compressor Station project. The field investigation was performed on in July 27, 2020 by Michael Baker International's (Michael Baker) qualified representatives. The purpose of this testing was to:

a. Determine if the proposed infiltration Best Management Practices (BMPs) are suitable at the site, and at what locations.
b. Obtain the required data for infiltration BMP design.

Methodology

This investigation was performed according to the methods described in the *Pennsylvania Stormwater Best Management Practices Manual (Document No. 363-0300-002), Appendix C – Site Evaluation and Soil Testing (PABMP) / Protocol I-II*.

Background Evaluation

Michael Baker completed a site-specific background evaluation prior to the field investigations. The background evaluation included review of soil survey information, aerial photographs, floodplain maps, National Wetland Inventory (NWI) maps, topographic maps, and preliminary site plans in order to gain an understanding of the existing site conditions and to identify potential BMP and testing locations. Additionally, a Pennsylvania One Call was contacted and consulted prior to field work and excavation.

The investigation included the excavation of test pits via excavator in the BMP areas to allow for visual observation of the soil horizons and overall subsurface conditions. Observations of the soil horizon, texture, color, depth of water table/bedrock (if observed), observance of pores/roots, type/percent of coarse fragments, soil plasticity, and limiting layers were documented. The test pits were backfilled at the completion of the field work.

Two BMPs are proposed for the site – an infiltration berm which controls runoff from the main access road; and an infiltration basin which controls runoff from the compressor station pad. One test pit (ITP5) was excavated at the infiltration berm location and four test pits (ITP1, ITP2, ITP3, and ITP4) were excavated at the infiltration basin location. Exhibit 1 shows the test pits locations.

Infiltration tests were completed at ITP3, ITP4, and ITP5 using a Double-Ring Infiltrometer (PABMP Methodology for Double-Ring Infiltrometer Field Test).

Soil

A review of the US Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) was performed. The soils at the BMP locations are classified as HuB soils (Hustontown silt loam, 3 to 8 percent slopes). Hustontown soils are defined as silt loam with moderately well drained soils. A soil survey map is provided as Exhibit 2.

Soil Evaluation

The soil evaluation was conducted by visual observation of the test pits.

Seasonal High Water Table (SHWT) depths, if encountered, were estimated based on soil characteristics including approximate moisture content in the soil (if observed) and through identification of low chroma redoximorphic depletions (mottles). Low chroma mottles may suggest past conditions of saturation and reducing soil conditions. The SHWT estimations by soil indicators are based on secondary evidence observed in the soil and not on direct water table measurements.

The test pit excavations were continued to at least a depth which demonstrated that there was a minimum of two feet of separation between the bottom of the proposed BMP and bedrock or the SHWT. Test pit depths can be found on Exhibits 3 and 4 as well as on the data forms in Appendix B. No evidence of a SHWT or bedrock was observed in any of the test pits.

The infiltration rate at the infiltration berm is 4.5 inches/hour (ITP5). This test was taken close to the surface, which corresponds to the bottom of the BMP. Infiltration rates in the proposed infiltration basin area were 0.9 inches/hour at ITP5 and 2.0 inches/hour at ITP4. Both of these tests were conducted at approximately the same elevation as the bottom of the proposed basin (elevation 1708.0).

In addition to the field investigation performed in July 2020, a detailed geotechnical investigation was performed at the site in April 2019. Nine test borings were drilled as part of this investigation. One of these borings, B-9, was located within the proposed infiltration

basin area – refer to Exhibit 3. This boring corroborates the findings that neither bedrock or a SHWT is located within at least 2 feet of the bottom of the proposed infiltration basin. The boring showed sandy silt with gravel and gravelly silt with sand in the area of the infiltration basin. A copy of the boring log for B-9 is provided in Appendix D.

Results and Conclusions

Neither the SHWT nor bedrock was observed throughout the soil profile at any of the test pits. A summary of the test pits results can be found on Exhibits 3 and 4 in Appendix A. Photographs of the test pits are provided in Appendix C. Detailed soil profile descriptions and infiltration test results are provided on the data forms in Appendix B. The infiltration rate at the infiltration berm is 4.5 inches/hour, and the infiltration rate at the bottom of the infiltration basin ranges from 0.9 inches/hour to 2.0 inches/hour. The investigation results show that the proposed locations are suitable for the proposed infiltration BMPs.

Exhibits

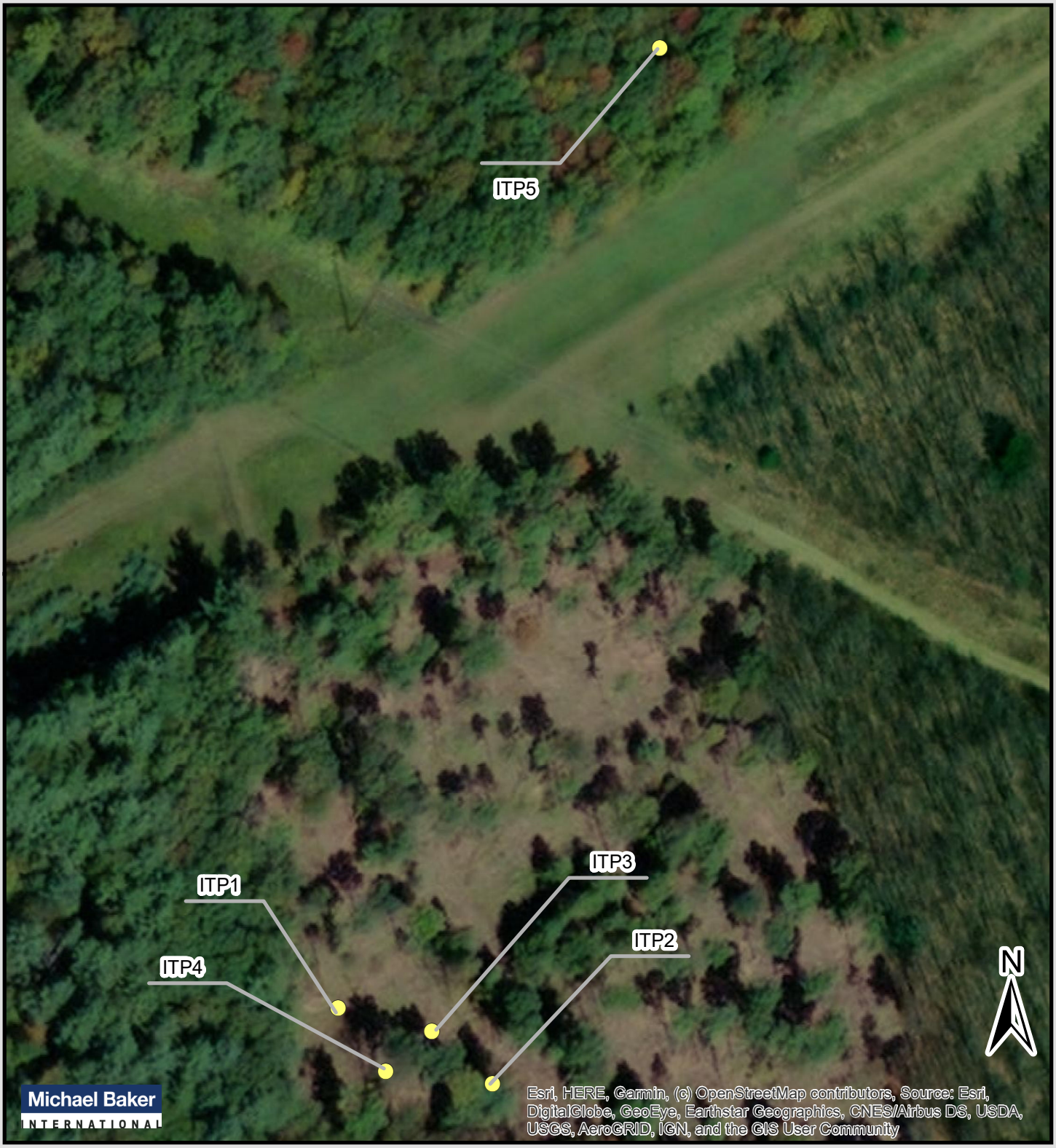


EXHIBIT 1 - INFILTRATION TEST LOCATION MAP

Legend

- Test Locations

Tamarack Compressor Station

Leidy Township
Clinton County, PA
Latitude: 41.436206
Longitude: -77.836497

0 75 150 300 Feet

prepared for

National Fuel

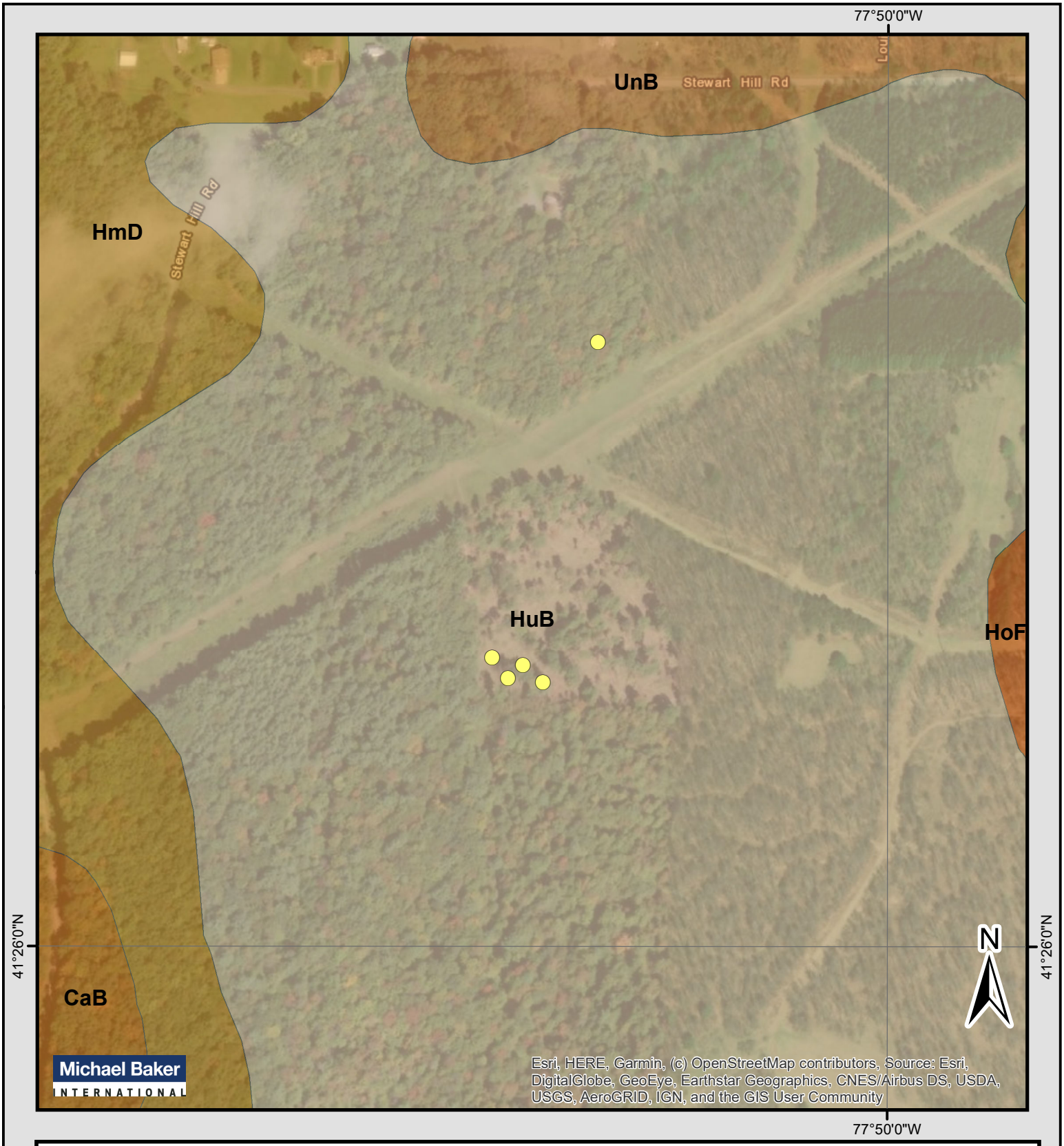


EXHIBIT 2 - SOIL MAP

Legend

- Test Locations

Tamarack Compressor Station

Leidy Township
Clinton County, PA
Latitude: 41.436206
Longitude: -77.836497

0 250 500 1,000 Feet

prepared for

National Fuel

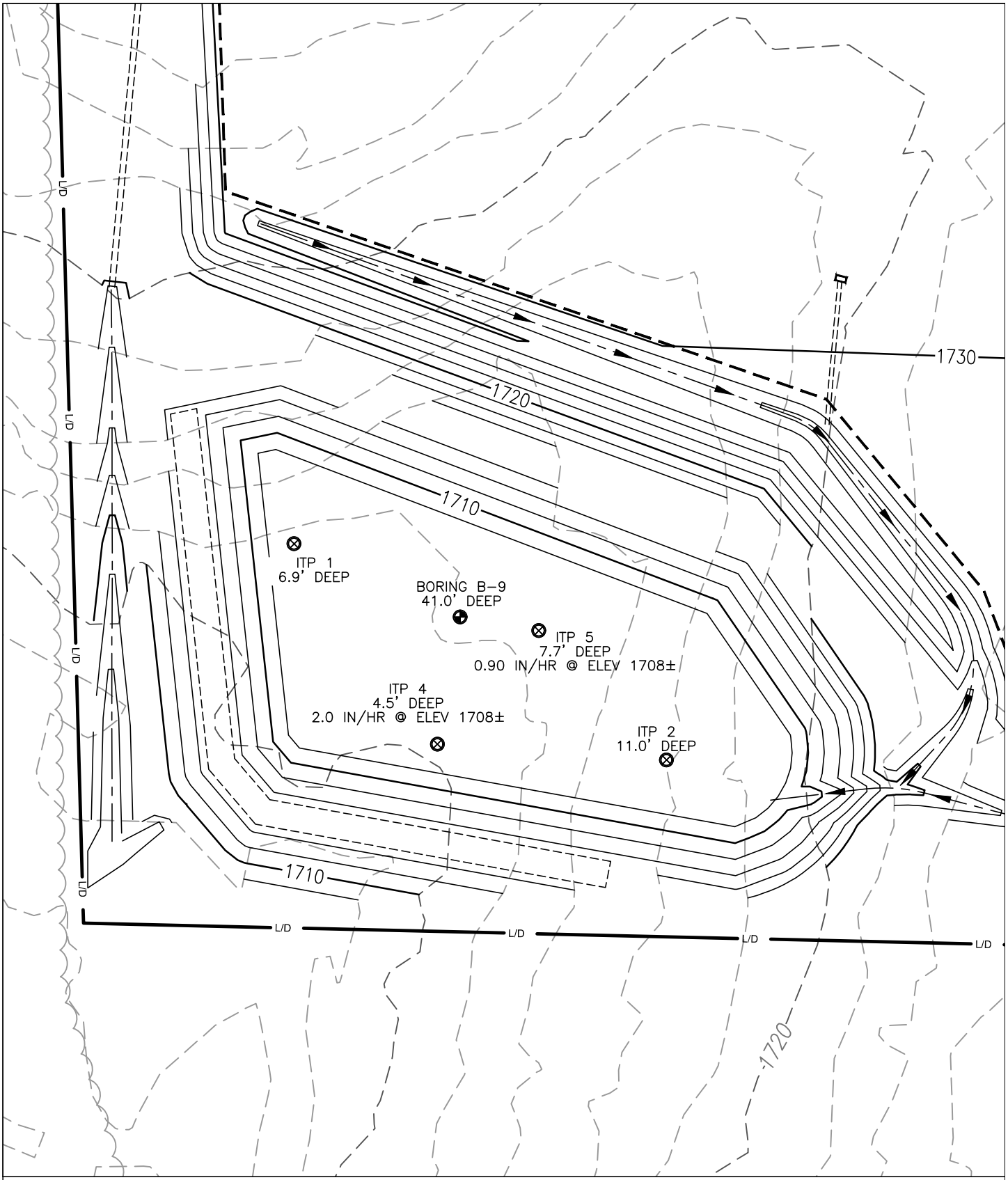


EXHIBIT 3 - BASIN INFILTRATION TEST PIT LOCATIONS

TAMARACK COMPRESSOR STATION

N

50 0 50

Michael Baker INTERNATIONAL

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

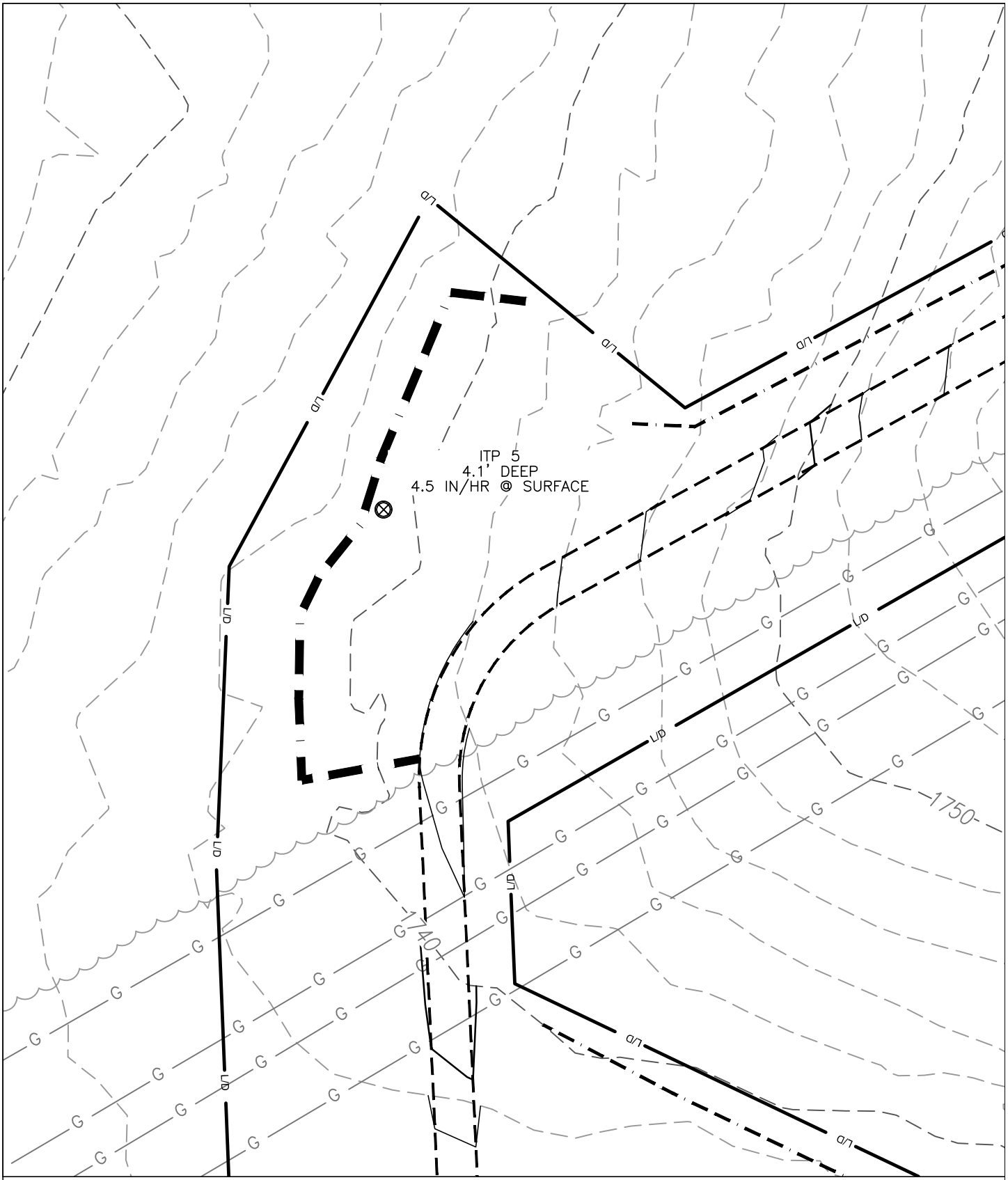


EXHIBIT 4 - BERM INFILTRATION TEST PIT LOCATIONS

TAMARACK COMPRESSOR STATION

N

50 0 50

Michael Baker INTERNATIONAL

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

Soil Profiles and Infiltration Test Data Forms

Tested By: Shane Stauffer
Test Pit: ITP1 **Date:** 7/27/2020 **Weather:** Sunny 85° F; Sunny
Geology: Catskill Formation **NRCS Soil Unit** Hustontown silt loam **Land Use:** Partially wooded lot **Coordinates:** 41.4354 -77.837097

Additional comments: _____

Horizon	Upper Boundary (ft)	Lower Boundary (ft)	Soil Textural Class (USDA)	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots	Depth to Bedrock	Depth to Free Water (ft)	Comments
A	0.0	0.7	Silty Loam	~25% fine to coarse gravel and channers	Brown (10YR 4/3)	NE	Few fine roots	NE	NE	Topsoil
B	0.7	6.9	Silty Clay Loam	~75% channers and coarse gravel	Brown (10YR 5/3)	NE	Few fine roots	NE	NE	

* NE = Not Encountered

Tested By: Shane Stauffer
Test Pit: ITP2 **Date:** 7/27/2020 **Weather:** Sunny 85° F; Sunny
Geology: Catskill Formation **NRCS Soil Unit** Hustontown silt loam **Land Use:** Partially wooded lot **Coordinates:** 41.435222 -77.836614

Additional comments: _____

Horizon	Upper Boundary (ft)	Lower Boundary (ft)	Soil Textural Class (USDA)	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots	Depth to Bedrock	Depth to Free Water (ft)	Comments
A	0.0	0.7	Silty Clay Loam	~15% fine to coarse gravel	Very Dark Brown (10YR 2/2)	NE	Few fine roots	NE	NE	Topsoil
B	0.7	9.8	Silty Clay Loam	~25% fine to coarse gravel	Dark Yellowish Brown (10YR 4/4)	NE	Few fine roots	NE	NE	
B	9.8	11.0	Silty Clay	~30% fine to coarse gravel	Dark Yellowish Brown (10YR 4/6)	NE	NE	NE	NE	

* NE = Not Encountered

Tested By: Shane Stauffer
Test Pit: ITP3 **Date:** 7/27/2020 **Weather:** Sunny 85° F; Sunny
Geology: Catskill Formation **NRCS Soil Unit** Hustontown silt loam **Land Use:** Partially wooded lot **Coordinates:** 41.435345, -77.836804

Additional comments: _____

Horizon	Upper Boundary (ft)	Lower Boundary (ft)	Soil Textural Class (USDA)	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots	Depth to Bedrock	Depth to Free Water (ft)	Comments
A	0.0	0.8	Silty Clay Loam	~10% fine to coarse gravel	Very Dark Brown (10YR 2/2)	NE	Few fine roots	NE	NE	Topsoil
B	0.8	5.0	Silty Clay	~15% fine to coarse gravel	Brown (7.5YR 4/3)	NE	Few fine roots	NE	NE	
B	5.0	7.7	Silty Clay	~25% fine to coarse gravel	Brown (10YR 5/3)	NE	NE	NE	NE	

* NE = Not Encountered

Project Identification:	National Fuel Tamarack Compressor Station					**Constants**	**Ring Diameter**	**Area (sq. in.)**	**Depth of Liquid (inches)**	Michael Baker INTERNATIONAL	
Test Location:	ITP-3					**Inner Ring**	6.0	28.3	5.0		
Liquid Used:	Tap Water	**pH:**	7.0			**Annular Ring**	12.0	113.1	5.0	Spreadsheet adapted from Turf-Tec International	
Tested By:	Shane Stauffer		**Date:**	7/27/2020		Liquid level maintained using:	( ) Flow Valve	( ) Float Valve	( ) Mariotte Tubes		
Depth to water table:	NE					**Penetration Depth of Outer Ring (inches):**	2		**S.O. Number**		

	Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/ *Total* Min	Flow Readings: Inner Ring Reading (Inches)	Flow Readings: Annular Ring Reading (Inches)	Liquid Temp (F)	Infiltration Rate: Inner Ring Infiltration Rate (in/hr)	Infiltration Rate: Annular Ring Infiltration Rate (in/hr)	Remarks: Weather Conditions, Soil Classification, Testing Depth, Etc...
PRESOAK	1	Start Test	7/27/20	14:30	30	0.563	1.063	60.0	1.1	2.1	Sunny 85°F, Tested at 3.0' Depth in Silty Clay. Begin Presoak
		End Test		15:00	*30*						
	2	Start Test	7/27/20	15:00	30	0.563	1.063	60.0	1.1	2.1	Less than 2" of infiltration observed. Commence testing with 30 minute intervals
		End Test		15:30	*60*						
TEST POINTS	3	Start Test	7/27/20	15:30	30	0.500	1.000	60.0	1.0	2.0	
		End Test		16:00	*90*						
	4	Start Test	7/27/20	16:00	30	0.500	1.000	60.0	1.0	2.0	
		End Test		16:30	*120*						
	5	Start Test	7/27/20	16:30	30	0.438	1.000	60.0	0.9	2.0	
		End Test		17:00	*150*						
	6	Start Test	7/27/20	17:00	30	0.438	0.938	60.0	0.9	1.9	
		End Test		17:30	*180*						
	7	Start Test	7/27/20	17:30	30	0.438	0.938	60.0	0.9	1.9	End testing
		End Test		18:00	*210*						
	8	Start Test									
		End Test									
	9	Start Test									
		End Test									
	10	Start Test									
		End Test									

Tested By: Shane Stauffer

Test Pit: ITP4 **Date:** 7/27/2020 **Weather:** Sunny 85° F; Sunny

Geology: Catskill Formation **NRCS Soil Unit** Hustontown silt loam **Land Use:** Partially wooded lot **Coordinates:** 41.435253, -77.836948

Additional comments: _____

Horizon	Upper Boundary (ft)	Lower Boundary (ft)	Soil Textural Class (USDA)	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots	Depth to Bedrock	Depth to Free Water (ft)	Comments
A	0.0	0.6	Silty Clay Loam	~15% fine to coarse gravel	Very Dark Brown (10YR 2/2)	NE	Few fine roots	NE	NE	Topsoil
B	0.6	4.5	Silty Clay	~30% fine to coarse gravel	Brown (10YR 4/3)	NE	Few fine roots	NE	NE	

* NE = Not Encountered

Project Identification:	National Fuel Tamarack Compressor Station					**Constants**	**Ring Diameter**	**Area (sq. in.)**	**Depth of Liquid (inches)**	Michael Baker INTERNATIONAL	
Test Location:	ITP-4					**Inner Ring**	6.0	28.3	5.0		
Liquid Used:	Tap Water	**pH:**	7.0			**Annular Ring**	12.0	113.1	5.0	Spreadsheet adapted from Turf-Tec International	
Tested By:	Shane Stauffer		**Date:**	7/27/2020		Liquid level maintained using:	( ) Flow Valve	( ) Float Valve	( ) Mariotte Tubes		
Depth to water table:	NE					**Penetration Depth of Outer Ring (inches):**	2		**S.O. Number**		

	Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/ *Total* Min	Flow Readings: Inner Ring Reading (Inches)	Flow Readings: Annular Ring Reading (Inches)	Liquid Temp (F)	Infiltration Rate: Inner Ring Infiltration Rate (in/hr)	Infiltration Rate: Annular Ring Infiltration Rate (in/hr)	Remarks: Weather Conditions, Soil Classification, Testing Depth, Etc...
PRESOAK	1	Start Test	7/27/20	15:35	30	1.188	1.938	60.0	2.4	3.9	Sunny 85°F, Tested at 2.5' Depth in Silty Clay. Begin Presoak
		End Test		16:05	*30*						
	2	Start Test	7/27/20	16:05	30	1.125	1.938	60.0	2.3	3.9	Less than 2" of infiltration observed. Commence testing with 30 minute intervals
		End Test		16:35	*60*						
TEST POINTS	3	Start Test	7/27/20	16:35	30	1.125	1.813	60.0	2.3	3.6	
		End Test		17:05	*90*						
	4	Start Test	7/27/20	17:05	30	1.063	1.813	60.0	2.1	3.6	
		End Test		17:35	*120*						
	5	Start Test	7/27/20	17:35	30	1.000	1.813	60.0	2.0	3.6	
		End Test		18:05	*150*						
	6	Start Test	7/27/20	18:05	30	1.000	1.813	60.0	2.0	3.6	
		End Test		18:35	*180*						
	7	Start Test	7/27/20	18:35	30	1.000	1.813	60.0	2.0	3.6	End testing
		End Test		19:05	*210*						
	8	Start Test									
		End Test									
	9	Start Test									
		End Test									
	10	Start Test									
		End Test									

Tested By: Shane Stauffer

Test Pit: ITP5 **ITP-4** 7/27/2020 **Weather:** Sunny 85° F; Sunny

Geology: Catskill Formation **NRCS Soil Unit** Hustontown silt loam **Land Use:** Partially wooded lot **Coordinates:** 41.437657, -77.836095

Additional comments: _____

Horizon	Upper Boundary (ft)	Lower Boundary (ft)	Soil Textural Class (USDA)	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots	Depth to Bedrock	Depth to Free Water (ft)	Comments
A	0.0	0.4	Silty Loam	~15% fine to coarse gravel	Brown (10YR 4/3)	NE	Many fine to large tree roots	NE	NE	Topsoil
B	0.4	4.1	Silty Loam	~30% fine to coarse gravel and channers	Brown (10YR 5/3)	NE	Few fine roots	NE	NE	

* NE = Not Encountered

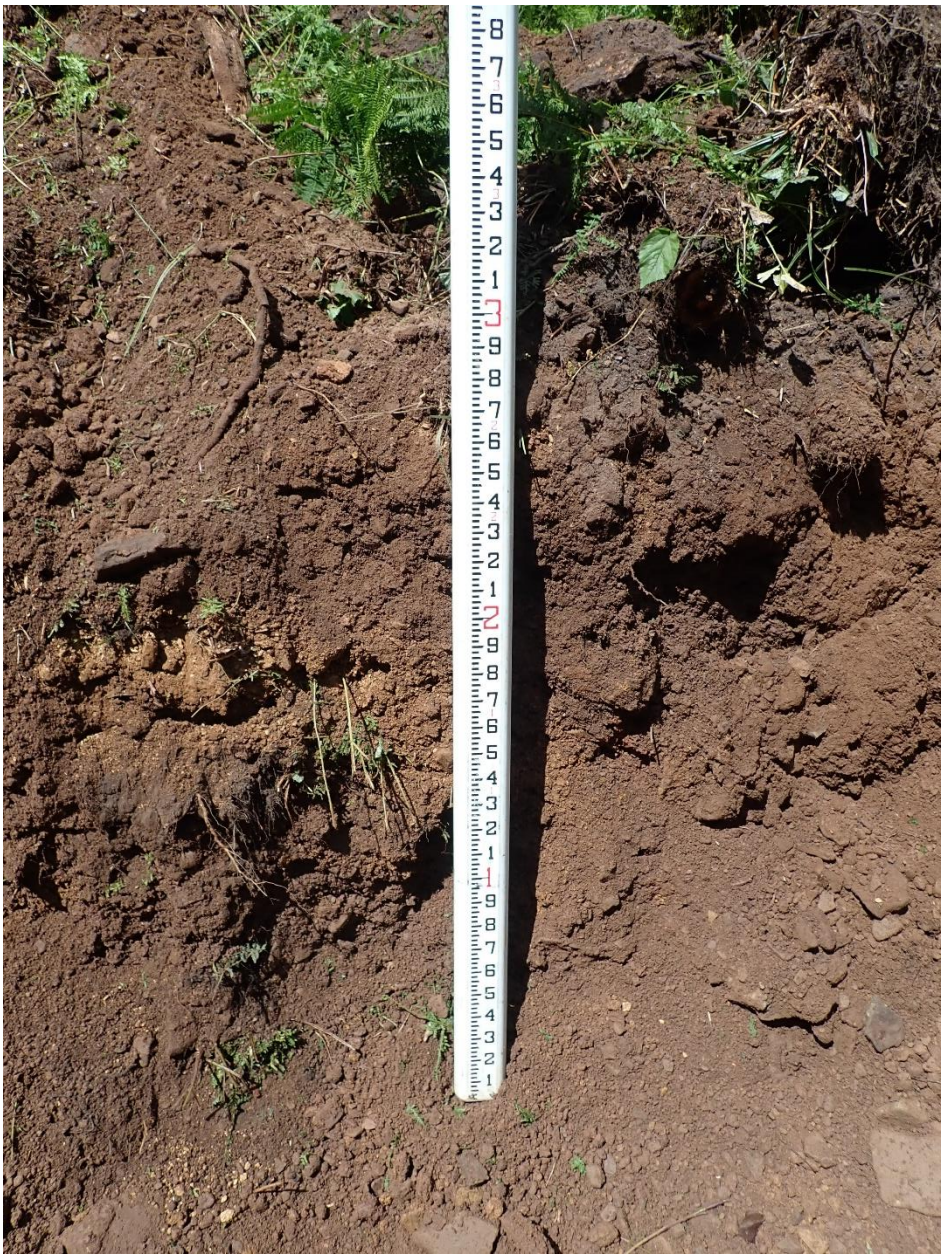
Project Identification:	National Fuel Tamarack Compressor Station					**Constants**	**Ring Diameter**	**Area (sq. in.)**	**Depth of Liquid (inches)**	Michael Baker INTERNATIONAL	
Test Location:	ITP-5					**Inner Ring**	6.0	28.3	5.0		
Liquid Used:	Tap Water	**pH:**	7.0			**Annular Ring**	12.0	113.1	5.0	Spreadsheet adapted from Turf-Tec International	
Tested By:	Shane Stauffer		**Date:**	7/27/2020		Liquid level maintained using:	( ) Flow Valve	( ) Float Valve	( ) Mariotte Tubes		
Depth to water table:	NE					**Penetration Depth of Outer Ring (inches):**	2		**S.O. Number**		

	Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Elapsed Time Chg/ *Total* Min	Flow Readings: Inner Ring Reading (Inches)	Flow Readings: Annular Ring Reading (Inches)	Liquid Temp (F)	Infiltration Rate: Inner Ring Infiltration Rate (in/hr)	Infiltration Rate: Annular Ring Infiltration Rate (in/hr)	Remarks: Weather Conditions, Soil Classification, Testing Depth, Etc...
PRESOAK	1	Start Test	7/27/20	7:37	30	2.438	4.000	60.0	4.9	8.0	Sunny 85°F, Tested at surface in Silty Loam. Begin Presoak
		End Test		8:07	*30*						
	2	Start Test	7/27/20	8:07	30	2.313	4.000	60.0	4.6	8.0	Greater than 2" of infiltration observed. Commence testing with 10 minute intervals
		End Test		8:37	*60*						
TEST POINTS	3	Start Test	7/27/20	8:37	10	0.813	1.313	60.0	4.9	7.9	
		End Test		8:47	*70*						
	4	Start Test	7/27/20	8:47	10	0.750	1.313	60.0	4.5	7.9	
		End Test		8:57	*80*						
	5	Start Test	7/27/20	8:57	10	0.750	1.313	60.0	4.5	7.9	
		End Test		9:07	*90*						
	6	Start Test	7/27/20	9:07	10	0.750	1.313	60.0	4.5	7.9	
		End Test		9:17	*100*						
	7	Start Test	7/27/20	9:17	10	0.750	1.313	60.0	4.5	7.9	End testing
		End Test		9:27	*110*						
	8	Start Test									
		End Test									
	9	Start Test									
		End Test									
	10	Start Test									
		End Test									

Photographic Documentation

ITP1 soil profile at a depth of 6.9’

ITP2 soil profile at a depth of 11.0’



ITP3 infiltration test

ITP4 soil profile at a depth of 4.5’

ITP4 infiltration test

ITP5 soil profile at a depth of 4.1’

ITP5 infiltration test conducted at surface

Boring B-9 Log

Michael Baker INTERNATIONAL

LOG OF BORING NO.: B-9

PROJECT: **Tamarack Compressor Station** SHEET: **1** OF **3**

LATITUDE: LONGITUDE: GEO. DATUM: START: **4/24/2019** END: **4/24/2019**

NORTH: **462251** EAST: **1944676** COORD. DATUM: LOGGER: **Dave Gaviglia**

STATION: OFFSET: BASELINE: DRILLER: **Brett Kirkpatrick**

EQUIPMENT: **D50 Track Rig** DRILL CO.: **Terra Testing**

METHOD DETAILS: **2" Split-Spoon Sample Hollow-Stem Auger (3-1/4" ID) NQ2 Coring**

▽ H_2O @ **18.5** ⌭ CAVED @ TIME: **09:50** DATE: **4/24/2019** DESC.: **0** PLUNGE: **-90**

▼ H_2O @ **20.5** ⌭ CAVED @ TIME: **11:15** DATE: **4/24/2019** DESC.: **0** ELEV. DATUM:

▼ H_2O @ ⌭ CAVED @ TIME: DATE: DESC.: GROUND ELEV.: **1712**

SAMPLE DEPTH (FT)	SAMPLE TYPE - NUMBER	RECOVERY %	SPT BLOWS/FT or (RQD)	TEST RESULTS	STRATA	DEPTH	DESCRIPTION	REMARKS
0.0	S-1	60%	1 2 4	**(0.0-1.5)** PPen=0.5		0	Sandy SILT with gravel (ml); sand is fine to coarse; gravel is fine to coarse; subangular; light brown and reddish brown; moist; medium stiff to very stiff; heterogeneous.	RESIDUAL.
1.5	A-N					1		
3.0	S-2	100%	5 8 11	**(3.0-4.5)** PPen=2 PL=19 LL=33 MC=17.9 USCS=GC AASHTO=A-6		3		
4.5	A-N					5		
6.0	S-3	100%	4 6 8	**(6.0-7.5)** PPen=2.5		6	6.0' - EL 1706.0 Gravelly SILT with sand (ml); sand is fine to medium; gravel is fine to coarse; subangular; light brown; moist; stiff to very stiff.	
7.5	A-N					8		
9.0	S-4	100%	8 11 11	**(9.0-10.5)** PPen=4		9		
10.5	A-N					11		
12.0	S-5	100%	9 22 20			12	12.0' - EL 1700.0 Silty SAND with gravel (sm); sand is fine to medium; gravel is fine to coarse; subangular; light to olive brown; moist; dense.	
13.5	A-N					14		
15.0	S-6	100%	7 7 5	**(15.0-16.5)** PPen=2.25 PL=19 LL=30 MC=17.9 USCS=SC AASHTO=A-6		15	15.0' - EL 1697.0 Sandy SILT with gravel (ml); sand is medium to coarse; gravel is fine to coarse; subangular; light brown, light grey, reddish-brown; moist to wet; stiff to very stiff.	Encountered water at 18.5'.
16.5	A-N					17		
18.0	S-7	100%	8 9 11	**(18.0-19.5)** PPen=4.5		18		
19.5						20		

Tremie cement/bentonite grout borehole upon completion.

CHECKED BY:

TEMPLATE=9BKTCAE PROJECT=GINT TAMARACK CS LOGS.GPJ LIBRARY=BAKER_STD.GLB DATE PRINTED= 5/27/19 S.O.#=169277

Michael Baker INTERNATIONAL

LOG OF BORING NO.: B-9

PROJECT: **Tamarack Compressor Station** SHEET: **2** OF **3**

LATITUDE: LONGITUDE: GEO. DATUM: START: **4/24/2019** END: **4/24/2019**

NORTH: **462251** EAST: **1944676** COORD. DATUM: LOGGER: **Dave Gaviglia**

STATION: OFFSET: BASELINE: DRILLER: **Brett Kirkpatrick**

EQUIPMENT: **D50 Track Rig** DRILL CO.: **Terra Testing**

METHOD DETAILS: **2" Split-Spoon Sample Hollow-Stem Auger (3-1/4" ID) NQ2 Coring**

▽ H_2O @ **18.5** ⊆ CAVED @ TIME: **09:50** DATE: **4/24/2019** DESC.: **0** PLUNGE: **-90**

▼ H_2O @ **20.5** ⊆ CAVED @ TIME: **11:15** DATE: **4/24/2019** DESC.: **0** ELEV. DATUM:

▼ H_2O @ ⊆ CAVED @ TIME: DATE: DESC.: GROUND ELEV.: **1712**

SAMPLE DEPTH (FT)	SAMPLE TYPE - NUMBER	RECOVERY %	SPT BLOWS/FT or (RQD)	TEST RESULTS	STRATA	DEPTH	DESCRIPTION	REMARKS
	A-N					20		
							21.0' - EL 1691.0	
21.0	S-8	100%	50/0.2			21	Poorly-graded GRAVEL with silt and sand (gp-gm); sand is fine to coarse; gravel is fine to coarse; angular, shale (can be crushed under hand pressure); olive brown; moist; very dense.	WEATHERED SHALE.
21.2	A-N					22		
						23		
24.0	S-9	100%	50/0.1			24		
24.1	A-N					25		
							26.0' - EL 1686.0	
26.0	R-1	70%	(50%)			26	SANDSTONE (medium grained); fresh; light gray	
							26.5' - EL 1685.5	
						27	LIMESTONE; hard; slightly weathered; light gray, brown 45 degree fracture at 27.5'	
28.0	R-2	98%	(76%)			28	28.2' - EL 1683.8	
							SANDSTONE (medium grained); slightly weathered to fresh; medium hard; indistinct to narrow bedding (<5 degrees); medium fracturing; light gray Limestone seam (fractured) with conglomerate from 29.1' to 29.3'	
						29		
						30		
						31		
						32		
33.0	R-3	100%	(88%)			33		
						34		
						35		
						36		
						37		
38.0	R-4	97%	(53%)			38		
						39		
						40		

Tremie cement/bentonite grout borehole upon completion.

TEMPLATE=9BKTC.AE PROJECT=GINT TAMARACK CS LOGS.GPJ LIBRARY=BAKER_STD.GLB DATE PRINTED= 5/27/19 S.O.#=169277 CHECKED BY:

Michael Baker INTERNATIONAL

LOG OF BORING NO.: B-9

PROJECT: **Tamarack Compressor Station** SHEET: **3** OF **3**

LATITUDE: LONGITUDE: GEO. DATUM: START: **4/24/2019** END: **4/24/2019**

NORTH: **462251** EAST: **1944676** COORD. DATUM: LOGGER: **Dave Gaviglia**

STATION: OFFSET: BASELINE: DRILLER: **Brett Kirkpatrick**

EQUIPMENT: **D50 Track Rig** DRILL CO.: **Terra Testing**

METHOD DETAILS: **2" Split-Spoon Sample Hollow-Stem Auger (3-1/4" ID) NQ2 Coring**

▽ H_2O @ **18.5** ⊆ CAVED @ TIME: **09:50** DATE: **4/24/2019** DESC.: **0** PLUNGE: **-90**

▼ H_2O @ **20.5** ⊆ CAVED @ TIME: **11:15** DATE: **4/24/2019** DESC.: **0** ELEV. DATUM:

▼ H_2O @ ⊆ CAVED @ TIME: DATE: DESC.: GROUND ELEV.: **1712**

SAMPLE DEPTH (FT)	SAMPLE TYPE - NUMBER	RECOVERY %	SPT BLOWS/FT or (RQD)	TEST RESULTS	STRATA	DEPTH	DESCRIPTION	REMARKS
41.0						40	40.2' - EL 1671.8 SHALE; soft to very soft; highly weathered; intensely bedded (<5 degrees); very closely fractured; gray 2 clay seams (1/4") at 40.3'	
						41	41.0' - EL 1671.0 End of Boring at 41.0'	
						42		
						43		
						44		
						45		
						46		
						47		
						48		
						49		
						50		
						51		
						52		
						53		
						54		
						55		
						56		
						57		
						58		
						59		
						60		

Tremie cement/bentonite grout borehole upon completion.

CHECKED BY:

TEMPLATE=9BKTCAE PROJECT=GINT TAMARACK CS LOGS.GPJ LIBRARY=BAKER_STD.GLB DATE PRINTED= 5/27/19 S.O.#=169277

APPENDIX E

PCSM/Site Restoration Drawings

MOTT MACDONALD

National Fuel

Act 167 Verification Report

FM100 Project

Date: October, 2019
Revised: September, 2020

FM100 Pipeline Project

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mottmac.com

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Drive, Suite 500

Salt Lake City, UT 84107
814-871-8000

Act 167 Verification Report

FM100 Project

Date: October, 2019
Revised: September, 2020

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
0	10/2019	J. MacMinn	W. Clark	D. Gibbons	Issued for PADEP
1	9/2020	J. MacMinn	W. Clark	D. Gibbons	Issued for PADEP

Information class: Standard

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Executive Summary

The Pennsylvania Stormwater Management Act (Act 167 of 1978), more commonly referred to as Act 167, enables the regulation of development and activities causing accelerated runoff. A portion of the proposed project is located within watersheds and counties covered by DEP approved and current (from 2005 or later) Act 167 Plans. The following report summarizes the compliance information that is provided in the individual PSCM Reports for the individual sites within the project. This report covers the FM100 mainline piping and following sites:

- KL Valve Set
- Carpenter Hollow OPP
- Mainline Block Valve – 1
- Mainline Block Valve – 2
- Mainline Block Valve – 3
- Mainline Block Valve – 4

Mott MacDonald has prepared this Act 167 Stormwater Consistency Verification Report. This report verifies consistency between the provisions of the McKean County and Potter County Act 167 Stormwater Management plans and FM100 Project (Project). The Project will traverse through McKean County and Potter County. The McKean county and Potter County Act 167 Plans aim to improve stormwater management practices, minimize negative impacts to future land use, and improve conditions to impaired waters.

1 Summary of Stormwater Recommendations in the Plans

The stated purpose of the Plans is to protect human health and safety by addressing the impacts of future land use on the current levels of stormwater runoff and to recommend measures to control accelerated runoff to prevent increased flood damages or additional water quality degradation. The Plans identify four aspects of effective stormwater management as:

- Peak discharge rate standards
- Groundwater Recharge
- Streambank Protection
- Water quality standards

The Plans identify criteria for control of stormwater runoff that are specific to the watersheds within the county. A broad and uniform approach is described for implementation of water quality, volume control, and channel protection controls. Peak discharge rate control standards were developed to achieve watershed specific controls where necessary.

2 Peak Rate Controls

2.1 Plan Requirement

Mathematical modeling of the county's watersheds was performed to analyze the flow patterns of the watersheds, the impact of anticipated development on those patterns, and when necessary, develop a release rate for various sub-basins to control regional peak flows. In some sub-basins, release rates were recommended that require sites to discharge at peak flows lower than those calculated for predevelopment conditions. The recommended release rates from the Plans fall into two categories:

- Areas not covered by a Release Rate Map

  Post-development discharge rates shall not exceed the predevelopment discharge rates for the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the predevelopment analysis for 1-, 2-, 5-,10-, 25-, 50-, and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.

- Areas covered by a Release Rate Map

  For the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year storms, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall not exceed the predevelopment discharge rates.

2.2 Consistency Verification

2.2.1 KL Valve Set

The site is located in the Potato Creek Watershed and within McKean County, which has an Act 167 Stormwater Management Plan, and the Toby Creek Watershed is in an area covered by a Release Rate Map. The plan states that:

> "In some subbasins, it is necessary to implement strict release rates that require sites to discharge at flows much lower than those calculated for pre-development flows. This is due to the timing of the peak flows from all of the subbasins, and how flows from the subbasin in question impact the overall stream flows. Variable release rates for subbasins throughout a watershed are an important part of achieving regional peak flow controls. The proposed release rates calculate no peak flow increase above the existing condition peak flows at any point throughout the county watersheds. Strict release rates for the more frequent design storms are necessary to meet this criterion in some subwatersheds. The proposed release rates for this plan fall into to categories:
>
> 1. Areas not covered by a Release Rate Map:
>
>   Post development discharge rates shall not exceed the predevelopmental discharge rates for the 2-, 10-, 25-, 50-, and 100-year storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the pre-development analysis for 2-, 10- 25-, 50-, and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.
>
> 2. Areas covered by a Release Rate Map:
>
>   For the 2-, 10-, 25-, 50-, and 100-year storms, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall note exceed the predevelopment discharge rates.
>
>   A. Tunungwant Creek Watershed – 70% and 100% release rate districts have been established.
>
>   B. Allegheny River Watershed – 100% release rate districts have been established.
>
>   C. Potato Creek Watershed – 100% release rate districts have been established."

The KL Valve Set is located in a 100% release rate district and therefore the post development discharge rates shall not exceed the predevelopment rates for the 1- through 100-year, 24-hour storms. The stormwater volume and peak runoff rate requirements are achieved as demonstrated in Tables 1 and 2 below:

Table 1: KL Valve Set Stormwater Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	1,029	1,202	173	1,137	Yes
2	1,446	1,647	201	1,585	Yes
Act 167 2" Capture			777	2,343	Yes

Table 2: KL Valve Set Stormwater Peak Flow Summary

Recurrence Interval (yrs)	Existing Disturbed Conditions Site Q (cfs)	Existing Undisturbed Conditions Offsite Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.064	0.323	0.378	0.000	Yes
2	0.097	0.475	0.559	0.000	Yes
5	0.145	0.696	0.823	0.000	Yes
10	0.188	0.892	1.057	0.026	Yes
25	0.252	1.187	1.406	0.106	Yes
50	0.305	1.435	1.699	0.441	Yes
100	0.364	1.706	2.020	1.485	Yes

See KL Valve Set Post-Construction Stormwater Management Plan Section 4 for calculation narrative and Appendices for calculations.

2.2.2 Carpenter Hollow OPP

The site is located in the Oswayo Creek Watershed and within Potter County, which has an Act 167 Stormwater Management Plan in place, and Oswayo Creek Watershed is not in an area covered by a Release Rate Map. The plan states that:

> "In some subbasins, it is necessary to implement strict release rates that require sites to discharge at flows much lower than those calculated for pre-development flows. This is due to the timing of the peak flows from all of the subbasins, and how flows from the subbasin in question impact the overall stream flows. Variable release rates for subbasins throughout a watershed are an important part of achieving regional peak flow controls. The proposed release rates calculate no peak flow increase above the existing condition peak flows at any point throughout the county watersheds. Strict release rates for the more frequent design storms are necessary to meet this criterion in some subwatersheds. The proposed release rates for this plan fall into two categories:
>
> 1. Areas not covered by a Release Rate Map:
>
>   Post development discharge rates shall not exceed the pre-developmental discharge rates for the 2-, 10-, 25-, 50-, and 100-year storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the pre-development analysis for 2-, 10- 25-, 50-, and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.
>
> 2. Areas covered by a Release Rate Map:
>
>   For the 2-, 10-, 25-, 50-, and 100-year storms, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall note exceed the predevelopment discharge rates."

The Carpenter Hollow OPP site is not covered by a Release Rate Map and therefore the post development discharge rates shall not exceed the predevelopment rates for the 2-, 10-, 25-, 50-, and 100-year 24-hour storms. The stormwater volume and peak runoff rate requirements are achieved as demonstrated in Tables 3 and 4 below:

Table 3: Carpenter Hollow OPP Stormwater Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	1,655	2,536	881	2,759	Yes
2	2,466	3,497	1,031	3,778	Yes
Act 167 2” Capture			2,585	6,200	Yes

Table 4: Carpenter Hollow OPP Stormwater Peak Flow Summary

Recurrence Interval (yrs)	Existing Disturbed Conditions Site Q (cfs)	Existing Undisturbed Conditions Offsite Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.189	0.260	0.441	0.000	Yes
2	0.297	0.414	0.697	0.000	Yes
5	0.466	0.652	1.100	0.000	Yes
10	0.623	0.873	1.472	0.036	Yes
25	0.878	1.235	2.079	0.166	Yes
50	1.119	1.577	2.651	0.742	Yes
100	1.406	1.985	3.339	2.065	Yes

See the Carpenter Hollow OPP Post-Construction Stormwater Management Plan Section 4 for calculation narrative and Appendices for calculations.

2.2.3 Mainline Block Valve - 1

The site is located in the Potato Creek Watershed and within McKean County, which has an Act 167 Stormwater Management Plan. This site is subject to the requirements of the McKean County Act 167 Stormwater Management Plan, which imposes stricter requirements than item (g)(2) of Pennsylvania Code Section 102.8. It states that:

> "In some subbasins, it is necessary to implement strict release rates that require sites to discharge at flows much lower than those calculated for pre-development flows. This is due to the timing of the peak flows from all of the subbasins, and how flows from the subbasin in question impact the overall stream flows. Variable release rates for subbasins throughout a watershed are an important part of achieving regional peak flow controls. The proposed release rates calculate no peak flow increase above the existing condition peak flows at any point throughout the county watersheds. Strict release rates for the more frequent design storms are necessary to meet this criterion in some subwatersheds. The proposed release rates for this plan fall into to categories:
>
> 1. Areas not covered by a Release Rate Map:
>
>   Post development discharge rates shall not exceed the predevelopmental discharge rates for the 2-, 10-, 25-, 50-, and 100-year storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the pre-development analysis for 2-, 10- 25-, 50-, and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.
>
> 2. Areas covered by a Release Rate Map:
>
>   For the 2-, 10-, 25-, 50-, and 100-year storms, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall note exceed the predevelopment discharge rates.
>
>   A. Tunungwant Creek Watershed – 70% and 100% release rate districts have been established.
>
>   B. Allegheny River Watershed – 100% release rate districts have been established.
>
>   C. Potato Creek Watershed – 100% release rate districts have been established."

*The MLV is located in a 100% release rate district and therefore the post development discharge rates shall not exceed the predevelopment rates for the 1- through 100-year, 24-hour storms. T*he stormwater volume and peak runoff rate requirements are achieved as demonstrated in Tables 5 and 6 below:

Table 5: MLV-1 Stormwater Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	178	546	368	684	Yes
2	261	676	415	873	Yes
Act 167 2" Capture			682	1,260	Yes

Table 6: MLV-1 Stormwater Peak Flow Summary

Recurrence Interval (yrs)	Existing Conditions Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.070	0.421	0.491	Yes
2	0.107	0.641	0.748	Yes
5	0.162	0.966	1.127	Yes
10	0.211	1.261	1.472	Yes
25	0.286	1.709	1.995	Yes
50	0.351	2.097	2.447	Yes
100	0.423	2.528	2.951	Yes

See MLV-1 Post-Construction Stormwater Management Plan Section 4 for calculation narrative, and Appendices for calculations.

2.2.4 Mainline Block Valve - 2

The site is located in the Potato Creek Watershed and within McKean County, which has an Act 167 Stormwater Management Plan This site is subject to the requirements of the McKean County Act 167 Stormwater Management Plan, which imposes stricter requirements than item (g)(2) of Pennsylvania Code Section 102.8. It states that:

> "In some subbasins, it is necessary to implement strict release rates that require sites to discharge at flows much lower than those calculated for pre-development flows. This is due to the timing of the peak flows from all of the subbasins, and how flows from the subbasin in question impact the overall stream flows. Variable release rates for subbasins throughout a watershed are an important part of achieving regional peak flow controls. The proposed release rates calculate no peak flow increase above the existing condition peak flows at any point throughout the county watersheds. Strict release rates for the more frequent design storms are necessary to meet this criterion in some subwatersheds. The proposed release rates for this plan fall into two categories:
>
> 1. Areas not covered by a Release Rate Map:
>
>   Post development discharge rates shall not exceed the predevelopmental discharge rates for the 2-, 10-, 25-, 50-, and 100-year storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the pre-development analysis for 2-, 10- 25-, 50-, and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.
>
> 2. Areas covered by a Release Rate Map:
>
>   For the 2-, 10-, 25-, 50-, and 100-year storms, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall note exceed the predevelopment discharge rates.
>
>   A. Tunungwant Creek Watershed – 70% and 100% release rate districts have been established.
>
>   B. Allegheny River Watershed – 100% release rate districts have been established.
>
>   C. Potato Creek Watershed – 100% release rate districts have been established."

The MLV is located in a 100% release rate district and therefore the post development discharge rates shall not exceed the predevelopment rates for the 1- through 100-year, 24-hour storms. The stormwater volume and peak runoff rate requirements are achieved as demonstrated in Tables 7 and 8 below:

Table 7: MLV-2 Stormwater Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	0	301	301	316	Yes
2	0	382	382	402	Yes
Act 167 2" Capture			530	1,084	Yes

Table 8: MLV-2 Stormwater Peak Flow Summary

Recurrence Interval (yrs)	Existing Undisturbed Conditions Site Q (cfs)	Existing Undisturbed Conditions Offsite Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.000	0.000	0.000	0.000	Yes
2	0.000	0.000	0.000	0.000	Yes
5	0.000	0.000	0.000	0.000	Yes
10	0.000	0.000	0.000	0.000	Yes
25	0.000	0.000	0.000	0.000	Yes
50	0.000	0.000	0.000	0.000	Yes
100	0.000	0.003	0.003	0.002	Yes

See MLV-2 Post-Construction Stormwater Management Plan Section 4 for calculation narrative, and Appendices for calculations.

2.2.5 Mainline Block Valve - 3

The site is located in the Allegheny River Watershed and within Potter County, which has an Act 167 Stormwater Management Plan. This site is subject to the requirements of the Potter County Act 167 Stormwater Management Plan, which imposes stricter requirements than item (g)(2) of Pennsylvania Code Section 102.8. It states that:

> *"*In some subbasins, it is necessary to implement strict release rates that require sites to discharge at flows much lower than those calculated for pre-development flows. This is due to the timing of the peak flows from all of the subbasins, and how flows from the subbasin in question impact the overall stream flows. Variable release rates for subbasins throughout a watershed are an important part of achieving regional peak flow controls. The proposed release rates calculate no peak flow increase above the existing condition peak flows at any point throughout the county watersheds. Strict release rates for the more frequent design storms are necessary to meet this criterion in some subwatersheds. The proposed release rates for this plan fall into two categories:
>
> 1. Areas not covered by a Release Rate Map:
>
>   Post development discharge rates shall not exceed the pre-developmental discharge rates for the 2-, 10-, 25-, 50-, and 100-year storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the pre-development analysis for 2-, 10- 25-, 50-, and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.
>
> 2. Areas covered by a Release Rate Map:
>
>   For the 2-, 10-, 25-, 50-, and 100-year storms, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall note exceed the predevelopment discharge rates."

The MLV site is not covered by a Release Rate Map and therefore the post development discharge rates shall not exceed the predevelopment rates for the 2-, 10-, 25-, 50-, and 100-year 24-hour storms. The stormwater volume and peak runoff rate requirements are achieved as demonstrated in Tables 9 and Table 10 below:

Table 9: MLV-3 Stormwater Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	0	173	173	181	Yes
2	0	237	237	249	Yes
Act 167 2" Capture			516	1,236	Yes

Table 10: MLV-3 Stormwater Peak Flow Summary

Recurrence Interval (yrs)	Existing Disturbed Conditions Site Q (cfs)	Existing Undisturbed Conditions Offsite Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.000	0.000	0.000	0.000	Yes
2	0.000	0.000	0.000	0.000	Yes
5	0.000	0.000	0.000	0.000	Yes
10	0.000	0.000	0.000	0.000	Yes
25	0.000	0.000	0.000	0.000	Yes
50	0.000	0.000	0.000	0.000	Yes
100	0.000	0.002	0.003	0.000	Yes

See MLV-3 Post-Construction Stormwater Management Plan Section 4 for calculation narrative, and Appendices for calculations.

2.2.6 Mainline Block Valve - 4

The site is in the Oswayo Creek Watershed within Potter County, which has an Act 167 Stormwater Management Plan in place, and Oswayo Creek Watershed is not in an area covered by a Release Rate Map. The plan states that:

> *"In some subbasins, it is necessary to implement strict release rates that require sites to discharge at flows much lower than those calculated for pre-development flows. This is due to the timing of the peak flows from all of the subbasins, and how flows from the subbasin in question impact the overall stream flows. Variable release rates for subbasins throughout a watershed are an important part of achieving regional peak flow controls. The proposed release rates calculate no peak flow increase above the existing condition peak flows at any point throughout the county watersheds. Strict release rates for the more frequent design storms are necessary to meet this criterion in some subwatersheds. The proposed release rates for this plan fall into two categories:*
>
> 1. Areas not covered by a Release Rate Map:
>
>   Post-development discharge rates shall not exceed the pre-development discharge rates for the 2-, 10-, 25-, 50-, and 100-year storms. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the pre-development analysis for 2-. 10-, 25-, 50- and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement.
>
> 2. Areas covered by a Release Rate Map:
>
>   For the 2-,10-, 25-, 50-, and 100-year storms, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall not exceed the pre-development discharge rates.

The MLV is not covered by a Release Rate Map and therefore the post development discharge rates shall not exceed the predevelopment rates for the 2-,10-,25-,50-, and 100-year, 24-hour storms. The stormwater volume and peak runoff rate requirements are achieved as demonstrated in Tables 11 and Table 12 below:

Table 11: MLV-4 Stormwater Volume Summary

Recurrence Interval (yrs)	Existing Volume (cf)	Proposed Unmitigated Volume from Model (cf)	Difference between Proposed and Existing (cf)	Proposed Trench Infiltration Capacity (cf)	Adequate Infiltration Volume? (Y/N)
1	2,016	2,286	270	95 + 213 = 308	Yes
2	2,986	3,333	346	143 + 2559 = 402	Yes
Act 167 2” Capture			655	1,500 + 1,140 = 3,140	Yes

Table 12: MLV-4 Stormwater Peak Flow Summary

Recurrence Interval (yrs)	Existing Disturbed Conditions Site Q (cfs)	Existing Undisturbed Conditions Offsite Q (cfs)	Maximum Allowable Proposed Peak Flow (cfs)	Proposed Q (cfs)	Proposed Less than Allowable? (Y/N)
1	0.015	0.027	0.029	0.027	Yes
2	0.022	0.042	0.046	0.042	Yes
5	0.035	0.068	0.072	0.068	Yes
10	0.046	0.091	0.098	0.091	Yes
25	0.064	0.131	0.139	0.131	Yes
50	0.082	0.168	0.178	0.168	Yes
100	0.103	0.212	0.225	0.212	Yes

See MLV-4 Post-Construction Stormwater Management Plan Section 4 for calculation narrative, and Appendices for calculations.

2.2.7

2.2.7 Mainline Pipe

Areas of disturbance associated with mainline pipe right-of-way will be restored to pre-construction grade and revegetated to meadow in good condition. Thus, these areas will be compliant with Post-Construction Stormwater Requirements for linear utilities. In general, the pre-construction drainage patterns surrounding the Project will be maintained.

The mainline portion of the Project will not result in increased stormwater runoff rate or volume. The Site Restoration Plan and narrative for the Project comply with 25 Pa. Code § 102.8 to preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving streams while minimizing any increase in stormwater runoff and volume, impervious areas, land clearing, and grading. The Project also protects the existing drainage features and vegetation to the maximum extent possible. The resulting stormwater runoff has been managed in a manner which otherwise adequately protects health and property from possible injury, since the site will be restored to pre-construction conditions.

3 Groundwater Recharge, Streambank Protection, and Water Quality Standards

3.1 Plan Requirement

The Plans identify meeting the goals of Groundwater Recharge, Streambank Protection, and Water Quality through the use of structural and non-structural Best Management Practices (BMPs).

The three sites in McKean County are covered by the McKean County Act 167 Stormwater Management Plan, which complies with the PA DEP BMP Manual Volume Control Guideline 1 (CG-1) and/or CG-2 as follows:

> "Stormwater runoff Volume Controls shall be implemented using the Design Storm Method or the Simplified Method as defined below. For Regulated Activity areas equal or less than one (1) acre that do not require hydrologic routing to design the stormwater facilities, this Ordinance establishes no preference for either method; therefore, the Applicant may select either method on the basis of economic considerations, the intrinsic limitations on applicability of the analytical procedures associated with each methodology, and other factors."

The three sites located within McKean County are as follows:

- KL Valve Set
- Mainline Block Valve – 1
- Mainline Block Valve – 2

The Design Storm Method (CG-1 in the BMP Manual): Do not increase the post-development total runoff volume for all storms equal to or less than the 2-year 24-hour duration precipitation.

The Simplified Method (CG-2 in the BMP Manual): Accommodate 2" of permanently removed runoff volume. At least the first 0.5 inch of the permanently removed runoff should be infiltrated."

The three sites in Potter County meet the requirements of the Potter County Act 167 Stormwater Management Plan which complies with the PA DEP BMP Manual Volume Control Guideline 1 (CG-1) and/or CG-2 as follows:

> "Stormwater runoff Volume Controls shall be implemented using the Design Storm Method or the Simplified Method as defined below. For Regulated Activity areas equal or less than one (1) acre that do not require hydrologic routing to design the stormwater facilities, this Ordinance establishes no preference for either method; therefore, the Applicant may select either method on the basis of economic considerations, the intrinsic limitations on applicability of the analytical procedures associated with each methodology, and other factors."

The sites located within Potter County are as follows:

- Carpenter Hallow OPP
- Mainline Block Valve – 3
- Mainline Block Valve – 4

The Design Storm Method (CG-1 in the BMP Manual): Do not increase the post-development total runoff volume for all storms equal to or less than the 2-year 24-hour duration precipitation.

The Simplified Method (CG-2 in the BMP Manual): Accommodate 2" of permanently removed runoff volume. At least the first 0.5 inch of the permanently removed runoff should be infiltrated."

3.2 Consistency Verification

3.2.1 KL Valve Set

The Site Restoration Plan and/or Post Construction Stormwater Management Plan for this project is consistent with the McKean County Act 167 County-Wide Stormwater Management Plan (Plan). The Plan was adopted by the County and approved by the Pennsylvania Department of Environmental Protection. The Erosion and Sediment Control Plan, Site Restoration Plan, and Post Construction Stormwater Management Plan (SR/PCSM Plan) for this project were prepared by Mott MacDonald personnel, under the direct supervision of a Pennsylvania licensed Professional Engineer trained and experienced in E&S control methods and techniques and stormwater management design methods and techniques.

The PCSM report provides evidence that the Act 167 standards for groundwater recharge, streambank protection and water quality are met or exceeded as demonstrated in KL Valve Set Post-Construction Stormwater Management Plan 3.1.2 Post-Construction Stormwater Management Plan Analysis Page 12 through 17.

3.2.2 Carpenter Hallow OPP

The Site Restoration Plan and/or Post Construction Stormwater Management Plan for this project is consistent with the Potter County Act 167 County-Wide Stormwater Management Plan (Plan). The Plan was adopted by the County and approved by the Pennsylvania Department of Environmental Protection. The Erosion and Sediment Control Plan, Site Restoration Plan, and Post Construction Stormwater Management Plan (SR/PCSM Plan) for this project were prepared by Mott MacDonald personnel, under the direct supervision of a Pennsylvania licensed Professional Engineer trained and experienced in E&S control methods and techniques and stormwater management design methods and techniques.

The PCSM report provides evidence that the Act 167 standards for groundwater recharge, streambank protection and water quality are met or exceeded as demonstrated in Carpenter Hallow OPP Post-Construction Stormwater Management Plan 3.1.2 Post-Construction Stormwater Management Plan Analysis Page 12 through 16.

3.2.3 Mainline Block Valve - 1

The Site Restoration Plan and/or Post Construction Stormwater Management Plan for this project is consistent with the McKean County Act 167 County-Wide Stormwater Management Plan (Plan). The Plan was adopted by the County and approved by the Pennsylvania Department of Environmental Protection. The Erosion and Sediment Control Plan, Site Restoration Plan, and Post Construction Stormwater Management Plan (SR/PCSM Plan) for this project were prepared by Mott MacDonald personnel, under the direct supervision of a Pennsylvania licensed Professional Engineer trained and experienced in E&S control methods and techniques and stormwater management design methods and techniques.

The PCSM report provides evidence that the PADEP Code Section 102.8 requirements for groundwater recharge, streambank protection and water quality are met or exceeded as demonstrated in Mainline Block Valve -1 Post-Construction Stormwater Management Plan 3.1.2 Post-Construction Stormwater Management Plan Analysis Page 13 through 18.

3.2.4 Mainline Block Valve - 2

The Site Restoration Plan and/or Post Construction Stormwater Management Plan for this project is consistent with the McKean County Act 167 County-Wide Stormwater Management Plan (Plan). The Plan was adopted by the County and approved by the Pennsylvania Department of Environmental Protection. The Erosion and Sediment Control Plan, Site Restoration Plan, and Post Construction Stormwater Management Plan (SR/PCSM Plan) for this project were prepared by Mott MacDonald personnel, under the direct supervision of a Pennsylvania licensed Professional Engineer trained and experienced in E&S control methods and techniques and stormwater management design methods and techniques.

The PCSM report provides evidence that the PADEP Code Section 102.8 requirements for groundwater recharge, streambank protection and water quality are met or exceeded as demonstrated in Mainline Block Valve - 2 Post-Construction Stormwater Management Plan 3.1.2 Post-Construction Stormwater Management Plan Analysis Page 13 through 17.

3.2.5 Mainline Block Valve - 3

The Site Restoration Plan and/or Post Construction Stormwater Management Plan for this project in Potter County is consistent with PADEP Code Section 102.8 requirements. The Erosion and Sediment Control Plan, Site Restoration Plan, and Post-Construction Stormwater Management Plan (SR/PCSM Plan) for this project were prepared by Mott MacDonald personnel, under the direct supervision of a Pennsylvania licensed Professional Engineer trained and experienced in E&S control methods and techniques and stormwater management design methods and techniques.

The PCSM report provides evidence that the PADEP Code Section 102.8 requirements for groundwater recharge, streambank protection and water quality are met or exceeded as demonstrated in Mainline Block Valve - 3 Post-Construction Stormwater Management Plan 3.1.2 Post-Construction Stormwater Management Plan Analysis Page 12 through 17.

3.2.6 Mainline Block Valve - 4

The Site Restoration Plan and/or Post Construction Stormwater Management Plan for this project in Potter County is consistent with PADEP Code Section 102.8 requirements. The Erosion and Sediment Control Plan, Site Restoration Plan, and Post-Construction Stormwater Management Plan (SR/PCSM Plan) for this project were prepared by Mott MacDonald personnel, under the direct supervision of a Pennsylvania licensed Professional Engineer trained and experienced in E&S control methods and techniques and stormwater management design methods and techniques.

The PCSM report provides evidence that the PADEP Code Section 102.8 requirements for groundwater recharge, streambank protection and water quality are met or exceeded as demonstrated in Mainline Block Valve – 4 Post-Construction Stormwater Management Plan 3.1.2 Post-Construction Stormwater Management Plan Analysis Page 13 through 18.

3.2.7 Mainline Pipe

Areas of disturbance associated with mainline pipe right-of-way will be restored to pre-construction grade and revegetated to meadow in good condition. Therefore, these areas will be compliant with Groundwater Recharge, Streambank Protection, and Water Quality Standards.

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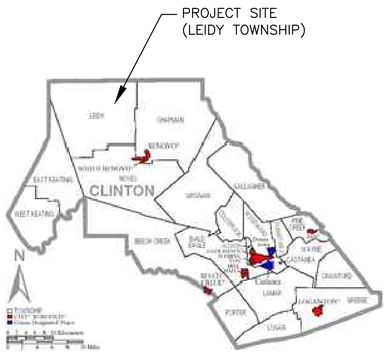
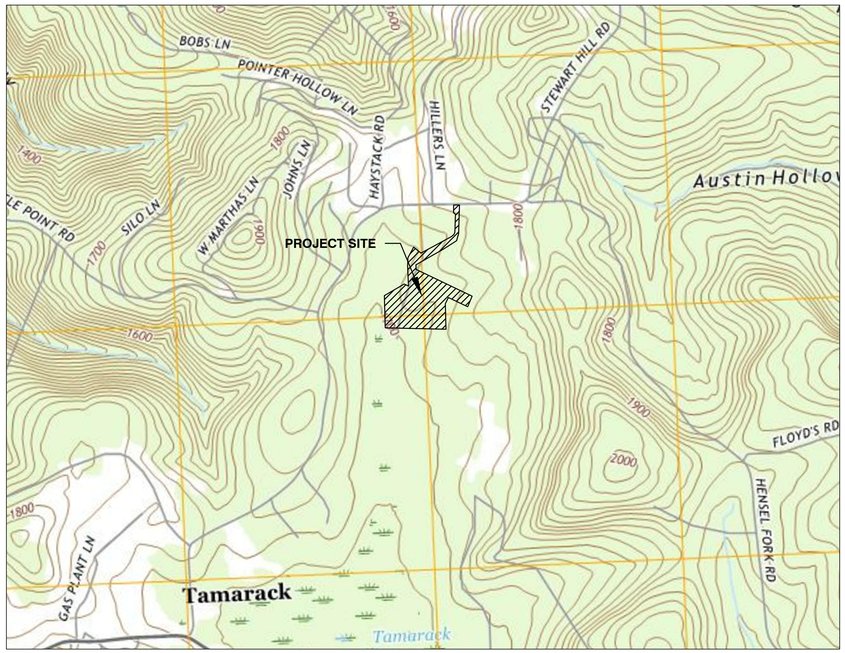
TAMARACK COMPRESSOR STATION
ESCGP-3 DRAWINGS

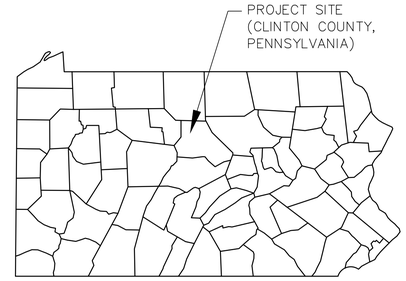


SITE LOCATION MAP

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA



GENERAL ARRANGEMENT
1" = 1000'



VICINITY MAP
N.T.S.

811
Know what's below
Call before you dig

CALL BEFORE YOU DIG
IN PENNSYLVANIA
1-800-242-1776

THE GENERAL CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES INVOLVED IN THE SITE NO MORE TEN DAYS AND NO LESS THAN THREE DAYS IN ADVANCE OF EXCAVATION (PA ACT 287 OF 1974 AMENDED BY ACT 121 OF 2008).

PA STATE LAW REQUIRES
3 WORKING DAYS NOTICE

SHEET INDEX

SHEET	REVISION	DATE	TITLE
1	1	AUGUST 2020	TITLE SHEET
2	1	AUGUST 2020	EROSION AND SEDIMENT CONTROL PLAN, SITE PREPARATION
3	1	AUGUST 2020	EROSION AND SEDIMENT CONTROL PLAN, SHEET 1 OF 2
4	1	AUGUST 2020	EROSION AND SEDIMENT CONTROL PLAN, SHEET 2 OF 2
5	1	AUGUST 2020	ACCESS ROAD PROFILES AND PAD CROSS SECTIONS
6	1	AUGUST 2020	EROSION AND SEDIMENT CONTROL DETAILS, SHEET 1 OF 3
7	1	AUGUST 2020	EROSION AND SEDIMENT CONTROL DETAILS, SHEET 2 OF 3
8	1	AUGUST 2020	EROSION AND SEDIMENT CONTROL DETAILS, SHEET 3 OF 3
9	1	AUGUST 2020	SEDIMENT POND/ INFILTRATION BASIN
10	1	AUGUST 2020	PCSM/SITE RESTORATION PLAN, SHEET 1 OF 2
11	1	AUGUST 2020	PCSM/SITE RESTORATION PLAN, SHEET 2 OF 2
12	1	AUGUST 2020	PCSM DETAILS, SHEET 1 OF 2
13	1	AUGUST 2020	PCSM DETAILS, SHEET 2 OF 2

REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

National Fuel SUPPLY CORPORATION

NATIONAL FUEL SUPPLY CORPORATION

Michael Baker INTERNATIONAL

MICHAEL BAKER INTERNATIONAL
CONSULTING ENGINEERS
MOON TOWNSHIP, PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
GREGORY A. HEILMAN
ENGINEER No. 043740-E

TAMARACK COMPRESSOR STATION

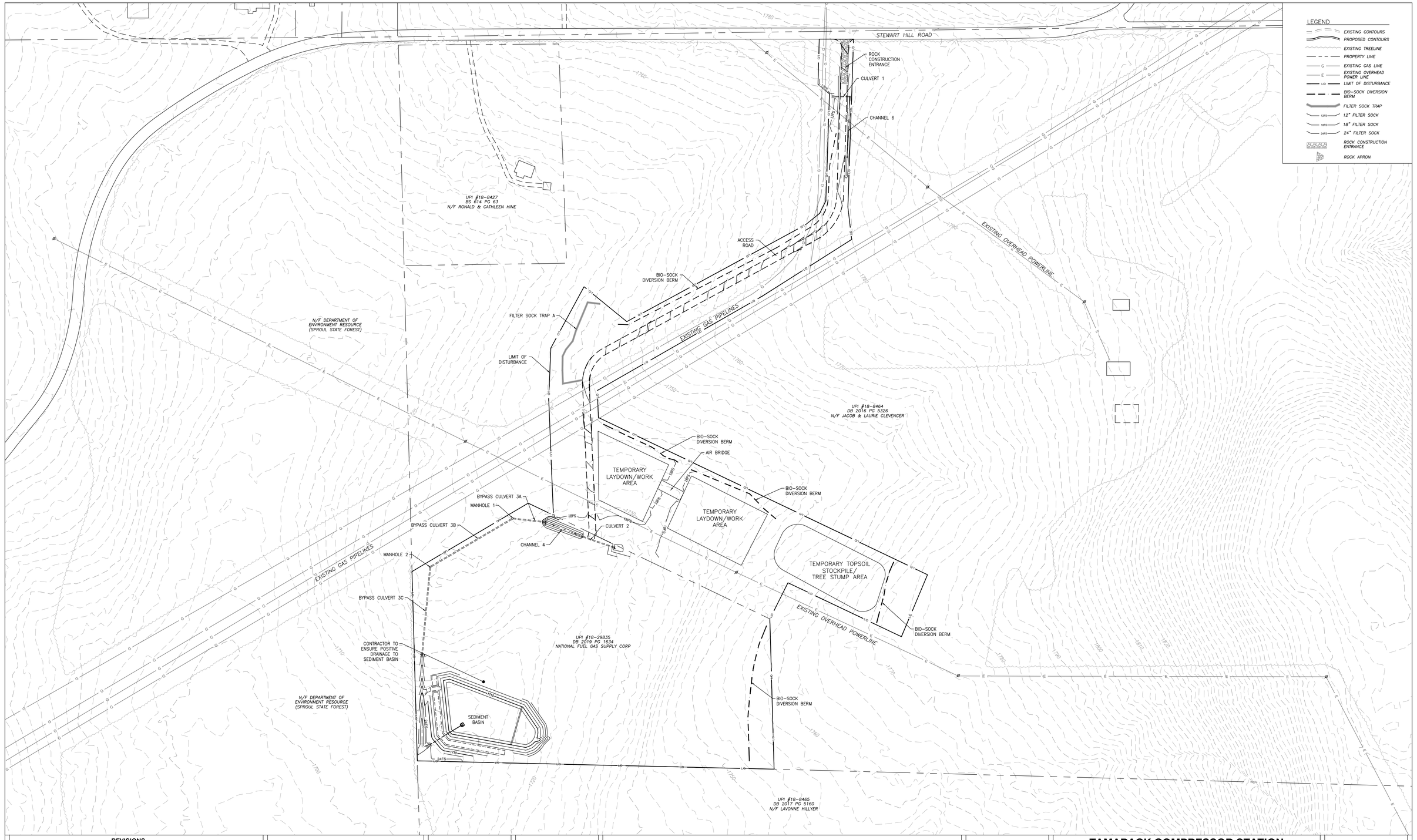
TITLE SHEET

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO.
01
OF 13



REVISIONS

1. **8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS**

100 0 100 200

SCALE IN FEET

NORTH

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

National Fuel SUPPLY CORPORATION

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Michael Baker INTERNATIONAL

MICHAEL BAKER INTERNATIONAL
CONSULTING ENGINEERS
MOON TOWNSHIP, PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
GREGORY A. HEILMAN
ENGINEER No. 043740-E

TAMARACK COMPRESSOR STATION

EROSION AND SEDIMENT CONTROL PLAN, SITE PREPARATION

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO.

02

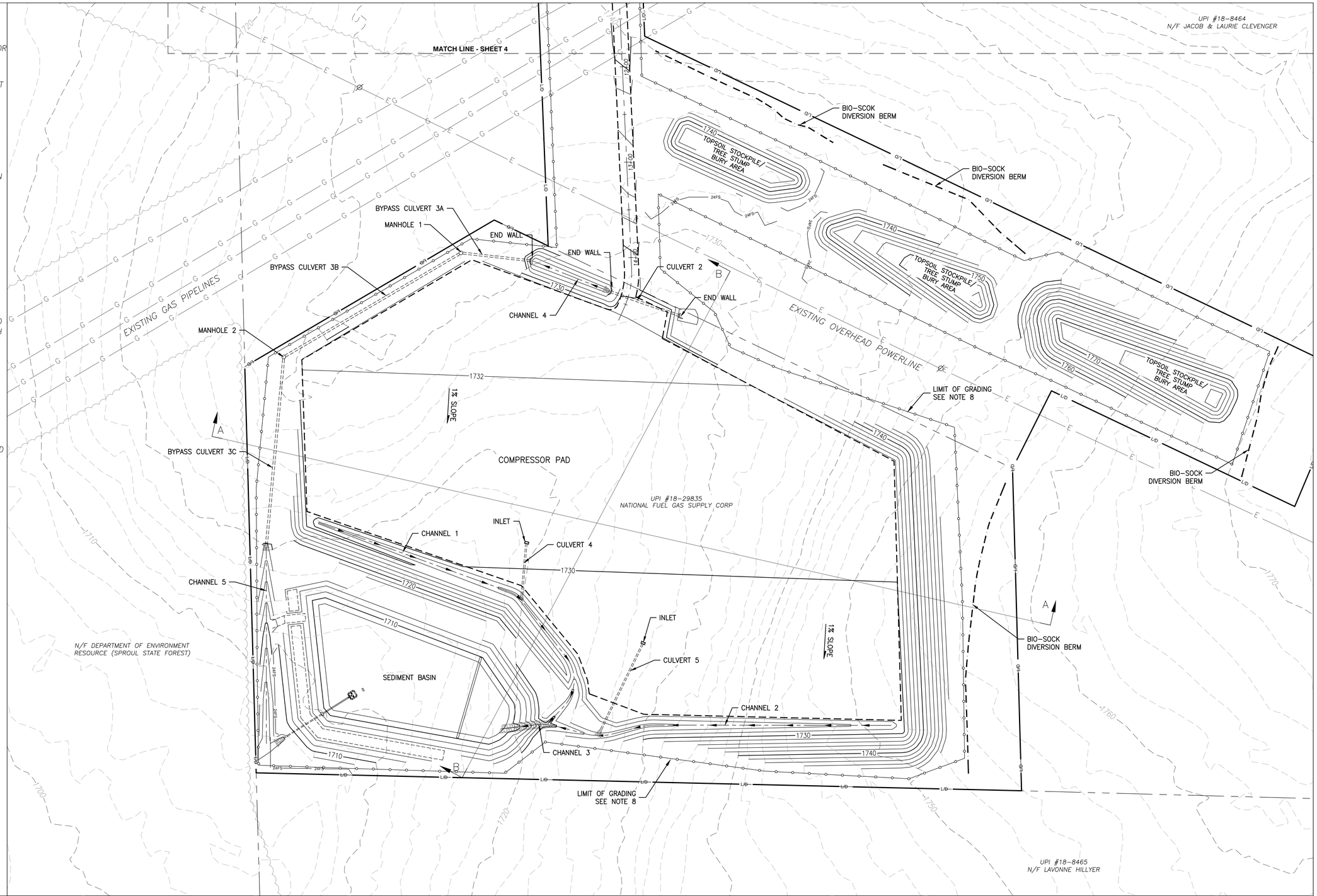
OF 13

NOTES:

1. MAPPING AND TOPOGRAPHY PROVIDED BY PA DCNR LIDAR SURVEY AND LIMITED FIELD SURVEY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ITS ACCURACY.
2. DISCREPANCIES FOUND IN THE PROJECT MAPPING MUST BE REPORTED TO THE PROJECT ENGINEER/OWNER.
3. THIS DRAWING PRESENTS THE RECOMMENDED EROSION AND SEDIMENTATION CONTROL BMPS BASED ON THE PROJECT MAPPING. THE TYPE AND LOCATION OF THESE BMPS SHOULD BE REVISED BASED ON ACTUAL CONDITIONS IN ACCORDANCE WITH THE DETAILS PRESENTED HEREIN AND LOCAL, STATE, AND FEDERAL REQUIREMENTS INCLUDING THE PADEP EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL. ALL BMPS SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.
4. EXISTING VEGETATION AND TREES SHALL BE LEFT UNDISTURBED TO THE GREATEST EXTENT PRACTICAL IN THE AREAS AROUND THE PROPOSED INFILTRATION BERMS.
5. LOCATIONS OF EXISTING UTILITIES ARE BASED ON LIMITED FIELD SURVEY. NO GUARANTEE OR ASSURANCE IS GIVEN BY THE OWNER OR ENGINEER AS TO THEIR ACCURACY, COMPLETENESS, OR VALIDITY. CONTRACTOR TO PERFORM 'DIG' PA 1-CALLS, COORDINATE WITH UTILITY COMPANIES, AND LOCATE AND IDENTIFY ALL UTILITIES PRIOR TO CONSTRUCTION.
6. ALL ROADWAY, SHOULDER, DRIVEWAY, AND FENCE DISTURBANCE SHALL BE REMEDIED AND REPLACED IN KIND.
7. CONTRACTOR IS RESPONSIBLE FOR ADHERING TO ALL OSHA SAFETY REGULATIONS DURING CONSTRUCTION.
8. CONTRACTOR SHALL DELINEATE THE LIMIT OF GRADING AS SHOWN WITH VISIBLE BARRIER AND MINIMIZE STRIPPING TOPSOIL, REMOVAL OF EXISTING VEGETATION, AND SOIL COMPACTION OUTSIDE OF THIS LIMIT TO THE MAXIMUM EXTENT POSSIBLE.

LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING TREELINE
- PROPERTY LINE
- G — EXISTING GAS LINE
- E — EXISTING OVERHEAD POWER LINE
- L/D — LIMIT OF DISTURBANCE
- LIMIT OF GRADING
- BIO-SOCK DIVERSION BERM
- FILTER SOCK TRAP
- 12FS — 12" FILTER SOCK
- 18FS — 18" FILTER SOCK
- 24FS — 24" FILTER SOCK
- ROCK CONSTRUCTION ENTRANCE & STOCKPILE
- ROCK APRON



REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

50 0 50 100
SCALE IN FEET

NORTH

DESIGNED	MJL
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National Fuel SUPPLY CORPORATION

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
GREGORY A. HEILMAN
ENGINEER No. 043740-E

TAMARACK COMPRESSOR STATION

EROSION AND SEDIMENT CONTROL PLAN, SHEET 1 OF 2

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO. 03 OF 13

NOTES:

1. MAPPING AND TOPOGRAPHY PROVIDED BY PA DCNR LIDAR SURVEY AND LIMITED FIELD SURVEY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ITS ACCURACY.
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LEGEND

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- PROPOSED CONTOURS
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- PROPERTY LINE
- G — EXISTING GAS LINE
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- L/D — LIMIT OF DISTURBANCE
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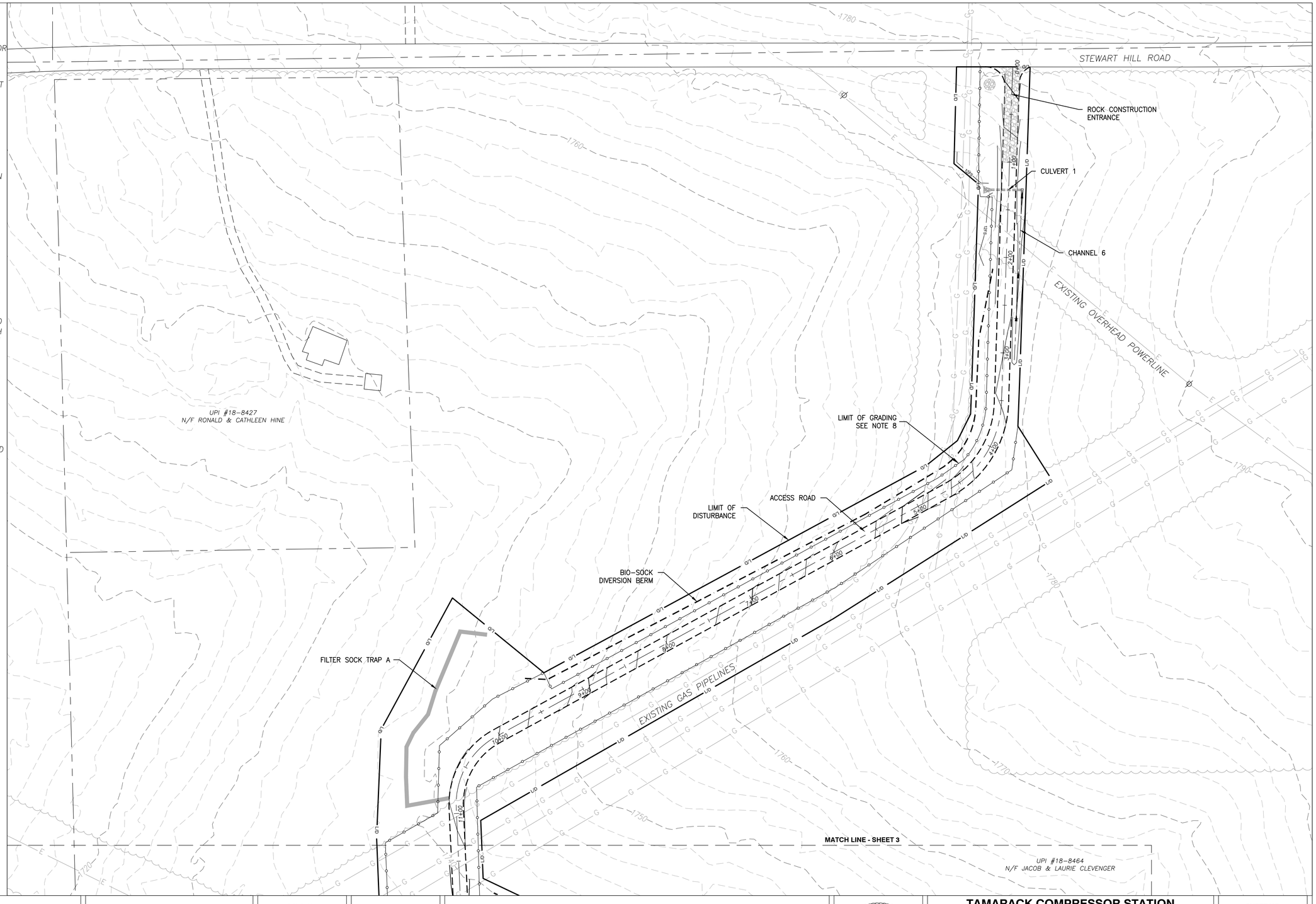

REVISIONS

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50 0 50 100
SCALE IN FEET

NORTH

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
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ENGINEER No. 043740-E

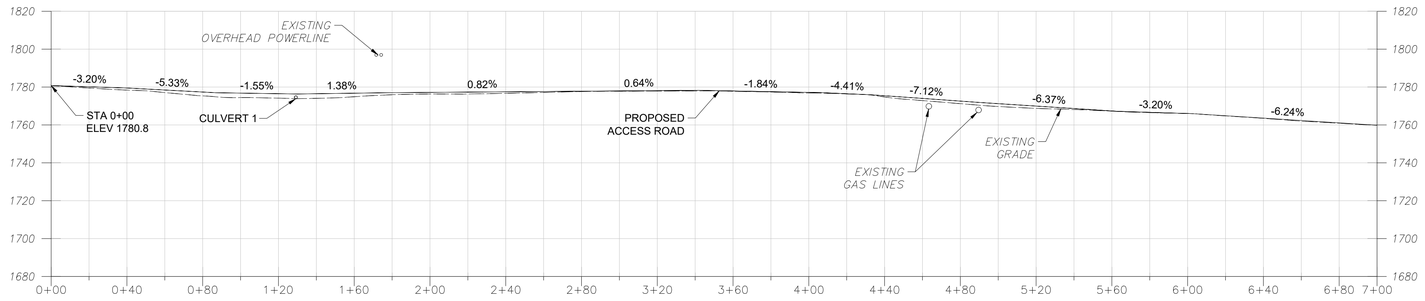
TAMARACK COMPRESSOR STATION

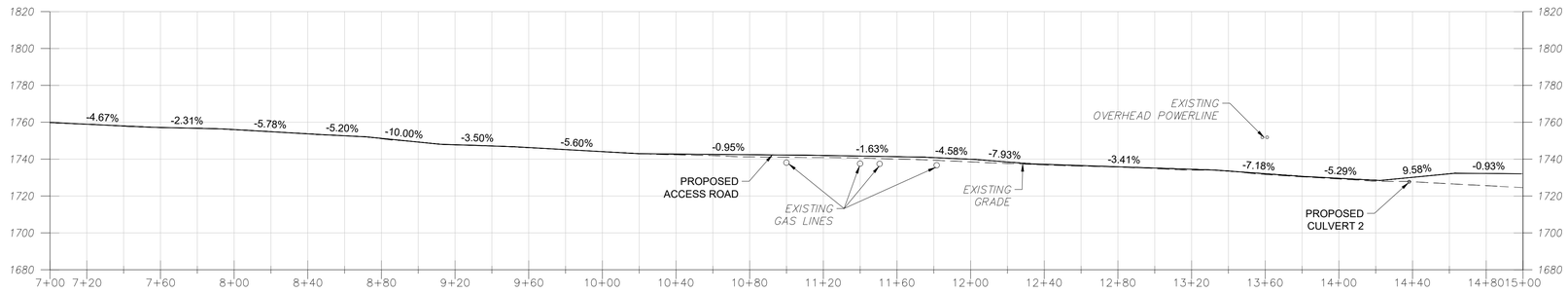
EROSION AND SEDIMENT CONTROL PLAN, SHEET 2 OF 2
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

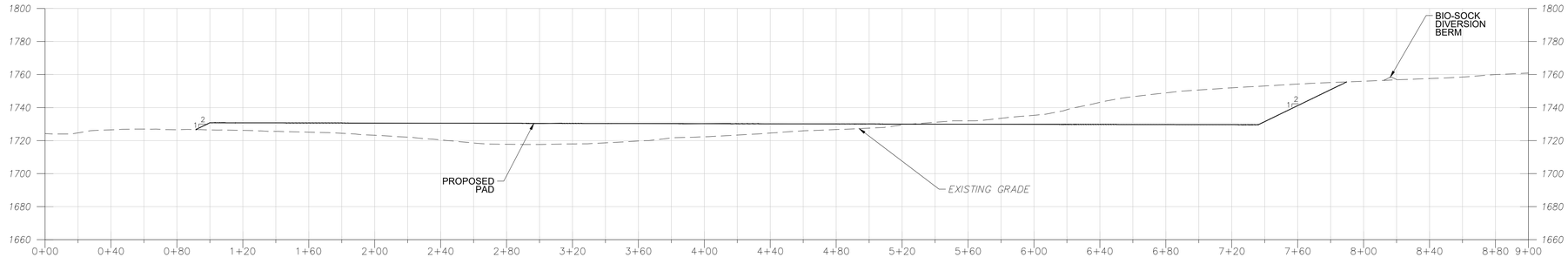
DATE: SEPTEMBER 2019

SHEET NO. 04 OF 13

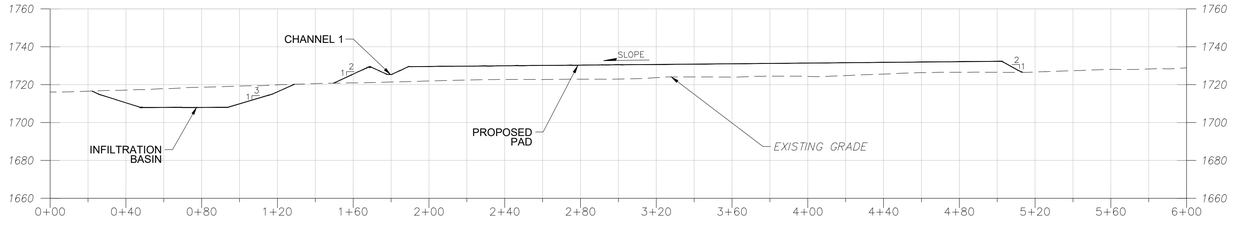




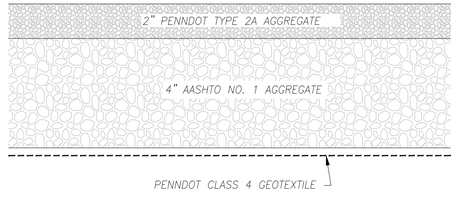
ACCESS ROAD PROFILE



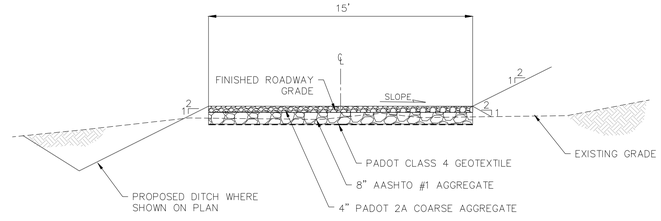
SECTION A–A



SECTION B–B



PAD SURFACE SECTION
N.T.S.



ACCESS ROAD TYPICAL SECTION
N.T.S.

REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

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SCALE IN FEET

DESIGNED	MJL
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CHECKED	GAH
BAKER S.O.	169277

National Fuel SUPPLY CORPORATION

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
GREGORY A. HEILMAN
ENGINEER No. 043740-E

TAMARACK COMPRESSOR STATION

ACCESS ROAD PROFILES AND PAD CROSS SECTIONS
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO.
05
OF 13

GENERAL NOTES:

1. ALL EARTH DISTURBANCES, INCLUDING CLEARING AND GRUBBING AS WELL AS CUTS AND FILLS SHALL BE DONE IN ACCORDANCE WITH THE APPROVED E&S PLAN. A COPY OF THE APPROVED DRAWINGS (STAMPED, SIGNED AND DATED BY THE REVIEWING AGENCY) MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. THE REVIEWING AGENCY SHALL BE NOTIFIED OF ANY CHANGES TO THE APPROVED PLAN PRIOR TO IMPLEMENTATION OF THOSE CHANGES. THE REVIEWING AGENCY MAY REQUIRE A WRITTEN SUBMITTAL OF THOSE CHANGES FOR REVIEW AND APPROVAL AT ITS DISCRETION.

2. AT LEAST 7 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, INCLUDING CLEARING AND GRUBBING, THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE E&S PLAN PREPARER, THE PCSM PLAN PREPARER, THE LICENSED PROFESSIONAL RESPONSIBLE FOR OVERSIGHT OF CRITICAL STAGES OF IMPLEMENTATION OF THE PCSM PLAN, AND A REPRESENTATIVE FROM CONSERVATION DISTRICT TO AN ON-SITE PRECONSTRUCTION MEETING.

3. AT LEAST 3 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, OR EXPANDING INTO AN AREA PREVIOUSLY UNMARKED, THE PENNSYLVANIA ONE CALL SYSTEM INC. SHALL BE NOTIFIED AT 1-800-242-1776 FOR THE LOCATION OF EXISTING UNDERGROUND UTILITIES.

4. ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE SEQUENCE PROVIDED ON THE PLAN DRAWINGS. DEVIATION FROM THAT SEQUENCE MUST BE APPROVED IN WRITING FROM THE LOCAL CONSERVATION DISTRICT OR BY THE DEPARTMENT PRIOR TO IMPLEMENTATION.

5. AREAS TO BE FILLED ARE TO BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS AND OTHER OBJECTIONABLE MATERIAL.

6. CLEARING, GRUBBING, AND TOPSOIL STRIPPING SHALL BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE OF THE CONSTRUCTION SEQUENCE. GENERAL SITE CLEARING, GRUBBING AND TOPSOIL STRIPPING MAY NOT COMMENCE IN ANY STAGE OR PHASE OF THE PROJECT UNTIL THE E&S BMPS SPECIFIED BY THE BMP SEQUENCE FOR THAT STAGE OR PHASE HAVE BEEN INSTALLED AND ARE FUNCTIONING AS DESCRIBED IN THIS E&S PLAN.

7. AT NO TIME SHALL CONSTRUCTION VEHICLES BE ALLOWED TO ENTER AREAS OUTSIDE THE LIMIT OF DISTURBANCE BOUNDARIES SHOWN ON THE PLAN MAPS. THESE AREAS MUST BE CLEARLY MARKED BEFORE CLEARING AND GRUBBING OPERATIONS BEGIN.

8. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION AND NOTIFY THE LOCAL CONSERVATION DISTRICT OR PADEP.

9. ALL BUILDING MATERIALS AND WASTES SHALL BE REMOVED FROM THE SITE AND RECYCLED OR DISPOSED OF IN ACCORDANCE WITH THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1, AND 287.1 ET. SEQ. NO BUILDING MATERIALS OR WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURNED, BURIED, DUMPED, OR DISCHARGED AT THE SITE.

10. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S PLAN APPROVED BY THE LOCAL CONSERVATION DISTRICT OR PADEP FULLY IMPLEMENTED PRIOR TO BEING ACTIVATED.

11. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY MATERIAL BROUGHT ON SITE IS CLEAN FILL. FORM FP-001 MUST BE RETAINED BY THE PROPERTY OWNER FOR ANY FILL MATERIAL AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE BUT QUALIFYING AS CLEAN FILL DUE TO ANALYTICAL TESTING.

12. ALL PUMPING OF WATER FROM ANY WORK AREA SHALL BE DONE ACCORDING TO THE PROCEDURE DESCRIBED IN THIS PLAN, OVER UNDISTURBED VEGETATED AREAS.

13. ALL VEHICLES AND EQUIPMENT ENTERING OR EXITING THE SITE MUST USE ROCK CONSRUCTION ENTRANCES.

14. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMPS SHALL BE MAINTAINED PROPERLY. MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING AND RENETTING MUST BE PERFORMED IMMEDIATELY. IF THE E&S BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.

15. A LOG SHOWING DATES THAT E&S BMPS WERE INSPECTED AS WELL AS ANY DEFICIENCIES FOUND AND THE DATE THEY WERE CORRECTED SHALL BE MAINTAINED ON THE SITE AND BE MADE AVAILABLE TO REGULATORY AGENCY OFFICIALS AT THE TIME OF INSPECTION.

16. SEDIMENT TRACKED ONTO ANY PUBLIC ROADWAY OR SIDEWALK SHALL BE RETURNED TO THE CONSTRUCTION SITE BY THE END OF EACH WORK DAY AND DISPOSED IN THE MANNER DESCRIBED IN THIS PLAN. IN NO CASE SHALL THE SEDIMENT BE WASHED, SHOVELED, OR SWEPT INTO ANY ROADSIDE DITCH, STORM SEWER, OR SURFACE WATER.

17. ALL SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN THE MANNER DESCRIBED ON THE PLAN DRAWINGS.

18. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 3 TO 5 INCHES -- 6 TO 12 INCHES ON COMPACTED SOILS -- PRIOR TO PLACEMENT OF TOPSOIL. AREAS TO BE VEGETATED SHALL HAVE A MINIMUM 4 INCHES OF TOPSOIL IN PLACE PRIOR TO SEEDING AND MULCHING. FILL OUTSLOPES SHALL HAVE A MINIMUM OF 2 INCHES OF TOPSOIL.

19. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.

20. ALL EARTHEN FILLS SHALL BE PLACED IN COMPACTED LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.

21. FILL MATERIALS SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.

22. FROZEN MATERIALS OR SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED INTO FILLS.

23. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.

24. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.

25. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY UPON REACHING FINISHED GRADE. CUT SLOPES IN COMPETENT BEDROCK AND ROCK FILLS NEED NOT BE VEGETATED. SEEDED AREAS WITHIN 50 FEET OF A SURFACE WATER, OR AS OTHERWISE SHOWN ON THE PLAN DRAWINGS, SHALL BE BLANKETED ACCORDING TO THE STANDARDS OF THIS PLAN.

26. IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE IN ANY AREA OR SUBAREA OF THE PROJECT, THE OPERATOR SHALL STABILIZE ALL DISTURBED AREAS. DURING NON-GERMINATING MONTHS, MULCH OR PROTECTIVE BLANKETING SHALL BE APPLIED AS DESCRIBED IN THE PLAN. AREAS NOT AT FINISHED GRADE, WHICH WILL BE REACTIVATED WITHIN 1 YEAR, MAY BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY STABILIZATION SPECIFICATIONS. THOSE AREAS WHICH WILL NOT BE REACTIVATED WITHIN 1 YEAR SHALL BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION SPECIFICATIONS.

27. PERMANENT STABILIZATION IS DEFINED AS A MINIMUM UNIFORM, PERENNIAL 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION. CUT AND FILL SLOPES SHALL BE CAPABLE OF RESISTING FAILURE DUE TO SLUMPING, SLIDING, OR OTHER MOVEMENTS.

28. E&S BMPS SHALL REMAIN FUNCTIONAL AS SUCH UNTIL ALL AREAS TRIBUTARY TO THEM ARE PERMANENTLY STABILIZED OR UNTIL THEY ARE REPLACED BY ANOTHER BMP APPROVED BY THE LOCAL CONSERVATION DISTRICT OR THE DEPARTMENT.

29. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT PADEP FOR AN INSPECTION PRIOR TO REMOVAL/CONVERSION OF THE E&S BMPS.

30. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPS MUST BE REMOVED OR CONVERTED TO PERMANENT POST CONSTRUCTION STORMWATER MANAGEMENT BMPS. AREAS DISTURBED DURING REMOVAL OR CONVERSION OF THE BMPS SHALL BE STABILIZED IMMEDIATELY. IN ORDER TO ENSURE RAPID REVEGETATION OF DISTURBED AREAS, SUCH REMOVAL/CONVERSIONS ARE TO BE DONE ONLY DURING THE GERMINATING SEASON.

31. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT PADEP TO SCHEDULE A FINAL INSPECTION.

32. FAILURE TO CORRECTLY INSTALL E&S BMPS, FAILURE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE CONSTRUCTION SITE, OR FAILURE TO TAKE IMMEDIATE CORRECTIVE ACTION TO RESOLVE FAILURE OF E&S BMPS MAY RESULT IN ADMINISTRATIVE, CIVIL, AND/OR CRIMINAL PENALTIES BEING INSTITUTED BY THE DEPARTMENT AS DEFINED IN SECTION 602 OF THE PENNSYLVANIA CLEAN STREAMS LAW. THE CLEAN STREAMS LAW PROVIDES FOR UP TO $10,000 PER DAY IN CIVIL PENALTIES, UP TO $10,000 IN SUMMARY CRIMINAL PENALTIES, AND UP TO $25,000 IN MISDEMEANOR CRIMINAL PENALTIES FOR EACH VIOLATION.

RECYCLING AND DISPOSAL PROCEDURES OF CONSTRUCTION WASTES

1. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S CONTROL PLAN APPROVED BY THE LOCAL CONSERVATION DISTRICT OR PADEP FULLY IMPLEMENTED PRIOR TO BEING ACTIVATED.

2. GARBAGE DISPOSAL IS HANDLED THROUGH ONE OF THE LOCAL WASTE MANAGEMENT PROVIDERS/FACILITIES. THE CONTRACTOR WILL LEASE A DUMPSTER FOR THE DURATION OF THE PROJECT WHICH WILL BE DISPOSED OF AT A LICENSED/PERMITTED MUNICIPAL LANDFILL.

3. THE CONTRACTOR WILL DISPOSE OF ALL SCRAP MATERIAL. THE SCRAP MATERIAL MUST BE REMOVED FROM THE SITE AND DISPOSED OF OR RECYCLED AT A PROPERLY LICENSED/PERMITTED FACILITY. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY PERMITS AND/OR DISPOSAL FEES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE TO ASSURE THAT ALL MATERIALS ARE HANDLED AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS, RULES, AND REGULATIONS, INCLUDING, BUT NOT LIMITED TO THOSE ISSUED BY THE ENVIRONMENTAL PROTECTION AGENCY, PADEP, AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION.

4. ALL WASTE OR EXCESS MATERIALS NOT SUITABLE FOR THE ON-SITE STOCKPILE OR BACKFILL SHALL BE DISPOSED OF IN ACCORDANCE WITH THE DEPARTMENTS SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA CODE CHAPTER 260 §260.1 ET SEQ. 271.1 AND 287.1 ET. SEQ. AT THE PADEP-APPROVED WASTE SITE WHERE FEASIBLE CONSTRUCTION WASTE MATERIALS WILL BE RECYCLED OR WILL BE TAKEN TO THE NEAREST PADEP APPROVED FACILITY FOR DISPOSAL. EXCESS SOIL MATERIAL IF ANY WILL BE SPREAD AND REVEGETATED WITHIN THE LOD. OFF-SITE SPOIL AND/OR BORROW SITES MUST BE OPERATED UNDER A CURRENT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT.

PERSONS RESPONSIBLE FOR CONSTRUCTION AND OFF SITE DISPOSAL REQUIREMENTS

IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE SATISFACTORY SOIL E&SC AND TO INTERFACE WITH APPLICABLE REGULATORY AGENCIES.

THE CONTRACTOR IS RESPONSIBLE FOR HAVING AN APPROVED E&SCP AND FOR CONFIRMING THAT AN ACTIVE E&SCP PERMIT EXISTS FOR ANY OFF-SITE BORROW AREA LOCATIONS. IF OFF-SITE DISPOSAL IS REQUIRED, DISPOSAL MUST OCCUR AT A SITE APPROVED BY THE LOCAL CONSERVATION DISTRICT OR PADEP. PROOF OF THESE PERMISSIONS MUST BE PROVIDED TO THE OWNER AND APPLICABLE REGULATORY AGENCIES PRIOR TO USE. ALL FILL MATERIAL MUST BE USED IN ACCORDANCE WITH THE PADEP'S POLICY "MANAGEMENT OF FILL" DOCUMENT NUMBER 258-2182-773. ENVIRONMENTAL DUE DILIGENCE IS DEFINED AS: INVESTIGATIVE TECHNIQUES, INCLUDING, BUT NOT LIMITED TO, VISUAL PROPERTY INSPECTIONS, ELECTRONIC DATA BASE SEARCHES, REVIEW OF PROPERTY OWNERSHIP, REVIEW OF PROPERTY USE HISTORY, SANBORN MAPS, ENVIRONMENTAL QUESTIONNAIRES, TRANSACTION SCREENS, ANALYTICAL TESTING, ENVIRONMENTAL ASSESSMENTS OR AUDITS.

IN THE EVENT THE CONTRACTOR WISHES TO MODIFY THE E&SCP, A COPY OF THE REVISED E&SCP MUST BE SUBMITTED TO THE ENGINEER AND LOCAL CONSERVATION DISTRICT OR PADEP FOR APPROVAL. THE USE OF THE TERM "ENGINEER" IN THIS REPORT SHALL REFER TO THE PROFESSIONAL ENGINEER WHO SIGNED AND SEALED THE E&SCP AND ESCGP-3 FOR THIS PROJECT.

LOCATION AND CLASSIFICATION OF SURFACE WATERS

REFER TO THE PLAN DRAWINGS FOR LOCATIONS OF THE STREAMS AND WETLANDS IN THE PROJECT AREA.

TEMPORARY STRUCTURAL PRACTICES

SEDIMENT BASIN.
A SEDIMENT BASIN IS A TEMPORARY SETTLING POND THAT RELEASES RUNOFF AT A CONTROLLED RATE. THE BASIN IS DESIGNED TO SLOWLY RELEASE RUNOFF, DETAINING IT LONG ENOUGH TO ALLOW MOST OF THE SEDIMENT TO SETTLE. THE SEDIMENT BASIN WILL BE CONVERTED TO A WET POND DURING THE PCSM PHASE OF THE PROJECT.

EXTENDED ROCK CONSTRUCTION ENTRANCE. IN ORDER TO PREVENT THE TRACKING OF MUD ONTO PAVED ROADWAYS, ROCK CONSTRUCTION ENTRANCES (RCE) SHALL BE INSTALLED FROM ANY PUBLIC ROAD, AS SHOWN ON THE PLAN SHEETS AND THE DETAIL SHEETS. THE CONTRACTOR MAY DEVIATE FROM THE LOCATIONS SHOWN ON THE PLAN WITHIN THE LOD, BUT MUST OBTAIN APPROVAL FROM THE ENGINEER. UPON SITE STABILIZATION, THE RCE SHALL BE REMOVED ALONG WITH ANY UNSUITABLE MATERIAL, AND THE AREA RESTORED ACCORDING TO MAINTENANCE PROGRAM OF THIS PLAN.

COMPOST FILTER SOCK. COMPOST FILTER SOCK SHALL BE INSTALLED IN ACCORDANCE WITH THE DETAILS AND SIZING CHART ON THE DRAWINGS TO FILTER SEDIMENT LADEN SHEET FLOW RUNOFF FROM THE LOD. ANY PORTION OF THE SEDIMENT BARRIER THAT IS UNDERMINED OR OVERTOPPED WILL BE IMMEDIATELY REPAIRED. IF THE SECTION CONTINUES TO BE UNDERMINED OR OVERTOPPED, A ROCK FILTER OUTLET WILL BE INSTALLED TO REPLACE THE SECTION. FOR SEDIMENT BARRIER LOCATIONS, SEE THE PLAN SHEETS.

BIO-SOCK DIVERSION BERMS. BIO-SOCK DIVERSION BERMS WILL BE USED TO DIVERT RUNOFF FROM UNDISTURBED UPSLOPE AREAS AND CONVEY IT AROUND AREAS OF EARTH DISTURBANCE.

TEMPORARY SEEDING. UPON TEMPORARY CESSATION OF AN EARTH DISTURBANCE ACTIVITY OR ANY STAGE OF AN ACTIVITY WHERE A CESSATION OF EARTH DISTURBANCE ACTIVITIES WILL EXCEED FOUR DAYS, THE SITE SHALL BE IMMEDIATELY SEEDED, MULCHED, OR OTHERWISE PROTECTED FROM ACCELERATED E&S PENDING FUTURE EARTH DISTURBANCE ACTIVITIES. FOR AN EARTH DISTURBANCE ACTIVITY OR ANY STAGE OF AN ACTIVITY TO BE CONSIDERED TEMPORARILY STABILIZED, THE DISTURBED AREAS SHALL BE COVERED WITH ONE OF THE FOLLOWING: A MINIMUM UNIFORM COVERAGE OF MULCH AND SEED, WITH A DENSITY CAPABLE OF RESISTING ACCELERATED E&S, OR AN ACCEPTABLE BMP WHICH TEMPORARILY MINIMIZES ACCELERATED E&S. TEMPORARY STABILIZATION WILL NOT OCCUR ON ACTIVE VEHICULAR TRAVEL WAYS WITHIN THE LOD. THE ON-SITE ENVIRONMENTAL INSPECTOR WILL LOG DAILY ACTIVITY WITHIN THE PROJECT LOD AND NOTIFY THE CONTRACTOR OR AREAS REQUIRING TEMPORARY STABILIZATION (I.E. AREAS WHERE WORK HAS CEASED FOR AT LEAST FOUR DAYS.) REFER TO THE DETAIL SHEETS FOR TEMPORARY SEEDING SPECIFICATIONS.

PUMPED WATER FILTER BAG. SEDIMENT LADEN WATER THAT COLLECTS DURING EXCAVATION SHALL BE PUMPED INTO A PUMPED WATER FILTER BAG. THE MEANS AND METHODS OF CONSTRUCTION BY THE CONTRACTOR WILL DICTATE THE LOCATION AND PLACEMENT OF THIS CONTROL, BUT THE CONTRACTOR MUST CONFORM TO THE MANUFACTURER'S RECOMMENDATIONS FOR USE OF THIS CONTROL. A COMPOST FILTER SOCK WILL BE INSTALLED BELOW THE BAG FOR ADDITIONAL SEDIMENT REMOVAL CAPACITY. PUMPED WATER FILTER BAGS WILL BE REPLACED ONCE THEY ARE HALF FULL.

FLEXIBLE GROWTH MEDIUM. SLOPES GREATER THAN 3:1 WILL HAVE FLEXTERRA FLEXIBLE GROWTH MEDIUM (FGM) INSTALLED.

FILTER SOCK TRAP. FILTER SOCK SEDIMENT TRAPS WILL BE INSTALLED IN THE LOCATIONS SHOWN ON THE E&S PLAN DRAWINGS.

PERMANENT STRUCTURAL PRACTICES

PERMANENT SEEDING. THE DISTURBED UPLAND AREAS WITHIN THE LOD WILL BE REVEGETATED IN ACCORDANCE WITH THE SEEDING INFORMATION PROVIDED ON THESE PLANS. FOR THE DISTURBED AREAS, TOPSOIL WILL BE SEGREGATED AND RESEEDED.

CHANNEL LININGS. APPROPRIATELY DESIGNED LININGS, INCLUDING EROSION CONTROL BLANKETS, TURF REINFORCEMENT MATS, AND RIPRAP, WILL BE INSTALLED IN THE DITCHES TO PREVENT EROSION AND PROTECT THE CHANNELS.

OUTLET PROTECTION. RIPRAP APRONS WILL BE USED TO PREVENT SCOUR AT CHANNEL AND CULVERT OUTFALLS.

PERMANENT AND TEMPORARY VEGETATIVE PRACTICES

PERMANENT VEGETATIVE STABILIZATION. DISTURBED AREAS WILL RECEIVE TOPSOIL AND PERMANENT VEGETATIVE STABILIZATION, DEFINED AS A UNIFORM 70 PERCENT PERENNIAL VEGETATIVE COVER. THE DISTURBED AREAS WILL BE PERMANENTLY STABILIZED IN ACCORDANCE WITH SEEDING INFORMATION PROVIDED ON THESE SHEETS. IF SEEDING DATES ARE EXTENDED APPLY FULL TEMPORARY SEEDING MIXTURE IN ADDITION TO APPLYING ONLY 50 PERCENT OF THE PERMANENT SEEDING AND SOIL SUPPLEMENTS. APPLY THE REMAINING 50 PERCENT WITHIN THE NEXT SEEDING DATES.

TEMPORARY VEGETATIVE PRACTICES (INTERIM STABILIZATION). UPON TEMPORARY CESSATION OF ANY EARTH DISTURBANCE ACTIVITY OR ANY STAGE OF AN ACTIVITY WHERE A CESSATION OF EARTH DISTURBANCE ACTIVITIES WILL EXCEED FOUR DAYS, THE SITE SHALL BE IMMEDIATELY SEEDED, MULCHED, OR OTHERWISE PROTECTED FROM ACCELERATED E&S PENDING FUTURE EARTH DISTURBANCE ACTIVITIES. FOR AN EARTH DISTURBANCE ACTIVITY OR ANY STAGE OF AN ACTIVITY TO BE CONSIDERED TEMPORARILY STABILIZED, THE DISTURBED AREAS SHALL BE COVERED WITH ONE OF THE FOLLOWING: A MINIMUM UNIFORM COVERAGE OF MULCH AND SEED, WITH A DENSITY CAPABLE OF RESISTING ACCELERATED E&S, OR AN ACCEPTABLE BMP WHICH TEMPORARILY MINIMIZES ACCELERATED E&S. TEMPORARY STABILIZATION WILL NOT OCCUR ON ACTIVE VEHICULAR TRAVEL WAYS WITHIN THE LOD. THE ON-SITE ENVIRONMENTAL INSPECTOR WILL LOG DAILY ACTIVITY WITHIN THE PROJECT LOD AND NOTIFY THE CONTRACTOR OF AREAS REQUIRING TEMPORARY STABILIZATION (I.E. AREAS WHERE WORK HAS CEASED FOR AT LEAST FOUR DAYS.)

SEQUENCE OF BMP INSTALLATION AND REMOVAL

A COPY OF THE APPROVED DRAWINGS (STAMPED, SIGNED, AND DATED BY THE REVIEWING AGENCY) MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. AT LEAST SEVEN DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE E&S PLAN PREPARER, THE POST CONSTRUCTION STORMWATER MANAGEMENT PLAN PREPARER, AND A REPRESENTATIVE FROM THE REVIEWING AGENCY TO THE ONSITE PRE-CONSTRUCTION MEETING. AT LEAST THREE DAYS PRIOR TO STARTING EARTH DISTURBANCE ACTIVITIES OR EXPANDING INTO AREAS PREVIOUSLY UNMARKED, THE PENNSYLVANIA ONE CALL SYSTEM, INC. SHALL BE NOTIFIED AT 1-800-242-1776 FOR THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES.

ALL BMPS SHALL BE INSTALLED IN ACCORDANCE WITH: THE E&S PLAN STANDARD DETAILS; SPECIFICATIONS DEFINED IN THE PADEP EROSION AND SEDIMENT BEST MANAGEMENT PRACTICE (BMP) MANUAL, LATEST EDITION; AND, WHERE APPLICABLE, THE PRODUCT MANUFACTURER'S RECOMMENDATIONS. EACH STEP OF THE SEQUENCE SHALL BE COMPLETED BEFORE PROCEEDING TO THE NEXT STEP EXCEPT WHERE NOTED.

SEQUENCE:

1. CLEARLY DELINEATE THE LIMITS OF DISTURBANCE AND MARK PERTINENT SITE FEATURES (I.E. PROTECTED FEATURES, BMP LOCATIONS, ETC.).

2. INSTALL AN EXTENDED ROCK CONSTRUCTION ENTRANCE IN THE LOCATION IDENTIFIED ON THE PLAN DRAWINGS. INSTALL CULVERT 1.

3. INSTALL COMPOST FILTER SOCK IN THE LOCATIONS IDENTIFIED ON THE PLAN DRAWINGS.

4. INSTALL THE FILTER SOCK TRAP.

5. INSTALL DIVERSION BERMS IN THE LOCATIONS IDENTIFIED ON THE PLAN DRAWINGS.

6. BEGIN CLEARING OF TREES AND VEGETATION, AS NECESSARY. CLEAR ONLY WITHIN THE LIMIT OF DISTURBANCE DEFINED. NO GRUBBING OR EARTH DISTURBANCE SHALL OCCUR UNTIL BMPS ARE INSTALLED DOWN SLOPE OF TRIBUTARY AREAS. EXISTING VEGETATION AND TREES SHALL BE LEFT UNDISTURBED TO THE GREATEST EXTENT PRACTICAL IN THE AREAS AROUND THE PROPOSED INFILTRATION BERM.

7. PREPARE THE TEMPORARY LAYDOWN/WORK AREA, INCLUDING INSTALLATION OF AIR BRIDGE. UTILIZE TEMPORARY STOCKPILE SHOWN AS NEEDED.

8. INSTALL THE BYPASS CULVERT SYSTEM, INCLUDING CULVERTS 2, 3A, 3B, AND 3C, AND CHANNELS 4 AND 5.

9. INSTALL THE SEDIMENT BASIN AND CHANNEL 3.

10. GRUBBING SHALL COMMENCE AS NECESSARY WITHIN THE LIMIT OF CLEARING NO MORE THAN FOUR DAYS PRIOR TO CONSTRUCTION OF THE ACCESS ROAD AND PAD. MINOR GRADING WITHIN THE LIMIT OF DISTURBANCE MAY BE NECESSARY TO PROVIDE AN EVEN SURFACE FOR SAFE AND EFFICIENT OPERATION OF CONSTRUCTION EQUIPMENT. EXISTING VEGETATION AND TREES SHALL BE LEFT UNDISTURBED TO THE GREATEST EXTENT PRACTICAL IN THE AREAS AROUND THE PROPOSED INFILTRATION BERM.

11. FOR THE DURATION OF CONSTRUCTION, WETNESS OR POOLING WATER ENCOUNTERED WITHIN THE CONSTRUCTION AREA SHALL BE DEWATERED BY USING PUMPS, HOSES, AND PUMPED WATER FILTER BAGS THAT DISCHARGE INTO WELL VEGETATED AREAS.

12. APPLY SOIL SUPPLEMENTS, AND TEMPORARY SEED AND MULCH TO SOIL STOCKPILES AND DISTURBED AREAS THAT WILL RECEIVE NO CONSTRUCTION ACTIVITY WITHIN FOUR DAYS.

13. CONSTRUCT THE ACCESS ROAD AND CHANNEL 6. INSTALL GRAVEL ON THE ACCESS ROAD IMMEDIATELY AFTER FINAL GRADE IS ESTABLISHED. APPLY SOIL SUPPLEMENTS AND PERMANENT SEED AND MULCH TO DISTURBED AREAS THAT HAVE ACHIEVED FINAL GRADE AND WILL NO LONGER BE SUBJECT TO CONSTRUCTION ACTIVITY. FOR SLOPE AREAS 3H:1V AND STEEPER, THE AREA SHALL BE VERTICALLY TRACKED AND FGM SHALL BE INSTALLED ONCE SOIL SUPPLEMENTS, SEED, AND MULCH HAVE BEEN APPLIED.

14. CONSTRUCT THE COMPRESSOR PAD. INSTALL GRAVEL ON THE PAD AREA WHEN FINAL GRADE IS ESTABLISHED. APPLY SOIL SUPPLEMENTS AND PERMANENT SEED AND MULCH TO DISTURBED AREAS THAT HAVE ACHIEVED FINAL GRADE AND WILL NO LONGER BE SUBJECT TO CONSTRUCTION ACTIVITY. FOR SLOPE AREAS 3H:1V AND STEEPER, THE AREA SHALL BE VERTICALLY TRACKED AND FGM SHALL BE INSTALLED ONCE SOIL SUPPLEMENTS, SEED, AND MULCH HAVE BEEN APPLIED.

15. UPON COMPLETION OF CONSTRUCTION ACTIVITY AND STABILIZATION OF DISTURBED AREAS, THE SITE CONDITIONS SHALL BE PREPARED IN ACCORDANCE WITH THE PROJECT POST CONSTRUCTION STORMWATER MANAGEMENT/SITE RESTORATION PLAN, INCLUDING INSTALLATION OF THE INFILTRATION BERM AND CONVERSION OF THE SEDIMENT BASIN TO AN INFILTRATION BASIN. CARE SHALL BE TAKEN TO LEAVE EXISTING VEGETATION AND TREES UNDISTURBED IN THE AREAS AROUND THE BERM TO THE GREATEST EXTENT PRACTICAL.

16. APPLY SOIL SUPPLEMENTS AND PERMANENT SEED AND MULCH TO ANY REMAINING DISTURBED AREAS. RE-SEED, AS NECESSARY, ANY AREAS THAT BECOME DISTURBED OR WHERE VEGETATION HAS NOT BEEN ESTABLISHED WITHIN THIRTY (30) DAYS.

17. REMOVE ALL TEMPORARY BMPS ONCE A UNIFORM 70% PERENNIAL VEGETATIVE COVER HAS ESTABLISHED ON ALL PREVIOUSLY DISTURBED AREAS.

MAINTENANCE PROGRAM

AFTER CONSTRUCTION IS COMPLETED AND SITE HAS REACHED FINAL GRADE, ALL TEMPORARY BMPS WILL BE REMOVED AND ANY LAND DISTURBED BY REMOVAL WILL BE PERMANENTLY STABILIZED, UNLESS OTHERWISE SPECIFIED, ALL MAINTENANCE MUST BE COMPLETED IMMEDIATELY AFTER AN INSPECTION IDENTIFIES THAT A BMP IS NOT FUNCTIONING.

1. IF CONCENTRATED FLOW AREAS FORM DUE TO ANY STORM EVENT AND ANY AREA BECOMES UNSTABLE, THE AREA SHALL BE STABILIZED BY INSTALLING ADDITIONAL BMPS IN THE CONCENTRATED FLOW AREAS. ANY REQUIRED REPAIRS OR MAINTENANCE SHALL BE MADE IMMEDIATELY.

2. THE CONTRACTOR SHALL ASSESS THE WORKING CONDITION OF THE E&S MEASURES AT LEAST WEEKLY AND AFTER EACH MEASURABLE RAIN EVENT (GREATER THAN ONE-HALF INCH IN 24 HOURS OR ANY SIGNIFICANT THAW EVENT). DAMAGED, BLOCKED, OR OTHERWISE COMPROMISED MEASURES OBSERVED DURING THE INSPECTION SHALL BE REPAIRED IMMEDIATELY.

3. COMPOST FILTER SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH MEASURABLE RAIN EVENT. THE FILTER SOCK SHALL BE INSPECTED TO ENSURE THEY HAVE NOT BEEN DISLODGED OR BROKEN. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH ONE-HALF THE ABOVE GROUND HEIGHT OF THE SOCK. DAMAGED SOCKS SHALL BE REPAIRED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS, OR REPLACED WITHIN TWENTY-FOUR HOURS OF INSPECTION.

4. BIODEGRADABLE FILTER SOCK SHALL BE REPLACED AFTER SIX MONTHS; PHOTODEGRADABLE SOCKS AFTER ONE YEAR; POLYPROPYLENE SOCKS SHALL BE REPLACED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. STAKES SHALL BE REMOVED FROM SOCKS UPON STABILIZATION OF THE AREAS TRIBUTARY TO A SOCK. SOCK MAY BE LEFT IN PLACE AND VEGETATED, OR REMOVED. IF LEFT IN PLACE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

5. PUMPED WATER FILTER BAGS SHALL BE INSPECTED DAILY FOR BREAKS OR LEAKS. THE FILTER BAG AND UNDERLYING EROSION PROTECTION MATERIALS (E.G. STRAW BALES, GEOTEXTILE) SHALL BE CLOSELY MONITORED FOR STABILITY. BAGS SHALL BE DISPOSED OF IN ACCORDANCE WITH THE PROJECT E&S PLAN AND REPLACED WHEN THE BAG BECOMES ONE-HALF FULL OF SEDIMENT. SPARE BAGS AND UNDERLYING MATERIALS SHALL BE KEPT AVAILABLE FOR REPLACEMENT. EROSION AND UNDERCUTTING OF FILTER BAGS SHALL BE PROMPTLY REPAIRED. THE PUMPING RATE TO FILTER BAGS FOR PUMPED WATER SHALL BE ONE-HALF THE MAXIMUM PUMPING RATE RECOMMENDED BY THE MANUFACTURER.

6. TRAP SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/3 THE HEIGHT OF THE SOCKS. MATERIAL REMOVED FROM THE TRAPS SHALL BE SPREAD AND DRIED ON-SITE, WITHIN THE LIMIT-OF-DISTURBANCE AND UPSLOPE OF EROSION AND SEDIMENT CONTROL DEVICES. DAMAGED SOCKS SHALL BE IMMEDIATELY REPLACED AND RESTORED TO THE DESIGN SPECIFICATIONS.

7. RIPRAP APRONS SHALL BE INSPECTED FOR DISPLACED RIPRAP. ANY DISPLACED RIPRAP SHALL BE REPLACED IMMEDIATELY.

8. CHANNELS SHALL BE MAINTAINED TO ENSURE THAT THE SPECIFIED DESIGN DIMENSIONS AND PROTECTIVE LININGS ARE AVAILABLE AT ALL TIMES. A CHANNEL SHOULD BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION. DAMAGED CHANNEL LININGS SHOULD BE REPAIRED OR REPLACED IMMEDIATELY.

9. ROCK CONSTRUCTION ENTRANCES WILL BE REGULARLY MAINTAINED SO THAT THE ENTRANCE REMAINS IN A CONDITION THAT WILL PREVENT TRACKING MUD OR FLOWING OF SEDIMENT ONTO THE PUBLIC ROADWAYS. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS MUST BE REMOVED IMMEDIATELY.

10. A LOG SHOWING DATES THAT E&S BMPS WERE INSPECTED AS WELL AS ALL DEFICIENCIES FOUND AND THE DATE THEY WERE CORRECTED SHALL BE MAINTAINED ON THE SITE AND BE MADE AVAILABLE TO REGULATORY AGENCY OFFICIALS AT THE TIME OF INSPECTION.

11. RE-VEGETATED AREAS SHALL BE INSPECTED FOR ADEQUATE VEGETATIVE COVER. AREAS EXHIBITING STRESSED VEGETATION OR SIGNS OF EROSION SHALL HAVE THE SEEDBED PREPARED AND HAVE SEED AND MULCH RE-APPLIED. ADDITIONAL MAINTENANCE ITEMS ARE OUTLINED IN THE "STANDARD EROSION AND SEDIMENT POLLUTION CONTROL NOTES."

12. ALL BMPS SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. WHENEVER INSPECTION AND/OR MONITORING REVEALS THAT THE BMPS IDENTIFIED IN THE E&S PLAN ARE INADEQUATE, THE E&S PLAN SHALL BE MODIFIED, AS APPROPRIATE, IN A TIMELY MANNER. DAMAGED BMPS WILL BE REPAIRED OR REPLACED AS SOON AS PRACTICABLE, BUT NO MORE THAN 24 TO 48 HOURS AFTER DISCOVERING THE DAMAGE. ANY SPILLAGE OR DISCHARGE OF POLLUTANTS SHALL BE REPORTED WITHIN TWENTY-FOUR HOURS.

13. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM DRAIN DOWN, SOLVENT AND DE-GREASING CLEANING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO SURFACE WATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CONTAMINATED SURFACES SHALL BE CLEANED IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. CONTAMINATED SOIL MUST BE DISPOSED OF PROPERLY. EMERGENCY REPAIRS MAY BE PERFORMED ON-SITE USING TEMPORARY PLASTIC PLACED BENEATH AND, IF RAINING, OVER THE VEHICLE.

14. THE E&S PLAN SHALL BE RETAINED ON-SITE. THE E&S PLAN SHALL BE MODIFIED WHENEVER THERE IS A SIGNIFICANT CHANGE IN THE DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE OF ANY BMP. THE PADEP MUST BE NOTIFIED OF ANY CHANGES. DEPENDING ON THE SIGNIFICANCE OF THE REVISION, A PERMIT MODIFICATION MAY NEED TO BE SUBMITTED TO THE PADEP OR AREA LINE MODIFICATION WITH NOTIFICATION AND INSPECTOR CAN BE USED IF CHANGE OCCURS WITHIN PERMIT LIMIT-OF-DISTURBANCE.

15. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED OR AFTER TEMPORARY BMPS ARE NO LONGER NEEDED, TEMPORARY EROSION AND SEDIMENTATION CONTROLS MUST BE REMOVED WITHIN THIRTY DAYS. ACCUMULATED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. AREAS DISTURBED DURING REMOVAL OF THE CONTROLS MUST BE STABILIZED IMMEDIATELY.

16. WHEN ENCOUNTERING A WASHOUT OF FGM USED ON SLOPES, RE-GRADE, RE-SEED AND RE-MULCH PER MANUFACTURER'S SPECIFICATIONS. WHEN ENCOUNTERING FGM FAILURE, RE-GRADE, RE-SEED, AND RE-MULCH PER MANUFACTURER'S SPECIFICATIONS.

17. INSPECT DISCHARGE LOCATIONS TO ASCERTAIN EFFECTIVENESS OF CONTROLS. IMPLEMENT ADDITIONAL CONTROL MEASURES AS NEEDED.

18. UPON FINAL COMPLETION OF AN EARTH DISTURBANCE ACTIVITY OR ANY STAGE OR PHASE OF AN ACTIVITY, THE SITE SHALL IMMEDIATELY HAVE TOPSOIL RESTORED, REPLACED, OR AMENDED, SEEDED, MULCHED OR OTHERWISE PERMANENTLY STABILIZED AND PROTECTED FROM ACCELERATED EROSION AND SEDIMENTATION.

19. THE SEDIMENT BASIN SHALL BE INSPECTED ON AT LEAST A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. A CLEAN OUT STAKE SHALL BE PLACED NEAR THE CENTER OF THE BASIN. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED THE CLEAN OUT ELEVATION ON THE STAKE AND THE BASIN RESTORED TO ITS ORIGINAL DIMENSIONS. SILT REMOVED FROM THE SEDIMENT BASIN SHALL BE SPREAD ON THE TOPSOIL STOCKPILE OR OTHER AREAS WITH THE LIMIT OF DISTURBANCE. EXCESS MATERIALS THAT CANNOT BE SPREAD ON-SITE MUST BE DISPOSED OF AT A PADEP APPROVED SITE. BASIN EMBANKMENTS, SPILLWAYS, AND OUTLETS SHALL BE INSPECTED FOR EROSION, PIPING AND SETTLEMENT. NECESSARY REPAIRS SHALL BE MADE PROMPTLY. DISPLACED RIPRAP WITHIN THE OUTLET ENERGY DISSIPATER SHALL BE REPLACED. ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISTURBED AREAS SHALL BE STABILIZED INSIDE THE BASIN BEFORE CONVERSION TO A STORMWATER MANAGEMENT FACILITY.

REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

National Fuel SUPPLY CORPORATION

NATIONAL FUEL SUPPLY CORPORATION

Michael Baker INTERNATIONAL

MICHAEL BAKER INTERNATIONAL
CONSULTING ENGINEERS
MOON TOWNSHIP, PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
GREGORY A. HEILMAN
ENGINEER No. 043740-E

TAMARACK COMPRESSOR STATION

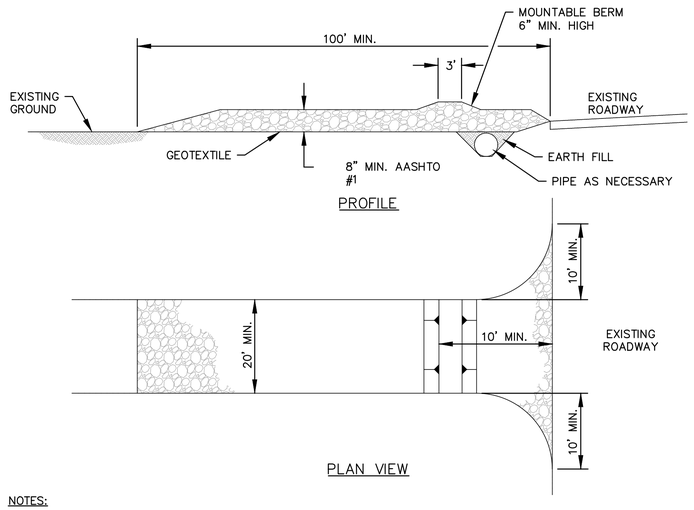
EROSION AND SEDIMENT CONTROL DETAILS, SHEET 1 OF 3

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: NTS

DATE: SEPTEMBER 2019

SHEET NO. 06 OF 13

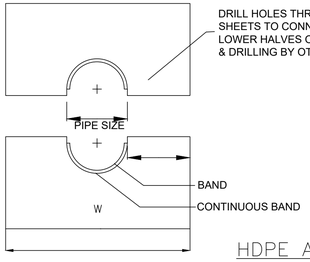


NOTES:

1. TOPSOIL SHALL BE REMOVED PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE.
2. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.
3. RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.
4. MOUNTABLE BERM SHOULD BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED. PIPE TO BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.
5. MAINTENANCE:
   ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON THE ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL A WASH RACK. WASHING THE ROADWAY OR SWEEPING DEPOSITS INTO ROADWAY DITCHES, SEWER, CULVERTS, OR OTHER DRAINAGE WAYS IS NOT ACCEPTABLE.

EXTENDED ROCK CONSTRUCTION ENTRANCE DETAIL

N.T.S.



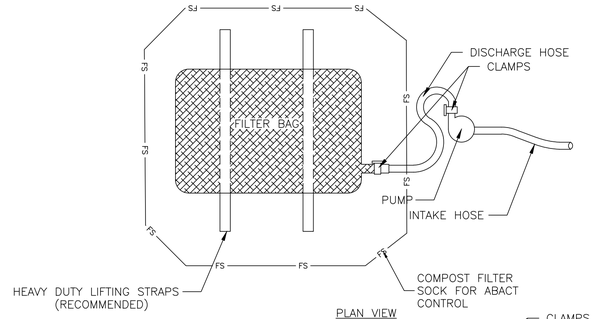
BASIN OR TRAP NO.	PIPE SIZE (IN)	NO. OF COLLARS (N)	W (IN)	COLLAR SPACING (FT)
INFILTRATION BASIN	15	2	48	15

NOTES:

1. MINIMUM DISTANCE TO PIPE JOINT SHALL BE 2 FEET.
2. ALL COLLARS SHALL BE INSTALLED SO AS TO BE WATERTIGHT.

HDPE ANTI-SEEP COLLAR

N.T.S.



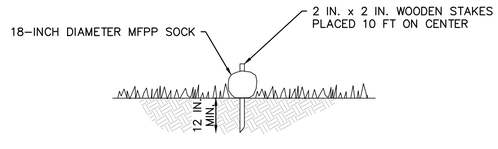
NOTES:

1. LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

2. A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.
3. BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.
4. NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL BE INSTALLED BELOW BAGS LOCATED IN HQ OR EV WATERSHEDS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.
5. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.
6. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.
7. FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

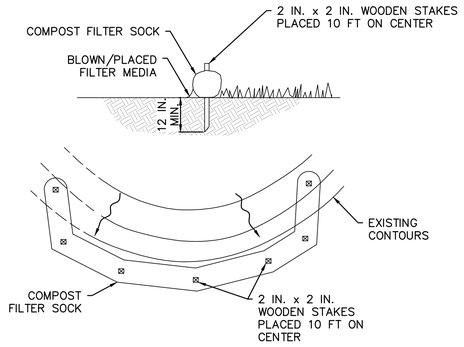
FILTER BAG WITH FILTER RING DETAIL



NOTE:
BIO-SOCK DIVERSION BERMS SHALL BE THE SAME MATERIAL AND USE THE SAME FILL AS INFILTRATION BERMS. REFER TO SHEET 12 FOR DETAILS AND SPECIFICATIONS.

BIO-SOCK DIVERSION BERM DETAIL

N.T.S.



NOTES:

SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1 OF THE PA DEP EROSION CONTROL MANUAL. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2 OF THE PA DEP EROSION CONTROL MANUAL.

COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY BARRIER SHALL NOT EXCEED THAT SPECIFIED FOR THE SIZE OF THE SOCK AND THE SLOPE OF ITS TRIBUTARY AREA.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS COMPOST FILTER SOCKS.

ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE BARRIER AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

COMPOST FILTER SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE COMPOST FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

TABLE 4.1
Compost Sock Fabric Minimum Specifications

Material Type	3 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament Polypropylene (MFPP)	Heavy Duty Multi-Filament Polypropylene (HDMFPP)
Material Characteristics	Photo-degradable	Photo-degradable	Bio-degradable	Photo-degradable	Photo-degradable
Sock Diameters	12" 18"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"
Mesh Opening	3/8"	3/8"	3/8"	3/8"	1/8"
Tensile Strength		26 psi	26 psi	44 psi	202 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	6 months	9 months	6 months	1 year	2 years
Two-ply systems					
Inner Containment Netting				HDPE biaxial net	
				Continuously wound	
				Fusion-welded junctures	
				3/4" X 3/4" Max. aperture size	
Outer Filtration Mesh				Composite Polypropylene Fabric (Woven layer and non-woven fleece mechanically fused via needle punch)	
				3/16" Max. aperture size	
Sock fabrics composed of burlap may be used on projects lasting 6 months or less.					

Filtrexx & JMD

TABLE 4.2
Compost Standards

Organic Matter Content	25% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - 8.5
Moisture Content	30% - 60%
Particle Size	30% - 50% pass through 3/8" sieve
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

COMPOST FILTER SOCK DETAIL

N.T.S.

REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

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GREGORY A. HEILMAN
ENGINEER No. 043740-E

TAMARACK COMPRESSOR STATION

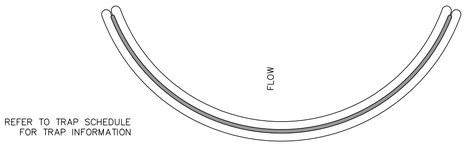
EROSION AND SEDIMENT CONTROL DETAILS, SHEET 2 OF 3

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

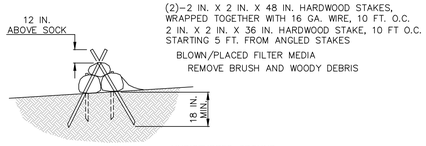
SCALE: NTS

DATE: SEPTEMBER 2019

SHEET NO. 07 OF 13



PLAN VIEW



STAKING DETAIL

COMPOST SOCK SEDIMENT TRAP DETAIL

N.T.S.

TRAP	TRAP SIZE	TRAP LENGTH (FT)	BOTTOM ELEV (FT)
A	2-24", 1-18"	270	1739.0

NOTES:

ENDS OF THE TRAP SHALL BE A MINIMUM OF 1 FOOT HIGHER IN ELEVATION THAN THE MID–SECTION, WHICH SHALL BE LOCATED AT THE POINT OF DISCHARGE.

SOCK MATERIAL SHALL MEET THE STANDARDS OF TABLE 4.1. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2.

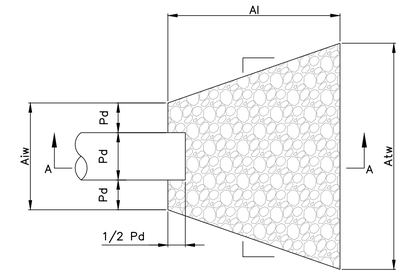
COMPOST SOCK SEDIMENT TRAPS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT.

SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/3 THE HEIGHT OF THE SOCKS.

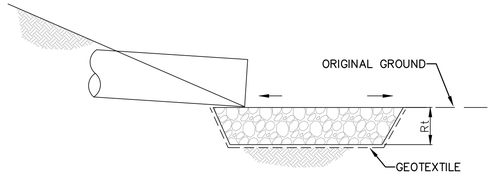
PHOTODEGRADABLE AND BIODEGRADABLE SOCKS SHALL NOT BE USED FOR MORE THAN 1 YEAR.

CULVERT NUMBER	DIAMETER (IN)	LENGTH (FT)	SLOPE (%)	INVERTS	
				INLET	OUTLET
1	12	32	7.53	1774.87	1772.46
2	18	46	1.00	1723.84	1723.38
3A	24	76	1.04	1724.51	1723.72
3B	24	215	1.00	1723.72	1721.57
3C	24	200	1.97	1721.57	1717.67

CULVERT SCHEDULE



PLAN VIEW



SECTION A–A

OUTLET NO.	PIPE DIA/ DITCH BOTTOM Pd (IN)	RIPRAP		APRON		
		SIZE R–_	THICK. Rt (IN)	LENGTH Al (FT)	INITIAL WIDTH Aiw (FT)	TERMINAL WIDTH Atw (FT)
CULVERT 1	12	4	18	8	4.5	12.5
CULVERT 2	18	4	18	12	6	18
CULVERT 4	12	4	18	10	3	13
CULVERT 5	12	4	18	10	3	13
BYPASS	24	4	18	12	6	18
SED POND	15	4	18	12	4	16

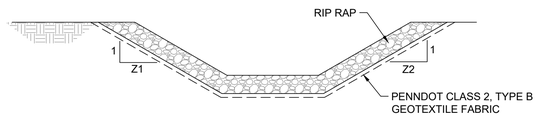
NOTES:
ALL APRONS SHALL BE CONSTRUCTED TO THE DIMENSIONS SHOWN.

ALL APRONS SHALL BE INSPECTED AT LEAST WEEKLY AND AFTER EACH RUNOFF EVENT. DISPLACED RIPRAP WITHIN THE APRON SHALL BE REPLACED IMMEDIATELY.

EXTEND RIPRAP ON BACK SIDE OF APRON TO AT LEAST 1/2 DEPTH OF PIPE ON BOTH SIDES TO PREVENT SCOUR AROUND THE PIPE.

RIPRAP APRON AT PIPE OR CHANNEL OUTLET

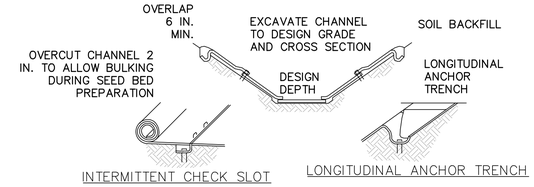
N.T.S.



CHANNEL CROSS – SECTION

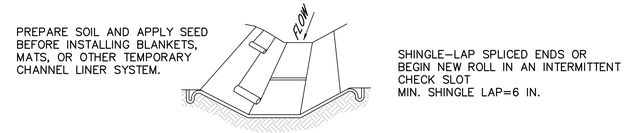
CHANNEL NO.	STATIONS	BOTTOM WIDTH B (FT)	DEPTH D (FT)	Z1 (FT)	Z2 (FT)	RIP RAP	
						SIZE (R-_)	THICKNESS t (IN)
3	0+00 - 0+50	4	1.5	2	2	5	27

RIPRAP CHANNEL

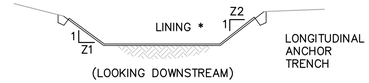


INTERMITTENT CHECK SLOT

LONGITUDINAL ANCHOR TRENCH



ISOMETRIC VIEW



CHANNEL CROSS–SECTION

* SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, VEGETATIVE STABILIZATION FOR SOIL AMENDMENTS, SEED MIXTURES AND MULCHING INFORMATION

VEGETATED CHANNEL

NOTES:

ANCHOR TRENCHES SHALL BE INSTALLED AT BEGINNING AND END OF CHANNEL IN THE SAME MANNER AS LONGITUDINAL ANCHOR TRENCHES.

CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION. SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.

NO MORE THAN ONE THIRD OF THE SHOOT (GRASS LEAF) SHALL BE REMOVED IN ANY MOWING. GRASS HEIGHT SHALL BE MAINTAINED BETWEEN 2 AND 3 INCHES UNLESS OTHERWISE SPECIFIED. EXCESS VEGETATION SHALL BE REMOVED FROM PERMANENT CHANNELS TO ENSURE SUFFICIENT CHANNEL CAPACITY.

CHANNEL	STATIONS	BOTTOM WIDTH B (FT)	MINIMUM DEPTH D (ft)	Z1	Z2	TEMP CHANNEL LINING	PERM CHANNEL LINING
1	0+00 - 3+31	2.0	2.0	2	2	S75	VEG
1	3+31 - 3+87	2.0	2.0	2	2	P550	P550/VEG
2	0+00 - 3+20	2.0	2.0	2	2	S75	VEG
4	0+00 - 0+90	2.0	2.0	2	2	S75	VEG
5	0+00 - 2+40	3.0	2.0	2	2	P550	P550/VEG
6	3+10 - 1+30	3.0	1.5	2	2	S75	VEG

S75 REFERS TO NORTH AMERICAN GREEN EROSION CONTROL S75 EROSION CONTROL BLANKET OR APPROVED EQUAL.

P300 REFERS TO NORTH AMERICAN GREEN EROSION CONTROL P300 EROSION CONTROL BLANKET OR APPROVED EQUAL.

P550 REFERS TO NORTH AMERICAN GREEN EROSION CONTROL P550 EROSION CONTROL BLANKET OR APPROVED EQUAL.

STATIONS SHOWN BEGIN UP UPSTREAM END OF CHANNEL. EXCEPT FOR CHANNEL 6, WHICH REPRESENTS ACCESS ROAD STATIONS.

CHANNEL DETAILS

N.T.S.

TEMPORARY

SPECIES:	WINTER RYE, 10/15 – 03/01
% PURE LIVE SEED:	80.75
APPLICATION RATE:	170 LB/AC
FERTILIZER TYPE:	10–10–10 (X–X–X)
FERTILIZER APPL. RATE:	500 LB/AC
LIMING RATE:	1 T/AC
MULCH TYPE:	STRAW
MULCHING RATE:	3 T/AC

PERMANENT

SPECIES:	SEED MIXTURE 1
% PURE LIVE SEED:	PER MANUFACTURERS RECOMENDATIONS
APPLICATION RATE:	40 LB/AC
FERTILIZER TYPE:	10–20–20 (X–X–X)
FERTILIZER APPL. RATE:	1000 LB/AC
LIMING RATE:	6 (OR LIQUID NEUTRA–LIME, 10–15 GAL/AC) T/AC
MULCH TYPE:	STRAW
MULCHING RATE:	3 T/AC
ANCHOR MATERIAL:	N/A
ANCHORING METHOD:	MECHANICALLY ANCHORED
RATE OF ANCHOR MATERIAL APPL.:	N/A LB/AC
SEEDING SEASON DATES:	PER MANUFACTURERS RECOMMENDATIONS

PERMANENT – STEEP SLOPES (≥3:1)

SPECIES:	SEED MIXTURE 2
% PURE LIVE SEED:	PER MANUFACTURERS RECOMENDATIONS
APPLICATION RATE:	50 LB/AC
FERTILIZER TYPE:	10–20–20 (X–X–X)
FERTILIZER APPL. RATE:	1000 LB/AC
LIMING RATE:	6 (OR LIQUID NEUTRA–LIME, 10–15 GAL/AC) T/AC
MULCH TYPE:	STRAW
MULCHING RATE:	3 T/AC
ANCHOR MATERIAL:	N/A
ANCHORING METHOD:	MECHANICALLY ANCHORED
RATE OF ANCHOR MATERIAL APPL.:	N/A LB/AC
SEEDING SEASON DATES:	PER MANUFACTURERS RECOMMENDATIONS

*IF MORE THAN ONE SPECIES IS USED, INDICATE APPLICATION RATE FOR EACH SPECIES.

SEED MIXTURE 1	SPECIES:	
	FAWN TALL FESCUE	30%
	ANNUAL RYEGRASS	25%
	TIMOTHY	15%
	BIRDSFOOT TREFOIL	10%
	ALSIKE CLOVER	10%
	YELLOW BLOSSOM CLOVER	5%
	RED TOP	5%
SEED MIXTURE 2	SPECIES:	
	PERENNIAL RYEGRASS	40%
	LATHCO FLATPEA (2 X INOCULM)	40%
	BIRDSFOOT TREFOIL	20%

TEMPORARY AND PERMANENT STABILIZATION SPECIFICATIONS

N.T.S.

REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
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National Fuel SUPPLY CORPORATION

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TAMARACK COMPRESSOR STATION

EROSION AND SEDIMENT CONTROL DETAILS, SHEET 3 OF 3

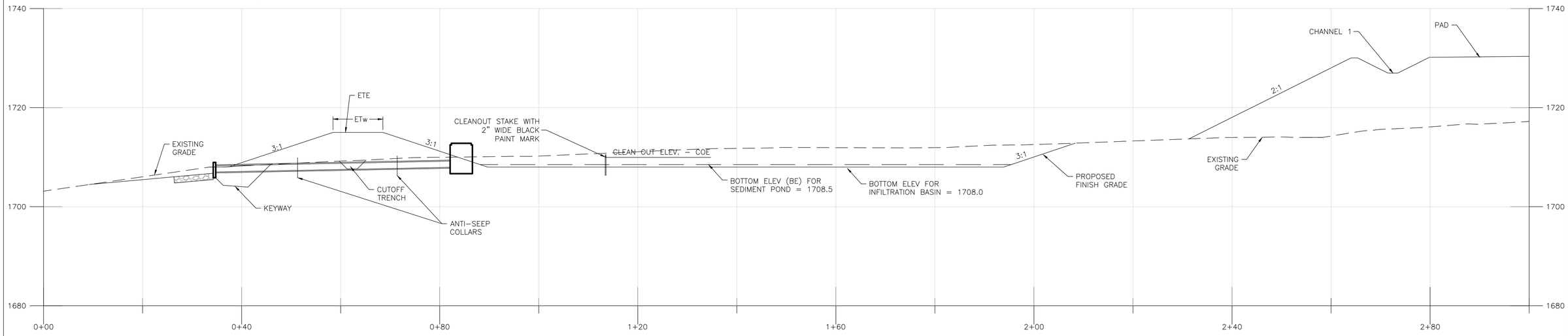
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

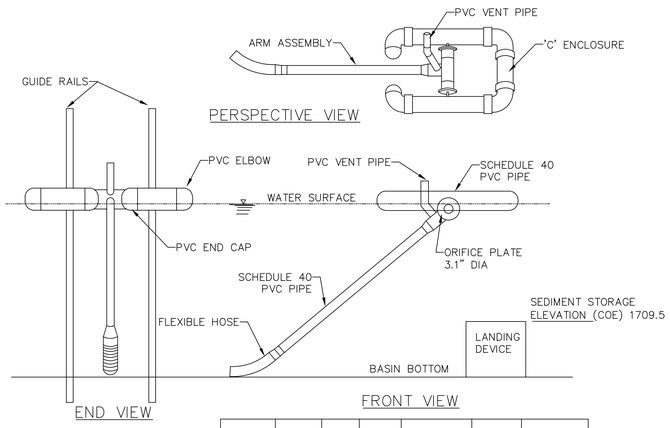
SCALE: NTS

DATE: SEPTEMBER 2019

SHEET NO. 08 OF 13

REFER TO NOTES ON SHEET 13 FOR SEDIMENT BASIN CONSTRUCTION REQUIREMENTS





FRONT VIEW

WATER SURFACE ELEV (FT)	ARM LENGTH (FT)	ARM DIA. (IN.)	ORIFICE SIZE (IN.)	TOP OF LANDING DEVICE ELEV (FT)	FLEXIBLE HOSE LENGTH (IN)	FLEXIBLE HOSE ATTACHMENT ELEV (FT)
1711.50	6	4	3.1"	1709.5	24	1708.5

NOTES:

ORIFICE DIAMETER MUST BE EQUAL TO OR LESS THAN ARM DIAMETER

A ROPE SHALL BE ATTACHED TO THE SKIMMER ARM TO FACILITATE ACCESS TO THE SKIMMER ONCE INSTALLED.

SKIMMER SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. ANY MALFUNCTIONING SKIMMER SHALL BE REPAIRED OR REPLACED WITHIN 24 HOURS OF INSPECTION.

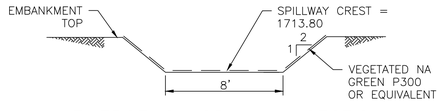
ICE OR SEDIMENT BUILDUP AROUND THE PRINCIPAL SPILLWAY SHALL BE REMOVED SO AS TO ALLOW THE SKIMMER TO RESPOND TO FLUCTUATING WATER ELEVATIONS.

SEDIMENT SHALL BE REMOVED FROM THE BASIN WHEN IT REACHES THE LEVEL MARKED ON THE SEDIMENT CLEAN-OUT STAKE OR THE TOP OF THE LANDING DEVICE.

A SEMI-CIRCULAR LANDING ZONE MAY BE SUBSTITUTED FOR THE GUIDE RAILS (STANDARD CONSTRUCTION DETAIL # 7-3).

SEDIMENT BASIN SKIMMER DETAIL

N.T.S.



EMERGENCY SPILLWAY SECTION

N.T.S.

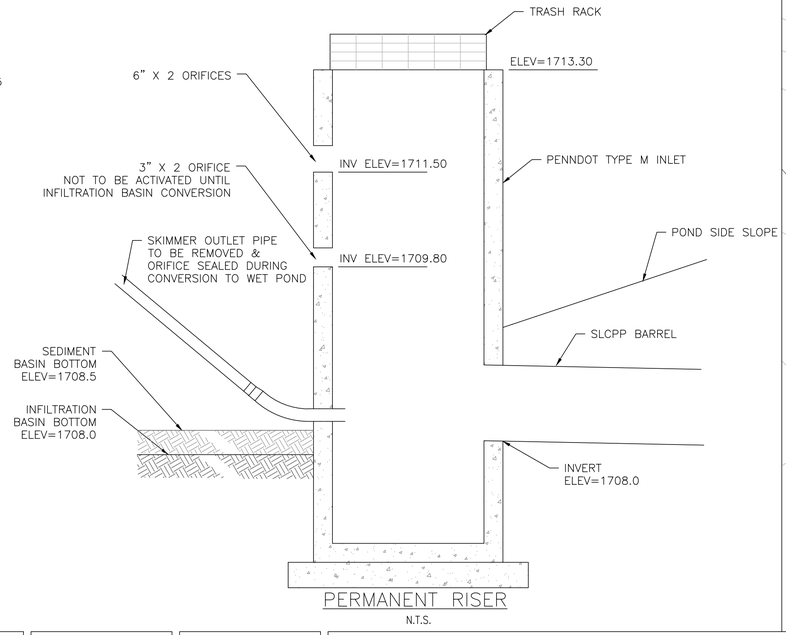
SEDIMENT BASIN/INFILTRATION BASIN SECTION A-A

1"=10

BARREL					EMBANKMENT		BOTTOM ELEV BE (FT)	CLEAN OUT ELEV COE (FT)
MAT'L	DIA Bd (IN)	INLET ELEV BIE (FT)	LENGTH BI (FT)	OUTLET ELEV BOE (FT)	TOP ELEV ETE (FT)	TOP WIDTH Etw (FT)		
SLCPP	15	1708.0	50	1707.0	1715.00	10	1708.5	1709.5

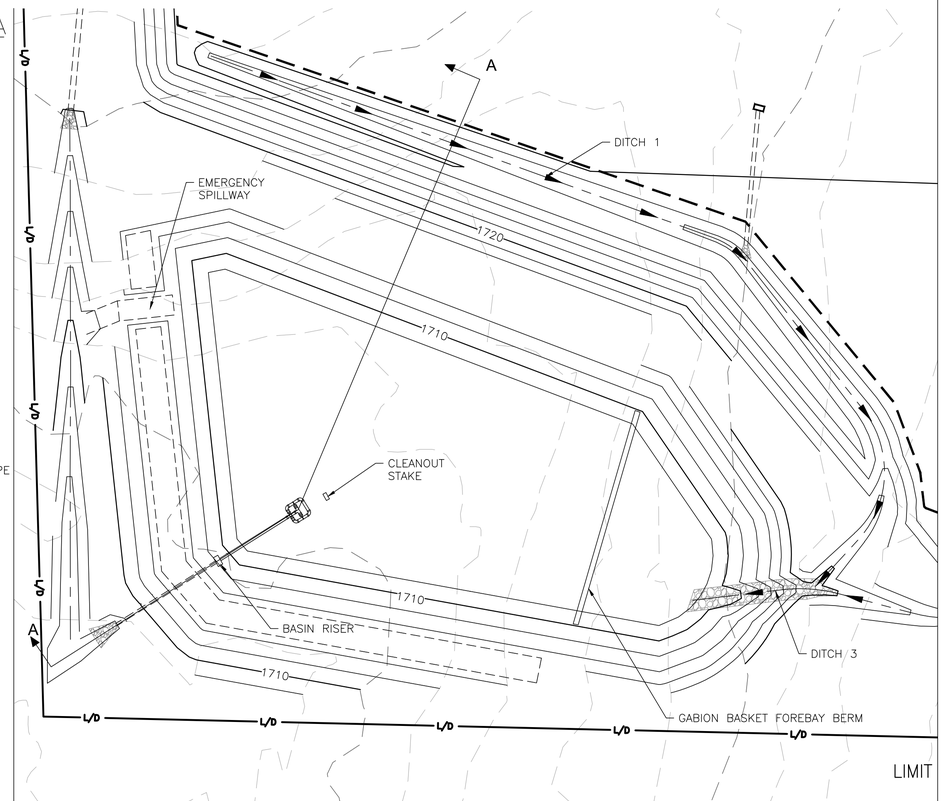
PERMANENT RISER						
DIA Dr (IN)	CREST ELEV PRCE (FT)	MAT'L	ORIFICE ONE		ORIFICE TWO	
			ORIFICE ELEV. (FT)	ORIFICE SIZE (IN)	ORIFICE ELEV. (FT)	ORIFICE SIZE (IN)
2X4 TYPE M INLET	1713.30	PRECAST CONCRETE	1709.80	3 (X2)	1711.50	6 (X2)

SEE ANTI-SEEP COLLAR DETAIL ON SHEET 07 FOR COLLAR SPACING



PERMANENT RISER

N.T.S.



SEDIMENT BASIN/INFILTRATION BASIN – PLAN VIEW

1"=30'

REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

DESIGNED	MJL
DRAWN	BRF
CHECKED	GAH
BAKER S.O.	169277

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COMMONWEALTH OF PENNSYLVANIA – REGISTERED PROFESSIONAL – GREGORY A. HEILMAN – ENGINEER No. 043740-E

TAMARACK COMPRESSOR STATION

SEDIMENT POND/ INFILTRATION BASIN

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO. 09 OF 13

NOTES:

1. MAPPING AND TOPOGRAPHY PROVIDED BY PA DCNR LIDAR SURVEY AND LIMITED FIELD SURVEY. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ITS ACCURACY.
2. DISCREPANCIES FOUND IN THE PROJECT MAPPING MUST BE REPORTED TO THE PROJECT ENGINEER/OWNER.
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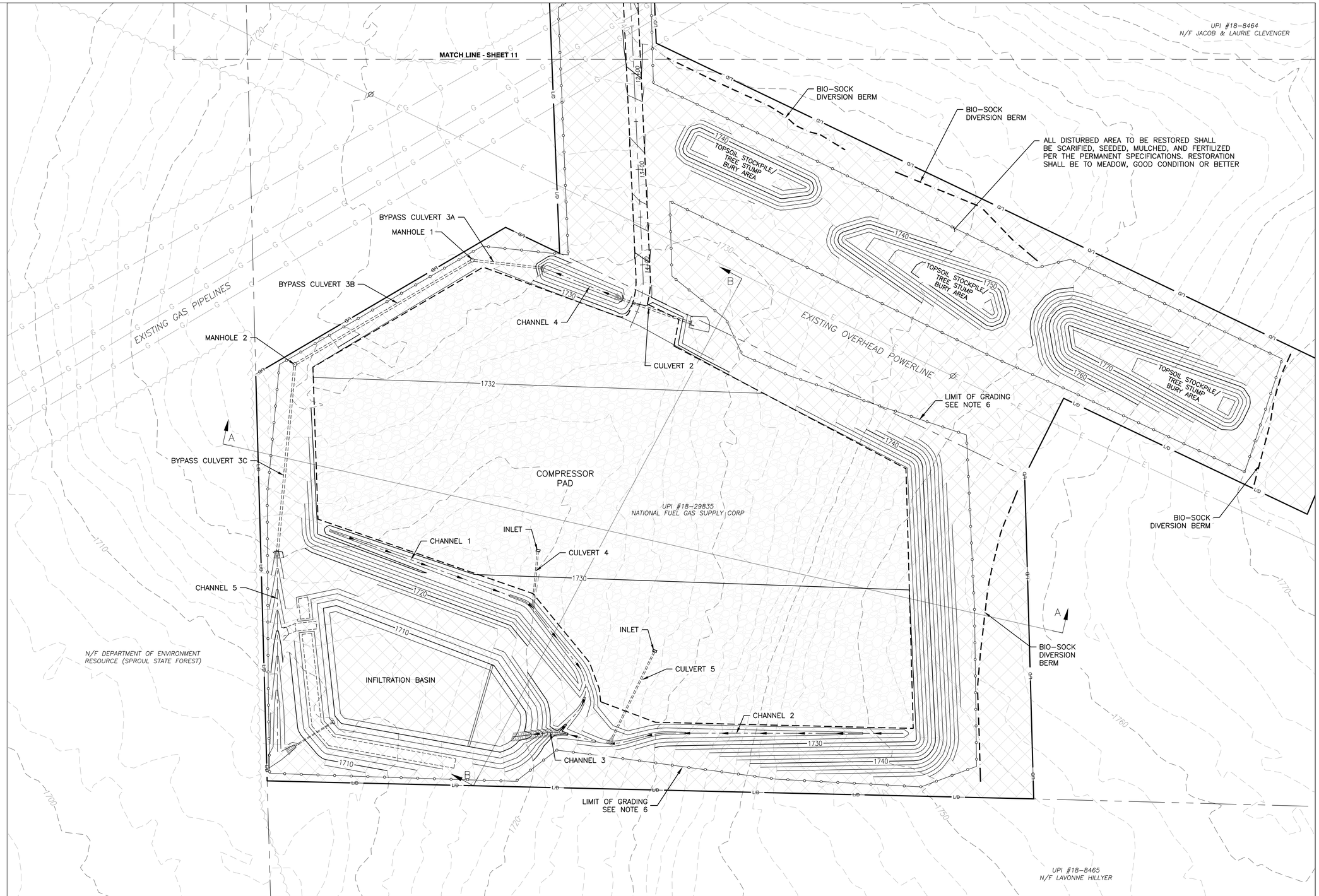
LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING TREELINE
- PROPERTY LINE
- G — EXISTING GAS LINE
- E — EXISTING OVERHEAD POWER LINE
- L/D — LIMIT OF DISTURBANCE
- LIMIT OF GRADING
- BIO-SOCK DIVERSION BERM
- INFILTRATION BERM
- RESTORED AREA
- GRAVEL AREA



REVISIONS

1. 8/25/2020. REVISIONS IN RESPONSE TO PADEP 7/10/2020 COMMENTS

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SCALE IN FEET

NORTH

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CHECKED	GAH
BAKER S.O.	169277

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TAMARACK COMPRESSOR STATION

PCSM AND SITE RESTORATION PLAN SHEET 1 OF 2
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO. 10 OF 13

NOTES:

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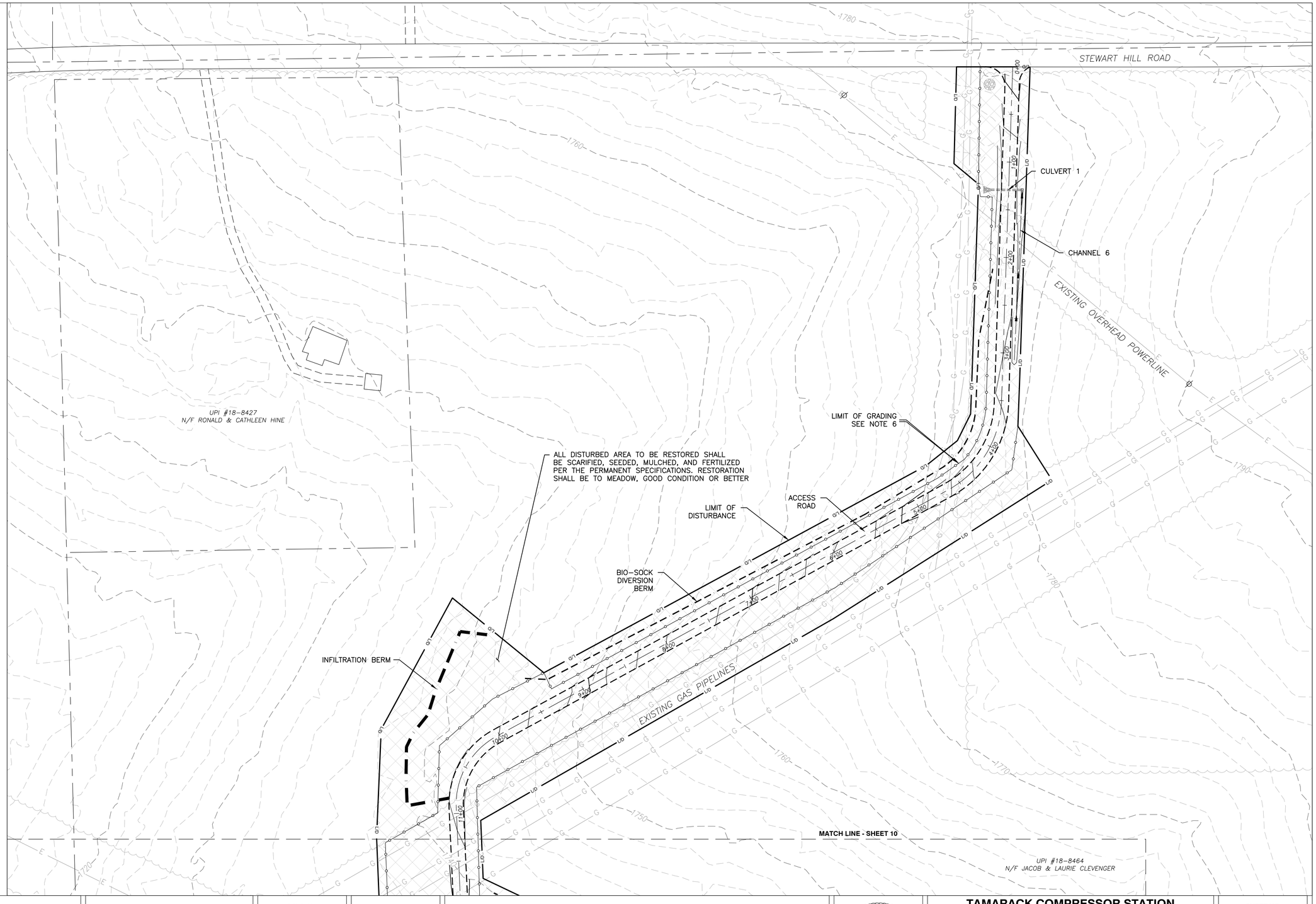

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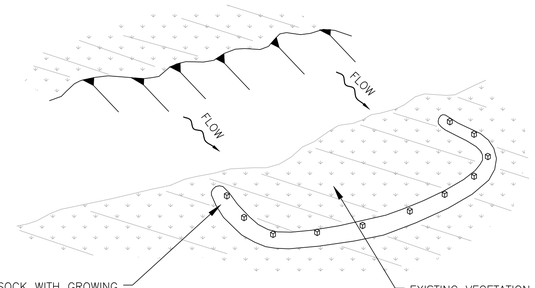
TAMARACK COMPRESSOR STATION

PCSM & SITE RESTORATION PLAN, SHEET 2 OF 2
LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: AS SHOWN

DATE: SEPTEMBER 2019

SHEET NO. 11 OF 13



MULTI-FILAMENT POLYPROPYLENE (MFPP) SOCK WITH GROWING MEDIA, NATIVE SOIL, AND NATIVE SEED MIXTURE IN FILL.
2"X2" WOODEN STAKES PLACED 10' O.C.
INSTALL SOCK ON CONTOUR AS FIELD CONDITIONS ALLOW.
SEE PLAN FOR SPECIFIC LOCATIONS.
REFER TO GROWING MEDIA SPECIFICATION ON THIS SHEET

EXISTING VEGETATION/TREES LEFT UNDISTURBED TO MAXIMUM EXTENT POSSIBLE TO PROMOTE INFILTRATION AND EVAPOTRANSPIRATION.
IF TREES ARE TO BE REMOVED TO ENSURE THE SOCK IS INSTALLED ON CONTOUR, THEN CUT THE TREE TO GRADE, BUT DO NOT GRUB STUMP.

BERM #	BERM HEIGHT (IN.)	LENGTH (FT.)	BASE ELEVATION
1	24	270	1739.0

GROWING MEDIA SPECIFICATIONS:

1. GROWING MEDIA SHALL BE WEED FREE AND DERIVED FROM A WELL-DECOMPOSED SOURCE OF ORGANIC MATTER.
2. THE COMPOSTED PRODUCTS SHALL BE PRODUCED USING AN AEROBIC COMPOSTING PROCESS MEETING USEPA CFR 503 REGULATIONS, INCLUDING TIME AND TEMPERATURE DATA INDICATING EFFECTIVE WEED SEED, PATHOGEN AND INSECT LARVAE KILL.
3. THE COMPOSTED PRODUCTS SHALL BE FREE OF ANY REFUSE, CONTAMINANTS OR OTHER MATERIAL TOXIC TO PLANT GROWTH.
4. MATERIAL SHALL HAVE A pH BETWEEN 5.0 AND 8.0
5. MATERIAL SHALL HAVE A MOISTURE CONTENT LESS THAN 60%.
6. MATERIAL SHALL MEET THE FOLLOWING PARTICLE SIZE REQUIREMENTS: 100% PASSING A 2-INCH (50 MM) SIEVE, 99% PASSING A 1-INCH (25 MM) SIEVE, A MINIMUM OF 60% PASSING A 1/2-INCH (12.5 MM) SIEVE.
7. MATERIAL SHALL BE RELATIVELY FREE OF INERT OR FOREIGN MAN-MADE MATERIALS.

MAINTENANCE

- REGULARLY INSPECT TO ENSURE THEY ARE INFILTRATING.
- NO MOWING REQUIRED. BERMS SHALL GROW WILD.
- AVOID RUNNING HEAVY EQUIPMENT OVER THE INFILTRATION AREA.
- ROUTINELY REMOVE ACCUMULATED TRASH AND DEBRIS.
- REMOVE INVASIVE PLANTS AS NEEDED.
- INSPECT FOR SIGNS OF FLOW CHANNELIZATION; RESTORE LEVEL GRADIENT IMMEDIATELY AFTER DEFICIENCIES ARE OBSERVED.

NOTES:

1. CARE SHOULD BE TAKEN DURING CONSTRUCTION TO ENSURE MINIMUM DISTURBANCE TO EXISTING VEGETATION, ESPECIALLY TREE ROOTS.
2. BERMS SHOULD BE INSTALLED PARALLEL TO THE CONTOUR WITH A TIE-BACK SECTION ON EACH END.

CONSTRUCTION SEQUENCE:

THE FOLLOWING IS A TYPICAL CONSTRUCTION SEQUENCE FOR THE BIORETENTION SOCK INFILTRATION BERM.

1. REPAIR AND/OR REPLACE THE TEMPORARY CONTROL MEASURES, INCLUDING THE ROCK CONSTRUCTION ENTRANCE AND PERIMETER FILTER SOCK IF NECESSARY.
2. STABILIZE ALL DISTURBED AREAS AS INDICATED.
3. ONCE THE AREA DRAINING TO THE PERMANENT BIORETENTION SOCK BERM IS STABILIZED WITH ROCK, EROSION CONTROL BLANKETS, VEGETATION, OR OTHER COVER AS INDICATED ON THE PLANS, THE FILTER SOCK TRAP CAN BE REMOVED AND THE BIORETENTION SOCK INFILTRATION BERM CAN BE INSTALLED.
4. REMOVE ALL SEDIMENT THAT HAS ACCUMULATED BEHIND THE FILTER SOCK TRAP. SEDIMENT THAT HAS BEEN REMOVED SHALL BE SPREAD AND DRIED ON-SITE WITHIN THE LIMITS OF DISTURBANCE AND UPSLOPE OF EROSION CONTROL DEVICES SUCH AS FILTER SOCK, AND VEGETATED IMMEDIATELY. CARE SHALL BE TAKEN TO MINIMIZE DISTURBANCE, LEAVE EXISTING TREES IN PLACE, AND PROTECT BERM PONDING AREAS FROM COMPACTION DURING SEDIMENT REMOVAL. IF DETERMINED BY THE ON-SITE LICENSED PROFESSIONAL TO BE NECESSARY, COMPACTION IN BERM PONDING AREAS SHALL BE TREATED BY SCARIFICATION OF THE SUBSOIL.
5. BEGIN INSTALLING THE SOCKS. THE SOCKS MUST BE INSTALLED AT A CONSTANT ELEVATION. A LICENSED PROFESSIONAL SHALL BE ON SITE FOR SOCK INSTALLATION.
6. STABILIZE/VEGETATE ALL AREAS DISTURBED DURING SOCK INSTALLATION.
7. UNTIL SUCH TIME AS THE SITE IS PERMANENTLY STABILIZED, ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE MAINTAINED IN WORKING ORDER. MAINTENANCE SHALL INCLUDE INSPECTION OF ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS.
8. PERMANENT STABILIZATION IS DEFINED AS A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING OR OTHER MOVEMENTS.
9. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATORS SHALL CONTACT THE PADEP FOR AN INSPECTION PRIOR TO THE REMOVAL OF THE TEMPORARY BMPS.
10. IMMEDIATELY REPAIR AND STABILIZE ANY AREAS DISTURBED DURING REMOVAL OF THE TEMPORARY BMPS.

BIORETENTION SOCK INFILTRATION BERM DETAIL

N.T.S.

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PCSM DETAILS, SHEET 1 OF 2

LEIDY TOWNSHIP
CLINTON COUNTY, PENNSYLVANIA

SCALE: NTS

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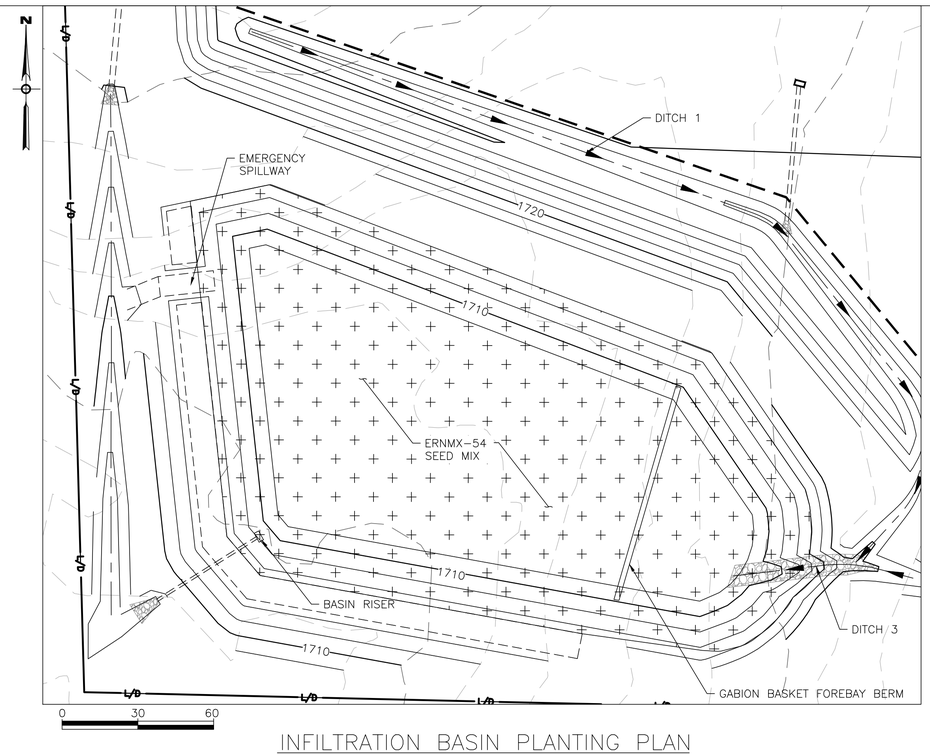
SHEET NO. 12 OF 13



INFILTRATION BASIN PLANTING PLAN

INFILTRATION BASIN CONVERSION SEQUENCE:

A LICENSED PROFESSIONAL OR DESIGNEE SHALL BE PRESENT ON SITE DURING CONVERSION OF THE INFILTRATION BASIN TO VERIFY THAT THE BMP IS BEING IMPLEMENTED IN ACCORDANCE WITH THE APPROVED PLAN. UPON COMPLETION OF CONVERSION, A LICENSED PROFESSIONAL OR DESIGNEE SHALL COMPLETE AN INSPECTION TO VERIFY THAT BMPS ARE IN PLACE AND FUNCTIONING AS DESIGNED.

1. PROTECT INFILTRATION BASIN AREA FROM COMPACTION TO THE MAXIMUM EXTENT POSSIBLE.
2. DRAIN SEDIMENT POND USING FILTER BAG AND REMOVE ACCUMULATED SEDIMENT AND EXCAVATE BOTTOM OF BASIN TO PROPOSED INFILTRATION ELEVATION. SPREAD SEDIMENT ON SOIL STOCKPILE OR OTHER AREAS AS SPECIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN.
3. REMOVE SKIMMER AND SKIMMER OUTLET PIPE, GROUT OVER SKIMMER OPENING.
4. REMOVE SEAL COVERING 6"X6" SQUARE ORIFICE.
5. PLANT THE ERNMX-154 SEED MIXTURE ON THE BOTTOM AND SIDES OF INFILTRATION BASIN.
6. DO NOT REMOVE EROSION AND SEDIMENT CONTROL MEASURES UNTIL THE SITE IS FULLY STABILIZED.

MAINTENANCE

1. THE VEGETATION ALONG THE SURFACE OF THE INFILTRATION BASINS WILL BE MAINTAINED IN GOOD CONDITION, AND ANY BARE SPOTS WILL BE RE-VEGETATED AS SOON AS POSSIBLE.
2. VEHICLES WILL NOT BE PARKED OR DRIVEN ON THE INFILTRATION BASIN, AND CARE SHOULD BE TAKEN TO AVOID EXCESSIVE COMPACTION BY MOWERS.
3. INSPECT THE BASINS AFTER RUNOFF EVENTS CONTAINING MORE THAN 2 INCHES OF RAINFALL IN 24 HOURS AND AT LEAST TWO TIMES PER YEAR.
4. INSPECT THE BASIN FOR ACCUMULATION OF SEDIMENT, DAMAGE TO OUTLET CONTROL STRUCTURES, EROSION CONTROL MEASURES, SIGNS OF WATER CONTAMINATION/SPILLS, AND SLOPE STABILITY.
5. MOW ONLY AS APPROPRIATE FOR VEGETATIVE COVER SPECIES.
6. REMOVE ACCUMULATED SEDIMENT FROM BASIN AS REQUIRED. RESTORE ORIGINAL CROSS SECTION AND INFILTRATION RATE. PROPERLY DISPOSE OF SEDIMENT.

SEDIMENT POND CONSTRUCTION NOTES:

1. THE AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO A DEPTH OF TWO FEET PRIOR TO ANY PLACEMENT AND COMPACTION OF EARTHEN FILL.
2. THE EMBANKMENT SHALL BE COMPACTED IN LAYERED LIFTS OF NOT MORE THAN 6" TO 9". THE MAXIMUM ROCK SIZE SHALL BE NO GREATER THAN 2/3 THE LIFT THICKNESS. FIVE PASSES OF THE COMPACTION EQUIPMENT OVER THE ENTIRE SURFACE OF EACH LIFT IS REQUIRED. EMBANKMENT COMPACTION TO VISIBLE NON-MOVEMENT IS ALSO REQUIRED.
3. SOILS ACCEPTABLE FOR EMBANKMENT CONSTRUCTION SHOULD BE LIMITED TO GC, GM, SC, SM, CL OR ML AS DESCRIBED IN ASTMD-2487 (UNIFIED SOILS CLASSIFICATION). FILL MATERIAL FOR THE EMBANKMENTS SHALL BE FREE OF ROOTS, OR OTHER WOODY VEGETATION, ORGANIC MATERIAL, LARGE STONES, AND OTHER OBJECTIONABLE MATERIALS.
4. THE KEY TRENCH SHALL HAVE A MINIMUM TRENCH DEPTH = 2', MINIMUM WIDTH = 4', MAXIMUM SIDE SLOPE STEEPNESS IS 1H:1V. THE TRENCH SHALL EXTEND UP BOTH ABUTMENTS TO THE RISER CREST ELEVATION. COMPACTION REQUIREMENTS SHALL BE THE SAME AS THOSE FOR THE EMBANKMENT. THE TRENCH SHALL BE DEWATERED DURING BACKFILLING AND COMPACTION OPERATIONS.
5. ANY SPRINGS ENCOUNTERED IN THE FOUNDATION AREA OF THE POND EMBANKMENT SHALL BE DRAINED TO THE OUTSIDE/DOWNSTREAM TOE OF THE EMBANKMENT WITH A DRAIN SECTION TWO FEET BY TWO FEET IN DIMENSION CONSISTING OF PENNDOT TYPE A SAND, COMPACTED BY HAND TAMPER. NO GEOTEXTILES ARE TO BE USED AROUND THE SAND. THE LAST THREE FEET OF THIS DRAIN AT THE OUTSIDE/DOWNSTREAM SLOPE SHALL BE CONSTRUCTED WITH AASHTO #8 MATERIAL.

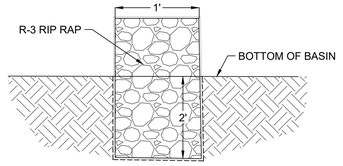
REQUIREMENTS FOR REVEGETATING DISTURBED AREAS USING NATIVE SPECIES

DURING ROUTINE INSPECTIONS, REVEGETATED AREAS SHALL BE INSPECTED FOR BARE SPOTS, WASHOUTS AND HEALTHY GROWTH. IDENTIFIED BARE SPOTS AND WASHOUTS SHALL BE REPAIRED WITHIN 10 BUSINESS DAYS UPON INSPECTION, WEATHER PERMITTING. REVEGETATED AREAS WILL HAVE NECESSARY SOIL SUPPLEMENTS, PERMANENT SEED AND MULCH APPLIED UNTIL A UNIFORM 70% COVER REGROWTH HAS BEEN ACHIEVED. IF NECESSARY, SOIL TESTING MAY BE PERFORMED TO DETERMINE PROPER APPLICATION RATES OF SOIL AMENDMENTS PRIOR TO ADDITIONAL SEEDING.

DO NOT USE CHEMICAL APPLICATIONS OR CHEMICAL BASED PEST CONTROLS IN REVEGETATED AREAS.

MINIMIZE MOWING IN REVEGETATED AREAS.

THE RESTORED AREAS SHALL BE EVALUATED FOR INVASIVE SPECIES DURING ROUTINE MAINTENANCE ACTIVITIES. IF INVASIVE SPECIES ARE FOUND, THEY WILL BE REMOVED BY HAND TO THE EXTENT PRACTICAL. ALL EQUIPMENT SHALL BE INSPECTED AND CLEANED AS NECESSARY, AND ALL CLOTHING INSPECTED PRIOR TO DEPARTURE TO REDUCE THE SPREAD OF INVASIVE SPECIES. IF A PARTICULAR INVASIVE SPECIES BECOMES ESTABLISHED AND HAND REMOVAL BECOMES INEFFECTIVE IN THE CONTROL OF THE SPECIES, CHEMICAL AGENTS MAY BE NEEDED. HOWEVER, CONSULTATION WITH THE DEPARTMENT SHOULD BE COMPLETED FOR ANY RECOMMENDATION OR ALTERNATIVE METHODS THAT MAY BE APPLICABLE TO THE SPECIFIC SPECIES OF CONCERN.



NOTES:

CONSTRUCT GABION BASKET FOREBAY BERM IN ACCORDANCE WITH PROJECT SPECIFICATIONS. GABION BASKET MATERIALS AND INSTALLATION SHALL CONFORM WITH PENNDOT PUBLICATION 72M, RC-43.

GABION BASKET FOREBAY BERM

N.T.S.

REVISIONS

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TAMARACK COMPRESSOR STATION

PCSM DETAILS, SHEET 3 OF 3

LEIDY TOWNSHIP
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SCALE: NTS

DATE: SEPTEMBER 2019

SHEET NO. 13 OF 13

FM100 Modernization Project

Site Restoration Plan
Narrative

October 2019 (Revised September 2020)

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FM100 Modernization Project

Site Restoration Plan
Narrative

October 2019 (Revised September 2020)

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B	09/2020	D. Ward	K. Kibbe	M. DeNichilo	Tech. Def. Revisions for PADEP

Document reference:

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1 Introduction

The Site Restoration Plan (SR Plan) for the FM100 Modernization Project (Project) includes this narrative, appended supporting information and the Erosion and Sediment Control General Permit (ESCGP-3) Application package and Permit Drawings (Drawings) in addition to the Site Restoration (SR) Plan set dated October 2019. The SR Plan narrative was developed in compliance with the requirements of Chapter 102, Title 25 of the Pennsylvania Administrative Code created under the Clean Streams Law, specifically Chapter 102, Section 102.8(n):

> "*Regulated activities that require site restoration or reclamation, and small earth disturbance activities.* The portion of a site reclamation or restoration plan that identifies Post Construction Stormwater Management (PCSM) Best Management Practices (BMPs) to manage stormwater from oil and gas activities or mining activities permitted in accordance with Chapters 78 and 86—90; timber harvesting activities; pipelines; other similar utility infrastructure; Department permitted activities involving less than 1 acre of earth disturbance; or abandoned mine land reclamation activities, that require compliance with this chapter, may be used to satisfy the requirements of this section if the PCSM, reclamation or restoration plan meets the requirements of subsections (b), (c), (e), (f), (h), (i) and (l) and, when applicable, subsection (m)."

National Fuel Gas Supply Corporation (National Fuel) has prepared this SR Plan to address the planned stormwater management measures that would be installed and maintained following the construction of the Project located in McKean, Potter, Clearfield, Elk, Cameron, and Clinton Counties, Pennsylvania. This SR Plan is intended for pipeline construction activities in Pennsylvania which are not proposed to result in an increase in impervious surfaces, including temporary access roads, staging areas, and wareyards associated with the Project. Two compressor stations, one overpressure protection station, and five mainline valves will also be constructed. The resulting increase in stormwater rates and volumes will be mitigated with PCSM BMPs. Separate PCSM reports and drawings are provided in National Fuel's ESCGP-3 Application for each facility site.

This SR Plan has been prepared in conjunction with an ESCGP-3 application for earth disturbance associated with oil and gas activities in Pennsylvania. Measures to address the potential for erosion and sediment control during construction and related earth disturbance are described in a separate Erosion and Sediment Control & Agricultural Mitigation Plan (ESCAMP) (ESCGP-3 Narrative Attachment G) prepared for the Project in Pennsylvania.

1.1 Project Purpose and Description

The primary purpose of the Project, as initially designed and pre-filed with Federal Energy Regulatory Commission (FERC) Docket No. PF17-10-000), is to modernize a portion of National Fuel's existing pipeline system. The Project will allow for the removal from service and abandonment of approximately 44.9 miles of vintage steel pipe. National Fuel's risk analysis has prioritized the replacement of these aging facilities. In order to continue to provide the existing transportation and storage services provided by the facilities proposed to be abandoned, approximately 29.5 miles of new 20-inch-diameter coated steel pipeline, 0.4 miles of 12-inch-diameter coated steel pipeline to be used as a suction/discharge header, and 4,055 horsepower (hp) of compression and related facilities at the proposed Marvindale Compressor Station will be installed. The Project will enhance the reliability and safety of the National Fuel system for transportation services, local distribution market needs, storage management purposes and local production collection and transportation. Line FM100 is National Fuel's only connecting pipeline between its western and eastern operating systems.

In addition to modernizing its existing system, National Fuel also proposes to construct additional facilities designed to create 330,000 Dekatherm/day of incremental transportation capacity ("Transportation Capacity") from the Sergeant Township area to Transco at Leidy, PA. These additional facilities include 11,110 hp at the proposed Marvindale Compressor Station, 22,220 hp at the proposed Tamarack Compressor Station, an increase in the Line YM58 pipe diameter to 20-inch, and measurement upgrades at National's interconnection with Transco at Leidy.

The Transportation Capacity, which is fully subscribed to Transco under a proposed capacity lease, will provide upstream gas supply from shale producing areas in central PA to Transco's "Leidy South Project" (Docket No. PF19-1-000) on behalf of Transco's foundation shipper. The companion projects will allow abundant, reliable, and economic gas supply to access the interstate pipeline system grid where it can reach key consuming market centers in the northeastern United States via the Transco pipeline system.

The Commission granted a certificate of convenience and necessity for the Project on August 6, 2020; should all other necessary permits be secured, it is anticipated that clearing and grading will commence in Q4 2020, with construction beginning in Q1 2021 and being complete by Q4 2021. Additional work will occur in 2022 supporting the abandonment of Line FM100. The proposed in-service date for the completed Project is December 2021. A detailed construction plan by Project segment will be submitted with the Implementation Plan. This plan will address timeframes for pre-construction activities (e.g., environmental clearance surveys, staking, clearing/grading, construction, restoration, and commissioning).

The Project includes:

- Installation of approximately 29.5 miles of 20-inch-diameter steel pipeline (Line YM58) from the proposed Marvindale Interconnect near the proposed Marvindale Compressor Station site in Sergeant Township, McKean County, PA and extending to the proposed Carpenter Hollow Over Pressure Protection (OPP) Station adjacent to existing Station HEP0 840T in Hebron Township, Potter County, PA. The proposed alignment generally parallels the existing Tennessee Gas Pipeline (TGP) 300 Lines.
- Installation of approximately 0.4 miles of 12-in-diameter steel pipeline (extension of existing Line KL).
- Installation of approximately 1.41 miles of 24-inch-diameter steel pipeline looping the existing National Fuel Line YM224 in Potter County, PA

Compressor Stations:

- Installation of the proposed 15,165 hp Marvindale Compressor Station in Sergeant Township, McKean County, PA
  - Install one natural gas fired Caterpillar G3516 (1,380 hp)
  - Install one natural gas fired Caterpillar G3608A4 (2,675 hp)
  - Install one natural gas fired Solar T-70 (11,110 hp)
- Installation of the proposed 22,220 hp Tamarack Compressor Station in Clinton County, PA
  - Install two natural gas fired Solar T-70 (11,110 hp each)

Interconnections/Stations:

- Proposed work at the existing Marvindale Interconnect/meter station near the new Marvindale Compressor Station (Sergeant Township, McKean County, PA);

- New OPP Station, Carpenter Hollow OPP Station, adjacent to existing Station HEP0 840T, between Line YM50 and Line YM224 (Hebron Township, Potter County, PA); and
- Modification of existing Leidy Interconnect LDC 2245 with Transco at the Leidy M&R Station (Clinton County, PA); evaluated under FERC Docket PF19-1-000.

Mainline Valves:

- KL Valve Set (Sergeant Township, McKean County, PA)
- MLV-1 (Norwich Township, McKean County, PA)
- MLV-2 (Liberty Township, McKean County, PA)
- MLV-3 (Hebron Township, Potter County, PA)
- MLV-4 (Allegany Township, Potter County, PA)

Abandonments:

- Abandonment and removal of Costello Compressor Station (Potter County, PA);
- Abandonment in place of approximately 44.9 miles of Line FM100 12-inch steel and appurtenances (Cameron, Clearfield, Elk and Potter Counties, PA); and
- Abandonment and removal of meter Station WHP-MS-4317X (Wharton Township, Potter County, PA).

Project Disturbance:

- McKean County: 333.5 acres
- Potter County: 167.9 acres
- Clinton County: 15.6 acres
- Clearfield County: 2.4 acres
- Cameron County: 17.4 acres
- Elk County: 1.3 acres

The following criteria were used to select the proposed route and aboveground facility locations:

- use of existing utility corridors;
- avoiding environmental resources (e.g., waterbodies, fisheries, wetlands, threatened and endangered species/significant habitats, etc.) and cultural resources, geologic/topographic hazards, and existing residential structures to the extent possible;
- the presence of existing access roads to accommodate construction along the proposed route;
- land uses (both existing and planned); potential impacts (both positive and negative) to local communities and landowners;
- engineering constraints, construction feasibility, topography and cost, including consideration of route length and opportunities to use existing corridors; and
- hydraulic design.

Site Restoration General Requirements

General restoration of the construction work area will begin in accordance with National Fuel's ESCAMP. Restoration measures will include the re-establishment of original grade and drainage patterns to the extent practicable, as well as the installation of permanent erosion and sedimentation control devices to minimize the likelihood of post-construction erosion.

1.2 Preserve the Integrity of Stream Channels; Maintain and Protect the Receiving Streams

PCSM will be achieved through the use of waterbars to reduce runoff velocity and divert water off the permanent ROW. Permanent waterbars would be installed across the entire ROW, including at waterbody crossings and upslope of wetland boundaries. Waterbody banks will be restored to pre-construction contours or to a stable angle of repose as approved by an Environmental Inspector (EI). Erosion control blanket or matting will be installed on disturbed areas within 50 feet of streams and within 100 feet of streams in high quality (HQ) and exceptional value (EV) watersheds. The site will be revegetated after earth-disturbing activities or any stage or phase of an activity is completed in accordance with the seed mixes presented in Attachment 5 of the ESCAMP.

1.3 Prevent an Increase in the Rate of Stormwater Runoff

Existing drainage patterns will be maintained as feasible by utilizing the existing contours or restoring any disturbed area to the existing condition or meadow, in good condition or better. Restoration measures will include the re-establishment of original grade and drainage patterns to the extent practicable, as well as the installation of permanent erosion and sedimentation control devices to minimize the likelihood of post-construction erosion. The rate of stormwater runoff from the Project area in the post-construction condition is not expected to exceed that of the pre-construction condition.

1.4 Minimize Any Increase in Stormwater Runoff Volume

Existing drainage patterns will be maintained by utilizing the existing contours or restoring any disturbed area to the existing condition or meadow in good condition or better. The volume of stormwater runoff from the Project area in the post-construction condition is not expected to exceed that of the pre-construction condition.

1.5 Minimize Impervious Areas

To the maximum extent possible, disturbed areas will be revegetated or restored with pervious material to their original condition, or meadow in good condition or better following construction.

1.6 Maximize Protection of Existing Drainage Features and Vegetation

The approximate original contours of the workspace will be maintained and/or restored to their original condition following construction, and disturbed areas will be re-vegetated or restored with pervious material. Existing drainage patterns will be maintained, and the volume of stormwater runoff from the Project area in the post-construction condition is not expected to exceed that of the pre-existing condition.

1.7 Minimize Land Clearing and Grading

Land clearing and grading will be limited to only what is required to conduct the work activities in each stage of work as outlined in the ESCAMP.

1.8 Minimize Soil Compaction

Construction activities will be limited to the approved workspace. Following construction, temporarily disturbed areas will be restored to their existing condition. Severely compacted agricultural areas would be plowed with a paraplow or other deep tillage implement. In agricultural areas where topsoil has been segregated, the subsoil would be plowed before replacing the segregated topsoil. If subsequent construction and cleanup activities result in further compaction, additional tilling would be conducted.

1.9 Utilize Other Measures or Controls that Prevent or Minimize Generation of Increased Stormwater Runoff

Existing drainage patterns will be maintained, and the volume of stormwater runoff from the Project area in the post-construction condition is not expected to exceed that of the existing condition. Post construction stormwater management will be achieved through the use of waterbars that will be placed across the width of the National Fuel's ROW.

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2 Existing Conditions

2.1 Existing Topography

The cumulative Project pipeline length measures a total length of 31.3 miles in Pennsylvania. The existing terrain varies throughout the length of the Project from flat to hilly to steep valley slopes. The terrain also ranges through the Project as described below.

2.2 Past and Present Land Uses

Construction and operation of the Project's facilities may result in both temporary and permanent alterations to land use and land cover. This section identifies land requirements for the Project and describes existing and past land use within the proposed Project areas. The locations of mapped soil types are shown on the alignment sheets and described on drawing "SR SOILS" of the SR Plan drawing package.

Information provided in this section includes land that will be affected by the temporary construction and permanent ROW, extra work or staging areas, and wareyards. Land use data was calculated based on information obtained through field surveys, review of aerial photography and USDA National Agricultural Statistics Service (NASS) Cropland Data Layer (USDA-NASS, 2014). The land use characteristics are classified by primary vegetation cover type and/or predominant land use. For consistency, the land use and land cover classification system were derived from the FERC's *Guidance Manual for Environmental Report Preparation*, with the addition of a land use category for existing utility ROW. The Project will cross land use categories including agricultural pasture, cultivated cropland, forest and woodland areas, industrial/commercial land, open lands, open water, residential lands, and wetlands. Linear waterbodies less than 20-feet wide may have been classified within the adjacent land use categories. Land use types within the Project area classified into the following six categories:

- Agricultural Land - Pasture and/or hay fields, active cropland, orchards, and/or vineyards;
- Industrial/Commercial - Electric power or gas utility stations, manufacturing or industrial plants, landfills, mines, quarries, and commercial or retail facilities;
- Forest & Woodland - Tracts of upland or wetland forest or woodland that would be removed for the construction ROW or extra work or staging areas;
- Open Land - Non-forested lands, herbaceous and scrub-shrub wetlands, and maintained utility ROW;
- Open Water - Water crossings; and
- Residential Land - Residential yards and residential subdivisions.

There are no land uses fitting the following descriptions located within the Project area:

- Land for local historical or cultural significance (e.g., Native American religious sites, historic districts, etc.);
- Land used for landfills or hazardous waste sites; and
- National Scenic Rivers (i.e., designated or proposed candidate rivers on the Nationwide Rivers Inventory), state scenic rivers, and designated scenic areas or roads.

National Fuel compared aerial photography from September 2013 available through Google Earth Pro and compared it to current aerial photography. There have been no significant changes to land use along the proposed pipeline alignment in the past five years.

2.3 Proposed Alteration and Land Use

During the initial construction stage of the Project, much of the area will consist of exposed soils. Upon installation of the pipeline, the ROW is to be stabilized with vegetative cover as indicated on the ESCGP-3 drawings. With the exception of long-term maintenance to trim woody vegetation and occasional mowing, no permanent topographic or land cover changes are proposed along the pipeline alignment aside from areas within the tree clearing limits.

Following construction, National Fuel will maintain a 50-foot-wide permanent ROW for operation and maintenance of the pipeline. Where the permanent ROW crosses wetlands, National Fuel will maintain a cleared 10-foot-wide ROW for operation and maintenance. The construction footprint, excluding the above-ground facilities operational impacts and permanent access roads maintained for operations will be restored to pre-construction land use types.

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3 Soils and Geology

3.1 Soil Limitations

Important attributes of the soils map units crossed by the pipeline are presented on the SR Plan drawing “SR SOILS.” The “SR SOILS” drawing includes the soil use limitations from the Pennsylvania Department of Environmental Protection (PADEP) E&S Manual Appendix E for all soils impacted by the Project in Pennsylvania. For all applicable soil use limitations, a resolution has been proposed. The locations of mapped soil types are shown on the ESCGP-3 drawings in plan- view as well as in a crossing band on the alignment sheets. These soil boundaries and associated information were obtained from the USDA SSURGO database.

National Fuel will reestablish vegetation following final grading to minimize impacts on soils during site restoration.

3.2 Natural Occurring Geologic Formations

This section provides a summary of the geological features present in the Project area, including physiography, topography, surficial and bedrock geology and mineral resources. The potential for geologic hazards to affect the Project is also discussed. In addition, National Fuel completed a geohazard review of the modernization portion of the project which specifically evaluated overall site conditions and potential risk levels posed by geotechnical conditions for construction and operation of the Project (see Appendix I of the ESCGP-3 Narrative). Where appropriate, mitigation measures intended to reduce the impact of the Project on geologic resources or reduce the impact of geologic hazards on the facilities are included.

3.2.1 Physiography

The Project and its associated facilities are within the Appalachian Plateaus physiographic province (PADCNR, 2016a). The Appalachian Plateaus province is a highland that has been eroded by streams which have created deep valleys and hilly topography (PADCNR, 2014). Further divided, the Project crosses the High Plateau Section, Pittsburgh Low Plateau Section and the Deep Valleys Section (PADCNR, 2016a).

The High Plateau section has a dominant topographic form characterized by broad, rounded to flat uplands having deep, angular valleys. The local relief is moderate to high (ranging from 300 to 1,000 feet) with approximate elevation ranges from 980 to 2,360 feet AMSL. This section is dominated by a dendritic drainage pattern (PADCNR, 2016b and 2016e).

The Pittsburgh Low Plateau section has a dominant topographic form characterized by a smooth to irregular, undulating surface with narrow, relatively shallow valleys and strip mines and reclaimed lands. The local relief is low to moderate (ranging from 100 to 600 feet) with approximate elevation ranges from 660 to 2,340 feet AMSL. The drainage pattern of this section is dendritic (PADCNR, 2016c and 2016e).

The Deep Valleys section has a dominant topographic form of very deep, angular valleys with some broad to narrow uplands. The local relief is moderate to very high (ranging from 300 to greater than 1,000 feet) with approximate elevation ranges from 560 to 2,560 feet AMSL. The drainage pattern of this section is angulate and rectangular (PADCNR, 2016d and 2016e).

3.2.2 Surficial Geology and Topography

The proposed pipelines are within a relatively simple geological location with generally near horizontally bedded sedimentary formations. The project intersects the following mapped geological formations (U.S. Geological Survey [USGS] descriptions quoted):

- Pottsville Formation – predominantly gray sandstone and conglomerate
- Catskill Formation – predominantly grayish-red sandstone, siltstone, shale and mudstone
- Senango and Oswayo Formation (Undivided) – predominantly greenish-gray, olive, and buff sandstone and siltstone, and gray shale in varying proportions
- Huntley Mountain Formation – predominantly greenish-gray and light-olive-gray, flaggy, fine-grained sandstone, siltstone and a few red shale interbeds
- Appendix E lists the geologic units crossed by the proposed pipeline routes (PADNCR, 2018d).
- Publicly available LiDAR data was processed to evaluate the site topography. The data set was obtained from Pennsylvania Spatial Data Access (PASDA) PAMAP Program – 3.2ft digital elevation model (Pennsylvania State University 2006-2008).

For the proposed Line YM58 pipeline alignment, 6.8 miles are between 15% and 30% gradient and 3.2 miles are >30% gradient. For the proposed Line YM224 pipeline alignment, 0.18 miles are between 15% and 30% gradient and 0.05 miles are >30% gradient.

3.2.3 Mineral Resources

Three non-active and restored mines and one active mining operation were identified within 0.25-mile of the Project. Project cumulative impacts to geologic resources related to mining activities are anticipated to be minimal to non-existent due to the current status (non-operational) and spatial distance of the mines from the Project.

This area has had significant oil and gas activity in the past. There are 17 abandoned wells, 204 active wells, and 42 inactive wells within 0.25-mile of the Project. Other oil and gas related projects include the YM28 and FM120 Modernization Project, National Fuel Northern Access 2016 Project and Dominion Energy LN16 and LN20 Project. The Proposed project will not be in construction during the same time period as these projects; however, the YM28 and FM120 Modernization Project and Dominion Energy LN16 and LN20 Project will likely be in service at the time of construction. Care will be taken to avoid impacting these operational pipelines, particularly if blasting is required in the vicinity of these facilities.

3.2.4 Potential Geologic Hazards and Mitigation

The Project alignment does not cross, nor are the proposed facilities located near active quaternary faults, or near seismically active areas according to the USGS fault map (USGS 2016a). Since 1970, there have been no earthquakes with a magnitude (M) of 2.0 or higher on the Richter scale that has occurred within 100 miles of the proposed Project (USGS 2016b).

The seismic hazard for Cameron, Clinton, Clearfield, Elk, McKean, and Potter Counties is between four and eight and is, therefore, generally regarded as low. This is based on a two percent probability of exceedance in 50 years of peak ground acceleration. The hazard rating system ranges from zero through 80+, where zero indicates the lowest hazard and 80+ indicates the highest hazard (USGS 2014). In addition, no known Quaternary faults (i.e., faults that are found at the Earth's surface and younger than 1.6 million years) have been found near the Project area (USGS 2016a).

The Project is located within an area with a less than one percent chance of damage from natural and induced earthquakes. Additionally, there are no mapped earthquake epicenters within the Project area (PADCNR 2004). Therefore, earthquakes are not anticipated to be a geologic hazard to the Project activities.

Karst features such as sinkholes, caves, and caverns can form as a result of the long-term action of groundwater on soluble carbonate rocks (e.g., limestone and dolostone). The Project is not located in an area with karst formations such as sinkholes or surface depressions (Kochanov 2015, PADCNR 2019); consistent with this analysis, no surficial karst features were identified during field surveys (e.g., sink holes, caves, surface depressions, etc.).

As part of National Fuel's pipeline integrity program, the pipeline ROW will be routinely inspected, including for subsidence activity. If subsidence is found, National Fuel will take the appropriate corrective measures to maintain the integrity of the pipeline. These measures include determining the allowable stresses on unsupported pipe spans, importing fill for pipe support, and evaluating whether recurrence is likely. If it is determined that recurrence is likely, National Fuel would evaluate the potential of implementing additional stabilization measures or, if necessary, relocating the pipelines, and/or facilities.

Due to the low incidence and likelihood of land subsidence and the absence of karst terrain within the Project area, there is no anticipated subsidence concerns related to construction and operation of the Project.

The presence of the existing adjacent pipelines provides a precedent that the construction and operation of a natural gas pipeline is feasible in this terrain. The project does not intersect any of the high hazard documented landslides on the USGS mapping such as Active landslide or Soil and rock susceptible to landsliding. The only USGS mapped landslide category which was intersected by project components was Old Landslides (4 locations) which are described as "…relatively stable…" by the USGS. Field inspections were performed which did not observe any recent, or actively occurring major slope movements. National Fuel has committed to providing a Professional Engineer specializing in geotechnical engineering and slope stability, or a Professional Geologist with experience in engineering geology and slope stability, during construction to perform part-time project observations. The part-time observations will not absolve the construction contractor of the prime responsibility for construction safety and compliance with U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration regulations. The observations will be performed at key events including; post vegetation clearing, first breaking ground, trenching, and final grade restoration.

Fossils are not common in Pennsylvania and are only found in Mesozoic-age rocks in the southeastern part of Pennsylvania. The Project area is underlain by Paleozoic sedimentary rocks which have low potential to contain fossils. Although fossil specimens may be encountered during construction activities, no impacts on sensitive paleontological resources are anticipated. Further, National Fuel will provide training to environmental inspection staff and the construction contractor prior to mobilizing to recognize sensitive paleontological resources. In the unlikely event that unique or significant fossil specimens are discovered during excavation activities, National Fuel would cease construction at the site and notify the appropriate landowner or state agency.

4 Receiving Watercourses

Surface water resources identified in the general Project area include rivers, streams, associated tributaries, ponds, lakes, and catchment basins. Pennsylvania water quality standards are set forth in Chapter 93 of the Pennsylvania Code, and amended under the Clean Streams Law (35 P.S. § § 691.5(b) (1) and 691.402). Definitions for Chapter 93 designated use and existing use classifications are based on a variety of criteria, including chemistry, biology, and outstanding resources. Designated uses are specified in Chapter 93 for each waterbody or segment whether or not they are being attained. Existing uses are uses actually being attained in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards (Commonwealth of PA, 2009a).

Trout water classifications include Approved Trout Water, Stream Sections that Support Natural Reproduction of Trout, and Wilderness Trout Streams under Title 58 of the Pennsylvania Code. Both Class A Wild Trout Streams and Stream Sections that Support Natural Reproduction of Trout are defined as streams that support a population of naturally produced trout of sufficient size and abundance to support a long-term fishery

4.1 Riparian Impacts

The feasibility of protecting, converting, or establishing a riparian forest buffer meeting the requirements of 25 PA Code §102.14 was analyzed for the proposed Project. Given the linear nature of the proposed Project, temporary impacts within riparian buffers is unavoidable. To mitigate for temporary disturbances within riparian buffers, National Fuel has reduced workspace within riparian buffers to the extent practicable. National Fuel will employ multiple measures to reduce the extent and duration of Project impacts to riparian communities which include, but are not limited to the following:

- National Fuel will cut vegetation just above ground level in workspace locations, leaving existing root systems in place and preserve 150- foot riparian area where possible
- National Fuel will limit the removal of stumps and grading in wetlands and along waterbodies to the trench line and what is necessary to safely install the equipment crossings to promote natural revegetation and surface stabilization;
- National Fuel will utilize a riparian buffer mix within 150 feet of HQ/EV waterbodies and within 100 feet of other waterbodies. This seed mix will be used to revegetate the entire LOD in riparian areas where slopes are less than 10%.
- Tree and shrub plantings will also occur in forested riparian buffers, within workspace outside of the 10-foot maintained ROW will be planted.
- National Fuel will restore portions of the disturbed riparian forest buffer with replanting in the riparian areas outside of its permanent maintained right of way.

National Fuel will implement BMPs to minimize riparian impacts and protect existing forested riparian buffers to the extent practicable. However, to manage the pipeline's integrity during Project operation, National Fuel must maintain a 10-foot wide tree free corridor over the pipeline; therefore, the entire forested riparian buffer cannot be replanted. Furthermore, because National Fuel does not own the property on which the proposed earth disturbance will occur, National Fuel cannot, without landowner permission, place deed restrictions or conservation easements to protect, convert, or establish a riparian buffer or riparian forest buffer to satisfy the antidegradation requirements of §102.4(b)(6) for the proposed earth disturbances.

In locations where a riparian buffer waiver is requested, where forest riparian areas are converted to herbaceous cover, National Fuel will develop a replanting plan for the riparian forest buffer locations. Replanting will occur in the construction workspace outside of the 10-foot-wide permanently maintained corridor over the pipeline. Preliminary details related to the replanted species and planting specifications are outlined below. National Fuel will replant and stabilize all riparian buffers affected by the Project once construction is completed. National Fuel will implement erosion and sediment BMPs as outlined in the ESCAMP and the erosion and sediment control plans. The riparian areas at stream crossings within the 50-foot-wide permanent ROW will be reestablished by applying a native approved riparian seed mix, developed in conjunction with the agencies. The seed mix will be applied at a rate and density as directed by nursery specifications and recommendations.

Replanting in the riparian areas within the ROW will include stabilizing with the approved seed mix and incorporating a mix of native shrubs listed in Table 4.1 below. The selected shrub species were identified in vegetation plot data obtained during the wetland and waterbody delineations. The selected plant materials have been selected for compatibility with the landscape characteristics and blend with the surrounding and adjacent riparian areas.

Outside of the permanent ROW, and to edge of the construction workspace and within a regulated floodplain, National Fuel will reestablish the riparian buffer by planting trees and shrubs. Replanting of the riparian buffers includes a combination of native tree and shrub species selected for different hydrologic regimes and different vegetative cover types throughout the Project area. Trees and shrubs selected for replanting will be taken from the PADEP's Riparian Forest Buffer Guidance (Document Number 394-5600-001 PADEP 2010) and will also include species listed in field delineation plots and stream forms. The trees and shrubs selected for the Project are listed in Table 4.1. This is a short list of preferred plant species which will be modified upon final plan development. Plants will be either bare root, live stake, or containerized species.

Replanting methods will include monocultures consisting of three to six plants of the species in random clumps spaced approximately six to eight feet on center (o.c.) for shrubs, 10 feet o.c. for small tree species, and 12-14 feet o.c. for tree species. Planting spacing will follow industry specifications. Trees and shrubs will be planted at a density determined by evaluation of both aerial assessment and current data collected in the field. Typical planting details will be developed and provided in the final planting schedule.

Table 4.1: List of Preliminary Species for Replanting

	Species	Height (feet)/caliper	Wildlife Functions	Flood Tolerance
Shrubs/Small Trees				
	Mountain Laurel (*Kalmia latifolia*)	4 - 6	high value-browse and cover	intolerant
	Hornbeam (*Carpinus caroliniana*)	35	food source-buds, seeds, leaves	intolerant
	Flowering Dogwood (*Cornus florida*)	35	food source	intolerant
	Witchhazel (*Hamamelis virginiana)*		Toxic to some	intolerant
	Winterberry (Ilex verticillata)	4 - 7	food source	intolerant

	Species	Height (feet)/caliper	Wildlife Functions	Flood Tolerance
	Northern Arrowwood (*Viburnum recognitum)*	5-7	food source- fruit, flowers	tolerant
Trees				
	American beech (*Fagus grandifolia*)	75+/2-inch	food source- nuts	very intolerant
	Black birch (*Betula lenta*)	50+/2-inch	food source- buds, seeds, leaves	intolerant
	Red Maple (*Acer rubrum*)	75+/2-inch	food source and browse	tolerant
	Northern red oak (*Quercus rubra*)	75+/2-inch	nesting and food source- mast	medium tolerance
	Black willow (*Salix nigra*)	35 – 50/ 2-inch	food source- buds, fruit, twigs	very tolerant
	Elm (Ulmus spp.)	50 - 70+/ 2-inch	food source- seeds, twigs	tolerant

Source: Riparian Forest Buffer Guidance, Document Number 3945600-001

Planting Methods

All seeding will be applied and plantings installed according to acceptable standards of the trade under the supervision of a landscape professional. All seed and plant materials will be nursery grown and will be guaranteed to be true to name and healthy upon delivery.

Wildlife Damage Control

After planting is completed, appropriate tree and shrub shelters (i.e. fencing, plastic collars) will be installed. If necessary additional or alternative methods of wildlife damage control including the application of a rodenticide or installing bait boxes.

Invasive Species Management

National Fuel's ESCAMP specifies that National Fuel will consult with the appropriate agencies regarding invasive species and develop specific procedures in coordination with the appropriate agencies to prevent the introduction or spread of invasive specifies. National Fuel's Environmental Construction Plan will be followed in the riparian buffer replanting areas.

5 PCSM

Existing drainage patterns will be maintained by utilizing the existing contours and restoring any disturbed area to the existing condition or meadow in good condition or better to the maximum extent possible. The volume and rate of stormwater runoff from the Project area in the post-construction condition are not expected to exceed that of the existing condition.

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6 PCSM Best Management Practices

PCSM will be achieved through the use of waterbars to reduce runoff velocity and divert water off the permanent ROW. Permanent waterbars would be installed across the entire ROW, including at waterbody crossings and upslope of wetland boundaries. The site will be revegetated after earth-disturbing activities or any stage or phase of an activity is completed using seed mixes in accordance with Attachment 5 of the ESCAMP.

6.1 Permanent Waterbars

Earthen waterbars are specified on the E&SCP alignment sheets in hillside locations where it will be necessary to divert both upslope and disturbed area runoff to vegetated areas to help minimize accelerated erosion and sedimentation. A construction detail is provided on Drawing "SR DETAILS 001" (Figure 7). They are to be aligned such that runoff will be directed towards the downslope side of the disturbed area and avoid flowing back into the ROW.

Permanent waterbars within the ROW shall be left in place after permanent stabilization has been achieved. Waterbars will be removed from agricultural and residential areas. Maintenance of waterbars shall be provided until ROW has achieved permanent stabilization.

6.2 Revegetate Disturbed Areas with Native Species

After earth-disturbing activities or any stage or phase of an activity is completed, the site will immediately have topsoil restored, replaced, amended, seeded, and mulched or otherwise permanently stabilized and protected from accelerated erosion and sedimentation. A recommended soil pH modifier and fertilizer will be incorporated into the top 2 inches of soil as soon as practicable. A permanent seed mix will be used for permanent vegetative stabilization, and soil amendments, including lime and fertilizer, would be applied. Seed mixes specified on Attachment 5 of the ESCAMP will be used in accordance with recommendations for seed rates and dates. Mulch will also be used to stabilize the soil surface and would consist of weed-free straw or hay, erosion control fabric, or some functional equivalent, as approved by the Environmental Inspector and Chief Inspector. Revegetation of areas disturbed by Project-related activities will be monitored after seeding/planting to ensure success.

6.3 Sequence of Implementation or Installation

National Fuel will be responsible for the following earth disturbance activities for BMP installation:

- Following initial grading operations, permanent waterbars shall be installed on disturbed areas, as necessary, to prevent excessive erosion.
- Permanent waterbars shall be installed at the spacing shown in the table on the waterbar standard construction detail.
- Waterbars are required at all waterbody crossings and upslope from all wetland boundaries.
- The waterbar outlet shall be located where runoff will be released onto an existing well-vegetated area.

6.4 Operation and Maintenance

National Fuel will be responsible for the proper construction, stabilization, and maintenance of all erosion and sediment controls and post-construction stormwater management facilities which include the vegetated areas. National Fuel will inspect the vegetated areas for erosion, distressed vegetation, and bare ground.

General maintenance will include the regular removal of debris and litter to help prevent possible damage to vegetated areas. National Fuel will control the growth of woody vegetation by mowing and clearing as appropriate. Routine inspection and maintenance will allow proper function and operation of the BMPs.

National Fuel will perform the following monitoring and maintenance activities following construction:

- Establish and implement a program to monitor the success of restoration upon completion of construction and restoration activities;
- Conduct follow-up inspections of all disturbed areas, as necessary to determine the success of revegetation and address landowner concerns. At a minimum, conduct inspections after the first and second growing seasons;
- Revegetation in nonagricultural areas shall be considered successful if the vegetative cover is sufficient to prevent the erosion of soils on the disturbed ROW and density and cover are similar to that in adjacent undisturbed area. Sufficient coverage in upland areas is defined when vegetation has a uniform 70 percent vegetative coverage. In agricultural areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise. Revegetation efforts (such as fertilizing or reseeding) will continue until revegetation is successful;
- Restoration shall be considered successful if the ROW surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless otherwise approved by the land owner or land managing agency), revegetation is successful, and proper drainage has been restored;
- Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is successful;
- Make efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, throughout the life of the Project. Maintain signs, gates, and permanent access roads as necessary;
- Monitor and record the success of wetland revegetation annually until wetland revegetation is successful. Wetland revegetation will be considered successful if all of the following criteria are satisfied: the affected wetland satisfies the current federal definition for a wetland (i.e., soils, hydrology, and vegetation); Vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction; if natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.
- For any wetland where vegetation is not successful at the end of 3 years after construction, National Fuel shall develop and implement (in consultation with a professional wetland ecologist) a plan to actively revegetate the wetland with native wetland herbaceous and woody plant species;

- Inspect all temporary remaining erosion and sedimentation controls during routine patrols to ensure proper functioning. Any deficiencies found will be reported and corrected as needed. Once the area has revegetated and stabilized, the erosion controls will be removed.
- Maintain written inspection reports documenting site inspections and BMP repair and maintenance activities.

6.4.1 Routine Right-of-Way Maintenance

The following requirements restrict the amount of routine vegetation mowing or clearing that can occur on new pipeline facilities. Where the newly established pipeline ROW is located on other existing ROWs not affiliated with National Fuel the easement holder or owner will continue to maintain their ROWs using procedures specified in their vegetative management programs.

6.4.1.1 Uplands

Routine maintenance of the ROW is required to allow continued access for routine pipeline patrols, maintaining access in the event of emergency repairs, and visibility during aerial patrols. In upland areas, maintenance of the ROW will involve clearing the entire ROW of woody vegetation.

- Routine vegetation mowing or clearing over a 50-foot wide corridor centered on the pipeline of the permanent ROW in uplands shall be conducted no more frequently than once every three years. However, to facilitate periodic corrosion and leak surveys, a 10-foot wide corridor centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot wide corridor in an herbaceous state.
- In no case shall routine vegetation mowing or clearing occur during the migratory bird nesting season between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency or the USFWS.

6.4.1.2 Waterbodies and Wetlands

Refer to Sections 9.1.1 and 9.1.2 of the ESCAMP for waterbody and wetland post-construction maintenance activities.

6.5 Recycling and Disposal of Materials

Building materials and other construction site wastes must be properly managed and disposed of to reduce potential for pollution to surface and ground waters as per 25 PA Code § 102.4(b)(5)(xi). All building materials and wastes shall be removed from the site and recycled or disposed of in accordance with PADEP's Solid Waste Management Regulations at 25 PA Code 260.1 et seq., 271.1 and 287.1 et. seq. No building materials, wastes, or unused building materials shall be burned, buried, dumped, or discharged at the site. No off-site disposal area has been identified as part of this application. Construction waste will be disposed of properly by the Contractor at a state-approved facility or recycled.

The Contractor will develop and implement procedures which will detail the proper measures for disposal and recycling of materials associated with or from the Project site in accordance with PADEP regulations. Construction wastes include, but are not limited to, excess soil materials, building materials, concrete wash water, and sanitary wastes that could adversely impact water quality. The Contractor will inspect the Project area weekly and properly dispose of all construction wastes. Measures will be planned and implemented for housekeeping materials management and litter control. Wherever possible, re-useable wastes will be segregated from other waste and stored separately for recycling.

The Contractor shall be responsible for implementing the ESCAMP for any borrow or waste areas required to complete the work. Disposal locations for excess soil/rock waste will have appropriate BMPs implemented at the waste site. The disposal locations must be verified with the applicable state department to show compliance with wetland and floodplain regulations. If an off-site location is used for borrow or disposal, the contractor is responsible for developing site-specific E&SC drawings, implementing the ESCAMP and submitting the E&SC drawings to PADEP or the applicable County Conservation District for review and approval. The Contractor must immediately stabilize the waste site upon completion of any stage or phase of earth disturbance activity at the waste site

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7 PCSM Implementation for Special Protection Waters

7.1 Non-Discharge Alternatives

The approximate original contours of the workspace will be maintained and/or restored to their original condition following construction, and disturbed areas will be re-vegetated or restored with pervious material. Existing drainage patterns will be maintained, and the volume and rate of stormwater runoff from the Project area in the post-construction condition is not expected to exceed that of the existing condition.

7.2 Antidegradation Best Available Combination of Technologies (ABACT)

As demonstrated in the previous section, non-discharge alternatives do not exist for the proposed Project. Environmentally sound and cost-effective ABACT BMPs will be utilized to demonstrate that any change in PA stormwater runoff rate, volume, or quality will maintain and protect the existing quality and water uses of receiving surface waters and preserve existing baseflow. The support drawings of this application package show the locations of all planned ABACT BMPs and details for construction of these facilities. The following is a summary of the combination of ABACT BMPs that have been incorporated into the site design and the features that make them ABACT:

7.2.1 Site Access

- 100-foot long Rock Construction Entrance(s)

7.2.2 Sediment Barriers

- Compost filter socks will be utilized for all perimeter control needs.

7.2.3 Stabilization

- Disturbed areas immediately stabilized upon completion, or temporary cessation, of earth disturbance activity.
- Disturbed areas stabilized with erosion control blanket within 100 feet of special protection surface waters, within 50 feet of all other receiving surface waters, and on slopes 3H:1V or steeper.

7.3 Pennsylvania Stormwater Best Management Practices Manual

After the proposed pipeline construction activities are complete, the pipeline ROW and areas of temporary disturbance will be restored to pre-construction conditions or to a condition of meadow in good condition, or better. There will be no net change in volume and rate of stormwater from preconstruction to post construction for the Project.

8 Thermal Impacts

On this Project, the principal source of thermal impacts would be related to disturbance of vegetative cover. The following provisions are included in the E&SCP application to avoid, minimize, or mitigate potential pollution from thermal impacts:

- Section 5 of the ESCAMP requires minimal disturbance within 50 feet of streams.
- Section 5 of the ESCAMP limits ROW width and vegetation removal through wetlands.
- Section 8 of the ESCAMP provides revegetation requirements.
- Section 9 of the ESAMP limits routine vegetation mowing or clearing.

The permanent pipeline ROW may be mowed periodically, and woody vegetation may be trimmed to allow safe pipeline operation. Some tree cover may be permanently removed in wooded areas. A 10-foot wide area will be maintained in an herbaceous state in wetland areas to comply with vegetative maintenance plan approved by FERC and the USDOT, Pipeline Hazardous Materials and Safety Administration (PHMSA) survey requirements.