DEWATERING SOLUTIONS: RESPONDING TO CHANGING EXPECTATIONS

IPLOCA ENVIRONMENTAL AWARD: WATER USAGE & PRESERVATION

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BUSINESS PROFILE

Precision Pipeline, LLC, (PPL) was founded in 2004 in Eau Claire, Wisconsin, by Steve Rooney and Dan Murphy. In 2009, PPL joined the MasTec, Inc., group of infrastructure companies to be its premier union oil and gas service line. A consistent leader in the infrastructure industry, PPL specializes in mainline cross-country pipeline, pipeline looping, laterals, rehabilitation and station construction, and has built a strong reputation across much of the United States by completing signature pipeline construction projects in difficult terrain.

Led by industry experts committed to bringing innovation to every project, our process evaluation determines the most efficient and cost-effective construction techniques that will produce a quality product on time and within budget. Our Quality Management System is certified to ISO 9001:2015 and pertains to processes relating to the management of construction and maintenance of pipelines, and related facilities. This system is based upon our core business beliefs: customer focus, process approach and risk-based thinking. PPL works to ensure a quality product is delivered while providing clients with the best construction solutions that also maintain a focus on health, safety and environment.

Project Overview

This case study uses examples from a large linear pipeline replacement project traversing more than 200 miles. This highly-scrutinized project had many unique challenges, including stringent permit conditions; seasonality & all-season construction through inclement weather and extreme cold; undulating terrain that crossed multiple jurisdictions; and varying soil strengths throughout wetlands and waterbodies. Due to the environmental challenges of this project and the environmentally sensitive construction locations, both winter (frozen) and summer construction techniques were used, in conjunction with other construction methods.

FINDINGS & SOLUTIONS

Preconstruction planning included a complete review of the project's terrain with additional attention given the sensitive wetland and waterbody areas. The site conditions play a key role in deciding what construction activities to perform at every location and what time of year they would be completed.

Notable Site Conditions:

- Expansive Wetlands
- Limited Access
- Highly Sensitive Water Crossings
- Ranging Soil Strata
- Changing Subsurface Conditions
- Water Infiltration
- Varying Water Table Depths

Winter Construction

Significant mileage was selected for winter construction through primarily sensitive and saturated wetlands with difficult access. This construction plan utilized frost driving and constructing through frozen ground to minimize wetland impacts. Since driving frost is done in the coldest months of the year and continues daily throughout the night during the coldest part of the day, the original permitting did not anticipate construction trench dewatering in frozen conditions. Early thaws created a need to dewater even though the ground was still frozen, challenging the conventional methods.

In conventional dewatering methods performed through well-vegetated upland areas, water can be directed through a geotextile filter bag and filtered through vegetated areas until natural infiltration occurs, to achieve water quality standards. In frozen or saturated conditions, infiltration is limited, and water flows a greater distance. PPL was required to respond to changing water discharge criteria regarding "nuisance" conditions. Conventional structures were installed, reinforced and supplemented with additional best management practices. Additionally, interim freeze/thaw conditions triggered continuous improvement.

Discharge In Frozen or Saturated Conditions

Infiltration is key to meet turbid water criteria. In frozen or saturated conditions, infiltration is limited, and water flows a greater distance. PPL was required to respond to changing water discharge criteria regarding nuisance conditions. Conventional structures were installed, reinforced and supplemented with additional best management practices but interim freeze/thaw conditions required continuous improvement.

To minimize impacts in these conditions, PPL monitored the water flow path and ensured it would not impact any waterbody, directly or indirectly. PPL also monitored the water conditions as turbid water flowing over or under snow was considered a nuisance condition. Additionally, off worksite monitoring was required and needed to ensure the flow was clean as it entered any adjacent wetlands or waterbodies. Adding to the challenges was, even though water was clean leaving worksite, it was not meeting expectations if sediment was picked up off-worksite.

Continuous Change

One of the biggest challenges of this project was continuous change to the interpretations for water quality and the addition of new requirements. Originally, wastes were to be discharged from either point or nonpoint sources into any waters of the state so as not to cause any **nuisance conditions**, but the water quality interpretations and requirements changed over the course of the project and nuisance conditions changed to require a nearly clear qualitative standard.

Pre-Identification of All Dewatering Locations

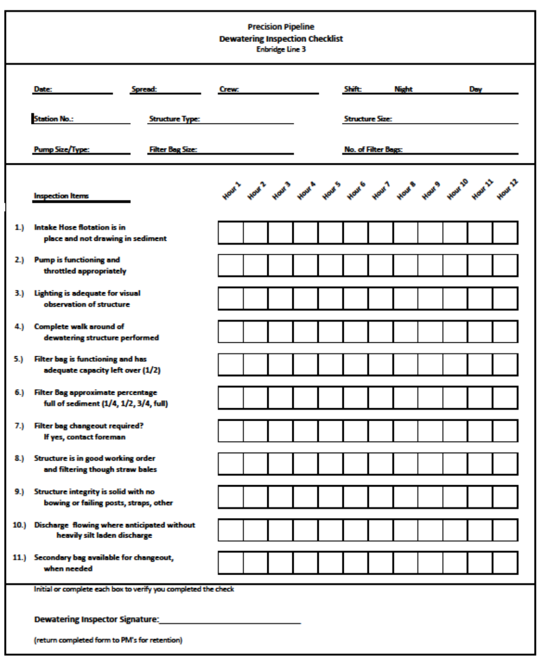
This continual change then required updates to the initial project plan and additional dewatering measures were required. All dewatering locations were required to be pre-identified on plan drawings using a consultant desktop survey. This exercise often led to structures being identified in less-than-optimal locations, and field adjustments and enhancements were often required.

Site Monitoring

Other measures implemented to solve concerns over increasing requirements included continuous monitoring of all discharge sites. It was determined that all dewatering activities must be continuously monitored for compliance with water quality standards. If the filtration system failed to adequately treat the discharge, the discharge must be stopped and alternative or supplemental filtration must be employed. Portable treatment systems had to be available on-site should the existing system fail.

In order to document the increased efforts to remain in compliance, a Dewatering Inspection Checklist was developed. This form indicated the hourly monitoring of the worksite and required a signature of the Dewatering Inspector. Inspections were continuously monitored in accordance with the following:

1. Intake hose flotation is in place and not drawing sediment
2. Pump is functioning and throttled appropriately
3. Lighting is adequate for visual observation of structure
4. Complete walk around of dewatering structure performed
5. Filter bag is functioning and has adequate capacity left over (½)
6. Filter bag approximate percentage full of sediment (¼, ½, ¾, Full)
7. Filter bag changeout required? If yes, contact foreman
8. Structure is in good work order and filtering through straw bales
9. Structure integrity is solid with no bowing or failing posts, straps, other
10. Discharge flowing where anticipated without heavily silt laden discharge
11. Secondary bag available for changeout, when needed



Precision Pipeline
Dewatering Inspection Checklist
Enbridge Line 3

Date: ______ Spread: ______ Crew: ______ Shift: Night ______ Day ______

Station No.: ______ Structure Type: ______ Structure Size: ______

Pump Size/Type: ______ Filter Bag Size: ______ No. of Filter Bags: ______

Inspection Items	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12
1.) Intake Hose flotation is in place and not drawing in sediment												
2.) Pump is functioning and throttled appropriately												
3.) Lighting is adequate for visual observation of structure												
4.) Complete walk around of dewatering structure performed												
5.) Filter bag is functioning and has adequate capacity left over (1/2)												
6.) Filter Bag approximate percentage full of sediment (1/4, 1/2, 3/4, full)												
7.) Filter bag changeout required? If yes, contact foreman												
8.) Structure is in good working order and filtering though straw bales												
9.) Structure integrity is solid with no bowing or failing posts, straps, other												
10.) Discharge flowing where anticipated without heavily silt laden discharge												
11.) Secondary bag available for changeout, when needed												

Initial or complete each box to verify you completed the check

Dewatering Inspector Signature:______________________

(return completed form to PM's for retention)

Reliance on conventional filtering structures designed for use at a single location were not efficient nor were they able to meet changing objectives. There was also a risk of structure failure compliance issues if weak posts are used, if posts are not driven deep enough into the ground and on terrain that is not level. Conventional structures also risked failure if crews attempt to dewater too quickly, overwhelming them with a high flow rate of water.

Ultimately, these changes required more flexible in-field solutions to maintain compliance. This included implementing additional procedures for supplemental dewatering, such as if the filtration system fails to adequately treat the discharge, STOP the discharge and implement alternative or supplemental filtration.

Sediment Filtration Solution

In conjunction with increased best management practices and additional documentation, PPL's newly developed and patented ROWD (Right-of-Way Dewatering) mobile dewatering sleds were approved and utilized as a tool and critical sediment filtration solution.

The ROWD sled eliminates the issues of conventional filtering structures, focusing on environmental compliance, cost and efficiency. Assembly of the mobile dewatering structure takes fewer crew members than standard straw bale structures and can be accomplished in the yard to minimize impact on the worksite. The ROWD sled is quick and easy to mobilize, eliminating the many setups and teardowns of conventional straw bale structures and freeing environmental crews for other environmental work. The ROWD sled design and solid steel frame provides a properly built structure in even the most challenging locations. It is easily leveled on uneven ground, used on timber mats where conventional structures can't be built and even used on frozen ground where conventional structure stakes can't be driven. The advantages of a ROWD sled make it a logical, economical dewatering equipment choice for any project.

1. ***The ROWD sled eliminates the assembly of conventional dewatering structures, which can be set up improperly.*** A conventional dewatering structure is built of straw bales and wooden posts, assembled on-site and intended to be used only at that site. Conventional dewatering structures will fail if an insufficient amount or posts are used, if weak posts are used or if the posts are not driven deep enough into the ground due to frozen terrain, laziness, rocks or mats. With a sturdy steel frame, the ROWD sled eliminates these potential failures. Once set up, the filter material is locked between the concentric rectangles, preventing it from shifting.

2. ***The ROWD sled can be set in place with minimal ground disturbance.*** Transferring materials and assembly of a conventional dewatering structure takes equipment or multiple trips by several employees to the dewatering location. The ROWD sled is easily assembled in the yard and loaded with straw bales and a filter bag prior to use. The ROWD sled can then be moved to the dewatering location, arriving ready to use.

3. ***The ROWD sled allows a properly built structure to be used in a not-so-perfect situation.*** For a dewatering structure to function properly, it needs to be positioned level. If not leveled, the water will flow to one side and cause the dewatering structure to fail, resulting in water overflow and low pumping volumes. A ROWD sled is able to be leveled due to the sturdy frame and solid steel construction. Dirt, logs, skids, construction timber mats, etc., can be used to quickly level the ROWD sled at any location.

4. ***The ROWD sled is designed for crews to easily move the structure for use over and over.*** Once dewatering is complete, the ROWD sled is easily disassembled and taken to a new location. This prevents structures from sitting for days, weeks or even months after dewatering is complete. This also cuts down on the number of conventional structures on a project.

5. ***The ROWD sled is designed to be used multiple times, in numerous locations.*** Typically, conventional dewatering structures are built for single-site use, often dewatering just one location. One crew may dewater multiple locations in a day requiring numerous conventional dewatering

structures. A ROWD sled allows a crew to move from one location to the next using the same structure, therefore reducing manpower, material and disposal cost.

ACHIEVEMENTS

Throughout the changing challenges of this project, our ability to adapt and implement additional processes to meet compliance requirements allowed us to complete the project successfully and meet restoration requirements.