Flambeau Mining Company
4700 Daybreak Parkway
South Jordan, UT 84095
801-204-2526

May 13, 2015

Mr. Phil Fauble
Wisconsin Department of Natural Resources
Division of Air & Waste
101 South Webster Street, GEF2
Madison, WI 53703

Dear Mr. Fauble:

RE: Flambeau Mining Company
Copper Park Business and Recreation Area Work Plan Supplement

The Flambeau Mining Company (Flambeau) is submitting the *Copper Park Business and Recreation Area Work Plan Supplement* (*Work Plan*). The *Work Plan* addresses surface water management at the site and is submitted under the authority of the Mine Permit.

Flambeau is submitting the following applications with the *Work Plan* to facilitate activities:

1. Notice of Intent for Construction Activities;

2. Individual Water Resources Application for Project Permits (WRAPP) for an artificial waterway connected to a navigable waterway and stream bank stabilization;

3. General WRAPP for culvert replacement;

4. A general NR 353 permit for wetland conservation activities; and

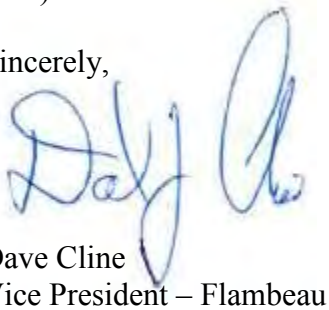
5. Wisconsin Department of Transportation Permit to Work on Highway Right-of-Way.

Flambeau requests that a public hearing be held regarding the individual Chapter 30 permits.

Flambeau is submitting the Individual WRAPP out of an excess of caution. With regard to the WRAPP, Flambeau objects to the Department's jurisdiction as it does not consider Intermittent Stream C to be navigable in the area that the activities are taking place.

If you have any comments or questions regarding this submittal, please contact me at (801) 204-2526 or dave.cline@riotinto.com.

Sincerely,



Dave Cline
Vice President – Flambeau Mining Company

Attachment

cc: Lynn Hudasek, Wisconsin Department of Natural Resources
Kyle McLaughlin, Wisconsin Department of Natural Resources
Brad Johnson, Wisconsin Department of Natural Resources
Randy Tatur, Rusk County Board of Supervisors
Tom Riegel, Town of Grant
Al Christianson, City of Ladysmith
CeCe Tesky, Rusk County Zoning
Steve Donohue, Foth
Henry Handzel, Jr., Esq.
Timm Speerschneider, Esq.
Laura Gauger, c/o James N. Saul, Esq. (certified mail)
Al Gedicks (certified mail)
Attorney Cheryl Heilman, Wisconsin Department of Natural Resources (certified mail)
Lac Courte Oreilles Band of Lake Superior Chippewa Indians, c/o Mr. Dennis Grzezinski (certified mail)
Dave Blouin, Sierra Club (certified mail)
Robert Ringstad, Rusk County Citizens Action Group (certified mail)
Tom Wilson, Northern Thunder (certified mail)
WI Resources Protection Council, c/o James N. Saul, Esq. (certified mail)

Plan

Copper Park Business and Recreation Area Work Plan Supplement

Reclaimed Flambeau Mine

Project I.D.: 14F779

Flambeau Mining Company
Ladysmith, Wisconsin

May 2015

Foth

Flambeau Reclaimed
promises made, promises kept

Green Bay Location

2121 Innovation Court, Suite 300
P.O. Box 5126 • De Pere, WI 54115-5126
(920) 497-2500 • Fax: (920) 497-8516
www.foth.com

May 13, 2015

Mr. Dave Cline
Flambeau Mining Company
4700 Daybreak Parkway
South Jordan, UT 84095

Dear Mr. Cline:

RE: Copper Park Business and Recreation Area Work Plan Supplement

Foth Infrastructure & Environment, LLC (Foth) is pleased to present the following *Copper Park Business and Recreation Area Work Plan Supplement* (*Work Plan*) for the Reclaimed Flambeau Mine located in Ladysmith, Wisconsin.

A conceptual design has been developed which involves several interrelated components related to the overall surface water management within the Copper Park Business and Recreation Area.

Flambeau is submitting the following applications with the *Work Plan* to facilitate activities:

1. Notice of Intent for Construction Activities;
2. Individual Water Resources Application for Project Permits (WRAPP) for an artificial waterway connected to a navigable waterway and stream bank stabilization;
3. General WRAPP for culvert replacement;
4. A general NR 353 permit for wetland conservation activities; and
5. Wisconsin Department of Transportation Permit to Work on Highway Right-of-Way.

If you have any questions regarding this report, please contact us at (920) 497-2500.

Sincerely,

Foth Infrastructure & Environment, LLC

Rich Schowengerdt
Principal Engineer/Principal Hydrogeologist

Sharon Kozicki, P.G., C.E.M.
Lead Geologist

cc: Steve Donohue, Foth Infrastructure & Environment, LLC

Copper Park Business and Recreation Area Work Plan Supplement

Distribution

No. of Copies	Sent To
3	Mr. Dave Cline Flambeau Mining Company 4700 Daybreak Parkway South Jordan, UT 84095

Copper Park Business and Recreation Area Work Plan Supplement

Project ID: 14F779

Prepared for

Flambeau Mining Company

Ladysmith, Wisconsin

Prepared by

Foth Infrastructure & Environment, LLC

May 2015

2121 Innovation Court, Ste. 300 • PO Box 5126 • De Pere, WI 54115-5126 • (920) 497-2500 • Fax: (920) 497-8516 • www.foth.com

Copper Park Business and Recreation Area Work Plan Supplement

Contents

Figures

Appendices

List of Abbreviations, Acronyms, and Symbols

AES	Applied Ecological Services, Inc.
BMPs	Best Management Practices
COC	Certification of Completion
CPL	Copper Park Lane
Flambeau	Flambeau Mining Company
Foth	Foth Infrastructure & Environment, LLC
HDPE	high density polyethylene
NOC	Notice of Completion
NOI	Notice of Intent
P.E.	Professional Engineer
RCCP	reinforced concrete culvert pipe
SSEA	shallow soil excavation area
WAMS	Web Access Management System
WDNR	Wisconsin Department of Natural Resources
WDOT	Wisconsin Department of Transportation
Wis. Admin. Code	Wisconsin Administrative Code
Work Plan	*Copper Park Business and Recreation Area Work Plan Supplement*
WRAPP	Water Resources Application for Project Permits

1 Introduction

Foth Infrastructure & Environment, LLC (Foth) has prepared the *Copper Park Business and Recreation Area Work Plan Supplement* (*Work Plan*) for the Reclaimed Flambeau Mine at the request of Flambeau Mining Company (Flambeau). Applied Ecological Services, Inc. (AES) was contracted to develop a comprehensive landscape design and planting plan for the *Work Plan*.

On January 14, 1991, after an exhaustive permitting process including extensive opportunity for public input, Flambeau received 11 permits from the Wisconsin Department of Natural Resources (WDNR) to operate an open pit copper mine in Rusk County, Wisconsin. Flambeau operated the open pit copper mine between 1993 and 1997. The location of the reclaimed mine is shown on Figure 1-1. Over the life of the mine, 181,000 tons of copper, 3.3 million ounces of silver, and 334,000 ounces of gold were mined.

Backfilling of the open pit began in earnest in early 1997 and in 1998 surface reclamation began. Reclamation activities started in 1998 included seeding, plug planting, tree planting, erosion control, mowing, invasive species control, trail construction, and prescribed burning. During 2001, Flambeau completed the planting plan and submitted the Notice of Completion (NOC) to the WDNR. Concurrent with the submittal of the NOC, the reclaimed Flambeau Mine nature trails were opened to the public for non-motorized recreational activities. The city of Ladysmith had partnered with Flambeau to develop the four-mile nature trail system. In 2005, the Equestrian Trailhead and driveway were constructed in the Copper Park Business and Recreation Area (a.k.a. the Industrial Outlot).

During 2007, Flambeau petitioned the WDNR for Certificate of Completion (COC). The COC process included a preconference hearing, public hearing and contested case hearing. At the contested case hearing, the parties negotiated an agreement and entered into a stipulation which was subsequently accepted by the administrative law judge and resulted in a signed order. The order granted a COC to Flambeau for 149 acres of the Flambeau Mine site that includes the backfilled pit but did not include the 32-acre area known as the Industrial Outlot. These areas are shown on Figure 1-2.

During 2008 and 2009, Flambeau completed extensive monitoring as required by the 2007 COC stipulation and also conducted supplemental monitoring on a voluntary basis. The 2008-2010 monitoring that has been completed documents that the Flambeau River remains fully protected and Flambeau maintains compliance with its permits.

In 2011, Flambeau submitted the Copper Park Business and Recreation Area Work Plan which proposed an alternative surface water management approach with construction elements. This work was completed in 2012. Site conditions and rising water tables have proven the infiltration basins to be ineffective at capturing and infiltrating spring snowmelt runoff and periods of significant rainfall events. This *Work Plan* has been prepared to address these issues. This *Work Plan* has been prepared to address the performance.

The proposed work described in this Plan focuses on the Industrial Outlot (Project Area). Wetlands, soil types, and floodplains are presented for reference on Figures 1-3.

1.1 Purpose

The purpose of the *Work Plan* is to modify and enhance the current surface water control features associated with the Industrial Outlot in accordance with applicable Best Management Practices (BMP), professionally accepted practices, and complying with applicable WDNR requirements.

Specific goals associated with the proposed surface water management actions include:

Goal #1 Modify the existing infiltration basins (originally intended to infiltrate runoff) to a flow-through wetlands system which directs surface water flow to the existing Wetland #7 area and associated drainage system.

Goal #2 Through general design features and BMPs, route the surface water flows to and through Wetland #7 and out of the Industrial Outlot in a manner which preserves approximate pre-mining hydrologic characteristics and system stability.

Goal #3 Create new wetlands within the Industrial Outlot to be functional and visually pleasing in concert with the existing wetland areas.

Goal #4 Conduct all permitting, design, and construction activities to be substantially completed in 2015.

1.2 Scope of Work

A conceptual design has been developed which involves several interrelated components including:

- Conversion of the West Basin and West-to-East Ditch to a wetland area connected to the former East Basin area.
- Conversion of the North Basin into a wetland area.
- Conversion of the East Basin into wetland area flowing to Wetland #7.
- Cleaning the entrance/exit and re-establishing uniform entrance/exit of the STH 27 culvert which flows into the Industrial Outlot.
- Replacement of the existing Copper Park Lane (CPL) culvert and re-grading the entrance/exit channels.
- Selected grading, cutting, filling, and removal/disposal of shallow soils.

- Conduct general restoration activities in the existing Wetland #7 (re-establishment of native wetlands species).

1.3 Schedule

Construction activities to achieve the grading and wetland creation are scheduled to occur during the third and fourth quarters of 2015 with seeding to occur during the fourth quarter.

1.4 Report Organization

Appendix A	Site Grading Plan - 2015
Appendix B	Surface Water Management and Erosion Control Plan
Appendix C	Landscape Design and Planting Plan
Appendix D	Dewatering Plan
Appendix E	Site Soil Test Results

In addition, WDNR permit application documents are provided in the appendices as follows:

Appendix F	Water Resources Application for Project Permits (Includes Individual Chapter 30 Permit Application)
Appendix G	Wisconsin Department of Transportation Application to Work on Highway Right-of-Way

2 Background Information

The following section provides a summary of the site history and a description of the *Work Plan* elements.

2.1 Work Plan Project Area History

The Project Area is currently used as a business park and recreation area and is known as the Industrial Outlot. This title is a misnomer as the area has never supported any actual industrial activities. Since 2009, the area has also been referred to as the Copper Park Business and Recreation Area.

During mining activities many of the supporting mining facilities; including the mine administration offices, laboratory, wastewater treatment facilities as well as ancillary services; including a run-off pond, a surge pond, septic drain field, storage areas, truck ready line, and parking areas were located within the *Work Plan* Project Area.

Upon mine closure most of the building structures were left in place. The wastewater treatment plant was eventually renovated and currently houses Xcel Energy's line maintenance shop and storage area for the WDNR, the former administration building and laboratory were renovated and are now occupied by the Ladysmith WDNR Service Center, the truck ready line was removed, the run-off pond was removed, and the surge pond was converted into the former 0.9-acre Biofilter to reduce suspended solids and other contaminants resulting from precipitation. In 2000, another building was constructed in the project area between the Service Center and former water treatment plant to house additional equipment for the Service Center.

In 2005, a portion of the former Industrial Outlot was converted into a driveway access and Equestrian Trailhead to be utilized for recreational purposes as an access way to non-motorized trails that have been developed on property owned by Flambeau.

In 2011 and 2012, a series of infiltration basis were installed per the *Copper Park Business and Recreational Area Work Plan* (Foth, 2011). The work described in this *Work Plan* will modify the infiltration basins into wetland areas and allow for surface water run-off from the Industrial Outlot to Wetland #7. The current site layout is presented on Figure 2-1.

2.2 Description of Key Project Elements

As presented above, the scope of work includes elements related to improving overall surface water flow within the Industrial Outlot.

The proposed actions for the cleaning the culvert consist of:

- Surveying the inlet and outlet controls and channels to determine grading requirements to provide inlet and outlet control to avoid the deposition of sediment within the culvert.
- Re-grade inlet and outlet approaches to facilitate runoff water flow.

- Add erosion control components as necessary to maintain the restored channels.

- Flush and remove the sediment trapped in and adjacent to the culvert.

Surveying the inlet and outlet controls and channels will precede the re-grading activities to design the appropriate channel slope to facilitate runoff water flow. The re-graded channels will be covered with a geo-fabric (mesh or non-woven fabric) and compacted with a sized washed stone on top of the fabric to maintain the channels integrity. After completion of the construction activities, the culvert will be flushed using high pressured water to flush residual sediment and any re-grading sediment from within the culvert.

The culvert will be flushed in a direction to maintain the design flow of the culvert. A vacuum truck will be located at the outlet to collect and remove the sediment trapped in the culvert. A silt fence and staked hay bales will be installed a few feet beyond the outlet to contain any sediment and water until the vacuum truck will be used to collect sediment and water.

STH 27 culvert, installed in 1948, was constructed out of reinforced concrete culvert pipe (RCCP) and is approximately 36 inches in height and 68 feet in length as identified from the Wisconsin Department of Transportation (WDOT) as-built. Figure 2-2 illustrates the culvert details and proposed construction design. The culvert will be flushed in an east-west direction using the procedures discussed in Section 2.2.1. In addition, the south-north culvert under the former rail spur will also be flushed to improve surface water drainage.

The CPL culvert was originally constructed from corrugated metal and is approximately 48 inches in height and 100 feet in length. The metal culvert has corroded and will be replaced with a high density polyethylene (HDPE) culvert pipe to the approximate existing inlet and outlet elevations to facilitate designed flow through the culvert. Figure 2-3 illustrates the current culvert layout and proposed construction design.

The culvert will be replaced using an excavator to remove the current fill material above and below the existing culvert. Materials removed during the excavation activities will be disposed of properly. Clean fill will replace excavated soil below the culvert to maintain the appropriate grade height before the HDPE culvert is installed. Clean fill will be placed and compacted around and above the culvert to designed elevations before asphalt patch is placed on the roadway. Silt fences and staked hay bales will be installed immediately downstream of the construction activities. Two additional culverts on the north and south sides of Copper Park Lane will also be cleaned to improve surface water flow. These are shown on Figure 2-3.

The inlet and outlet approaches will be graded and the culvert will be cleaned using the procedures discussed below.

Proposed changes to the surface water management plan involve re-shaping the floors of the three existing infiltration basins and adding vegetation to convert the basin interiors to wetland areas, re-grading the existing west-to-east ditch north of the parking lot so the entire ditch flows

east, and constructing an overflow structure on the east edge of the new wetland area. The post-construction *Work Plan* is shown on Figure 2-4.

The West Basin will be re-graded to a floor elevation of approximately 1,142.0 feet, and will include three shallow pools with floor elevations of approximately 1,140.0 feet. This area will outlet via the drainage ditch north of the asphalted area, which will be re-graded to flow east. The drainage ditch will flow to the east wetland system via a culvert under the access road to the Equestrian Trailhead. The existing 18-inch culvert will be replaced with a 24-inch culvert, and the invert will be lowered to 1,141.0 feet.

The North Basin will be re-graded to an elevation of approximately 1,138.5 feet, and will include three shallow pools with floor elevations of varying between 1,136.0 – 1,137.0 feet. The basin will flow south via an approximately 8-foot-wide earthen weir and channel. The overflow elevation of the channel in this area will be approximately 1,137.5 feet.

The East Basin will be re-graded to a floor elevation of approximately 1,138.0 feet, and will include three shallow pools with floor elevations of approximately 1,136.0 feet. The pools will be connected by a ditch with a bottom width of approximately 8 feet, and with a bottom elevation varying between 1,136.5 – 1,137.5 feet. Surface water will flow toward Wetland #7 via a multi-stage earthen weir. The weir invert will be a channel approximately 8-feet-wide with an elevation of approximately 1,137.5 feet. The second weir stage will be at an elevation of approximately 1,138.0 feet, and will be approximately 75-feet-wide. Surface water will flow toward Wetland #7 and ultimately to the culvert under CPL.

In conjunction with the culvert cleanout and replacement and the other site activities, Flambeau will remove the existing topsoil and subgrade material to an approximate depth of 6 inches in selected areas shown on Figure 2-5. Additional information on these activities is provided in Appendices B, C, and E. Appendix E contains soil results from the proposed shallow soil excavation areas (SSEA). A table summarizing the soil results within the SSEAs is included as Table E-1 and a figure showing the sample locations is provided as Figure E-1. Seventeen areas will be excavated totaling approximately 42,600 square feet, which approximately 900 square feet will be in wetland.

The excavation and loading will be performed by standard excavation and loading equipment such as a backhoe, front-end loader or bull dozer. The excavated material will be taken to an approved landfill for disposal or for beneficial re-use at the landfill.

Prior to excavation activities erosion control measures will be initiated as presented in Appendix B.

Clean, well-graded gravel and/or topsoil will be placed in the ditches to re-establish the subgrade elevations. Clean, hydric soils, carbonate rock fines, or topsoil will be used as needed to re-establish the subgrade elevation in the wetland areas. Clean topsoil from the topsoil stockpile on-site or carbonate rock fines will be used to re-establish the subgrade elevation in the upland

areas south of the Equestrian Trailhead area. Clean, hydric soils will be used to re-establish the subgrade elevation in the wetland areas.

The areas will be seeded and covered with appropriate erosion control matting. The seeding to be used will consistent with the landscape and planting plan presented in Appendix C.

2.3 Regulatory Background

The project elements described in Section 2.2 involve work within or adjacent to what some consider navigable waterways and Flambeau has requested that permit applications be prepared as required under Wisconsin Statute NR 310 Wisconsin regulations out of an excess of caution. With regard to the Water Resources Applications for Project Permits (WRAPP), Flambeau objects to the WDNR's jurisdiction as it does not consider Stream C to be navigable north of CPL in the area North of CPL where most of the work will take place. The WRAPP, Notice of Intent (NOI), and wetland conservation forms are provided in Appendix F and supporting documents are provided in Appendices A through D.

The following permits are being requested by submittal of this *Work Plan*:

- The *Work Plan* addresses surface water management at the site and is submitted under the authority of the Mining Permit.

- The work includes grading activities that are over one acre and a construction site surface water permit is being requested as part of this *Work Plan*. A NOI is included in Appendix F and will be submitted as required to the WDNR.

- The proposed project includes stream bank stabilization and creating artificial waterways adjacent to a waterway that is considered to be navigable by the WDNR. Therefore, Individual WRAPPs under Chapter 30.12(3m) and 30.19(4) Wisconsin Administrative Code (Wis. Admin. Code) were prepared. The Individual WRAPP form and supporting documents are provided in Appendix F.

- The proposed project includes replacing a culvert, placing riprap (under NR 328), and attendant grading activity within a waterway that is considered to be navigable by the WDNR. A general permit is being requested as part of the *Work Plan*. The general WRAPP form is included in Appendix F.

- The scope includes work in an area that is within the WDOT right-of-way. A WDOT permit to work in a right-of-way is included in Appendix G.

- Wetland conservation activities will occur as part of this project and a general permit is being requested from the WDNR.

There are no erosion control ordinances for the city of Ladysmith or Rusk County that apply to this project.

3 Completed Plans and Permit Applications

The following section summarizes the plans and permit applications that have been prepared for this *Work Plan*.

3.1 Site Grading Plan

The site grading plan is presented in Appendix A.

3.2 Erosion Control and Surface Water Management Plan

The Erosion Control and Surface Water Management Plan is located in Appendix B. More detailed information on the erosion control and surface water management during and after construction can be found in that plan. A summary of the plan is presented below.

3.2.1 Erosion Control

Construction site erosion control is required by ch. NR 216, Wis. Admin. Code for any construction site with greater than one acre of land disturbing construction activity. Ch. NR 216, Wis. Admin. Code also requires that a construction site discharge no more than five tons per acre per year, to the maximum extent practicable, of the sediment load carried in runoff from initial grading until final stabilization.

Proposed site construction activities involve re-shaping the floors of the three existing basins and adding vegetation to convert them to wetland areas, re-grading the ditch north of the parking lot so the entire ditch flows east, constructing an overflow structure on the east edge of the East wetland area, and performing various limited, shallow (< 6 inches) excavations. The post-construction site conditions are shown on Figure 2-4.

The potential for sediment loss due to construction activities is anticipated to be relatively low. Most of the grading work will take place within the areas of the existing West, North, and East Basins, and in the drainage ditch north of the Industrial Outlot parking lot. Runoff from most of the shallow excavations will also drain to the new wetland areas. The overflow weir to Wetland #7 will occur during the final phase in the construction sequence. Therefore, runoff during most of the construction is expected to be contained.

The five tons per acre per year standard is achieved by applying a combination of BMPs in compliance with their respective WDNR Technical Standards. Proposed erosion control during construction activity BMPs include the installation of stone tracking pads at construction site entrances, installation of silt fence adjacent to Wetland #7 and the shallow excavations along CPL and Highway 27, temporary ditch checks, and seeding, fertilizing, and mulching and is detailed in Appendix B.

3.2.2 Surface Water Management

The proposed project is exempt from the post-construction storm water management requirements under ch. NR 151.12(2)(c): "A redevelopment post-construction site with no

increase in exposed parking lots or roads." The proposed work will not result in an increase in the impervious area at the site, and therefore, will not increase the existing peak runoff rates.

The proposed plan will also not alter the watershed drainage in any way, other than re-grading the existing ditch north of the parking lot to flow east, and creating overflow weirs. The net result routes a portion of the runoff previously infiltrated, evaporated, or re-routed to other closed basins within the reclaimed mine site to the CPL culvert.

The proposed surface water plan involves the conversion of the three existing surface water infiltration basins into wetland areas. The new wetland areas will collect and temporarily store runoff from the 21.8-acre former Industrial Outlot, and from the 10.1-acre watershed immediately west of Highway 27. The proposed surface water plan will have largely the same watershed drainage currently existing at the site but will now drain into Wetland #7 Wetland rather than infiltrate/evaporate. Differences in the proposed plan relative to current conditions involve re-grading the existing ditch north of the parking lot to flow east, and creating overflow weirs through the new wetland areas.

The three constructed wetlands, existing drainage ditches and swales, and temporary storage in natural depressions within the watersheds will all serve as BMPs that will reduce total suspended solids loading. The greatest potential source of sediment loading at the site is from the asphalted parking lot. However, sediment removal from this area will be promoted by a number of BMPs in series, including the west wetland area, the 650-foot drainage ditch north of the lot, and the east wetland area.

Surface water runoff calculations were performed to verify that the proposed wetlands, drainage ditches, and culverts can safely pass design storm events under post-construction conditions. The BMPs will also serve to reduce peak flows, offer erosive velocity protection, and promote sediment removal. Design precipitation event modeling has shown that the proposed wetland areas have been designed to safely pass runoff from the 100-year, 24-hour storm event. Additionally, armoring and other applicable energy dissipation techniques will be installed at high-velocity flow locations to minimize scouring and erosion under post-construction conditions.

3.3 Landscape Design and Planting Plan

The landscape design and planting plan is included in Appendix C. Construction will consist of rough and final grading, followed by placement of topsoil (engineered soil and organic/mineral amendments in emergent areas) as needed. The engineered soil for the low flow (emergent areas) will consist of on-site stockpiled topsoil or topsoil excavated as part of the earth moving and basin construction mixed with organic compost (see soil preparation specification). Emergent areas will be over-excavated to a 6-inch depth with engineered soils placed in the emergent areas to achieve the desired final grades.

Due to anticipated construction schedule, native seed may need to be installed as a dormant seeding (after October 1). A cover crop will likely be required for that period when final grading is complete and dormant native seeding occurs. A cover crop of winter rye (*Secale cereale*)

applied at a rate of 30 pounds per acre will be installed on all bare soil areas. In emergent areas, an annual wet adapted cover crop grass, barnyard grass (*Echinochloa crusgalli*) applied at a rate of 32 ounces per acre shall be used.

3.4 Dewatering Plan

Dewatering will need to occur before the three surface water basins can be converted into the constructed wetlands. Water removed from the three surface water basins will be pumped to upland vegetated areas north of the former Industrial Outlot, as with previous basin dewatering activities. Details of the dewatering plan are included in Appendix D.

3.5 Water Resources Application for Project Permits

Included as part of this *Work Plan* is the WRAPP. The forms are included in Appendix F and will be submitted to the WDNR.

3.6 Wisconsin Department of Transportation Right-of-Way Permit Application

Highway 27 is owned by the WDOT. A permit application to work in the right-of-way has been prepared and is included for reference in Appendix G. This application will be submitted separately to the WDOT.

4 Documentation and Monitoring

4.1 Documentation

Work will be documented during construction activities. All construction activities will be overseen by a qualified construction observer who will document and coordinate activities including:

- Daily activity logs
- Photographic logs of activities
- Document general adherence to the *Work Plan*
- Coordinate site safety activities

Overall, work will be managed by a Professional Engineer (P.E.) who will ultimately be responsible for general adherence to the design plans.

Upon completion of the activities described in this plan, the work completed will be summarized in a Construction Documentation Report, which will be submitted to the WDNR within 90 days of project completion.

Since the proposed project is exempt from ch. NR 151, Wis. Admin. Code post-construction surface water management requirements under ch. NR 151.12(2)(d), a plan detailing the maintenance and inspection schedule of the surface water facilities is not required. County and local ordinances also do not require an operation and maintenance plan.

4.2 Surface Water Monitoring

Surface water monitoring will be conducted at two locations: SW-C9 and SW-C1. These locations are shown on Figure 2-4.

SW-C9: Is located west of Highway 27 near the culvert and is representative of surface water coming under Highway 27 from the east.

SW-C1: Is located south of Copper Park Lane and is representative of the water south of Copper Park Lane.

SW-C9 and SW-C1will be sampled twice a year for three years, once in the spring and once in the fall during a qualifying storm water runoff event. Sampling activities will begin the spring 2016 and conclude in the fall of 2019. A qualifying storm water runoff event will be determined by having visible surface water flow from the culvert under Highway 27 at SW-C9 and in the channel of Intermittent Stream C at SW-C1, which will trigger sampling.

Surface water collected from these locations shall be sent to a state-certified laboratory and analyzed for the following parameters:

- Total Hardness
- Total Copper
- Total Zinc
- Total Suspended Solids

Analytical results will be submitted to the WDNR twice per year after data is received from the laboratory and data has undergone quality checks.

5 References

Foth Infrastructure & Environment, LLC, 2011. *Copper Park Business and Recreational Area Work Plan*.

Figures

Flambeau Project Area

NOTES:
1. Topographic basemap from esri.
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).

LEGEND

Flambeau Project Area

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE: MAY '15
APPROVED BY:	SVF	DATE: MAY '15
APPROVED BY:		DATE:

N

FLAMBEAU MINING COMPANY

FIGURE 1-1

SITE LOCATION MAP

RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

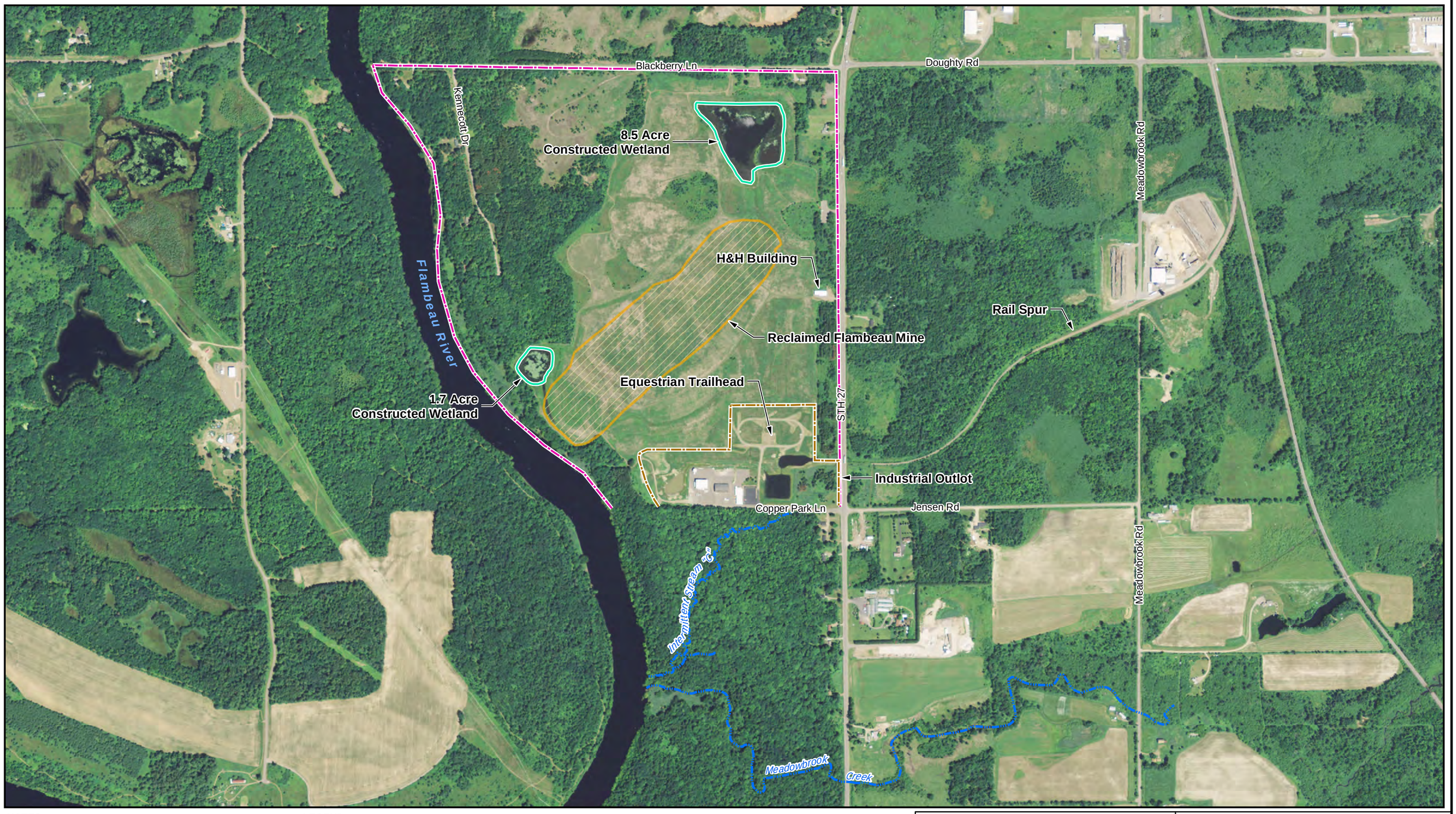
Scale: 0 1,000 2,000 Feet

Date: MAY 2015

Prepared by: BJW1

Project No: 14F779.14

Path: X:\GB\E\2014\14F779-00\GIS\mxd\Permit_Application\FMC_site_location_map_11x17.mxd Date: 5/7/2015



NOTES:

1. 2013 - 1 meter imagery downloaded from the USDA Geospatial Data Gateway.
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).

LEGEND

- Intermittent Stream
- Flambeau Project
- Industrial Outlot
- Reclaimed Flambeau Mine
- Constructed Wetland

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE: MAY '15
APPROVED BY:	SVF	DATE: MAY '15
APPROVED BY:		DATE:

FLAMBEAU MINING COMPANY

FIGURE 1-2

SITE LAYOUT MAP

RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

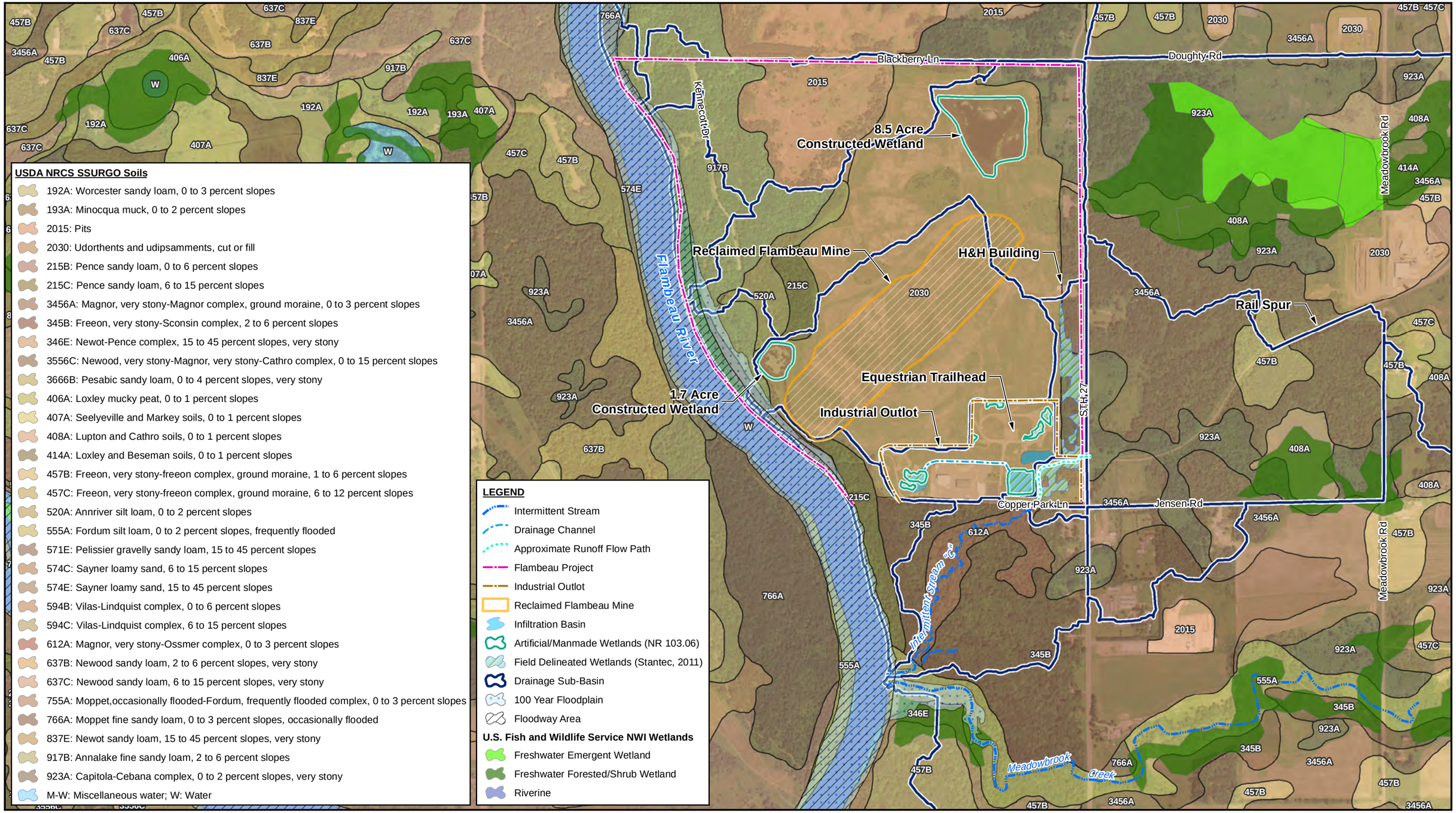
Scale: 0 400 800 Feet

Date: MAY 2015

Prepared by: BJW1

Project No: 14F779.14

Path: X:\GB\IE\2014\14F779-00\GIS\mxd\Permit_Application\FMC_site_layout_map_11x17.mxd Date: 5/7/2015



NOTES

1. 2013 - 1 meter imagery downloaded from the USDA Geospatial Data Gateway.
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (feet).
3. U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) wetlands data downloaded from http://www.fws.gov/wetlands/
4. USDA NRCS SSURGO soil data downloaded from http://websoilsurvey.nrcs.usda.gov/
5. Floodplain data from FEMA Map Service Center. http://msc.fema.gov/portal
6. Drainage areas estimated from 2012 1' LiDAR contour data received from Rusk County.

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

FLAMBEAU MINING COMPANY

FIGURE 1-3

WETLANDS, SOILS AND FLOODPLAINS MAP

RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

Scale: 0 400 800 Feet

Date: MAY 2015

Prepared by: BJW1

Project No: 14F779.14

Path: X:\GB\E\2014\14F779-00\GIS\mxd\Permit_Application\FMC_wetland_soils_floodplain_map_11x17.mxd Date: 5/7/2015

NOTES:

1. 2013 - 1 meter imagery downloaded from the USDA Geospatial Data Gateway.
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).
3. Drainage areas estimated from 2012 - 1' LiDAR contour data received from Rusk County.

LEGEND

- Approximate Culvert Location
- Intermittent Stream
- Drainage Channel
- Approximate Runoff Flow Path
- Flambeau Project
- Industrial Outlot
- Field Delineated Wetlands (Stantec, 2011)
- Infiltration Basin
- Drainage Sub-Basin

N

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

FLAMBEAU MINING COMPANY

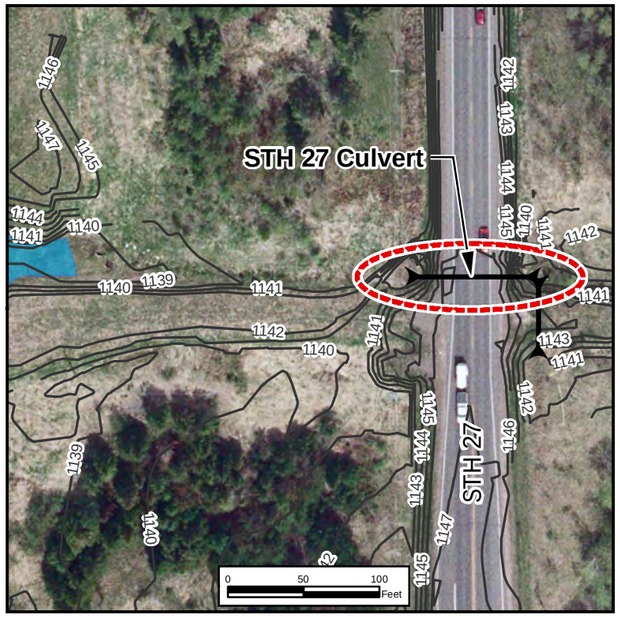
FIGURE 2-1

EXISTING SITE CONDITIONS

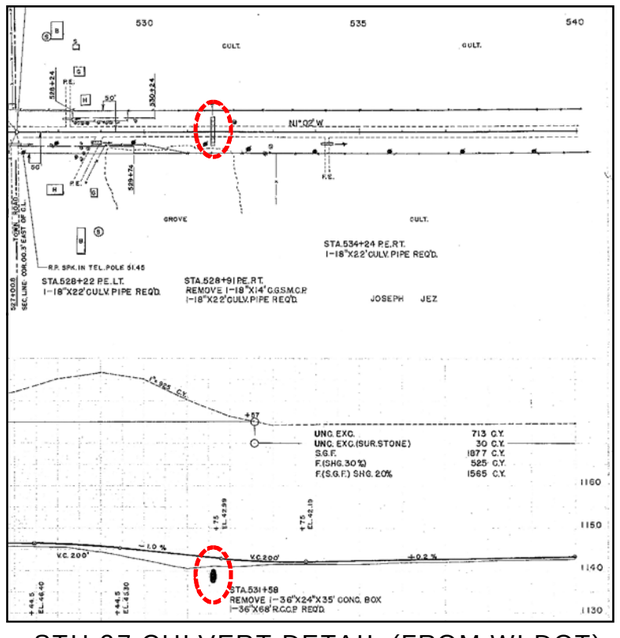
RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

Scale:	0 80 160 Feet	Date:	MAY 2015
Prepared by:	BJW1	Project No:	14F779.14

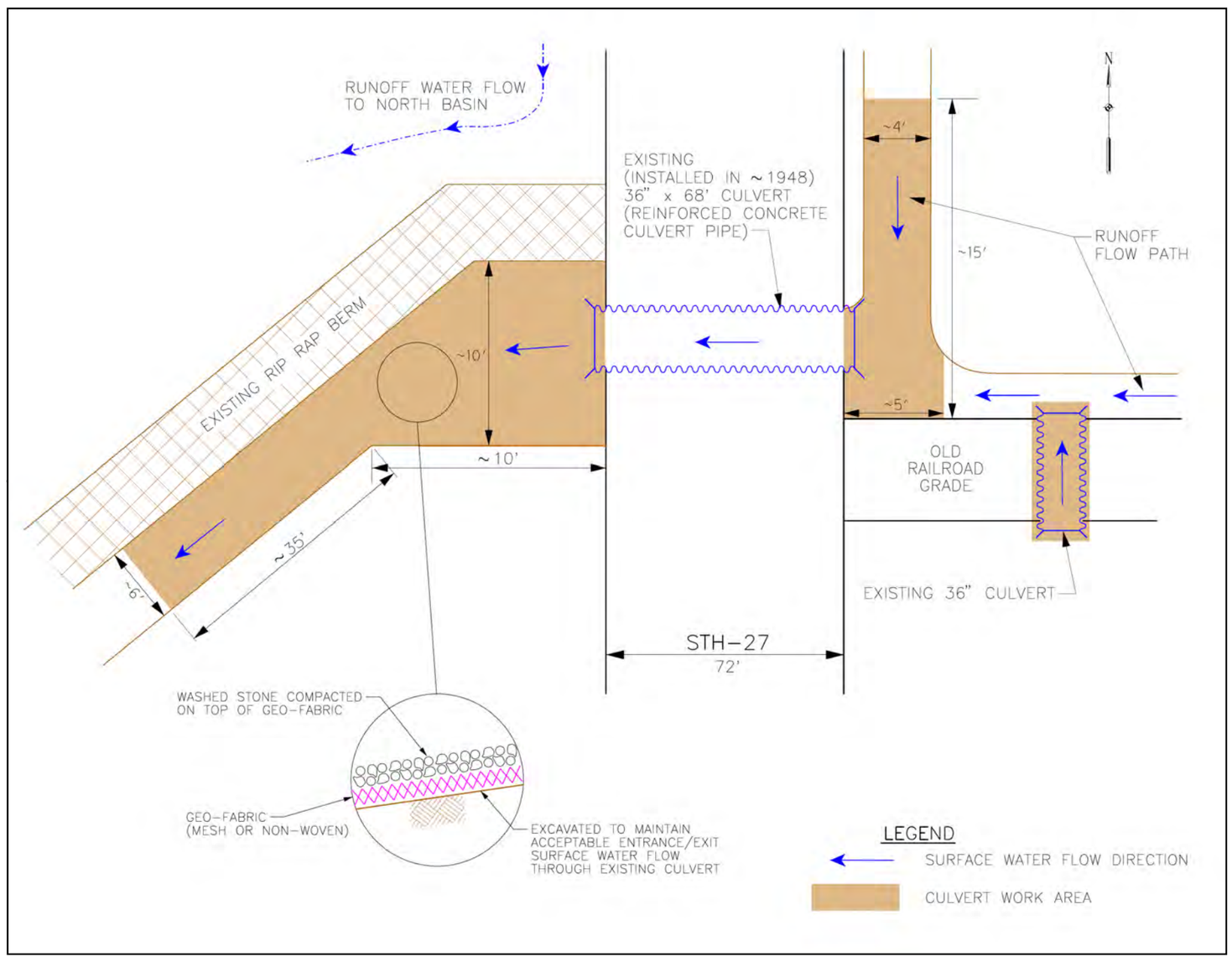
Path: X:\GB\IE\2014\14F779-00\GIS\mxd\Permit_Application\FMC_industrial_outlot_layout_map_11x17.mxd Date: 5/7/2015



SITE LOCATION



STH 27 CULVERT DETAIL (FROM WI DOT)



STH 27 CULVERT DETAIL

NOTES:
1. Silt fence and staked hay bales installed downstream of construction
2. Sediment flushed and removed using a vacuum truck.
3. Sediment disposed of, as required.

NOTES:
1. Aerial imagery provided by Aero-Metric. Date of Acquistion: May 17, 2008
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

FLAMBEAU MINING COMPANY

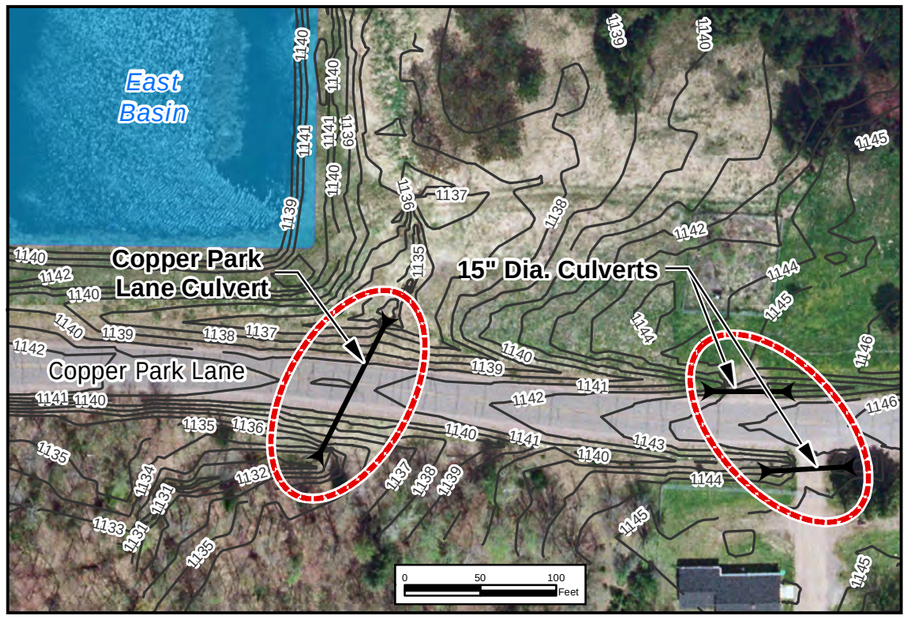
FIGURE 2-2

STH 27 CULVERT WORK

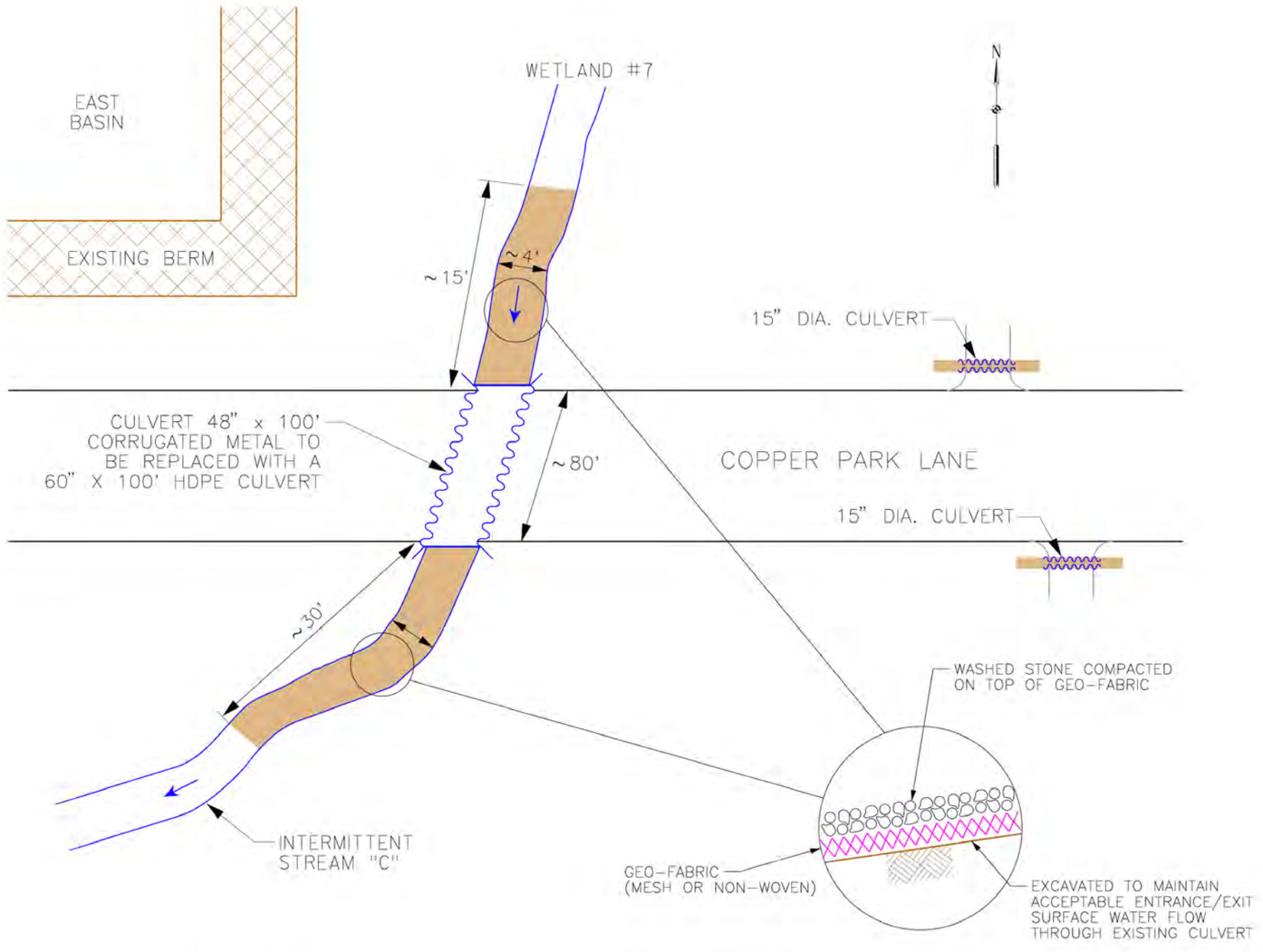
RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

Scale:	NOT TO SCALE	Date:	MAY 2015
Prepared by:	BJW1	Project No:	14F779.14

Path: X:\GB\IE\2014\14F779-00\GIS\mxd\Permit_Application\FMC_STH27Culvert_Details_11x17.mxd Date: 5/7/2015



SITE LOCATION



NOTES:
1. Silt fence and staked hay bales installed downstream of construction
2. Sediment flushed and removed using a vacuum truck.
3. Sediment disposed of, as required.

LEGEND

SURFACE WATER FLOW DIRECTION

CULVERT WORK AREA

COPPER PARK LANE CULVERT DETAIL

NOTES:
1. Aerial imagery provided by Aero-Metric. Date of Acquistion: May 17, 2008
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).

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REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

FLAMBEAU MINING COMPANY

FIGURE 2-3

COPPER PARK LANE CULVERT WORK

RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

Scale:	NOT TO SCALE	Date:	MAY 2015
Prepared by:	BJW1	Project No:	14F779.14

Path: X:\GB\E\2014\14F779-00\GIS\mxd\Permit_Application\FMC_CuPkLn_Details_11x17.mxd Date: 5/7/2015

LEGEND

- 1150 — EXISTING 2' ELEVATION CONTOURS
- EXISTING FENCE
- EXISTING TREE
- EXISTING TREE/BRUSH LINE
- EXISTING BUILDING
- EXISTING EDGE OF GRAVEL
- EXISTING EDGE OF PAVEMENT
- EXISTING CULVERT LOCATION
- INDUSTRIAL OUTLOT LIMITS
- 1140 — PROPOSED CONTOUR
- PROPOSED DRAINAGE PATTERN
- GEOCELL PROTECTION
- FILTER FABRIC/ RIPRAP PROTECTION
- SW-C1 PROPOSED SURFACE WATER MONITORING POINT

N

1,682,500 E

1,683,000 E

101,000 N

100,500 N

ST. HWY 27

COPPER PARK LANE

PROPOSED 24" CULVERT

PROPOSED INVERT=1141.0

PROPOSED INVERT=1140.5

Invert Elev. 1142.11

12" CMP

Invert Elev. 1141.92

Invert Elev. 1139.00

36" CMP

SW-C9

Invert Elev. 1139.83

Invert Elev. 1132.57

PROPOSED 60" CMP

SW-C1

Invert Elev. 1131.51

NOTE:

1. HORIZONTAL DATUM BASED ON NAD 1983. HORIZONTAL COORDINATES BASED ON WISCONSIN STATE PLAN NORTH (NORTH).

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth
Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

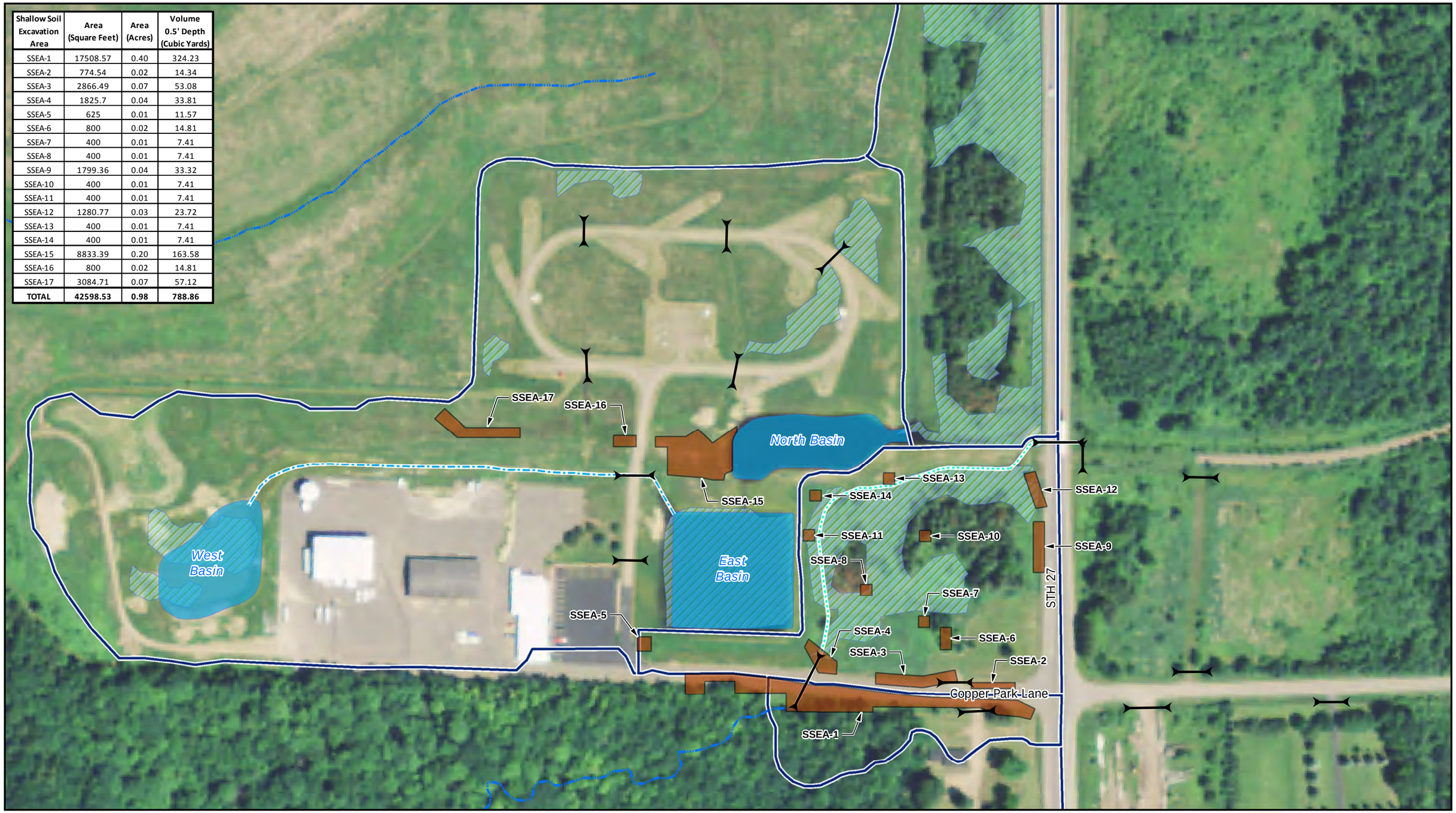
FIGURE 2-4

POST-CONSTRUCTION STORMWATER PLAN

Scale:	0 60' 120'	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

X:\GB\IE\2014\14F779-00\CAD\figures\14F779_Fig_2-4_Post-Construction_plan.dgn
5/7/2015 bjwl

Shallow Soil Excavation Area	Area (Square Feet)	Area (Acres)	Volume 0.5' Depth (Cubic Yards)
SSEA-1	17508.57	0.40	324.23
SSEA-2	774.54	0.02	14.34
SSEA-3	2866.49	0.07	53.08
SSEA-4	1825.7	0.04	33.81
SSEA-5	625	0.01	11.57
SSEA-6	800	0.02	14.81
SSEA-7	400	0.01	7.41
SSEA-8	400	0.01	7.41
SSEA-9	1799.36	0.04	33.32
SSEA-10	400	0.01	7.41
SSEA-11	400	0.01	7.41
SSEA-12	1280.77	0.03	23.72
SSEA-13	400	0.01	7.41
SSEA-14	400	0.01	7.41
SSEA-15	8833.39	0.20	163.58
SSEA-16	800	0.02	14.81
SSEA-17	3084.71	0.07	57.12
TOTAL	**42598.53**	**0.98**	**788.86**



NOTES:
1. 2013 - 1 meter imagery downloaded from the USDA Geospatial Data Gateway.
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).
3. Drainage areas estimated from 2012 - 1' LiDAR contour data received from Rusk County.

LEGEND

- Approximate Culvert Location
- Intermittent Stream
- Drainage Channel
- Approximate Runoff Flow Path
- Field Delineated Wetlands (Stantec, 2011)
- Infiltration Basin
- Drainage Sub-Basin
- Proposed Soil Excavation Area (0-6")

N

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

FLAMBEAU MINING COMPANY

FIGURE 2-5

PROPOSED SOIL EXCAVATION AREAS

RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

Scale:	0 80 160 Feet	Date:	MAY 2015
Prepared by:	BJW1	Project No:	14F779.14

Path: X:\GB\IE\2014\14F779-00\GIS\mxd\Permit_Application\FMC_Proposed_Soil_Excavation_Areas_05042015_11x17.mxd Date: 5/7/2015

Appendix A

Site Grading Plan - 2015

Site Grading Plan - 2015
Reclaimed Flambeau Mine Site
Rusk County, Wisconsin

On behalf of the Flambeau Mining Company, Foth Infrastructure & Environment, LLC has prepared this memorandum summarizing the grading plan associated with the *Copper Park Business and Recreation Area Work Plan Supplement* for the Reclaimed Flambeau Mine site in Ladysmith, Wisconsin.

Construction Overview

Site construction activities involve re-grading the West Basin, North Basin and East Basin to become flow-through wetland areas with ponded areas, cleaning of the existing culvert at Highway 27, the removal and replacement of the culvert underneath Copper Park Lane, the removal and replacement of the existing culvert on the north-south driveway to the equestrian trail head/parking, some shallow soil removal, installation of wetland vegetation in the former basin areas, and re-grading of the east west ditch between former west basin and the former east basin to allow surface water flow eastward.

The site grading plan is presented as Figure A-1.

Construction Component Details

Construction components include excavation/filling of each of the three basins, re-grading the east-west ditch north of the parking lot, culvert removal and replacement, and seeding and planting activities.

The work elements are described below.

The existing rock lined ditch along the north side of the asphalt parking lot (east-west ditch) will be re-graded to direct surface water flow eastward. The ditch will be re-graded with a high point within the west area. The ditch will maintain the trapezoidal shape with a 6-foot bottom width, 3:1 horizontal to vertical side slopes, and a grade of approximately 0.5%. The existing 18-inch diameter corrugated metal pipe under the road to the Equestrian Trailhead will also be replaced with a 24-inch diameter corrugated metal pipe. The ditch will be revegetated to provide for suspended sediment removal.

The West Infiltration Basin will be generally filled to allow surface water drainage to the east to occur. There will be three sub-areas that will be kept at a lower elevation as emergent wetland areas. Construction in this area will require approximately 2,113 cubic yards (cy) of fill.

The North Infiltration Basin will be re-graded to allow surface water to flow westward through the new wetland area. There will be three widened areas constructed within the smaller channel area that will act as passive storage wetlands. The first of the three areas will be on the east side where surface water from the east enters the area. This low area will serve as an initial sediment catch. Construction in this area will produce approximately 717 cy of net cut.

The existing East Infiltration Basin will be re-graded to allow for surface water from the west and north to flow through the new wetland area to Wetland #7. Three areas will be widened and deepened within the smaller channel area and used to establish wetlands. Water will flow from the new wetland to Wetland #7 through a smaller channel area near the south east corner of the new basin. The east berm will be re-graded to allow a wide area of overland flow to occur towards Wetland #7 during large precipitation events. Construction in this area will produce approximately 1,556 cy of net cut.

Copper Park Lane Culvert Removal/Replacement

The existing culvert under Copper Park Lane will be removed and replaced during construction activities. The culvert replacement will require minor excavation or grading to create a stable entrance and exit channel. A layer of porous stone bedding wrapped in filter fabric will be constructed beneath the base of the new culvert.

Topsoil

Topsoil will be obtained from the onsite stockpile located on the western side of the project. Approximately 1,333 cy of topsoil will be placed across disturbed areas as fill and as topsoil. If there is not sufficient topsoil available on site, the contractor shall obtain additional clean top soil from local supplies.

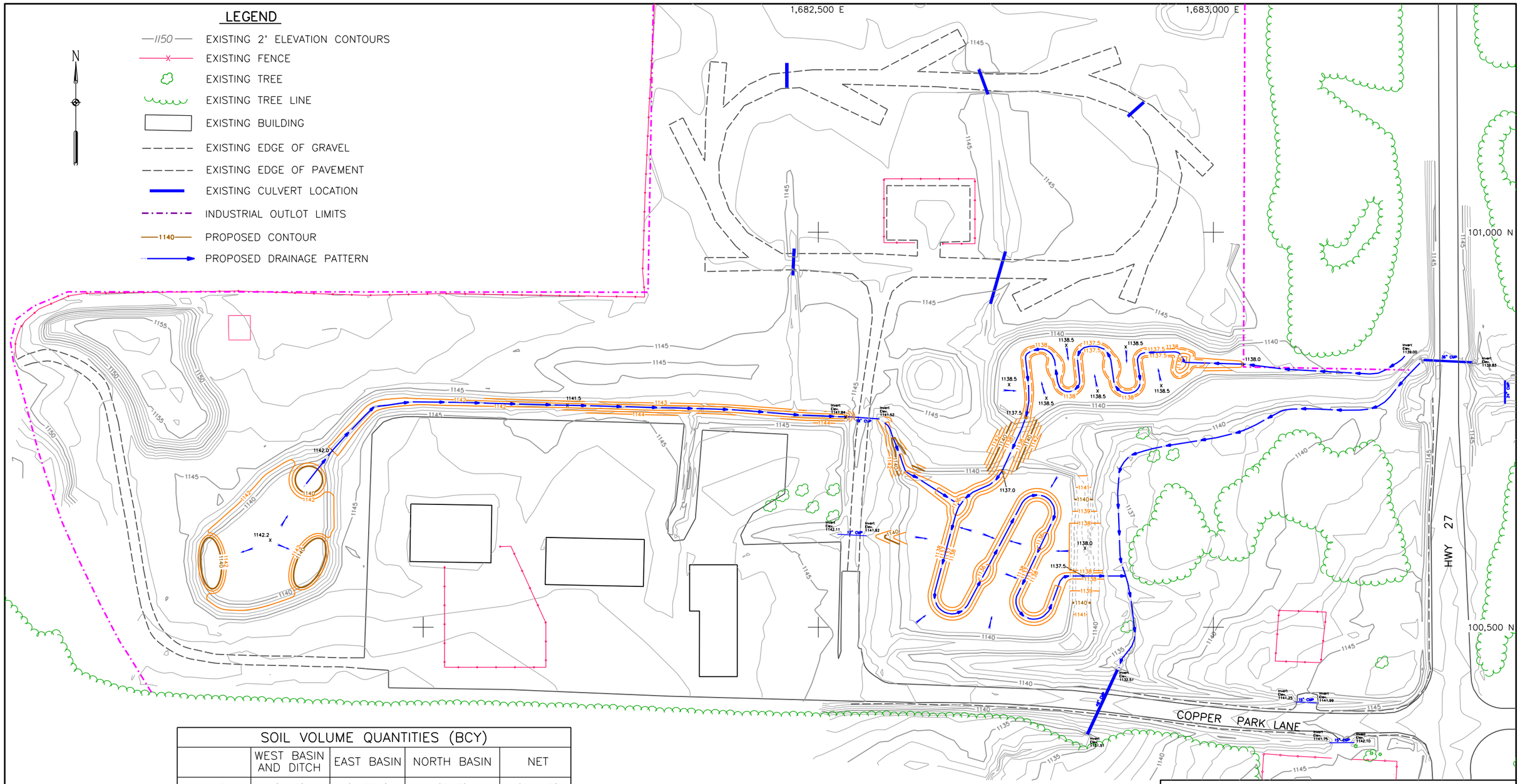
Wetland Plantings and Seeding

After the surface soils within the graded areas and the east-west ditch have been properly prepared and topsoiled, seeding with wetland plants will occur. The seed mix and methods of wetland seeding and plantings will incorporate practices that will allow the former basins to develop as wetlands (see Appendix C of the *Work Plan* for the AES seeding and planting plan).

Attachment:
Figure A-1 Grading Plan

LEGEND

- 1150 — EXISTING 2' ELEVATION CONTOURS
- EXISTING FENCE
- EXISTING TREE
- EXISTING TREE LINE
- EXISTING BUILDING
- EXISTING EDGE OF GRAVEL
- EXISTING EDGE OF PAVEMENT
- EXISTING CULVERT LOCATION
- INDUSTRIAL OUTLOT LIMITS
- 1140 — PROPOSED CONTOUR
- PROPOSED DRAINAGE PATTERN



SOIL VOLUME QUANTITIES (BCY)				
	WEST BASIN AND DITCH	EAST BASIN	NORTH BASIN	NET
CUT	(222)	(1,556)	(717)	(2,495)
FILL	2,335	0	0	2,335
NET	**2,113**	**(1,556)**	**(717)**	**(160)**
4" TOPSOIL	413	613	307	1,333

NOTES:

1. HORIZONTAL DATUM BASED ON NAD 1983. HORIZONTAL COORDINATES BASED ON WISCONSIN STATE PLAN NORTH (NORTH).
2. ACTUAL SUB-GRADE ELEVATIONS 4" LOWER THAN DEPICTED TO ALLOW FOR TOPSOIL PLACEMENT.

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE A-1

GRADING PLAN

Scale:	0 60' 120'	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

X:\GB\IE\2014\14F779-00\CAD\figures\14F779_Fig_A-1_Industrial_Outlot_reconfigured_wetland_grading_plan.dgn
5/7/2015 bjw1

Appendix B

Surface Water Management and Erosion Control Plan

Report

Surface Water Management and Erosion Control Plan

Copper Park Business and Recreation Area

Project I.D.: 14F779

Flambeau Mining Company
Ladysmith, Wisconsin

May 2015

Foth

Surface Water Management and Erosion Control Plan

Project ID: 14F779

Prepared for

Flambeau Mining Company

Ladysmith, Wisconsin

Prepared by

Foth Infrastructure & Environment, LLC

May 2015

2121 Innovation Court, Ste. 300 • PO Box 5126 • De Pere, WI 54115-5126 • (920) 497-2500 • Fax: (920) 497-8516 • www.foth.com

Surface Water Management and Erosion Control Plan

Contents

Figures

Appendices

Surface Water Management and Erosion Control Plan

Executive Summary

The purpose of this *Surface Water Management and Erosion Control Plan* (*SWMECP*) is to show that the Copper Park Business and Recreation Area project located at the Reclaimed Flambeau Mine, in Ladysmith, Wisconsin, is in compliance with state and local surface water management and erosion control regulations and ordinances.

The state of Wisconsin erosion control requirements are met through the implementation of Best Management Practices (BMP). For this project, the proposed BMPs include silt fences, stone tracking pads, channel erosion mat, temporary ditch checks, seeding, fertilizing, and mulching. These BMPs will be installed in accordance with ch. NR 151, Wis. Admin. Code.

The proposed project is exempt from ch. NR 151, Wisconsin Administrative Code (Wis. Admin. Code) post-construction storm water management requirements under ch. NR 151.12(2)(c): "A redevelopment post-construction site with no increase in exposed parking lots or roads." The proposed work will not result in an increase in the impervious area at the site, and therefore, will not increase the existing peak runoff rates.

List of Abbreviations, Acronyms, and Symbols

%	percent
ac-ft	acre feet
BMP	Best Management Practices
cfs	cubic feet per second
ch.	Chapter
CMP	corrugated metal pipe
COC	Certificate of Completion
Flambeau	Flambeau Mining Company
Foth	Foth Infrastructure & Environment, LLC
hr	hour
HSG	hydrologic soil group
in/hr	inch/hour
NOAA	National Oceanic and Atmospheric Administration
NOC	Notice of Completion
NRCS	Natural Resources Conservation Service
RCN	Runoff curve number
SWMECP	Surface Water Management and Erosion Control Plan
T_c	Time of concentration
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
USLE	Universal Soil Loss Equation
WDNR	Wisconsin Department of Natural Resources
Wis. Admin. Code	Wisconsin Administrative Code
Work Plan	Copper Park Business and Recreation Area Work Plan Supplement
WRAPP	Water Resources Application for Project Permits
yr	year

1 Introduction

Foth Infrastructure & Environment, LLC (Foth) has prepared this *Surface Water Management and Erosion Control Plan* (*SWMECP*) at the request of Flambeau Mining Company (Flambeau) as part of the *Copper Park Business and Recreation Area Work Plan Supplement (Work Plan))*.

The project will include the conversion of the three existing infiltration basins into wetlands, re-grading the ditch north of the parking lot to flow east, lowering the east berm on the existing East Basin to allow flow-through, and select shallow soil excavations. Culvert cleaning will also take place on the culverts under Highway 27 and Copper Park Lane, and the culvert under the access road to the Equestrian Trailhead will be replaced.

1.1 Purpose

The purpose of this *SWMECP* is to show that the *Work Plan* is in compliance with state and local surface water management and erosion control regulations and ordinances.

1.2 Regulatory Requirements

This *SWMECP* has been completed in compliance with ch. NR 151, Wisconsin Administrative Code (Wis. Admin. Code).

Erosion control sediment performance standards in NR 151 call for Best Management Practices (BMP) to be installed that, by design, discharge no more than five tons per acre per year of sediment load between the initial grading and final stabilization periods.

The proposed project is exempt from the post-construction surface water management requirements under ch. NR 151.12(2)(c): "A redevelopment post-construction site with no increase in exposed parking lots or roads". The proposed work will not result in an increase in the impervious area at the site, and therefore, will not increase the existing peak runoff rates.

There are no erosion control ordinances for the city of Ladysmith or Rusk County that apply to this project.

2 Project Description

The work elements are described in the *Work Plan*. Approximately 4.8 acres of the Industrial Outlot will be disturbed during the proposed construction. Construction activity (in order of completion) will include the following:

1. Erosion control installation.
2. Soil excavation, filling, grading, and temporary stockpiling.
3. Site grading.
4. Vegetative cover placement.
5. Construction maintenance and monitoring.

The construction activity for this project is anticipated to begin in August 2015 and be completed by November 2015.

A photograph log of existing site conditions is presented in Appendix F of the *Work Plan*.

3 Erosion Control

The following section describes the erosion control components of the *Work Plan*.

3.1 Soil Series Information

The soil type was determined from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) web soil survey: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. The soil series for the entire Industrial Outlot area is classified as "Udorthents and Udipsamments, cut or fill." The soil type identified is representative of areas that have been significantly disturbed from grading activities and normally do not show characteristics of the native soil descriptions. Because the area is disturbed the NRCS soil survey does not list hydric qualities or hydric inclusions for this soil type.

The area west of Highway 27 and north of the Industrial Outlot and in the Wetland #7 area is classified as both the Capitola-Cebana complex (very stony with 0 – 2% slopes), and the Magnor, very stony-Magnor complex, ground moraine (0 – 3% slopes). The area east of Highway 27 also contains these same two soil types, as well as small areas of Lupton and Cathro soils (0 – 1% slopes) and Freeon, very stony-freeon complex, ground moraine (1 – 6% slopes). A map of the soil survey can be found in Figure 1-3 of the *Work Plan*.

3.2 Wetlands Information

Seven wetlands were identified and delineated as part of a wetland delineation completed by Stantec. These are described in detail in a February 2011 *Wetland Delineation Report* prepared by Stantec. These wetlands and U.S. Fish and Wildlife Service NWI Wetlands are shown on Figure 1-3 of the *Work Plan*.

3.3 Universal Soil Loss Equation Calculations

The need for BMPs is determined by applying the Revised Universal Soil Loss Equation (RUSLE2) spreadsheet for various slopes and soil types on the subject site. The RUSLE2 work sheet for the project area is included in Appendix A. In the spreadsheet, an average slope and slope length present during construction activities was used. Also, silty clay was used as the soil type, which is a conservative estimate of the cut and fill soils found in the Industrial Outlot.

The results show that approximately 2.1 tons/acre of soil loss will occur, and as such, no reduction is required to meet the NR 151 sediment yield limits of five tons per acre. Also, since most of the grading work will take place within the current basin footprints, sediment loss is expected to be further minimized. However, a combination of BMPs will be installed in compliance with their respective Wisconsin Department of Natural Resources (WDNR) Technical Standards before and during construction to assure that the five tons per acre per year requirements are met, and that sediment yield is reduced to the maximum extent practicable.

3.4 Erosion Control

Construction site erosion control is required by ch. NR 151, Wis. Admin. Code for any construction site with greater than one acre of land disturbing construction activity. Ch. NR 151, Wis. Admin. Code also requires that a construction site discharge no more than five tons per acre per year, to the maximum extent practicable, of the sediment load carried in runoff from initial grading until final stabilization.

The five tons per acre per year standard is achieved by applying a combination of BMPs in compliance with their respective WDNR Technical Standards. Erosion control BMPs at the Flambeau site will include stone tracking pads, silt fence, ditch checks, construction site diversions, dust control, sedimentation basins, and seeding.

The potential for sediment loss due to construction activities is anticipated to be relatively low given the low slope, general topography and drainage of the area, and the majority of the work occurring in existing, contained basins. Most of the grading work will take place within the existing West, North, and East Infiltration Basins, and in the drainage ditch north of the parking lot. Runoff from most of the shallow excavations will also drain to the new wetland areas. The outlet construction of the East basin will also be the final phase in the construction sequence. Therefore, runoff from most of the construction areas is expected to be contained within the construction areas.

BMPs will be implemented in accordance with ch. NR 151, Wis. Admin. Code. Proposed erosion control during construction activity BMPs include the installation of stone tracking pads at construction site entrances, installation of silt fence adjacent to Wetland #7 and the shallow excavations along Copper Park Lane and Highway 27, temporary ditch checks and diversions in Wetland #7 and adjacent to Copper Park Lane, and seeding, fertilizing, and mulching. The locations of the proposed BMPs are included on Figure B-1, and details of the BMPs are included on Figures B-4 – B-6. Details on the BMP installations include the following:

- *Tracking Pads:* Tracking pads will be installed at the two construction site entrances prior to the start of the asphalt surfaces (Figure B-1). Details are shown on Figure B-4, and WDNR Technical Standard 1057 will be followed (WDNR, 2003a).

- *Silt Fences:* Silt fencing will be installed adjacent to Wetland #7 east of the East Basin, and adjacent to Copper Park Lane and Intermittent Stream C (Figure B-1). The installation will follow WDNR Technical Standard 1056 (WDNR, 2006b), and details are shown on Figure B-4.

  Ditch Checks: Ditch checks will be installed across the drainage ditches and waterways adjacent to Copper Park Lane to reduce water velocity and encourage sediment removal. Locations are shown on Figure B-1, and details are shown on Figure B-5. Ditch checks will be constructed with rock-filled bags. WDNR Technical Standard 1062 will be followed (WDNR, 2006a).

- *Temporary Grading Practices:* Temporary grading practices will be employed as needed to minimize construction site erosion. Temporary grading practices may include creating

diversions and shallow depressions with the intent of slowing and ponding runoff. WDNR Technical Standard 1067 will be followed (WDNR, 2004a). Details of typical temporary diversions and ditches are shown on Figure B-6.

- *Channel Erosion Mat:* Channel erosion mats may be used in the ditch north of the parking lot as needed, to protect the soil surface from erosion until vegetation is established (Figure B-1). Channel erosion mats will be Class II Type C TRM, and installation will adhere to the WDNR Technical Standard 1053 (WDNR, 2005), and details are shown on Figure B-6.

- *Dewatering:* Dewatering of the existing basins will take place prior to construction. Water will be pumped from the basins and discharged to upland areas via overland flow, similar to previous, WDNR-approved basin dewatering at the site. Dewatering practices will follow WDNR Technical Standard 1061 (WDNR, 2007a). In addition, depending on flow conditions at the time, water may be pumped from the waterway north of Copper Park Lane to Intermittent Stream C south of Copper Park Lane during replacement of the culvert. This would isolate the disturbed area during culvert replacement and reduce erosion potential.

- *Dust Control:* Dust control will be employed as necessary during excavation and grading work. Dust control will adhere to the WDNR Technical Standard 1068 (WDNR, 2004) and will include the application of water or commercially available compounds.

- *Seeding:* Any area remains undisturbed for an extended period, including soil stockpiles that are left inactive for more than seven days, will be seeded per WDNR Technical Standard 1059 (WDNR, 2003b). A site restoration plan that involves seeding work will be implemented following completion of remedial activities.

3.5 Maintenance

Inspections of the erosion control BMPs will be performed at a minimum of once weekly in compliance with ch. NR 151, Wis. Admin. Code during construction activities. A copy of the WDNR Erosion Control Inspection Form is included in Appendix B. All inspection records will be kept on file at the site construction office.

4 Surface Water Management

The following section describes the surface water management components of the *Work Plan*.

The proposed project is exempt from the post-construction surface water management requirements under ch. NR 151.12(2)(c): "A redevelopment post-construction site with no increase in exposed parking lots or roads". The proposed work will not result in an increase in the impervious area at the site, and therefore, will not increase the existing peak runoff rates.

4.1 Surface Water Quantity

4.1.1 Existing Conditions

The three existing infiltration basins are fed by four sub-watersheds from the Industrial Outlot. The Industrial Outlot watershed consists of a parking lot and buildings, grassland and meadow areas, dirt and gravel access roads, wetlands as previously described, and the three infiltration basins. The watershed adjacent to Highway 27 consists of trees, brush/grass mix, and the western half of Highway 27.

The infiltrations basins were constructed with the intent to retain runoff from the 22-acre former Industrial Outlot and the 9.4-acre immediately west of Highway 27 for storms up to and including the 100-year (yr), 24-hour (hr) event. The watersheds currently drain via overland flow and ditches toward the infiltration basins. The ditch north of the asphalted parking lot area was graded with a high point near the center, dividing flows to both the East and West Basins.

4.1.2 Post-Construction Conditions

Proposed site construction activities involve re-grading the floors of the three existing infiltration basins and adding vegetation to convert to constructed wetlands, re-grading the ditch north of the parking lot so the entire ditch flows east, and constructing an overflow structure on the east edge new wetland areas. The future site conditions are shown on Figure B-1. The proposed plan will not increase impervious area or alter the watershed drainage in any way, other than re-grading the existing ditch north of the parking lot to flow east, and creating overflow weirs on the East basin.

Surface water runoff calculations were performed to verify that the proposed wetlands, drainage area, and culverts can safely pass design storm events. Peak runoff flow rates and storm water hydrographs were analyzed for the site conditions following construction. The peak runoff flow rates and storm water hydrographs were determined using the Haestad Methods PondPack Version 08.11.01.54 Urban Hydrology and Detention Pond Modeling Software (Bentley, 2008b).

The longest flow path for each drainage area was determined by analyzing the topography of the site, based on the project design and construction drawings. Flow lengths and slopes from the flow path analyses were input into the PondPack program to calculate the time of concentration (Tc). Runoff Curve Numbers (RCN) and weighted RCNs were then determined for each drainage area based on soil types and land use areas within each sub-watershed.

The values calculated for the drainage area, Tc, and RCN were then used to calculate the tabular hydrograph, peak discharge and volume. Calculations were run for the 100-yr, 24-hr storm event to size the wetland, drainage areas, and culverts. Precipitation depths and temporal distributions were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 8, Version 2.

The RCNs for hydrologic soil group (HSG) C soils were used for existing conditions in the Copper Park Business and Recreation Area, due to surficial fill material having been compacted during construction of the former outlot. Type B soils were used for portions of the watershed to the east of Highway 27. Watershed boundaries and areas, impervious areas, and times of concentration routes for the six sub-watersheds can be found on Figures B-2 and B-3.

Results show that the wetland system has been designed to safely pass runoff from the 100-yr, 24-hr storm event. PondPack analyses for watershed runoff from the proposed site conditions are included in Appendix C, and results at individual locations are summarized in Section 4.3 of this report.

4.2 Surface Water Quality

Since the proposed project is exempt from the post-construction storm water management requirements under ch. NR 151.12(2)(c), surface water quality modeling was not performed.

If the project were not exempt from post-construction surface water management requirements, then according to ch. NR 151, Wis. Admin. Code BMPs are to be designed, installed, and maintained to control total suspended solids carried in runoff. Re-development would have to reduce, to the maximum extent practicable, the total suspended solids (TSS) load by 40% based on average annual rainfall, as compared to no runoff management controls, from parking areas and roads.

BMPs to be installed at the Flambeau site that will serve to reduce TSS loading include the three constructed wetlands, and existing drainage areas and temporary storage in natural depressions within the watersheds. The greatest potential source of sediment loading at the site is from the asphalted parking lot. However, sediment removal from this area will be promoted by BMPs in series, including flow dampening and vegetative buffers associated with the West wetland area, the 650-foot drainage ditch north of the lot, and the East wetland areas.

4.3 Design of Surface Water Features

Pursuant to Ch. NR 151, Wis. Admin. Code under certain circumstances BMPs are to be employed to maintain or reduce peak runoff discharge rates, to minimize TSS load, and to infiltrate runoff to the maximum extent practicable.

The three existing infiltration basins will be converted to wetlands areas (Figure B-1). The wetlands will also include storage volume and will have overflow outlets, enabling them to retain wetland features. All wetland storage volumes were reduced by 15% to account for storage loss due to vegetation growth, which is consistent with values found in a literature review (EPA, 2000).

The new wetland areas will collect runoff from the 21.8-acre former Industrial Outlot, and from the 10.1-acre watershed immediately west of Highway 27 and north of the Industrial Outlot. Additionally, the watershed runoff, temporary natural depressions storage, and culvert hydraulics were analyzed for the watershed feeding the existing 36-inch culvert under Highway 27, and then ultimately feeding the 48-inch culvert under Copper Park Lane. Watersheds draining to the wetland system are shown on Figures B-2 and B-3.

The wetlands were analyzed for the 2-yr, 10-yr, and 100-yr, 24-hr storm events. All PondPack calculations are included in Appendix C.

4.3.1 Wetland Areas

Detention storage will be obtained at the Flambeau site by the design of wetland areas within the Industrial Outlot, as well as natural retention areas upstream of the Highway 27 and Copper Park Lane culverts and detention associated with existing Wetland #7. The following sections describe the proposed wetland areas.

The west area will receive runoff from the western portion of the asphalted area, as well as the grassed and dirt road areas to the west of the asphalt. The ditch north of the asphalted area, which will function as both a conveyance mechanism and will contribute to the west wetland area storage volume, will receive overland flow from the adjacent asphalted and grassed areas, as well as the western portion of the Equestrian Trailhead area. The total drainage area to the west will be approximately 12.9 acres (Figure B-3).

The West Basin will be re-graded to a floor elevation of approximately 1,142.0 feet, and will include three deeper areas with floor elevations of approximately 1,140.0 feet. Surface water from this area will flow east via the ditch north of the asphalted area, which will be re-graded to flow east. The ditch will ultimately discharge to the east and Wetland #7 via a culvert under the access road to the Equestrian Trailhead. The existing 18-inch culvert will be replaced with a 24-inch culvert, and the invert will be lowered to 1,141.0 feet. The 2-yr, 10-yr, and 100-yr, 24-hr storm events will produce peak ponding elevations of 1,142.3, 1,142.9, and 1,144.0 feet, respectively, as shown on Figures B-7 through B-9.

The new wetland areas will receive runoff from the majority of the Equestrian Trailhead area (approximately 5.9 acres) as well as the narrow watershed immediately west of Highway 27 (approximately 10.1 acres) (Figure B-3). Runoff from along the west side of Highway 27 will initially flow through the natural low area to the north of the former rail spur, which will provide for sediment removal. Runoff from most of the eastern half of the Equestrian Trailhead area will be collected by the existing vegetated swale prior to flowing into the new wetland area. A small amount of runoff from the area will flow directly to the new wetland area.

The North Basin will be re-graded to an elevation of approximately 1,138.5 feet, and will include three deeper areas with elevations of varying between 1,136.0 – 1,137.0 feet. The runoff will then continue south via an approximately eight foot wide earthen weir and channel. The overflow elevation of the weir will be approximately 1,137.5 feet. The 2-yr, 10-yr, and 100-yr,

24-hr storm events will produce peak ponding elevations of 1,138.2, 1,138.6, and 1,139.2 feet, respectively, as shown on Figures B-7 through B-9.

Flow from the north and west will be directed south and east toward Wetland #7 (approximately 3.0 acres) (Figure B-3).

The East Basin will be re-graded to a floor elevation of approximately 1,138.0 feet, and will include three deeper areas with elevations of approximately 1,136.0 feet. The deeper areas will be connected by a swale with a bottom width of approximately eight feet, and with a bottom elevation varying between 1,136.5 – 1,137.5 feet. Flow will continue east via a multi-stage earthen weir to Wetland #7. The weir invert will be a channel approximately eight feet wide with an elevation of approximately 1,137.5 feet. The second weir stage will be at an elevation of approximately 1,138.0 feet, and will be approximately 75 feet wide. The overflow weirs will discharge to Wetland #7 and then ultimately to the culvert under Copper Park Lane. The 2-yr, 10-yr, and 100-yr, 24-hr storm events will produce peak ponding elevations of 1,138.1, 1,138.2, and 1,138.6 feet, respectively, as shown on Figures B-7 through B-9.

4.3.2 Highway 27 East Natural Retention

For larger storm events, runoff from the approximately 106 acre watershed east of Highway 27 exceeds the capacity of the 36-inch culvert under Highway 27 (Figure B-2). A natural low area exists primarily north of the culvert adjacent to Highway 27, which will serve to retain runoff during larger events. Therefore, the low area east of the Highway 27 culvert was modeled as a detention basin. The natural detention basin discharges through the 36-inch culvert, and ultimately to Intermittent Stream C and the 48-inch culvert under Copper Park Lane.

Results show that the 2-yr, 10-yr, and 100-yr, 24-hr storm events will produce peak ponding elevations of 1,141.1, 1,142.6, and 1,144.2 feet, respectively, in the low area east of Highway 27 (Figures B-7 through B-9). Peak discharges from the storms are 8.3, 50, and 60 cfs, respectively. The 100-yr, 24-hr peak ponding elevation is lower than the elevation of Highway 27, showing that the 36-inch culvert can pass the 100-yr, 24-hr storm without overtopping the highway.

4.3.3 Wetland #7 Natural Retention

The existing low area east of the East basin and north of Copper Park Lane will receive runoff from the East basin, from the East Highway 27 watershed, and by overland flow from the adjacent watershed (approximately 4.9 acres) (Figure B-3). The natural low area includes the flowpath within Wetland #7 and will pond runoff ahead of the 48-inch culvert under Copper Park Lane during larger events. Therefore, the area was modeled as a detention basin.

Results show that the 2-yr, 10-yr, and 100-yr, 24-hr storm events will produce peak ponding elevations of 1,135.0, 1,136.5 and 1,138.5 feet, respectively, in the Wetland #7 area (Figures B-7 through B-9). Peak discharges through the culvert under Copper Park Lane for the storms are 21, 55.5, and 101 cfs, respectively. The 100-yr, 24-hr peak ponding elevation is lower than the elevation of Copper Park Lane, showing that the 48-inch culvert can pass the 100-yr, 24-hr storm without overtopping the road.

4.3.4 Drainage Swales

The existing drainage swales will collect overland flow and transmit it to larger surface water conveyance structures, but can also be effective BMPs to help promote TSS reduction. Drainage swales will be grass lined or vegetated, and may include armoring to prevent erosion in high velocity areas.

The ditch along the north side of the asphalted area will be re-graded so that runoff is directed to the East. The ditch was designed to provide capacity for the 100-yr, 24-hr storm event. The hydraulic capacity of the ditch was determined using Haestad FlowMaster 2005, Version 8.0045 (Bentley, 2009). Under large runoff events, the ditch will also serve as an extension of the storage volume available in the west wetland area. In addition, the swale between the former North and East Basins were analyzed to verify that it could safely pass the 100-yr, 24-hr storm. Hydraulic calculations from the FlowMaster program are included in Appendix C.

Other existing drainage areas and natural depressions in the Equestrian Trailhead area and adjacent to Highway 27 will not be altered in the proposed construction work (other than cleaning near select culverts).

4.3.5 Culverts

Roadside culverts were designed to provide sufficient capacity to intake and pass all flow in the ditches or swales for storms up to and including 100-yr, 24-hr event. The culverts analyzed include the 36-inch culvert under Highway 27, the 48-inch culvert under Copper Park Lane, and the proposed 24-inch culvert draining the ditch from the West wetland. Culvert performance was assessed using Haestad CulvertMaster Version 3.3 software (Bentley, 2008a).

The existing 18-inch diameter corrugated metal pipe (CMP) carrying runoff to the East Basin under the road to the Equestrian Trailhead will be replaced with a 24-inch diameter CMP, and will be lowered to an invert elevation of 1,141.0 feet. This will allow for storms larger than the 100-yr, 24-hr storm event to pass without overtopping the swale onto the parking lot.

The 36-inch concrete culvert under Highway 27 and the 48-inch CMP culvert under Copper Park Lane were shown to safely pass runoff from the 100-yr, 24-hr storm event. Calculations from the CulvertMaster software used to analyze culvert capacities can be found in Appendix C. It is proposed that the 48-inch CMP under Copper Park Lane be replaced with a 60-inch culvert to provide additional capacity for runoff from events greater than the 100-yr, 24-hr storm event.

4.4 Maintenance

Since the proposed project is exempt from ch. NR 151, Wis. Admin. Code post-construction storm water management requirements under ss. NR 151.12(2)(c), a plan detailing the maintenance and inspection schedule of the surface water facilities is not required. County and local ordinances also do not require an operation and maintenance plan.

All site surface water facilities will be inspected and maintained by the site owner.

5 Conclusions

State of Wisconsin erosion control requirements are met through the implementation of BMPs. For the Copper Park Business and Recreation Area, the proposed BMPs include stone tracking pads, silt fences, temporary ditch checks and diversions, and seeding, fertilizing, and mulching. These BMPs will be installed in accordance with ch. NR 151, Wis. Admin. Code.

The proposed project is exempt from the post-construction storm water management requirements under ch. NR 151.12(2)(c): "A redevelopment post-construction site with no increase in exposed parking lots or roads". The proposed work will not result in an increase in the impervious area at the site, and therefore, will not increase the existing peak runoff rates. However, storm water runoff calculations were performed to verify that the proposed wetlands, drainage areas, and culverts can safely pass design storm events. The BMPs will also reduce peak flows and promote sediment removal.

6 References

Bentley, 2008a. Bentley CulvertMaster, Bentley Systems, Inc., Watertown, CT.

Bentley, 2008b. Bentley PondPack, Bentley Systems, Inc., Watertown, CT.

Bentley, 2009. Bentley FlowMaster, Bentley Systems, Inc., Watertown, CT.

EPA, 2000. *Constructed Wetlands Treatment of Municipal Wastewaters*. September 2000. United States Environmental Protection Agency, Office of Research and Development. EPA/625/R-99/010.

Foth, 2015. Copper Park Business and Recreation Area Work Plan.

WDNR, 2003a. *Stone Tracking Pad and Tire Washing (1057)*. August 2003. Wisconsin Department of Natural Resources Conservation Practice Standard.

WDNR, 2003b. *Seeding for Construction Site Erosion Control (1059)*. November 2003. Wisconsin Department of Natural Resources Conservation Practice Standard.

WDNR, 2004. *Dust Control on Construction Sites (1068)*. March, 2004. Wisconsin Department of Natural Resources Conservation Practice Standard.

WDNR, 2005. *Channel Erosion Mat (1053)*. August 2005. Wisconsin Department of Natural Resources Conservation Practice Standard.

WDNR, 2006a. *Ditch Check (1062)*. March 2006. Wisconsin Department of Natural Resources Conservation Practice Standard.

WDNR, 2006b. *Silt Fence (1056)*. March 2006. Wisconsin Department of Natural Resources Conservation Practice Standard.

WDNR, 2007a. *Dewatering (1061)*. April 2007. Wisconsin Department of Natural Resources Conservation Practice Standard.

WDNR, 2007b. *Wet Detention Pond (1001)*. April 2007. Wisconsin Department of Natural Resources Conservation Practice Standard.

Figures

LEGEND

- 1150 — EXISTING 2' ELEVATION CONTOURS
- EXISTING FENCE
- EXISTING TREE
- EXISTING TREE/BRUSH LINE
- EXISTING BUILDING
- EXISTING EDGE OF GRAVEL
- EXISTING EDGE OF PAVEMENT
- EXISTING CULVERT LOCATION
- INDUSTRIAL OUTLOT LIMITS
- 1140 — PROPOSED CONTOUR
- PROPOSED DRAINAGE PATTERN
- PROPOSED STONE TRACKING PAD
- PROPOSED SILT FENCE
- PROPOSED ROCK–FILLED FILTER BAG DITCH CHECK
- PROPOSED SOIL EXCAVATION AREA (0–6")

N

1,682,500 E

1,683,000 E

101,000 N

100,500 N

ST. HWY 27

COPPER PARK LANE

PROPOSED 24" CULVERT

PROPOSED INVERT=1140.5

PROPOSED INVERT=1141.0

Invert Elev. 1142.11

Invert Elev. 1141.92

12" CMP

Invert Elev. 1139.00

36" CMP

Invert Elev. 1139.83

PROPOSED SILT FENCE LOCATION SEE DETAIL 1/4

PROPOSED ROCK FILLED FILTER BAG DITCH CHECK LOCATIONS SEE DETAIL 1/5

PROPOSED STONE TRACKING PAD LOCATIONS SEE DETAIL 2/4

Invert Elev. 1132.57

PROPOSED 60" CMP

Invert Elev. 1131.51

NOTE:

1. HORIZONTAL DATUM BASED ON NAD 1983. HORIZONTAL COORDINATES BASED ON WISCONSIN STATE PLAN NORTH (NORTH).

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE B-1

PROPOSED EROSION CONTROL AND SURFACE WATER MANAGEMENT PLAN

Scale:	0 60' 120'	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

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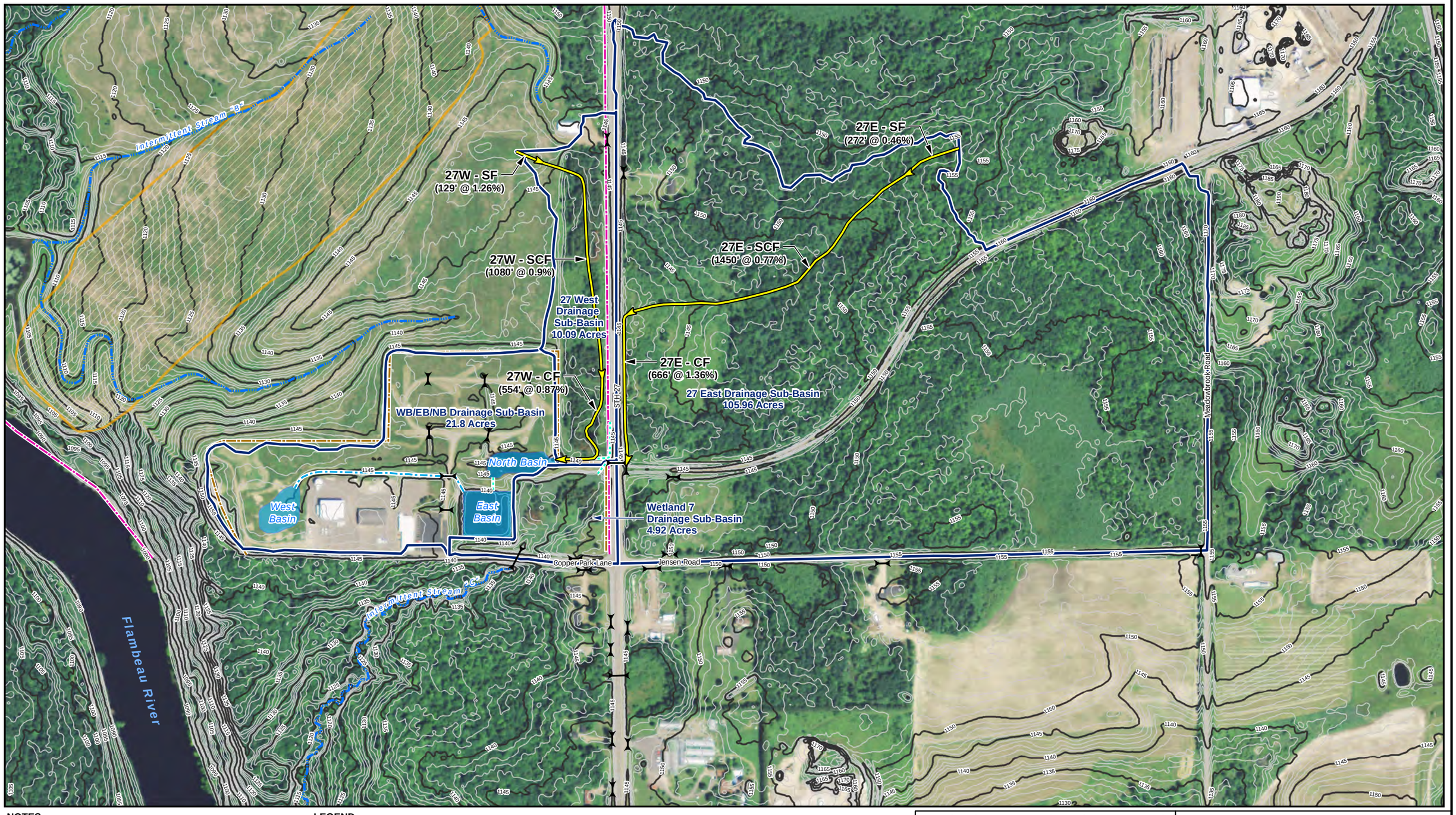
5/11/2015 jrb2



NOTES:

1. 2013 - 1 meter imagery downloaded from the USDA Geospatial Data Gateway.
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).
3. Drainage areas estimated from 2012 - 1' LiDAR contour data recieved from Rusk County.
4. SF = sheet flow, SCF = shallow concentrated flow
   CF = channel flow

LEGEND

- Approximate Culvert Location
- Intermittent Stream
- Drainage Channel
- Approximate Runoff Flow Path
- Infiltration Basin
- Drainage Sub-Basin
- 5' Index Contour
- 1' Contour
- Time of Concentration Route
- Reclaimed Mine Pit
- Flambeau Project
- Industrial Outlot

N

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE: MAY '15
APPROVED BY:	SVF	DATE: MAY '15
APPROVED BY:		DATE:

FLAMBEAU MINING COMPANY

FIGURE B-2

HIGHWAY 27 WATERSHED AND HYDROLOGY DESIGN DETAILS

RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

Scale: 0 200 400 Feet

Date: MAY 2015

Prepared by: BJW1

Project No: 14F779.14

Path: X:\GB\IE\2014\14F779-00\GIS\mxd\ECP\FMC_drainage_basin_calculations_march2015_11x17.mxd Date: 5/7/2015

LEGEND

- 1150 — EXISTING 2' ELEVATION CONTOURS
- EXISTING FENCE
- EXISTING TREE
- EXISTING TREE LINE
- EXISTING BUILDING
- EXISTING EDGE OF GRAVEL
- EXISTING EDGE OF PAVEMENT
- EXISTING CULVERT LOCATION
- INDUSTRIAL OUTLOT LIMITS
- 1140 — PROPOSED CONTOUR
- PROPOSED DRAINAGE PATTERN

- WEST WATERSHED
- NORTH WATERSHED
- SOUTH WATERSHED
- SOUTHEAST WATERSHED
- NORTHEAST WATERSHED
- TIME OF CONCENTRATION ROUTE

SF = SHEET FLOW
SCF = SHALLOW CONCENTRATED FLOW
CF = CHANNEL FLOW

N

1,682,500 E
1,683,000 E
101,000 N
100,500 N

NORTH DRAINAGE AREA = 5.9 ACRES
40,191 sq. ft.
18,298 sq. ft.
SCF @ 1.1%
311'
1142.81
CF
195' @ 2.4%
1146.27
84' @ 0.4%
SCF

WATERSHED EXTENDS NORTH TO H & H BUILDING

NORTHEAST WATERSHED AREA = 10.1 ACRES

ST. HWY 27
HWY 27 EAST WATERSHED AREA = 106 ACRES

INSTALL INLET PROTECTION

EXISTING STORMWATER DRAINS AND PIPING

SF
46' @ 2.9%
1147.47
1148.80
SCF
537' @ 1.2%
CF
634' @ 0.1%
1141.18
1141.84

PROPOSED 24" CULVERT
PROPOSED INVERT=1140.5
PROPOSED INVERT=1141.0

WEST DRAINAGE AREA = 12.9 ACRES
WEST WETLAND
7,463 sq. ft.
7,404 sq. ft.
8,934 sq. ft.
153,761 sq. ft.
(134,551 sq. ft.)

NORTH WETLAND
1138.18
1138.51
DIVERSION BERM
1139.21
OVERFLOW OUTLET
Invert Elev. 1139.00
Invert Elev. 1139.83
36" CMP

SOUTH DRAINAGE AREA = 3.0 ACRES
Invert Elev. 1142.11
Invert Elev. 1141.92
12" CMP
89'
1138.46
5.0%
CF
3,071 sq. ft.
3,166 sq. ft.
4,343 sq. ft.
SCF @ 2.7%
118'
SF
67'
0.4%
1146.15
1146.30
30,535 sq. ft.
EAST WETLAND

SOUTHEAST DRAINAGE AREA = 4.9 ACRES
524' CF @ 1.2%
404' SCF @ 2.2%
23,206 sq. ft.
2,897 sq. ft.
1132.69
Invert Elev. 1132.57
18" CMP
45'
Invert Elev. 1131.51
1147.98
1148.12
COPPER PARK LANE

NOTE:

1. HORIZONTAL DATUM BASED ON NAD 1983. HORIZONTAL COORDINATES BASED ON WISCONSIN STATE PLAN NORTH (NORTH).

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth
Foth Infrastructure & Environment, LLC

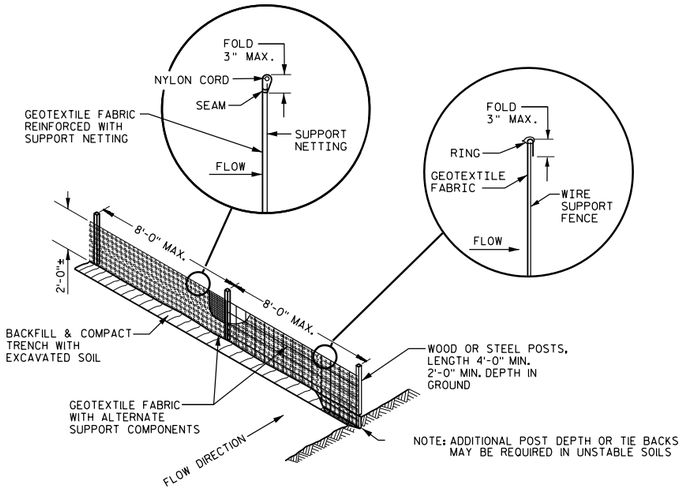
FLAMBEAU MINING COMPANY

FIGURE B-3

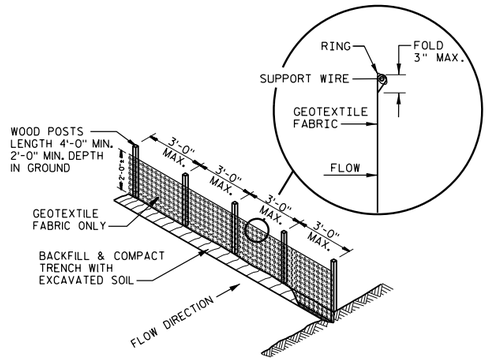
INDUSTRIAL OUTLOT WATERSHEDS AND HYDROLOGY DESIGN DETAILS

Scale:	0 60' 120'	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

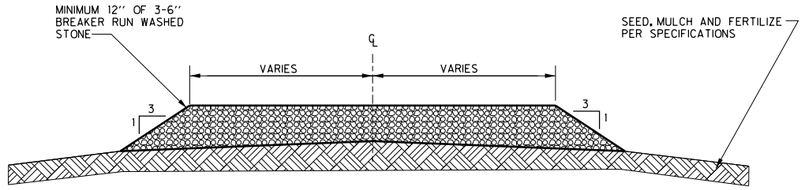
X:\GB\IE\2014\14F779-00\CAD\figures\Erosion Control Plan\14F779_Fig_B-3_Industrial Outlot Watersheds.dgn
5/11/2015 bjwl



ALTERNATE "A"



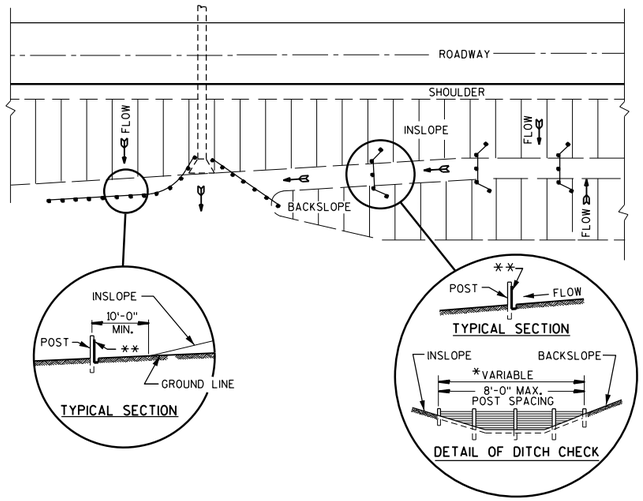
ALTERNATE "B"



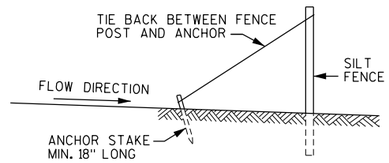
NOTE: TRACKING PAD TO BE A MINIMUM LENGTH OF 50'. WIDTH OF TRACKING PAD SHALL EXTEND TO EXISTING EDGE OF PAVEMENT.

2/4 PROPOSED TYPICAL TRACKING PAD

NOT TO SCALE

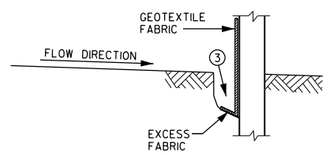


PLAN – AT CULVERTS



SILT FENCE TIE BACK DETAIL

(WHEN REQUIRED)



FABRIC ANCHOR TRENCH DETAIL

1/4 PROPOSED SILT FENCE DETAIL

NOT TO SCALE

GENERAL NOTE:

THE SILT FENCE SHOULD BE CONSTRUCTED IN AN ARC OR HORSESHOE SHAPE, WITH THE ENDS POINTING UPSLOPE TO MAXIMIZE BOTH STRENGTH AND EFFECTIVENESS.

Erosion Control Plan During Construction

Best Management Practices (BMPs) address erosion control during construction. The BMPs will be maintained during project construction and as appropriate throughout the life of the project.

Best Management Practices (BMPs)
The project has been designed with an efficient storm water collection system that routes storm water to infiltration basins.

BMPS to be implemented follow the materials and methods specified in ch NR 151, WIS Adm code and are summarized below:

Silt fencing will be installed before construction activity begins. Fencing will envelope the entire border of the project.

Land clearing will be performed taking care not to disturb areas beyond the clearing and grubbing limits. Clearing (removing trees) and grubbing (removing stumps and roots) will be performed in a single operation, as necessary, to minimize disturbance. Unmarketable timber, herbaceous plants, dead wood, stumps, and other vegetation will be disposed of by the contractor. Stumps too large to chip will be stockpiled and burned on-site with appropriate burn permits. Contractor is required to obtain all necessary burn permits.

Topsoil stripping and stockpiling and excess soil stockpiling will be performed on the site. Topsoil is defined as the A-horizon of the soil in which organic matter accumulates. Any material not placed will be stockpiled in a prepared area that has silt fencing installed around the entire stockpile. Piles will be developed with side slope shallower than a ratio of 3 horizontal to 1 vertical (3H:1V) to minimize erosion. Conventional earth-moving equipment will be used. Seeding will take place after the stockpile surface is roughened (i.e. driving a bulldozer up and down the slope to leave a pattern of track imprints „parallel„to the slope contours). Seeding will be accomplished in accordance with WDNR standard #1059 "seeding". Seed mixtures will include temporary species such as oats or perennial rye grass that germinate quickly and act as a nurse crop until the perennial species germinate and mature.

Ditch installation will be performed at the appropriate time to route storm water runoff to the basins. Mulching and seeding will take place as soon as possible to maintain ditch surfaces. Rock-filled filter bags, erosion bales, and erosion mats will be used as needed.

Installation of gravel/aggregate on vehicle traffic areas will be constructed in accordance with details and sections from the drawings and specifications. Traffic area of the main facility will be lined with gravel. During construction, BMPs will be maintained daily and undergo formal inspection.

Foth Infrastructure & Environment, LLC

REVISED	DATE	BY	DESCRIPTION

CHECKED BY: MAN	DATE: MAY '15
APPROVED BY: SVF	DATE: MAY '15
APPROVED BY:	DATE:

Foth
Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE B-4
EROSION CONTROL DETAILS (1 of 3)

Scale: NOT TO SCALE	Date: MAY 2015
Prepared By: JRB2	Project No: 14F779

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5/7/2015 bjw1

GENERAL NOTES:

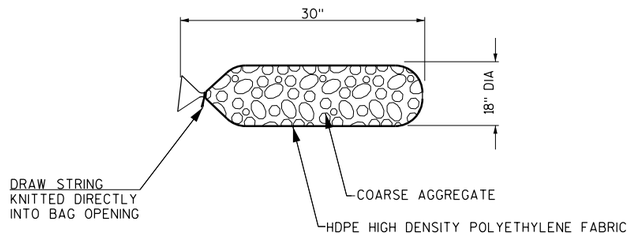
1. 18" X 30" ROCK FILLED FILTER BAG SHALL BE COMPRISED OF THE FOLLOWING:
   a. HDPE HIGH DENSITY POLYETHYLENE
   b. HDPE HIGH DENSITY POLYETHYLENE DRAW STRING KNITTED DIRECTLY INTO BAG OPENING.
   c. 80% FABRIC CLOSURE WITH APPARENT OPENING SIZE NO LARGER THAN 1/8" X 1/8"
   d. ROLLED SEAM USING A MINIMUM OF 480 DENIER POLYESTER SEWING YARN FOR STRENGTH AND DURABILITY.

AGGREGATE TO BE WELL GRADED COURSE AGGREGATE CONFORMING TO THE FOLLOWING GRADATION REQUIREMENTS:

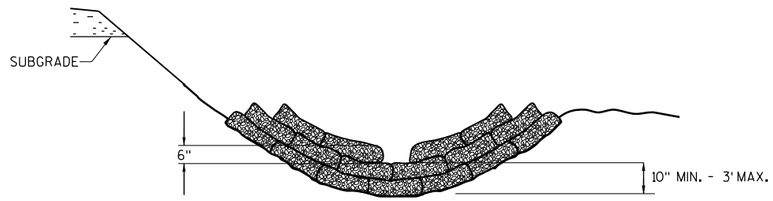
SIEVE SIZE	SIZE NO. AASHTO No. 67 [1]
2 INCH (50 mm)	-
1 1/2 INCH (37.5mm)	-
1 INCH (25.0 mm)	100
3/4 INCH (19.0mm)	90-100
3/8 INCH (9.5mm)	20-55
No. 4 (4.75mm)	0-10
No. 8 (2.36mm)	0-5

[1] SIZE No. ACCORDING TO AASHTO M 43

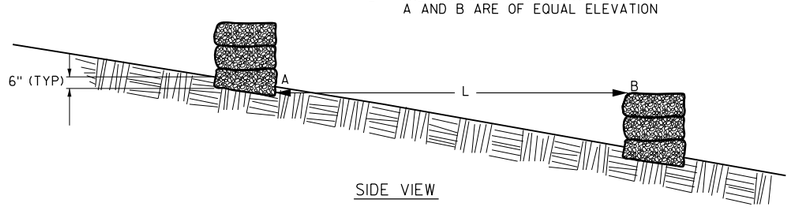
COURSE AGGREGATE INFORMATION



FILTER BAG DETAIL
(PRIOR TO INSTALLATION)



CROSS SECTIONAL VIEW



SIDE VIEW

DITCH CHECK DETAIL

1/5 PROPOSED ROCK FILLED FILTER BAG
NOT TO SCALE

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE B-5
EROSION CONTROL DETAILS (2 of 3)

Scale:	NOT TO SCALE	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

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5/7/2015 bjwl

GENERAL NOTES

VARIATIONS IN THE DIMENSIONS OR MATERIALS SHOWN HEREON MAY BE PERMITTED IF THEY PROVIDE EQUIVALENT PROTECTION AND MATERIAL STRENGTH AND IF PRIOR APPROVAL OF THE ENGINEER IS OBTAINED.

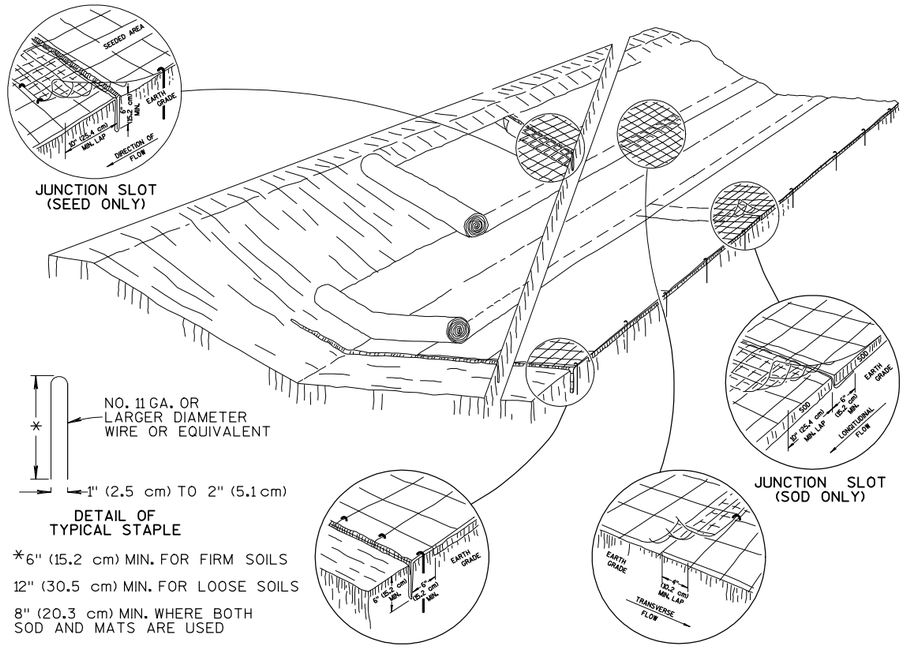
PLACE LAP JOINTS IN THE BOTTOM OF V-SHAPED DITCHES.

STAGGER JUNCTION SLOTS ON ADJACENT STRIPS OF MATTING A MINIMUM OF 4 FEET (1.219 m) APART.

EDGES OF THE EROSION MAT SHALL BE IMPRESSED IN THE SOIL.

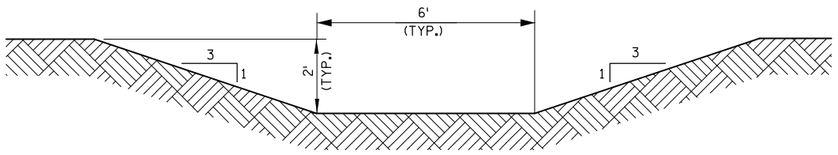
EROSION MAT OVER SEEDING

JUNCTION OR ANCHOR SLOTS SHALL BE AT MINIMUM INTERVALS OF 100 FEET (30.48 m) ON GRADES UP TO AND INCLUDING 3 PERCENT, AND 50 FEET (15.24 m) ON GRADES EXCEEDING 3 PERCENT.



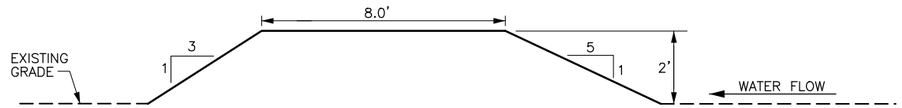
1/6 PROPOSED EROSION MAT

NOT TO SCALE



2/6 TYPICAL PROPOSED DRAINAGE SWALE DETAIL

NOT TO SCALE



BERM DIMENSIONS INSIDE SOIL EXCAVATION AREA

3/6 TYPICAL PROPOSED DIVERSION BERM DETAIL

NOT TO SCALE

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY: MAN	DATE: MAY '15
APPROVED BY: SVF	DATE: MAY '15
APPROVED BY:	DATE:

Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE B-6

EROSION CONTROL DETAILS (IF NEEDED) (3 of 3)

Scale: NOT TO SCALE	Date: MAY 2015
Prepared By: JRB2	Project No: 14F779

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5/11/2015 jrb2

LEGEND

- 1150 — EXISTING 2' ELEVATION CONTOURS
- EXISTING FENCE
- EXISTING TREE
- EXISTING TREE LINE
- EXISTING BUILDING
- EXISTING EDGE OF GRAVEL
- EXISTING EDGE OF PAVEMENT
- EXISTING CULVERT LOCATION
- INDUSTRIAL OUTLOT LIMITS
- 1140 — PROPOSED CONTOUR
- PROPOSED DRAINAGE PATTERN
- PONDING AREA

N

1,682,500 E

1,683,000 E

101,000 N

100,500 N

EAST HWY. 27 WATERSHED: 1141.1 ELEV.

1142.3 ELEV.

1142.2

1142.0

1138.2 ELEV.

PROPOSED 24" CULVERT

PROPOSED INVERT=1140.5

PROPOSED INVERT=1141.0

Invert Elev. 1139.00

36" CMP

Invert Elev. 1139.83

MAX. FLOW: 8.3 CFS

Invert Elev. 1142.11

12" CMP

Invert Elev. 1141.92

1138.1 ELEV.

1135 ELEV.

MAX. FLOW: 21 CFS

Invert Elev. 1132.57

18" CMP

Invert Elev. 1131.51

COPPER PARK LANE

ST. HWY 27

NOTE:

1. HORIZONTAL DATUM BASED ON NAD 1983. HORIZONTAL COORDINATES BASED ON WISCONSIN STATE PLAN NORTH (NORTH).

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE B-7

2-YR., 24-HR. MAXIMUM PONDING ELEVATIONS

Scale:	0 60' 120'	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

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5/7/2015 bjw1

LEGEND

- 1150 — EXISTING 2' ELEVATION CONTOURS
- EXISTING FENCE
- EXISTING TREE
- EXISTING TREE LINE
- EXISTING BUILDING
- EXISTING EDGE OF GRAVEL
- EXISTING EDGE OF PAVEMENT
- EXISTING CULVERT LOCATION
- INDUSTRIAL OUTLOT LIMITS
- 1140 — PROPOSED CONTOUR
- PROPOSED DRAINAGE PATTERN
- PONDING AREA

N

1,682,500 E

1,683,000 E

1,682,000 E

101,000 N

100,500 N

EAST HWY. 27 WATERSHED: 1142.6 ELEV.

HWY 27

1138.6 ELEV.

Invert Elev. 1139.00

36" CMP

Invert Elev. 1139.83

MAX. FLOW: 50 CFS

PROPOSED 24" CMP

PROPOSED INVERT=1140.5

PROPOSED INVERT=1141.0

1142.9 ELEV.

Invert Elev. 1142.11

12" CMP

Invert Elev. 1141.92

1136.5 ELEV.

1138.2 ELEV.

MAX. FLOW: 55.5 CFS

Invert Elev. 1132.57

PROPOSED 60" CMP

COPPER PARK LANE

Invert Elev. 1131.51

NOTE:

1. HORIZONTAL DATUM BASED ON NAD 1983. HORIZONTAL COORDINATES BASED ON WISCONSIN STATE PLAN NORTH (NORTH).

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE B-8

HYDROLOGY MODEL RESULTS: 10-YR., 24-HR. STORM EVENT

Scale:	0 60' 120'	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

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5/7/2015 bjwl

LEGEND

- 1150 — EXISTING 2' ELEVATION CONTOURS
- EXISTING FENCE
- EXISTING TREE
- EXISTING TREE LINE
- EXISTING BUILDING
- EXISTING EDGE OF GRAVEL
- EXISTING EDGE OF PAVEMENT
- EXISTING CULVERT LOCATION
- INDUSTRIAL OUTLOT LIMITS
- 1140 — PROPOSED CONTOUR
- PROPOSED DRAINAGE PATTERN
- PONDING AREA

N

1,682,500 E

1,683,000 E

1,682,000 E

101,000 N

100,500 N

EAST HWY. 27 WATERSHED: 1144.2 ELEV.

HWY 27

1139.2 ELEV.

Invert Elev. 1139.00

36" CMP

Invert Elev. 1139.83

MAX. FLOW: 60 CFS

PROPOSED 24" CMP

PROPOSED INVERT=1140.5

PROPOSED INVERT=1141.0

1138.5 ELEV.

1144.0 ELEV.

Invert Elev. 1142.11

12" CMP

Invert Elev. 1141.92

1138.6 ELEV.

MAX. FLOW: 101 CFS

Invert Elev. 1132.57

PROPOSED 60" CMP

COPPER PARK LANE

Invert Elev. 1131.51

NOTES:

1. HORIZONTAL DATUM BASED ON NAD 1983. HORIZONTAL COORDINATES BASED ON WISCONSIN STATE PLAN NORTH (NORTH).

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION

CHECKED BY:	MAN	DATE:	MAY '15
APPROVED BY:	SVF	DATE:	MAY '15
APPROVED BY:		DATE:	

Foth Infrastructure & Environment, LLC

FLAMBEAU MINING COMPANY

FIGURE B-9

HYDROLOGY MODEL RESULTS: 100-YR., 24-HR. STORM EVENT

Scale:	0 60' 120'	Date:	MAY 2015
Prepared By:	JRB2	Project No:	14F779

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5/7/2015 bjw1

Appendix A

Universal Soil Loss Equation Calculations

Universal Soil Loss Equation for Construction Sites

for use in the State of Wisconsin

commerce.wi.gov Wisconsin Department of Commerce

Developer:

Project: Flambeau Mining Company

Date: 4/1/2015

County: Rusk ***VER ESTABLISHMENT FROM SEEDING MUST BE AT LEAST 60 DAYS***

Version 3.0

Land Disturbing Activity	Begin Date	End Date	Period % R	Annual R Factor	Sub Soil Texture	Soil Erodibility K Factor	Slope (%)	Slope Length (feet)	LS Factor	Land Cover C Factor	Soil loss A=%RxRxKxLSxC (tons/acre)	Percent Reduction Required	
												5.0 tons/acre	7.5 tons/acre
Bare Ground	8/1/2015	10/15/2015	31.0%	130	Silty Clay	0.28	1.0%	300	0.18	1.00	2.0		
Seed and Mulch	10/15/2015	11/15/2015	4.0%	130	Silty Clay	0.28	1.0%	300	0.18	0.12	0.0		
End	11/15/2015	-----	-----	-----	-------	-----			-----	-----	-----		
		-----	-----	-----	-------	-----			-----	-----	-----		
		-----	-----	-----	-------	-----			-----	-----	-----		
		-----	-----	-----	-------	-----			-----	-----	-----		
COVER ESTABLISHMENT FROM SEEDING MUST BE AT LEAST 60 DAYS													
										TOTAL	2.1	NONE	NONE

Land Disturbing Activities:

Input	Definition
Bare Ground	activity which leaves the ground devoid of vegetation
Seed and Mulch	application of straw at 1.5 tons/acre with or without seeding
Seeding	temporary or permanent seeding without the use of mulching materials
Sod	installation of sod
End	end of 60 day cover establishment or permanent stabilization (required input)

If additional practices are needed for 1 acre or more disturbed: ("X" all that apply)

X	Mandatory practices per Comm 60(req'd)
	Wet basin per standard
	Seed & mulch within 1 week of disturbance
	Erosion control mat per standard
x	Place "X" in this box if no % reduction is required on "TOTAL" row
X	No additional practices needed to comply with soil loss standar
	Additional practices needed to comply with soil loss standard

Notes:

Designed By:	Mike Nimmer
Date	4/1/2015
Checked By:	
Date	

Appendix B

WDNR Construction Site Inspection Report

State of Wisconsin
Department of Natural Resources
dnr.wi.gov

CONSTRUCTION SITE INSPECTION REPORT

Form 3400-187 (rev. 9/04)

Notice: Use of this specific form is voluntary, but the information contained on this form must be collected and kept by the permittee under s. NR 216.48(4), Wis. Adm. Code, for a construction site covered under the General WPDES Construction Site Storm Water Discharge Permit, Permit No. WI-0067831-2. This form is provided for the convenience of the permittee to meet the requirements of s. NR 216.48(4), Wis. Adm. Code. Multiple copies of this form may be made to compile the inspection report.

Inspections of implemented erosion and sediment control best management practices must be performed weekly and within 24 hours after a precipitation event 0.5 inches or greater which results in runoff.

Weekly written reports of all inspections conducted by or for the permittee must be maintained throughout the period of general permit coverage.

The information maintained in accordance with s. NR 216.48 (4) must be submitted to the Department upon request.

Name of Permittee:	
Construction Site Name (Project):	**Construction Site ID No.:**
Location:	**County:**
Contractor:	**Field Office Phone:**

Note: Weekly inspection reports, along with erosion control and stormwater management plans, are required to be maintained on site and made available upon request.

Date of inspection (mm/dd/yy): _____ **Time of inspection: Start:** _____ **a.m./p.m.** **End:** _____ **a.m./p.m.**	**Type of inspection:** ☐ **Weekly** ☐ **Precipitation Event** ☐ **Other (specify)** _____ **Name(s) of individual(s) performing inspection:**
Weather:	
Description of present phase of construction:	

Modifications Required	Yes	No	Not Applicable	**Comments/Recommendations** about the overall effectiveness of the erosion and sediment control measures. **Note**: For each item checked "Yes", complete the follow-up information on page 2.
Ditch Checks	☐	☐	☐	
Erosion Control Plan	☐	☐	☐	
Erosion Mat	☐	☐	☐	
Grading Practices	☐	☐	☐	
Inlet Protection	☐	☐	☐	
Mulch	☐	☐	☐	
Offsite Sediment	☐	☐	☐	
Permanent Seeding	☐	☐	☐	
Schedule / Phasing	☐	☐	☐	
Silt Fence	☐	☐	☐	
Silt Screen	☐	☐	☐	
Sod	☐	☐	☐	
Stabilized Outlet	☐	☐	☐	
Temp. Diversion Channel	☐	☐	☐	
Temp. Settling Basin	☐	☐	☐	
Temporary Seeding	☐	☐	☐	
Tracking Pads	☐	☐	☐	
Turbidity Barrier	☐	☐	☐	
Other (specify) _____	☐	☐	☐	

Name of Permittee:	
Construction Site Name (Project):	**Construction Site ID No.:**

Use the space below for detailed follow-up action items.

Exact place of erosion/sediment control inspected	**Type of erosion/sediment control and its observed condition**	**Description of any necessary maintenance or repair to erosion/sediment control, including anticipated date of completion**

Appendix C

Surface Water Quantity Calculations

Culvert Calculator Report
CPL_48 in culvert

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	1,140.40	ft	Headwater Depth/Height	1.96	
Computed Headwater Elev	1,140.40	ft	Discharge	124.68	cfs
Inlet Control HW Elev.	1,140.15	ft	Tailwater Elevation	1,133.00	ft
Outlet Control HW Elev.	1,140.40	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	1,132.57	ft	Downstream Invert	1,131.51	ft
Length	90.00	ft	Constructed Slope	0.011778	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	3.35	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	3.35	ft
Velocity Downstream	11.08	ft/s	Critical Slope	0.024714	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,140.40	ft	Upstream Velocity Head	1.53	ft
Ke	0.90		Entrance Loss	1.38	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,140.15	ft	Flow Control	N/A	
Inlet Type	Projecting		Area Full	12.6	ft²
K	0.03400		HDS 5 Chart	2	
M	1.50000		HDS 5 Scale	3	
C	0.05530		Equation Form	1	
Y	0.54000				

Culvert Calculator Report
Hwy 27 _36 in culvert

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	1,146.15	ft	Headwater Depth/Height	2.11	
Computed Headwater Eleva	1,146.15	ft	Discharge	82.03	cfs
Inlet Control HW Elev.	1,146.15	ft	Tailwater Elevation	1,140.00	ft
Outlet Control HW Elev.	1,145.29	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,139.83	ft	Downstream Invert	1,138.99	ft
Length	65.00	ft	Constructed Slope	0.012938	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	2.79	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.79	ft
Velocity Downstream	11.98	ft/s	Critical Slope	0.013088	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,145.29	ft	Upstream Velocity Head	2.15	ft
Ke	0.20		Entrance Loss	0.43	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,146.15	ft	Flow Control	N/A	
Inlet Type	Groove end projecting		Area Full	7.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
West Swale_24 in culvert

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	1,145.00	ft	Headwater Depth/Height	2.00	
Computed Headwater Eleva	1,145.00	ft	Discharge	22.29	cfs
Inlet Control HW Elev.	1,144.85	ft	Tailwater Elevation	1,141.75	ft
Outlet Control HW Elev.	1,145.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	1,141.00	ft	Downstream Invert	1,140.35	ft
Length	40.00	ft	Constructed Slope	0.016250	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	1.68	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.68	ft
Velocity Downstream	7.89	ft/s	Critical Slope	0.031615	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,145.00	ft	Upstream Velocity Head	0.78	ft
Ke	0.90		Entrance Loss	0.70	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,144.85	ft	Flow Control	N/A	
Inlet Type	Projecting		Area Full	3.1	ft²
K	0.03400		HDS 5 Chart	2	
M	1.50000		HDS 5 Scale	3	
C	0.05530		Equation Form	1	
Y	0.54000				

North to East Spillway

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00670	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	45.00	ft^3/s

Results

Normal Depth	1.11	ft
Flow Area	12.52	ft^2
Wetted Perimeter	15.00	ft
Hydraulic Radius	0.83	ft
Top Width	14.64	ft
Critical Depth	0.88	ft
Critical Slope	0.01514	ft/ft
Velocity	3.59	ft/s
Velocity Head	0.20	ft
Specific Energy	1.31	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.11	ft
Critical Depth	0.88	ft
Channel Slope	0.00670	ft/ft
Critical Slope	0.01514	ft/ft

Pond Low-flow Channels

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00125	ft/ft
Normal Depth	0.50	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	8.00	ft

Results

Discharge	4.85	ft^3/s
Flow Area	5.00	ft^2
Wetted Perimeter	12.12	ft
Hydraulic Radius	0.41	ft
Top Width	12.00	ft
Critical Depth	0.22	ft
Critical Slope	0.02268	ft/ft
Velocity	0.97	ft/s
Velocity Head	0.01	ft
Specific Energy	0.51	ft
Froude Number	0.27	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.22	ft
Channel Slope	0.00125	ft/ft
Critical Slope	0.02268	ft/ft

West 27 waterway capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01250	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	120.00	ft³/s

Results

Normal Depth	1.51	ft
Flow Area	21.17	ft²
Wetted Perimeter	20.44	ft
Hydraulic Radius	1.04	ft
Top Width	20.07	ft
Critical Depth	1.49	ft
Critical Slope	0.01325	ft/ft
Velocity	5.67	ft/s
Velocity Head	0.50	ft
Specific Energy	2.01	ft
Froude Number	0.97	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.51	ft
Critical Depth	1.49	ft
Channel Slope	0.01250	ft/ft
Critical Slope	0.01325	ft/ft

West swale

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00090	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	20.00	ft³/s

Results

Normal Depth	1.23	ft
Flow Area	14.34	ft²
Wetted Perimeter	15.76	ft
Hydraulic Radius	0.91	ft
Top Width	15.36	ft
Critical Depth	0.54	ft
Critical Slope	0.01732	ft/ft
Velocity	1.39	ft/s
Velocity Head	0.03	ft
Specific Energy	1.26	ft
Froude Number	0.25	
Flow Type	Subcritical	

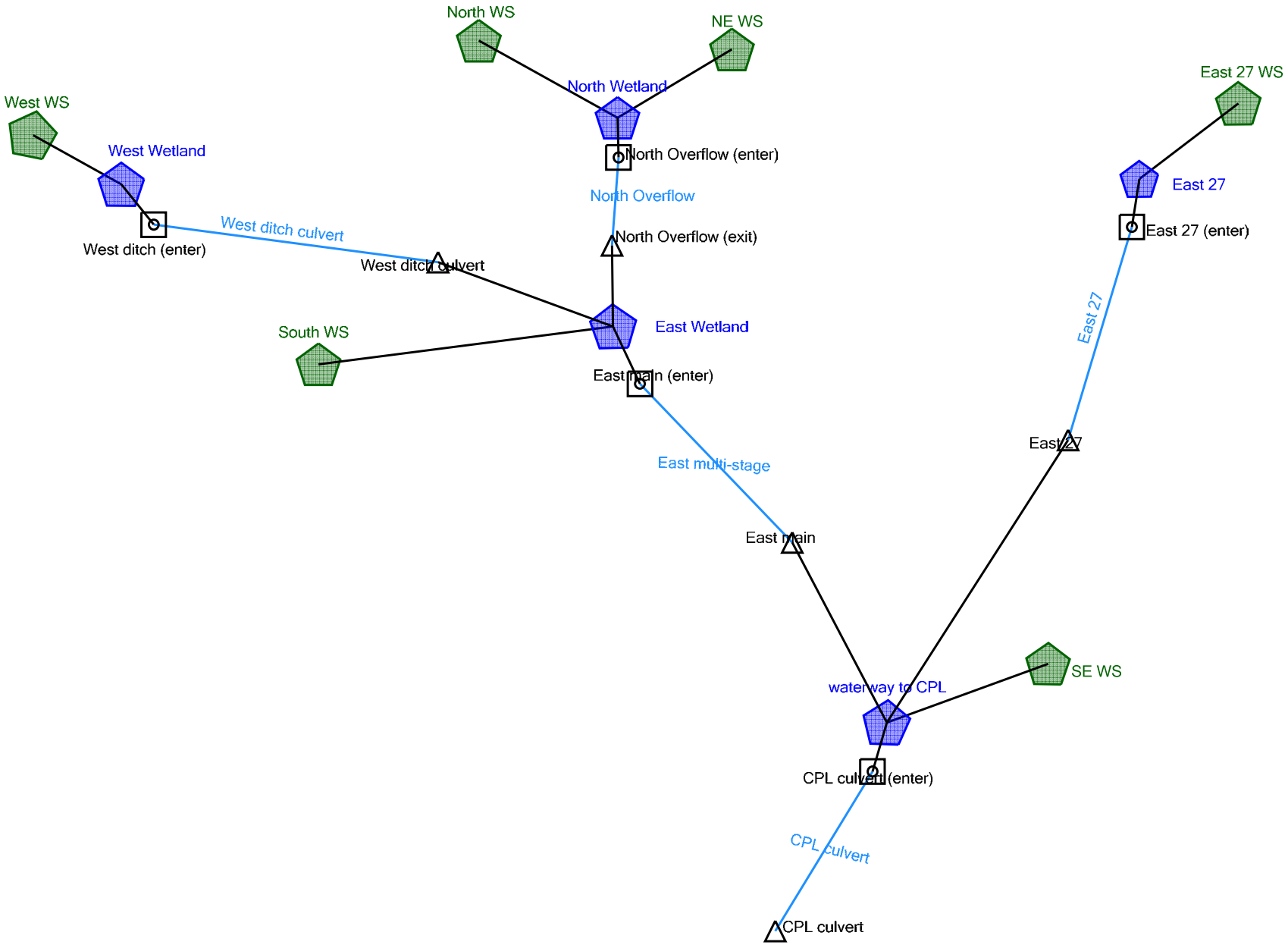
GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.23	ft
Critical Depth	0.54	ft
Channel Slope	0.00090	ft/ft
Critical Slope	0.01732	ft/ft

Scenario: 100-yr, 24-hr



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Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
NE WS	2-yr, 24-hr	2	0.476	12.300	4.66
NE WS	10-yr, 24-hr	10	1.067	12.300	11.82
NE WS	100-yr, 24-hr	100	2.551	12.250	29.95
North WS	2-yr, 24-hr	2	0.665	12.150	11.40
North WS	10-yr, 24-hr	10	1.166	12.150	19.79
North WS	100-yr, 24-hr	100	2.248	12.150	37.09
South WS	2-yr, 24-hr	2	0.410	12.100	8.13
South WS	10-yr, 24-hr	10	0.682	12.100	13.25
South WS	100-yr, 24-hr	100	1.253	12.100	23.51
West WS	2-yr, 24-hr	2	1.316	12.250	15.46
West WS	10-yr, 24-hr	10	2.370	12.250	28.16
West WS	100-yr, 24-hr	100	4.686	12.250	55.06
East 27 WS	2-yr, 24-hr	2	2.336	12.550	11.58
East 27 WS	10-yr, 24-hr	10	6.730	12.450	50.14
East 27 WS	100-yr, 24-hr	100	19.326	12.400	171.27
SE WS	2-yr, 24-hr	2	0.340	12.150	5.81
SE WS	10-yr, 24-hr	10	0.681	12.150	11.98
SE WS	100-yr, 24-hr	100	1.481	12.150	25.85

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
CPL culvert	2-yr, 24-hr	2	5.544	12.600	20.51
CPL culvert	10-yr, 24-hr	10	12.696	12.700	55.48
CPL culvert	100-yr, 24-hr	100	31.545	12.750	101.16

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
North Wetland (IN)	2-yr, 24-hr	2	1.142	12.150	14.13	(N/A)	(N/A)
North Wetland (OUT)	2-yr, 24-hr	2	1.142	12.300	9.16	1,138.20	0.151
North Wetland (Reverse)	2-yr, 24-hr	2	-0.001	9.500	-0.01	(N/A)	(N/A)
North Wetland (IN)	10-yr, 24-hr	10	2.233	12.150	28.21	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
North Wetland (OUT)	10-yr, 24-hr	10	2.233	12.300	20.08	1,138.55	0.259
North Wetland (Reverse)	10-yr, 24-hr	10	-0.001	7.800	-0.01	(N/A)	(N/A)
North Wetland (IN)	100-yr, 24-hr	100	4.799	12.150	60.11	(N/A)	(N/A)
North Wetland (OUT)	100-yr, 24-hr	100	4.799	12.300	44.37	1,139.18	0.493
North Wetland (Reverse)	100-yr, 24-hr	100	-0.001	5.950	-0.01	(N/A)	(N/A)
East Wetland (IN)	2-yr, 24-hr	2	2.868	12.100	14.66	(N/A)	(N/A)
East Wetland (OUT)	2-yr, 24-hr	2	2.868	12.400	14.09	1,138.04	0.263
East Wetland (IN)	10-yr, 24-hr	10	5.285	12.350	29.91	(N/A)	(N/A)
East Wetland (OUT)	10-yr, 24-hr	10	5.285	12.400	29.41	1,138.17	0.325
East Wetland (IN)	100-yr, 24-hr	100	10.738	12.300	64.46	(N/A)	(N/A)
East Wetland (OUT)	100-yr, 24-hr	100	10.738	12.350	62.89	1,138.54	0.512
waterway to CPL (IN)	2-yr, 24-hr	2	5.544	12.550	20.55	(N/A)	(N/A)
waterway to CPL (OUT)	2-yr, 24-hr	2	5.544	12.600	20.51	1,134.82	0.010
waterway to CPL (IN)	10-yr, 24-hr	10	12.696	12.550	56.91	(N/A)	(N/A)
waterway to CPL (OUT)	10-yr, 24-hr	10	12.696	12.700	55.48	1,136.54	0.130
waterway to CPL (IN)	100-yr, 24-hr	100	31.545	12.400	116.51	(N/A)	(N/A)
waterway to CPL (OUT)	100-yr, 24-hr	100	31.545	12.750	101.16	1,138.48	1.024
East 27 (IN)	2-yr, 24-hr	2	2.336	12.550	11.58	(N/A)	(N/A)
East 27 (OUT)	2-yr, 24-hr	2	2.336	12.950	8.27	1,141.11	0.237
East 27 (IN)	10-yr, 24-hr	10	6.730	12.450	50.14	(N/A)	(N/A)
East 27 (OUT)	10-yr, 24-hr	10	6.730	12.800	31.52	1,142.57	1.028
East 27 (IN)	100-yr, 24-hr	100	19.326	12.400	171.27	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
East 27 (OUT)	100-yr, 24-hr	100	19.326	13.050	60.01	1,144.17	5.737
West Wetland (IN)	2-yr, 24-hr	2	1.316	12.250	15.46	(N/A)	(N/A)
West Wetland (OUT)	2-yr, 24-hr	2	1.316	12.700	4.71	1,142.29	0.488
West Wetland (IN)	10-yr, 24-hr	10	2.370	12.250	28.16	(N/A)	(N/A)
West Wetland (OUT)	10-yr, 24-hr	10	2.370	12.650	9.23	1,142.91	0.899
West Wetland (IN)	100-yr, 24-hr	100	4.686	12.250	55.06	(N/A)	(N/A)
West Wetland (OUT)	100-yr, 24-hr	100	4.686	12.650	18.21	1,144.00	1.797

Time-Depth Curve: 100-yr, 24-hr	
Label	100-yr, 24-hr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.2
4.500	0.2	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.3
5.500	0.3	0.4	0.4	0.4	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.5	0.5	0.5	0.5
7.000	0.5	0.5	0.5	0.5	0.6
7.500	0.6	0.6	0.6	0.6	0.6
8.000	0.6	0.6	0.7	0.7	0.7
8.500	0.7	0.7	0.7	0.7	0.8
9.000	0.8	0.8	0.8	0.8	0.9
9.500	0.9	0.9	0.9	1.0	1.0
10.000	1.0	1.0	1.1	1.1	1.1
10.500	1.1	1.2	1.2	1.3	1.3
11.000	1.4	1.4	1.5	1.6	1.7
11.500	1.7	1.8	2.0	2.2	2.5
12.000	3.0	3.9	4.2	4.4	4.6
12.500	4.7	4.7	4.8	4.9	5.0
13.000	5.0	5.1	5.1	5.2	5.2
13.500	5.3	5.3	5.3	5.3	5.4
14.000	5.4	5.4	5.4	5.5	5.5
14.500	5.5	5.5	5.6	5.6	5.6
15.000	5.6	5.6	5.7	5.7	5.7
15.500	5.7	5.7	5.7	5.7	5.8
16.000	5.8	5.8	5.8	5.8	5.8
16.500	5.8	5.8	5.9	5.9	5.9
17.000	5.9	5.9	5.9	5.9	5.9
17.500	6.0	6.0	6.0	6.0	6.0

Subsection: Time-Depth Curve
Label: Rusk Co

Return Event: 100 years
Storm Event: 100-yr, 24-hr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	6.0	6.0	6.0	6.0	6.0
18.500	6.1	6.1	6.1	6.1	6.1
19.000	6.1	6.1	6.1	6.1	6.1
19.500	6.2	6.2	6.2	6.2	6.2
20.000	6.2	6.2	6.2	6.2	6.2
20.500	6.2	6.2	6.2	6.3	6.3
21.000	6.3	6.3	6.3	6.3	6.3
21.500	6.3	6.3	6.3	6.3	6.3
22.000	6.3	6.3	6.3	6.3	6.3
22.500	6.3	6.4	6.4	6.4	6.4
23.000	6.4	6.4	6.4	6.4	6.4
23.500	6.4	6.4	6.4	6.4	6.4
24.000	6.4	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 10-yr, 24-hr	
Label	10-yr, 24-hr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.0	0.0	0.0
2.000	0.0	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.1	0.1	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.3	0.3	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.4	0.4	0.4	0.4	0.4
8.000	0.4	0.4	0.4	0.4	0.4
8.500	0.4	0.4	0.5	0.5	0.5
9.000	0.5	0.5	0.5	0.5	0.5
9.500	0.6	0.6	0.6	0.6	0.6
10.000	0.6	0.6	0.7	0.7	0.7
10.500	0.7	0.7	0.8	0.8	0.8
11.000	0.9	0.9	0.9	1.0	1.0
11.500	1.1	1.2	1.2	1.4	1.6
12.000	1.9	2.4	2.6	2.8	2.8
12.500	2.9	3.0	3.0	3.1	3.1
13.000	3.1	3.2	3.2	3.2	3.3
13.500	3.3	3.3	3.3	3.3	3.4
14.000	3.4	3.4	3.4	3.4	3.4
14.500	3.4	3.5	3.5	3.5	3.5
15.000	3.5	3.5	3.5	3.5	3.6
15.500	3.6	3.6	3.6	3.6	3.6
16.000	3.6	3.6	3.6	3.6	3.6
16.500	3.6	3.7	3.7	3.7	3.7
17.000	3.7	3.7	3.7	3.7	3.7
17.500	3.7	3.7	3.7	3.7	3.7

Subsection: Time-Depth Curve
Label: Rusk Co

Return Event: 10 years
Storm Event: 10-yr, 24-hr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	3.8	3.8	3.8	3.8	3.8
18.500	3.8	3.8	3.8	3.8	3.8
19.000	3.8	3.8	3.8	3.8	3.8
19.500	3.8	3.8	3.9	3.9	3.9
20.000	3.9	3.9	3.9	3.9	3.9
20.500	3.9	3.9	3.9	3.9	3.9
21.000	3.9	3.9	3.9	3.9	3.9
21.500	3.9	3.9	3.9	3.9	3.9
22.000	4.0	4.0	4.0	4.0	4.0
22.500	4.0	4.0	4.0	4.0	4.0
23.000	4.0	4.0	4.0	4.0	4.0
23.500	4.0	4.0	4.0	4.0	4.0
24.000	4.0	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 2-yr, 24-hr	
Label	2-yr, 24-hr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.0	0.0	0.0
2.000	0.0	0.0	0.0	0.0	0.0
2.500	0.0	0.0	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.1	0.1	0.1
4.500	0.1	0.1	0.1	0.1	0.1
5.000	0.1	0.1	0.1	0.1	0.1
5.500	0.1	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.2	0.2
6.500	0.2	0.2	0.2	0.2	0.2
7.000	0.2	0.2	0.2	0.2	0.2
7.500	0.2	0.3	0.3	0.3	0.3
8.000	0.3	0.3	0.3	0.3	0.3
8.500	0.3	0.3	0.3	0.3	0.3
9.000	0.3	0.3	0.4	0.4	0.4
9.500	0.4	0.4	0.4	0.4	0.4
10.000	0.4	0.5	0.5	0.5	0.5
10.500	0.5	0.5	0.5	0.6	0.6
11.000	0.6	0.6	0.7	0.7	0.7
11.500	0.8	0.8	0.9	1.0	1.1
12.000	1.3	1.7	1.8	1.9	2.0
12.500	2.0	2.1	2.1	2.1	2.2
13.000	2.2	2.2	2.2	2.3	2.3
13.500	2.3	2.3	2.3	2.3	2.3
14.000	2.4	2.4	2.4	2.4	2.4
14.500	2.4	2.4	2.4	2.4	2.5
15.000	2.5	2.5	2.5	2.5	2.5
15.500	2.5	2.5	2.5	2.5	2.5
16.000	2.5	2.5	2.5	2.5	2.5
16.500	2.6	2.6	2.6	2.6	2.6
17.000	2.6	2.6	2.6	2.6	2.6
17.500	2.6	2.6	2.6	2.6	2.6

Subsection: Time-Depth Curve
Label: Rusk Co

Return Event: 2 years
Storm Event: 2-yr, 24-hr

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
18.000	2.6	2.6	2.6	2.6	2.6
18.500	2.7	2.7	2.7	2.7	2.7
19.000	2.7	2.7	2.7	2.7	2.7
19.500	2.7	2.7	2.7	2.7	2.7
20.000	2.7	2.7	2.7	2.7	2.7
20.500	2.7	2.7	2.7	2.7	2.7
21.000	2.7	2.7	2.7	2.7	2.8
21.500	2.8	2.8	2.8	2.8	2.8
22.000	2.8	2.8	2.8	2.8	2.8
22.500	2.8	2.8	2.8	2.8	2.8
23.000	2.8	2.8	2.8	2.8	2.8
23.500	2.8	2.8	2.8	2.8	2.8
24.000	2.8	(N/A)	(N/A)	(N/A)	(N/A)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	272.00 ft
Manning's n	0.030
Slope	0.005 ft/ft
2 Year 24 Hour Depth	2.8 in
Average Velocity	0.39 ft/s
Segment Time of Concentration	0.194 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,458.00 ft
Is Paved?	False
Slope	0.008 ft/ft
Average Velocity	1.42 ft/s
Segment Time of Concentration	0.286 hours

Segment #3: TR-55 Channel Flow	
Flow Area	24.6 ft²
Hydraulic Length	666.00 ft
Manning's n	0.050
Slope	0.014 ft/ft
Wetted Perimeter	22.58 ft
Average Velocity	3.67 ft/s
Segment Time of Concentration	0.050 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.531 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Tc =
Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	129.00 ft
Manning's n	0.030
Slope	0.013 ft/ft
2 Year 24 Hour Depth	2.8 in
Average Velocity	0.50 ft/s
Segment Time of Concentration	0.071 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,080.00 ft
Is Paved?	False
Slope	0.009 ft/ft
Average Velocity	1.53 ft/s
Segment Time of Concentration	0.196 hours

Segment #3: TR-55 Channel Flow	
Flow Area	10.0 ft²
Hydraulic Length	554.00 ft
Manning's n	0.050
Slope	0.009 ft/ft
Wetted Perimeter	15.08 ft
Average Velocity	2.11 ft/s
Segment Time of Concentration	0.073 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.340 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Tc =
Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	84.00 ft
Manning's n	0.030
Slope	0.004 ft/ft
2 Year 24 Hour Depth	2.8 in
Average Velocity	0.29 ft/s
Segment Time of Concentration	0.080 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	311.00 ft
Is Paved?	False
Slope	0.011 ft/ft
Average Velocity	1.69 ft/s
Segment Time of Concentration	0.051 hours

Segment #3: TR-55 Channel Flow	
Flow Area	7.4 ft²
Hydraulic Length	195.00 ft
Manning's n	0.050
Slope	0.024 ft/ft
Wetted Perimeter	12.64 ft
Average Velocity	3.24 ft/s
Segment Time of Concentration	0.017 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.148 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Tc =
Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	60.00 ft
Manning's n	0.013
Slope	0.002 ft/ft
2 Year 24 Hour Depth	2.8 in
Average Velocity	0.40 ft/s
Segment Time of Concentration	0.041 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	404.00 ft
Is Paved?	False
Slope	0.022 ft/ft
Average Velocity	2.39 ft/s
Segment Time of Concentration	0.047 hours

Segment #3: TR-55 Channel Flow	
Flow Area	17.1 ft²
Hydraulic Length	524.00 ft
Manning's n	0.050
Slope	0.012 ft/ft
Wetted Perimeter	17.87 ft
Average Velocity	3.17 ft/s
Segment Time of Concentration	0.046 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.134 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Tc =
Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	67.00 ft
Manning's n	0.013
Slope	0.004 ft/ft
2 Year 24 Hour Depth	2.8 in
Average Velocity	0.54 ft/s
Segment Time of Concentration	0.034 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	118.00 ft
Is Paved?	True
Slope	0.027 ft/ft
Average Velocity	3.34 ft/s
Segment Time of Concentration	0.010 hours

Segment #3: TR-55 Channel Flow	
Flow Area	4.0 ft²
Hydraulic Length	89.00 ft
Manning's n	0.050
Slope	0.050 ft/ft
Wetted Perimeter	10.12 ft
Average Velocity	3.59 ft/s
Segment Time of Concentration	0.007 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.083 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Tc =
Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	46.00 ft
Manning's n	0.030
Slope	0.029 ft/ft
2 Year 24 Hour Depth	2.8 in
Average Velocity	0.57 ft/s
Segment Time of Concentration	0.022 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	537.00 ft
Is Paved?	False
Slope	0.012 ft/ft
Average Velocity	1.77 ft/s
Segment Time of Concentration	0.084 hours

Segment #3: TR-55 Channel Flow	
Flow Area	14.7 ft²
Hydraulic Length	634.00 ft
Manning's n	0.050
Slope	0.001 ft/ft
Wetted Perimeter	15.91 ft
Average Velocity	0.77 ft/s
Segment Time of Concentration	0.228 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.334 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Tc =
Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Runoff CN-Area
Label: East 27 WS

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil B	55.000	59.230	0.0	0.0	55.000
Brush - brush, weed, grass mix - good - Soil C	65.000	43.500	0.0	0.0	65.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	2.270	0.0	0.0	98.000
Impervious Areas - Dirt (w/ right-of-way) - Soil C	87.000	1.000	0.0	0.0	87.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	106.000	(N/A)	(N/A)	60.327

Subsection: Runoff CN-Area
Label: NE WS

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	4.286	0.0	0.0	70.000
Brush - brush, weed, grass mix - good - Soil C	65.000	5.230	0.0	0.0	65.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.584	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	10.100	(N/A)	(N/A)	69.030

Subsection: Runoff CN-Area
Label: North WS

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	2.740	0.0	0.0	71.000
Impervious Areas - Dirt (w/ right-of-way) - Soil C	87.000	0.920	0.0	0.0	87.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	2.240	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	5.900	(N/A)	(N/A)	83.746

Subsection: Runoff CN-Area
Label: SE WS

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.700	0.0	0.0	98.000
Woods - fair - Soil C	73.000	1.500	0.0	0.0	73.000
Brush - brush, weed, grass mix - fair - Soil C	70.000	2.700	0.0	0.0	70.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	4.900	(N/A)	(N/A)	74.918

Subsection: Runoff CN-Area
Label: South WS

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	1.029	0.0	0.0	71.000
Impervious Areas - Dirt (w/ right-of-way)	87.000	0.071	0.0	0.0	87.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads	98.000	1.900	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.000	(N/A)	(N/A)	88.479

Subsection: Runoff CN-Area
Label: West WS

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	4.780	0.0	0.0	98.000
Impervious Areas - Dirt (w/ right-of-way) - Soil C	87.000	0.625	0.0	0.0	87.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	7.500	0.0	0.0	71.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	12.905	(N/A)	(N/A)	81.776

Storm Event	2-yr, 24-hr
Return Event	2 years
Duration	48.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.531 hours
Area (User Defined)	106.000 acres

Computational Time Increment	0.071 hours
Time to Peak (Computed)	12.529 hours
Flow (Peak, Computed)	11.60 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.550 hours
Flow (Peak Interpolated Output)	11.58 ft³/s

Drainage Area	
SCS CN (Composite)	60.000
Area (User Defined)	106.000 acres
Maximum Retention (Pervious)	6.7 in
Maximum Retention (Pervious, 20 percent)	1.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.3 in
Runoff Volume (Pervious)	2.336 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.336 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.531 hours
Computational Time Increment	0.071 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	226.23 ft³/s
Unit peak time, Tp	0.354 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.416 hours
Total unit time, Tb	1.770 hours

Storm Event	10-yr, 24-hr
Return Event	10 years
Duration	48.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.531 hours
Area (User Defined)	106.000 acres

Computational Time Increment	0.071 hours
Time to Peak (Computed)	12.458 hours
Flow (Peak, Computed)	50.35 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.450 hours
Flow (Peak Interpolated Output)	50.14 ft³/s

Drainage Area	
SCS CN (Composite)	60.000
Area (User Defined)	106.000 acres
Maximum Retention (Pervious)	6.7 in
Maximum Retention (Pervious, 20 percent)	1.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	6.730 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6.730 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.531 hours
Computational Time Increment	0.071 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	226.23 ft³/s
Unit peak time, Tp	0.354 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.416 hours
Total unit time, Tb	1.770 hours

Storm Event	100-yr, 24-hr
Return Event	100 years
Duration	48.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.531 hours
Area (User Defined)	106.000 acres

Computational Time Increment	0.071 hours
Time to Peak (Computed)	12.387 hours
Flow (Peak, Computed)	171.89 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.400 hours
Flow (Peak Interpolated Output)	171.27 ft³/s

Drainage Area	
SCS CN (Composite)	60.000
Area (User Defined)	106.000 acres
Maximum Retention (Pervious)	6.7 in
Maximum Retention (Pervious, 20 percent)	1.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.2 in
Runoff Volume (Pervious)	19.326 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	19.326 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.531 hours
Computational Time Increment	0.071 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	226.23 ft³/s
Unit peak time, Tp	0.354 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.416 hours
Total unit time, Tb	1.770 hours

Storm Event	2-yr, 24-hr
Return Event	2 years
Duration	48.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.340 hours
Area (User Defined)	10.100 acres

Computational Time Increment	0.045 hours
Time to Peak (Computed)	12.297 hours
Flow (Peak, Computed)	4.67 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.300 hours
Flow (Peak Interpolated Output)	4.66 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	10.100 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.6 in
Runoff Volume (Pervious)	0.476 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.476 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.340 hours
Computational Time Increment	0.045 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.63 ft³/s
Unit peak time, Tp	0.227 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.908 hours
Total unit time, Tb	1.134 hours

Storm Event	10-yr, 24-hr
Return Event	10 years
Duration	48.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.340 hours
Area (User Defined)	10.100 acres

Computational Time Increment	0.045 hours
Time to Peak (Computed)	12.297 hours
Flow (Peak, Computed)	11.87 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.300 hours
Flow (Peak Interpolated Output)	11.82 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	10.100 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.3 in
Runoff Volume (Pervious)	1.066 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.067 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.340 hours
Computational Time Increment	0.045 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.63 ft³/s
Unit peak time, Tp	0.227 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.908 hours
Total unit time, Tb	1.134 hours

Storm Event	100-yr, 24-hr
Return Event	100 years
Duration	48.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.340 hours
Area (User Defined)	10.100 acres

Computational Time Increment	0.045 hours
Time to Peak (Computed)	12.252 hours
Flow (Peak, Computed)	30.02 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	29.95 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	10.100 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.0 in
Runoff Volume (Pervious)	2.549 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.551 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.340 hours
Computational Time Increment	0.045 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.63 ft³/s
Unit peak time, Tp	0.227 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.908 hours
Total unit time, Tb	1.134 hours

Storm Event	2-yr, 24-hr
Return Event	2 years
Duration	48.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.148 hours
Area (User Defined)	5.900 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.153 hours
Flow (Peak, Computed)	11.40 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	11.40 ft³/s

Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	5.900 acres
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.4 in
Runoff Volume (Pervious)	0.665 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.665 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.148 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	45.18 ft³/s
Unit peak time, Tp	0.099 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.395 hours
Total unit time, Tb	0.493 hours

Storm Event	10-yr, 24-hr
Return Event	10 years
Duration	48.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.148 hours
Area (User Defined)	5.900 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	19.82 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	19.79 ft³/s

Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	5.900 acres
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.4 in
Runoff Volume (Pervious)	1.166 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.166 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.148 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	45.18 ft³/s
Unit peak time, Tp	0.099 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.395 hours
Total unit time, Tb	0.493 hours

Storm Event	100-yr, 24-hr
Return Event	100 years
Duration	48.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.148 hours
Area (User Defined)	5.900 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	37.35 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	37.09 ft³/s

Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	5.900 acres
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.6 in
Runoff Volume (Pervious)	2.248 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.248 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.148 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	45.18 ft³/s
Unit peak time, Tp	0.099 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.395 hours
Total unit time, Tb	0.493 hours

Storm Event	2-yr, 24-hr
Return Event	2 years
Duration	48.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.134 hours
Area (User Defined)	4.900 acres

Computational Time Increment	0.018 hours
Time to Peak (Computed)	12.151 hours
Flow (Peak, Computed)	5.81 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	5.81 ft³/s

Drainage Area	
SCS CN (Composite)	75.000
Area (User Defined)	4.900 acres
Maximum Retention (Pervious)	3.3 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.340 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.340 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.134 hours
Computational Time Increment	0.018 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	41.43 ft³/s
Unit peak time, Tp	0.089 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.357 hours
Total unit time, Tb	0.447 hours

Storm Event	10-yr, 24-hr
Return Event	10 years
Duration	48.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.134 hours
Area (User Defined)	4.900 acres

Computational Time Increment	0.018 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	12.11 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	11.98 ft³/s

Drainage Area	
SCS CN (Composite)	75.000
Area (User Defined)	4.900 acres
Maximum Retention (Pervious)	3.3 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	0.681 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.681 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.134 hours
Computational Time Increment	0.018 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	41.43 ft³/s
Unit peak time, Tp	0.089 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.357 hours
Total unit time, Tb	0.447 hours

Storm Event	100-yr, 24-hr
Return Event	100 years
Duration	48.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.134 hours
Area (User Defined)	4.900 acres

Computational Time Increment	0.018 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	26.37 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	25.85 ft³/s

Drainage Area	
SCS CN (Composite)	75.000
Area (User Defined)	4.900 acres
Maximum Retention (Pervious)	3.3 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.6 in
Runoff Volume (Pervious)	1.480 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.481 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.134 hours
Computational Time Increment	0.018 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	41.43 ft³/s
Unit peak time, Tp	0.089 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.357 hours
Total unit time, Tb	0.447 hours

Storm Event	2-yr, 24-hr
Return Event	2 years
Duration	48.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	3.000 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.111 hours
Flow (Peak, Computed)	8.29 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	8.13 ft³/s

Drainage Area	
SCS CN (Composite)	88.000
Area (User Defined)	3.000 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.6 in
Runoff Volume (Pervious)	0.410 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.410 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	40.79 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	10-yr, 24-hr
Return Event	10 years
Duration	48.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	3.000 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.111 hours
Flow (Peak, Computed)	13.47 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	13.25 ft³/s

Drainage Area	
SCS CN (Composite)	88.000
Area (User Defined)	3.000 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.7 in
Runoff Volume (Pervious)	0.682 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.682 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	40.79 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100-yr, 24-hr
Return Event	100 years
Duration	48.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	3.000 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.111 hours
Flow (Peak, Computed)	23.81 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	23.51 ft³/s

Drainage Area	
SCS CN (Composite)	88.000
Area (User Defined)	3.000 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	1.253 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.253 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	40.79 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2-yr, 24-hr
Return Event	2 years
Duration	48.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.334 hours
Area (User Defined)	12.905 acres

Computational Time Increment	0.045 hours
Time to Peak (Computed)	12.257 hours
Flow (Peak, Computed)	15.57 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	15.46 ft³/s

Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	12.905 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.2 in
Runoff Volume (Pervious)	1.316 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.316 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.334 hours
Computational Time Increment	0.045 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	43.74 ft³/s
Unit peak time, Tp	0.223 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.891 hours
Total unit time, Tb	1.114 hours

Storm Event	10-yr, 24-hr
Return Event	10 years
Duration	48.000 hours
Depth	4.0 in
Time of Concentration (Composite)	0.334 hours
Area (User Defined)	12.905 acres

Computational Time Increment	0.045 hours
Time to Peak (Computed)	12.257 hours
Flow (Peak, Computed)	28.30 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	28.16 ft³/s

Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	12.905 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.2 in
Runoff Volume (Pervious)	2.369 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.370 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.334 hours
Computational Time Increment	0.045 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	43.74 ft³/s
Unit peak time, Tp	0.223 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.891 hours
Total unit time, Tb	1.114 hours

Storm Event	100-yr, 24-hr
Return Event	100 years
Duration	48.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.334 hours
Area (User Defined)	12.905 acres

Computational Time Increment	0.045 hours
Time to Peak (Computed)	12.257 hours
Flow (Peak, Computed)	55.23 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	55.06 ft³/s

Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	12.905 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.4 in
Runoff Volume (Pervious)	4.685 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4.686 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.334 hours
Computational Time Increment	0.045 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	43.74 ft³/s
Unit peak time, Tp	0.223 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.891 hours
Total unit time, Tb	1.114 hours

Subsection: Elevation-Area Volume Curve
Label: East 27

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
1,139.80	0.0	0.005	0.000	0.000	0.000
1,141.00	0.0	0.500	0.555	0.222	0.189
1,142.50	0.0	0.750	1.862	0.931	0.980
1,143.00	0.0	3.000	5.250	0.875	1.724
1,144.00	0.0	4.800	11.595	3.865	5.009
1,145.00	0.0	7.400	18.160	6.053	10.154
1,146.00	0.0	11.000	27.422	9.141	17.924

Subsection: Elevation-Area Volume Curve
Label: East Wetland

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
1,136.00	0.0	0.016	0.000	0.000	0.000
1,137.00	0.0	0.146	0.210	0.070	0.060
1,138.00	0.0	0.290	0.642	0.214	0.241
1,139.00	0.0	0.947	1.761	0.587	0.740
1,140.00	0.0	1.062	3.012	1.004	1.594
1,141.00	0.0	1.185	3.369	1.123	2.548

Subsection: Elevation-Area Volume Curve
Label: North Wetland

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
1,136.00	0.0	0.003	0.000	0.000	0.000
1,137.00	0.0	0.008	0.016	0.005	0.004
1,137.50	0.0	0.110	0.148	0.025	0.025
1,138.00	0.0	0.191	0.446	0.074	0.089
1,139.00	0.0	0.564	1.083	0.361	0.396
1,140.00	0.0	0.686	1.872	0.624	0.926
1,141.00	0.0	1.135	2.703	0.901	1.692
1,142.00	0.0	2.226	4.950	1.650	3.095

Subsection: Elevation-Area Volume Curve
Label: waterway to CPL

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
1,132.50	0.0	0.001	0.000	0.000	0.000
1,133.00	0.0	0.001	0.003	0.001	0.000
1,134.00	0.0	0.004	0.007	0.002	0.002
1,135.00	0.0	0.018	0.031	0.010	0.011
1,136.00	0.0	0.067	0.120	0.040	0.045
1,137.00	0.0	0.334	0.551	0.184	0.201
1,138.00	0.0	0.685	1.497	0.499	0.625
1,139.00	0.0	1.297	2.925	0.975	1.454
1,140.00	0.0	1.880	4.739	1.579	2.797

Subsection: Elevation-Area Volume Curve
Label: West Wetland

Return Event: 2 years
Storm Event: 100-yr, 24-hr

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
1,141.00	0.0	0.125	0.000	0.000	0.000
1,142.00	0.0	0.693	1.112	0.371	0.315
1,143.00	0.0	0.830	2.281	0.760	0.962
1,144.00	0.0	1.153	2.961	0.987	1.801
1,144.50	0.0	1.200	3.529	0.588	2.301
1,145.00	0.0	1.250	3.675	0.612	2.821

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,132.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,140.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	48 in culvert	Forward	TW	1,132.57	1,140.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: 48 in culvert Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	48.0 in
Length	90.00 ft
Length (Computed Barrel)	90.01 ft
Slope (Computed)	0.012 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.900
Kb	0.005
Kr	0.900
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0340
M	1.5000
C	0.0553
Y	0.5400
T1 ratio (HW/D)	1.257
T2 ratio (HW/D)	1.419
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	1,137.60 ft	T1 Flow	87.96 ft³/s
T2 Elevation	1,138.25 ft	T2 Flow	100.53 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,139.80 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,146.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Hwy 27 36 in culvert	Forward	TW	1,139.83	1,146.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Hwy 27 36 in culvert Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	36.0 in
Length	65.00 ft
Length (Computed Barrel)	65.01 ft
Slope (Computed)	0.013 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.007
Kr	0.200
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.089
T2 ratio (HW/D)	1.191
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	1,143.10 ft	T1 Flow	42.85 ft³/s
T2 Elevation	1,143.40 ft	T2 Flow	48.97 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,136.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,141.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward + Reverse	TW	1,137.50	1,141.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
-100.00	1,141.00
-55.00	1,138.00
-6.00	1,138.00
-4.00	1,137.50
-2.00	1,137.50
-0.50	1,137.50
0.50	1,137.50
2.00	1,137.50
4.00	1,137.50
6.00	1,138.00
16.00	1,138.00
61.00	1,141.00

Lowest Elevation	1,137.50 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,136.00 ft
Increment (Headwater)	0.01 ft
Maximum (Headwater)	1,142.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	N weir	Forward + Reverse	TW	1,137.50	1,142.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: N weir Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	1,137.50 ft
Weir Length	8.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,141.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,145.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	West Ditch 24 in culvert	Forward	TW	1,141.00	1,145.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: West Ditch 24 in culvert Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	40.00 ft
Length (Computed Barrel)	40.01 ft
Slope (Computed)	0.016 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.900
Kb	0.012
Kr	0.900
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0340
M	1.5000
C	0.0553
Y	0.5400
T1 ratio (HW/D)	1.255
T2 ratio (HW/D)	1.417
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	1,143.51 ft	T1 Flow	15.55 ft³/s
T2 Elevation	1,143.83 ft	T2 Flow	17.77 ft³/s

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,139.83 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	11.58 ft³/s	Time to Peak (Flow, In)	12.550 hours
Flow (Peak Outlet)	8.27 ft³/s	Time to Peak (Flow, Outlet)	12.950 hours

Elevation (Water Surface, Peak)	1,141.11 ft
Volume (Peak)	0.237 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.336 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	2.336 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,139.83 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	50.14 ft³/s	Time to Peak (Flow, In)	12.450 hours
Flow (Peak Outlet)	31.52 ft³/s	Time to Peak (Flow, Outlet)	12.800 hours

Elevation (Water Surface, Peak)	1,142.57 ft
Volume (Peak)	1.028 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	6.730 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	6.730 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary
Label: East 27 (IN)

Return Event: 100 years
Storm Event: 100-yr, 24-hr

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,139.83 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	171.27 ft³/s	Time to Peak (Flow, In)	12.400 hours
Flow (Peak Outlet)	60.01 ft³/s	Time to Peak (Flow, Outlet)	13.050 hours

Elevation (Water Surface, Peak)	1,144.17 ft
Volume (Peak)	5.737 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	19.326 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	19.326 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,137.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.151	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.400	1,138.04	0.263

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.151 ac-ft
Volume (Total In ICPM)	2.868 ac-ft
Volume (Total Out ICPM)	2.868 ac-ft
Volume (Ending)	0.151 ac-ft
Elevation (Ending)	1,137.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,137.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.151	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.400	1,138.17	0.325

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.151 ac-ft
Volume (Total In ICPM)	5.285 ac-ft
Volume (Total Out ICPM)	5.285 ac-ft
Volume (Ending)	0.151 ac-ft
Elevation (Ending)	1,137.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,137.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.151	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.750	1,138.54	0.512

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.151 ac-ft
Volume (Total In ICPM)	10.738 ac-ft
Volume (Total Out ICPM)	10.738 ac-ft
Volume (Ending)	0.151 ac-ft
Elevation (Ending)	1,137.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Subsection: Interconnected Pond Routing Summary
Label: North Wetland

Return Event: 2 years
Storm Event: 2-yr, 24-hr

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,137.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.025	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.350	1,138.20	0.151

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.025 ac-ft
Volume (Total In ICPM)	1.142 ac-ft
Volume (Total Out ICPM)	1.142 ac-ft
Volume (Ending)	0.025 ac-ft
Elevation (Ending)	1,137.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,137.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.025	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.300	1,138.55	0.259

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.025 ac-ft
Volume (Total In ICPM)	2.233 ac-ft
Volume (Total Out ICPM)	2.233 ac-ft
Volume (Ending)	0.025 ac-ft
Elevation (Ending)	1,137.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,137.50	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.025	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.300	1,139.18	0.493

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.025 ac-ft
Volume (Total In ICPM)	4.800 ac-ft
Volume (Total Out ICPM)	4.799 ac-ft
Volume (Ending)	0.025 ac-ft
Elevation (Ending)	1,137.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,132.57	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.600	1,134.82	0.010

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	5.544 ac-ft
Volume (Total Out ICPM)	5.544 ac-ft
Volume (Ending)	0.000 ac-ft
Elevation (Ending)	1,132.57 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,132.57	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.700	1,136.54	0.130

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	12.696 ac-ft
Volume (Total Out ICPM)	12.696 ac-ft
Volume (Ending)	0.000 ac-ft
Elevation (Ending)	1,132.57 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	1,132.57	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.000	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage		
	Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
	12.750	1,138.48	1.024

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	(N/A)	(N/A)	(N/A)	(N/A)
Pond Outflow...	(N/A)	(N/A)	(N/A)	(N/A)

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.000 ac-ft
Volume (Total In ICPM)	31.545 ac-ft
Volume (Total Out ICPM)	31.545 ac-ft
Volume (Ending)	0.000 ac-ft
Elevation (Ending)	1,132.57 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,141.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	15.46 ft³/s	Time to Peak (Flow, In)	12.250 hours
Flow (Peak Outlet)	4.71 ft³/s	Time to Peak (Flow, Outlet)	12.700 hours

Elevation (Water Surface, Peak)	1,142.29 ft
Volume (Peak)	0.488 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.316 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.316 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,141.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	28.16 ft³/s	Time to Peak (Flow, In)	12.250 hours
Flow (Peak Outlet)	9.23 ft³/s	Time to Peak (Flow, Outlet)	12.650 hours

Elevation (Water Surface, Peak)	1,142.91 ft
Volume (Peak)	0.899 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.370 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	2.370 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,141.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	55.06 ft³/s	Time to Peak (Flow, In)	12.250 hours
Flow (Peak Outlet)	18.21 ft³/s	Time to Peak (Flow, Outlet)	12.650 hours

Elevation (Water Surface, Peak)	1,144.00 ft
Volume (Peak)	1.797 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	4.686 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	4.686 ac-ft
Volume (Retained)	0.000 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

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Appendix C

Landscape Design and Planting Plan

APPLIED ECOLOGICAL SERVICES
SPECIALISTS IN ECOLOGICAL SCIENCE, RESTORATION, MANAGEMENT, AND RESEARCH
17921 W SMITH ROAD • PO BOX 256 • BRODHEAD, WI 53520 • (608) 897-8641

May 08, 2015

Sharon Kozicki
Foth Infrastructure & Environment, LLC
2121 Innovation Court
PO Box 5095
DePere, WI. 54115-5095

Re: Planting Plan for the Copper Park Business and Recreation Area Work Plan Supplement, Rusk County, Wisconsin (AES #14-0863)

Dear Ms Kozicki,

Applied Ecological Services (AES) has completed a design and planting plan for the Copper Park Business and Recreation Area Work Plan Supplement (Work Plan). The property is located in Section 9, T34N, R6W, City of Ladysmith, Rusk County, Wisconsin (Figure 1). The Work Plan improves surface water function as flow-through systems discharging to additional flow to Wetland #7 area prior to exiting the Industrial Outlot via the Copper Park Lane Culvert.

Existing Site Description

The current topography is relatively flat and the project area consists of three basins (west, east and north), a drainage ditch connecting the east and west basins, mesic prairie plantings and an existing low quality reed canary grass (*Phalaris arundinacea*) dominated wetland (Figure 2). Within the wetland footprint are two small upland woodland areas and a water way within the Wetland #7 area. The project area is bordered by STH 27 to the east, Copper Park Lane to the south, the Flambeau River to the west and mesic prairie for most of the north border.

Design Features

The existing West Basin bottom will be raised to provide wet meadow habitat over much of the current basin footprint (Figure 3). Three small depressional areas in the basin will provide for emergent vegetation establishment. The drainageway between the west and east basins will be re-graded to allow outflow from the west basin into the east basin.

The North Basin will be re-graded to incorporate a low flow channel 1-2 feet in depth to increase water residence times during low flow conditions (Figure 3). Water entering the re-designed north area comes from a small watershed to the west of STH 27 and portions of the Equestrian Trailhead. The low flow channel will be installed with native emergent seeds adapted to the hydrologic regime

anticipated in the design. The remainder of the area will be seeded to native wet meadow vegetation. The north area is designed to release water at an as not to adversely impact the native wetland vegetation on the channel bottom.

The East Basin will be re-graded in a similar fashion as the North Basin and will include a low flow channel to increase water residence times during low flow conditions. The low flow channel will be installed with emergent plant species seed. The remainder of the area will be seeded to wet meadow native vegetation. In minor storm events water will slowly be released to Wetland #7 through a small channel. In larger flow events water will exit the area over a reinforced shallow berm, created along the east side.

Grading and Site Preparation

Site construction is anticipated to begin August 2015 based on the Work Plan developed by Foth Infrastructure and Environment, LLC. The construction will consist of rough and final grading, followed by placement of top soil (engineered soil in emergent areas) as needed. The engineered soil for the low flow (emergent areas) will consist of onsite stockpiled topsoil or topsoil excavated as part of the earth moving and basin construction mixed with organic compost. Due to anticipated construction schedule, native seed may need to be installed as a dormant seeding (after October 1). A cover crop will likely be required for that period when final grading is complete and dormant native seeding occurs. A cover crop of winter rye (*Secale cereale*) applied at a rate of 30 lbs/acre will be installed on all bare soil areas. In emergent areas, an annual wet adapted cover crop grass, barnyard grass (*Echinochloa crusgalli*) applied at a rate of 32 ounces/acre shall be used.

Site re-vegetation will consist of plants native to Wisconsin as identified in Tables 1-3 below. The anticipated plant communities include emergent, wet meadow and mesic (upland) prairie and can be direct seeded in fall/winter 2015. All graded and seeded areas will be stabilized by placing straw mulch over the direct seeded areas. If additional stabilization is required, install erosion control blanket (S75 or similar) over the seeded areas to hold seed in place overwinter and into spring 2016. If erosion blanket is required, it should only be put in place after the dormant native seeding has occurred.

Native Seeding and Establishment

The planting plan incorporates three plant species mixes to be used to correspond to the design features and proposed hydrologic regimes. Native seed can be installed as a dormant seeding in fall or winter 2015 assuming that site final grading has been completed.

Based on the design and final construction conditions it is expected that the seed to be installed in the buffer areas will be with a tractor and no till drill. Areas of emergent and wet meadow will likely be too wet for a tractor and will require the seed to be broadcast with a cyclone seeder attached to an ATV. Some hand broadcasting of seed may also be required for some areas in areas not accessible to equipment. Prior to hand broadcast seeding, each of the three seed mixes shall be mixed with an inert moist material, such as sand, perlite or vermiculite. Seed and inert material shall be mixed at a 2:1 ratio of seed to inert material and mixed such seeds are evenly distributed in the mix. Divide the seed/inert material mixture into halves and spread the first half over the entire area where seed for that community is to be hand broadcast. Repeat this step with the remaining half of seed to ensure adequate cover of seed.

All areas to receive native seed will require a cover crop consisting of oats (*Avena sativa*) and annual rye (*Lolium multiflorum*), or winter rye (S*ecale cereale*) seeded at a rate of 30 lbs/acre. Oats and annual rye shall be used during spring and winter rye in fall. If winter rye is installed after site construction but prior to dormant seeding, the dormant native seeding will not require additional winter rye cover crop. All cover crop grass species shall be supplied as pure live seed (PLS).

The seed will be native to native Wisconsin and shall be from within a 200-mile radius of the project site unless approved by the Owner. Grass seed shall be in conformance with USDA rules and regulations under the Federal Seed Act and applicable Wisconsin state seed laws.

Seeding shall be preferentially conducted as a late fall dormant seeding (after October 1). Seed shall be preferentially installed with a rangeland type grain drill or no-till planter, such as by Truax, or equivalent, or broadcast into a lightly tilled soil surface, followed by impressing seed into the soil with a cultipacker roller.

If soil is too wet or grade is too steep to install seed, a mechanical broadcast seeder, such as a Cyclone, shall be used. Hand broadcasting of seed may also be employed. Within 24 hours or as soon as site conditions permit, broadcast seeded areas shall be rolled or dragged perpendicular to the slope.

If areas to be seeded have been treated with herbicide prior to seeding, seeding shall occur no less than 14 days after herbicide application.

An emergent seed mix is proposed for the low flow channels and depressional areas (Figure 3). The species to be seeded were selected for ease of germination, rapid growth and are adapted to the anticipated hydrology (Table 1). The seeding rate will be 2.0 lb/acre. Seed is comprised of native wetland sedges and forbs to provide a dense growth and to assist with sedimentation and provide some plant diversity and provide aesthetics.

Table 1. Emergent Seed for the Copper Park Business & Recreation Area.

Species	Common Name	Qty./Acre Seeds (oz.)
Schoenoplectus tabernaemontani	Soft stem bulrush	6
Schoenoplectus fluviatilis	River bulrush	6
Sagittaria latifolia	Arrowhead	6
Alisma subcordatum	Water plantain	6
Iris versicolor	Wild iris	4
Sparganium eurycarpum	Bur reed	4
Echinochloa crusgalli	Barnyard grass (cover crop)	32

A wet meadow seed mix is proposed for the remainder of the bottoms of the three basins (Table 2, Figure 3). The species have been selected because of their suitability for the site and anticipated hydrology. The native seeding rate is 6.6 lbs/acre and consists of native grasses, sedges and forbs that will provide diversity, wildlife habitat and aesthetics.

Table 2. Wet Meadow Species for the Copper Park Business & Recreation Area.

Species	Common Name	Qty./Acre Seeds (oz.)
Scirpus cyperinus	Woolgrass	4
Scirpus atrovirens	Dark green bulrush	4
Calamagrostis canadensis	Canada blue joint grass	4
Elymus virginicus	Virginia wild rye	32
Asclepias incarnata	Marsh milkweed	4
Verbena hastata	Blue vervain	4
Eupatorium perfoliatum	Boneset	4
Symphyotrichum novae-angliae	New England aster	4
Doellingeria umbellata	Flat top aster	4
Lobelia siphilitica	Great blue lobelia	2
Euthamia graminifolia	Grass leaf goldenrod	3
Helenium autumnale	Sneezeweed	4
Carex scoparia	Pointed broom sedge	12
Carex vulpinoidea	Fox sedge	12
Spartina pectinata	Cord grass	8
Carex lacustris	Lake bank sedge	4

Upland areas in the Copper Park Business and Recreation Area will receive an upland prairie species buffer seed mix (Table 3, Figure 3). The upland native prairie species were selected because they are adapted to the upland conditions will help to stabilize soils, reduce soil erosion, provide wildlife habitat and provide aesthetics. Some upland areas proposed to be seeded have previously been planted to mesic prairie. However, construction activities will require reseeding of the upland buffer areas. It is anticipated that the upland prairie zone will be seeded using a tractor and no-till drill. The native seeding rate is 12 lbs/acre and consists of native grasses and forbs that will provide diversity, wildlife habitat and aesthetics.

Table 3. Upland Prairie Species for the Copper Park Business and Recreation Area.

Species	Common Name	Qty./Acre Seeds (oz.)
Grasses		
Andropogon gerardii	Big bluestem grass	48
Sorghastrum nutans	Indian grass	48
Elymus canadensis	Canada wild rye	32
Panicum virgatum	Switch grass	16
Schizachyrium scoparium	Little bluestem grass	16
Wildflowers		
Rudbeckia hirta	Black-eyed Susan	8
Ratibida pinnata	Yellow coneflower	8
Monarda fistulosa	Bergamot	4
Penstemon digitalis	Smooth Penstemon	2
Solidago rigida	Stiff goldenrod	4
Desmodium canadense	Canada tick trefoil	4
Tradescantia ohiensis	Spiderwort	2

Existing Wetland Conservation

The existing 1.4 acre reed canary grass dominated Wetland #7 (Figure 2) will be voluntarily conserved by the removal of the non-native aggressive reed canary grass (RCG) and by re-seeding. It is anticipated that up to two herbicide treatments will be required using an approved herbicide for use in wetlands. A prescribed burn will also be conducted in this wetland in the late summer or fall of 2015, depending on weather to remove RCG biomass and allow for an adequate seed bed for the native seed installation. The 1.4 acre wetland will be seeded with a wet meadow seed mix, after the burn in 2015 (Table 2). If all necessary permits are obtained prior to the end of July 2015, the wetland enhancement schedule will be as follows:

1. First herbicide to RCG will occur in August/September 2015 as active RCG growth resumes.
2. Follow up spot herbicide to RCG re-sprouts 2-3 weeks later (i.e. September 2015).
3. Conduct a fall prescribed burn, if weather conditions allow in September or October 2015.
4. Dormant seed the native species in Table 2 after Oct 1 2015.

Construction Oversight

It is recommended that a qualified ecologist and engineer provide construction oversight and coordination during the construction phase and provide native seed installation oversight during the native vegetation installation phase for the Copper Park Business and Recreation Area Work Plan. A site visit will be conducted in 2016 between June and August and will be conducted by a qualified professional ecologist with adequate plant identification skills and who is also able to make an evaluation of the establishment of the native plantings.

2015 Herbicide Application

Prior to commencing and necessary herbicide work as part of the site preparation in 2015, the native seed installation contractor shall provide copies of valid herbicide applicator licenses in the General, Right-of-Way, and Aquatics categories for each person who will be applying herbicide at the project site. A copy of each commercial pesticide applicator's license must be maintained on site at all times during completion of the Work.

Target species include, but are not limited to, Kentucky blue grass (*Poa pratensis*), Canada blue grass (*Poa compressa*), tall fescue (*Festuca elatior*), Hungarian brome (*Bromus inermis*), quack grass (*Agropyron repens*), common reed grass (*Phragmites australis*), RCG (*Phalaris arundinacea*), teasel (*Dipsacus sylvestris*), burdock (*Arctium spp.*), sweet clover (*Melilotus spp.*), clover (*Trifolium spp.*), non-native thistles (*Cirsium spp.*), crown vetch (*Coronilla varia*), purple Loosestrife (*Lythrum salicaria*), poison hemlock (*Conium maculatum*), or any other herbaceous species not native to northern, Wisconsin.

Herbaceous species to be removed in areas with standing water or saturated soils shall be treated with a 5% solution of Glyphosate, N-(phosphonomethyl) glycine in a form approved for aquatic applications such as Rodeo, or equivalent, with added non-ionic surfactant.

Herbaceous species to be removed in areas without standing water or saturated soils shall be treated with a 3% solution of Glyphosate, N-(phosphonomethyl) glycine, trade name Roundup or equivalent as approved in writing by Owner. Contractor may also use a grass-specific herbicide with the approval of the Owner.

Copper Park Business and Recreational Area

Figure 1. Project Location

(As Of May 2015)

Legend

AES Project Area

N
W E
S

0 500 1,000 2,000 Feet

Project Location:
S9, T34N, R62
Town of Grant, Rusk County, WI
AES Project #: 14-0863
Mapped by: dwa
Last modified: May 07, 2015

Applied Ecological Services, Inc.
17921 W Smith Rd
Brodhead, WI 53520

Copper Park Business and Recreational Area

Figure 2. Existing Conditions

(As Of May 2015)

Legend

AES Existing Conditions Outlines

Label

- 1 - West Basin
- 2 - Drainage Ditch
- 3 - Mesic Prairie
- 4 - Old Field
- 5 - North Basin
- 6 - East Basin
- 7 - Field Delineated Wetland
- 8 - Northern Dry Forest
- 9 - Northern Mesic Forest
- 2 - Drainage Ditch Highlight
- AES Project Area

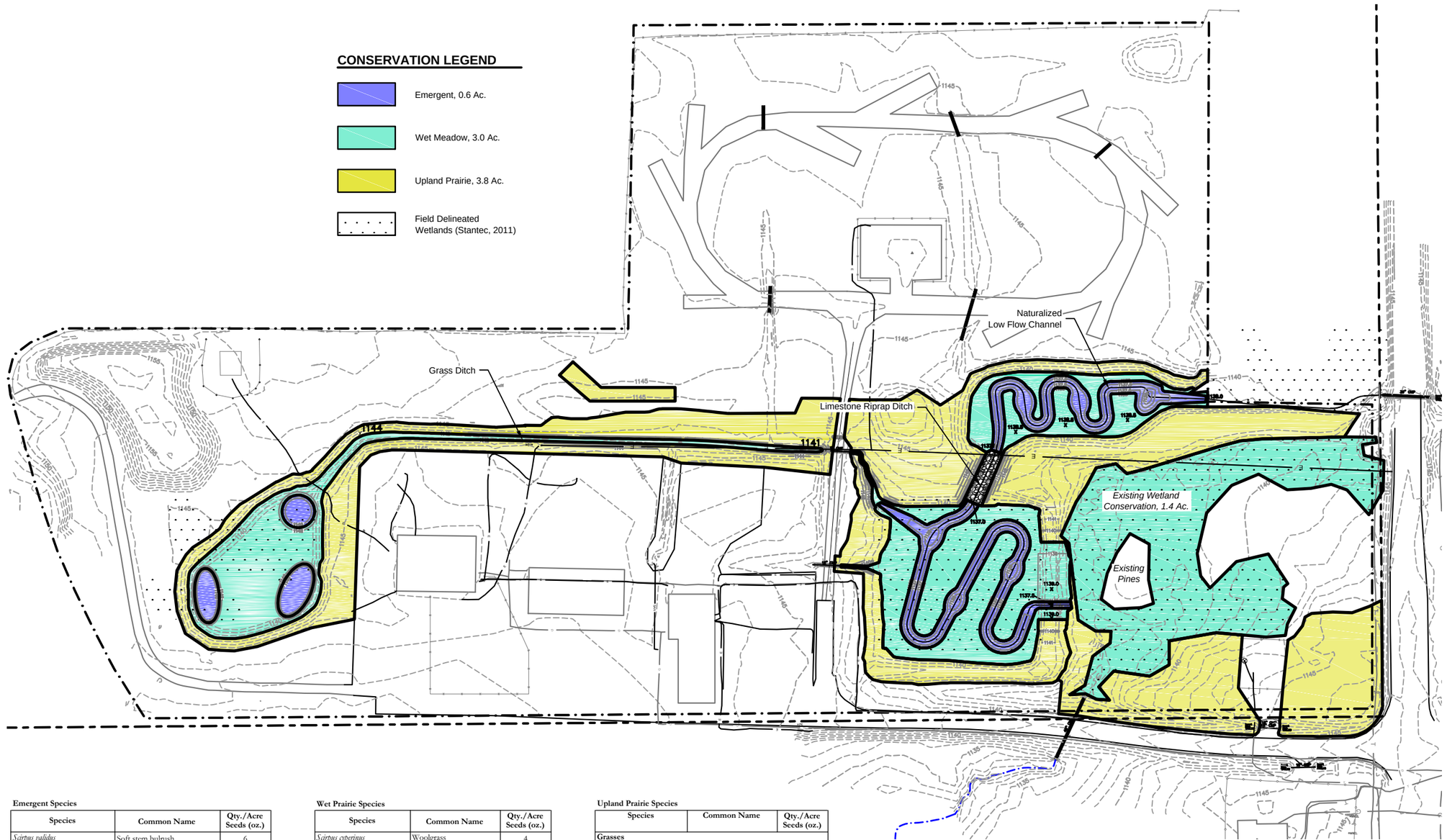
Background Image: Google Earth March 2012

N
W E
S

0 50 100 200 300 Feet

Project Location:
S9, T34N, R62
Town of Grant, Rusk County, WI
AES Project #: 14-0863
Mapped by: dwa
Checked by: jll
Last modified: May 08, 2015

Applied Ecological Services, Inc.
17921 W Smith Rd
Brodhead, WI 53520



Emergent Species

Species	Common Name	Qty./Acre Seeds (oz.)
Scirpus validus	Soft stem bulrush	6
Scirpus fluviatilis	River bulrush	6
Sagittaria latifolia	Arrowhead	6
Alisma subcordatum	Water plantain	6
Iris versicolor	Wild iris	4
Sparganium eurycarpum	Bur reed	4
Echinochloa crusgalli	Barnyard grass (cover crop)	32

Wet Prairie Species

Species	Common Name	Qty./Acre Seeds (oz.)
Scirpus cyperinus	Woolgrass	4
Scirpus atrovirens	Dark green bulrush	4
Calamagrostis canadensis	Canada blue joint grass	4
Elymus virginicus	Virginia wild rye	32
Asclepias incarnata	Marsh milkweed	4
Verbena hastata	Blue vervain	4
Eupatorium perfoliatum	Boneset	4
Aster novae angliae	New England aster	4
Aster umbellatus	Flat top aster	4
Lobelia siphilitica	Great blue lobelia	2
Euthamia graminifolia	Grass leaf goldenrod	3
Helenium autumnale	Sneezeweed	4
Carex soparia	Pointed broom sedge	12
Carex vulpinoidea	Fox sedge	12
Spartina pectinata	Cord grass	8
Carex lucustris	Lake bank sedge	4

Upland Prairie Species

Species	Common Name	Qty./Acre Seeds (oz.)
Grasses		
Andropogon gerardii	Big bluestem grass	48
Sorgbastrum nutans	Indian grass	48
Elymus canadensis	Canada wild rye	32
Panicum virgatum	Switch grass	16
Schizachyrium scoparium	Little bluestem grass	16
Wildflowers		
Rudbeckia hirta	Black-eyed Susan	8
Ratibida pinnata	Yellow coneflower	8
Monarda fistulosa	Bergamot	4
Penstemon digitalis	Smooth Penstemon	2
Solidago rigida	Stiff goldenrod	4
Desmodium canadense	Canada tick trefoil	4
Tradescantia ohiensis	Spiderwort	2

N

0 30 60 120 Feet

Scale: 1" = 60'

To Scale When Printed at 24" x 36"

Copper Park Business and Recreational Area Work Plan Supplement

Rusk County, Wisconsin

Foth Infrastructure & Environmental LLC - DePere, WI

Figure 3

Site Planting Plan

No.	Date	Revision Description	By
1	07/09/2015	Updated for Final Report	EMK

AES Proj. #: 14-0863

Designed By: JLL

Drawn By: EMK

Checked By: SIA

File: 140863cpr20150508_Site-Final.dwg

Date: 07 May 2015

Coordinate System: NAD 83, WI SP North, US Ft.

Applied Ecological Services, Inc.
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Email: info@appliedeco.com

Sheet Number

Fig. 3

SHEET 1 OF 1

Appendix D

Dewatering Plan

Dewatering Plan
Reclaimed Flambeau Mine Site
Rusk County, Wisconsin

On behalf of the Flambeau Mining Company, Foth Infrastructure & Environment, LLC has prepared this memorandum summarizing the dewatering plan associated with the *Copper Park Business and Recreation Area Work Plan* Supplement for the Reclaimed Flambeau Mine in Ladysmith, Wisconsin.

Dewatering Plan Overview

Dewatering will need to occur during the conversion of the three infiltration basins into the new wetland areas. Dewatering is needed in advance of the construction activities so that basin floors are firm enough to support construction equipment and grading work.

Dewatering Plan Details

Storm Water Basin Water Volumes

Water volumes in the three existing basins are estimated based on the as-built grading plan and average ponding depths. Actual volumes will be based on site conditions at the time of dewatering and subsurface contributions and will likely vary from the estimates below. Estimated basin volumes in gallons, along with average ponding depths used in the calculations (feet, in parenthesis), are as follows:

- West Basin (4.0 feet [ft]): 750,000 gallons
- East Basin (3.0 ft): 1,000,000 gallons
- North Basin (2.0 ft): 360,000 gallons

Groundwater Inflow Rates

Groundwater inflow during proposed construction activities is discussed below.

The West basin is expected to have minimal groundwater impacts as the current basin floor (approximately 1,138.0 ft) is well above the high groundwater elevation in the area (approximately 1,122.0 ft), and no additional cutting of the floor will take place. However, subsurface water contribution from adjacent saturated soils and subgrade materials may be encountered and require additional pumping.

The current North basin floor is at approximately 1,138.0 ft, and the high groundwater table in the area is approximately 1,135.0 ft. Proposed construction activities involve excavating a few small depressions to an elevation of 1,136.0 ft, with the rest of the low-flow channel at 1,137.5 ft. The potential exists that if high water table conditions occur during construction, the construction equipment weight combined with capillary action could cause some upward flow through the basin floor. However, high groundwater conditions are not expected during the anticipated construction time frame (August-October), and any upward flow rates would be expected to be minimal. The potential also exists for the water table to intersect the ground surface in isolated low areas west of Highway 27 and north of the former rail spur. Again, this would only occur under high water conditions, and any water could be temporarily be diverted

prior to entering the area.

The current East basin floor is at approximately 1,138.0 ft, and the high groundwater table in the area is approximately 1,135.0 ft. Proposed construction activities again involve excavating a few small depressions to an elevation of 1,136.0 ft, with the rest of the low-flow channel at 1,137.5 ft. As with the North basin, an upward flow potential exists, but is expected to be minimal. Both the North and East Basins may exhibit subsurface water contribution from adjacent saturated soils and subgrade materials may be encountered and require additional pumping.

Dewatering Operations

The dewatering operations will be conducted in general accordance with the Wisconsin Department of Natural Resources (WDNR) Standard 1061 – Dewatering. Water removed from the three basins will be pumped to upland vegetated areas north of the Industrial Outlot, in accordance with all previous basin dewatering activities approved by the WDNR. A flow dissipater (plate) will again be used to apply flow as a dispersed stream or spray rather than as a concentrated stream.

Pursuant to WDNR Standard 1061 (Dewatering), a daily log is to be kept during dewatering activities that shall document the following:

- Discharge duration
- Pumping rate
- Water table depth
- Maintenance activities

During the culvert replacement activities under Copper Park Lane, surface water flow may need to be diverted to prevent erosion of exposed areas into Intermittent Stream C. If flow is observed, a pump will be set up with a hose network diverting flow from north of the Copper Park Lane culvert to Intermittent Stream C south of Copper Park Lane.

References

WDNR, 2007. *Dewatering (1061)*. Wisconsin Department of Natural Resources Conservation Practice Standard. April 2007.

Appendix E

Site Soil Test Results

Table E-1
Soil Results within the SSEAs

SAMPLE ID	SAMPLE DATE	COPPER (Mg/Kg)	ZINC (Mg/Kg)	START DEPTH (INCHES)	END DEPTH (INCHES)	PROPOSED SOIL EXCAVATION AREA
F2013-D3-01-0-2	11/20/2013	910	NA	0	2	SSEA-1
F2013-D3-01-0-2	11/20/2013	1033	NA	0	2	SSEA-1
F2013-D3-01-DTN12	11/21/2013	78	NA	0	2	SSEA-1
F2013-D3-01-DTN16	11/21/2013	32	NA	0	2	SSEA-1
F2013-D3-01-DTN4	11/21/2013	233	NA	0	2	SSEA-1
F2013-D3-01-DTN8	11/21/2013	99	NA	0	2	SSEA-1
F2013-D3-01-DTS0	11/21/2013	460	NA	0	2	SSEA-1
F2013-D3-01-DTS12	11/21/2013	35	NA	0	2	SSEA-1
F2013-D3-01-DTS16	11/21/2013	20	NA	0	2	SSEA-1
F2013-D3-01-DTS4	11/21/2013	323	NA	0	2	SSEA-1
F2013-D3-01-DTS8	11/21/2013	77	NA	0	2	SSEA-1
F2013-D3-02-DTN0	11/21/2013	492	NA	0	2	SSEA-1
F2013-D3-02-DTN12	11/21/2013	74	NA	0	2	SSEA-1
F2013-D3-02-DTN16	11/21/2013	30	NA	0	2	SSEA-1
F2013-D3-02-DTN4	11/21/2013	481	NA	0	2	SSEA-1
F2013-D3-02-DTN8	11/21/2013	158	NA	0	2	SSEA-1
F2013-D3-02-DTS12	11/21/2013	36	NA	0	2	SSEA-1
F2013-D3-02-DTS16	11/21/2013	38	NA	0	2	SSEA-1
F2013-D3-02-DTS4	11/21/2013	44	NA	0	2	SSEA-1
F2013-D3-02-DTS8	11/21/2013	50	NA	0	2	SSEA-1
F2013-D3-03-DTN0	11/21/2013	319	NA	0	2	SSEA-1
F2013-D3-04-DTN0	11/21/2013	368	NA	0	2	SSEA-1
F2013-D3-05-DTN0	11/21/2013	553	NA	0	2	SSEA-1
F2013-D3-06B-DTN0	11/21/2013	80	NA	0	2	SSEA-1
F2013-D3-06-DTN0	11/21/2013	54	NA	0	2	SSEA-1
F2013-D3-07-0-2	11/23/2013	830	NA	0	2	SSEA-1
F2013-D3-07-0-2	11/23/2013	926	NA	0	2	SSEA-1
F2013-D3-07-DTN0	11/21/2013	264	NA	0	2	SSEA-1
F2013-S1-01X-DTN16	11/21/2013	83	NA	0	2	SSEA-1
F2013-S1-01X-DTN20	11/21/2013	247	NA	0	2	SSEA-1
F2013-S1-01X-DTN24	11/21/2013	327	NA	0	2	SSEA-1
F2013-S1-01X-DTN28	11/21/2013	342	NA	0	2	SSEA-1
F2013-S1-01X-DTN32	11/21/2013	69	NA	0	2	SSEA-1
F2013-S1-01X-DTN36	11/21/2013	28	NA	0	2	SSEA-1
F2013-S1-01X-DTS16	11/21/2013	49	NA	0	2	SSEA-1
F2013-S1-01Y-0-2	11/23/2013	90	NA	0	2	SSEA-1
F2013-S1-01Y-0-2	11/23/2013	102	NA	0	2	SSEA-1
F2013-S1-01Y-DTN0	11/21/2013	60	NA	0	2	SSEA-1
F2013-S1-01Y-DTN12	11/21/2013	162	NA	0	2	SSEA-1
F2013-S1-01Y-DTN16	11/21/2013	81	NA	0	2	SSEA-1
F2013-S1-01Y-DTN20	11/21/2013	85	NA	0	2	SSEA-1
F2013-S1-01Y-DTN4	11/21/2013	511	NA	0	2	SSEA-1
F2013-S1-01Y-DTN4-0-2	11/23/2013	790	NA	0	2	SSEA-1
F2013-S1-01Y-DTN4-0-2	11/23/2013	740	NA	0	2	SSEA-1
F2013-S1-01Y-DTN8	11/21/2013	173	NA	0	2	SSEA-1
F2013-S1-02-0-2	11/20/2013	1117	NA	0	2	SSEA-1
F2013-S1-02-DTN12	11/21/2013	55	NA	0	2	SSEA-1
F2013-S1-02-DTN16	11/21/2013	148	NA	0	2	SSEA-1
F2013-S1-02-DTN20	11/21/2013	929	NA	0	2	SSEA-1
F2013-S1-02-DTN24	11/21/2013	130	NA	0	2	SSEA-1
F2013-S1-02-DTN4	11/21/2013	59	NA	0	2	SSEA-1
F2013-S1-02-DTN8	11/21/2013	63	NA	0	2	SSEA-1
F2013-S1-02-DTNO	11/21/2013	246	NA	0	2	SSEA-1
F2013-S1-02-DTS12	11/21/2013	111	NA	0	2	SSEA-1
F2013-S1-02-DTS4	11/21/2013	434	NA	0	2	SSEA-1
F2013-S1-02-DTS8	11/21/2013	382	NA	0	2	SSEA-1
F2013-S1-03-0-2	11/20/2013	59	NA	0	2	SSEA-1
T1-2	9/23/2014	43	26.9	0	2	SSEA-1
T1-3	9/23/2014	115	26.9	0	2	SSEA-1
T1-4	9/23/2014	110	20	0	2	SSEA-1
T1-5	9/23/2014	71	34	0	2	SSEA-1
T2-1	9/23/2014	42	61	0	2	SSEA-1
T2-2	9/23/2014	426	36	0	2	SSEA-1
T2-3	9/23/2014	57	31.6	0	2	SSEA-1

SAMPLE ID	SAMPLE DATE	COPPER (Mg/Kg)	ZINC (Mg/Kg)	START DEPTH (INCHES)	END DEPTH (INCHES)	PROPOSED SOIL EXCAVATION AREA
T2-4	9/23/2014	49	36.3	0	2	SSEA-1
T3-1	9/23/2014	28	30	0	2	SSEA-1
T3-2	9/23/2014	102	42	0	2	SSEA-1
T3-3	9/23/2014	58	26.1	0	2	SSEA-1
T3-4	9/23/2014	114	27.2	0	2	SSEA-1
T3-5	9/23/2014	90	31.4	0	2	SSEA-1
T4-1	9/23/2014	23	35	0	2	SSEA-1
T4-2	9/23/2014	254	58	0	2	SSEA-1
T4-3	9/23/2014	58	49	0	2	SSEA-1
T5-1	9/23/2014	31	34	0	2	SSEA-1
T5-2	9/23/2014	421	71	0	2	SSEA-1
T5-4	9/23/2014	45	34	0	2	SSEA-1
T5-4 Replicate	9/23/2014	51	38	0	2	SSEA-1
T6-1	9/23/2014	29	23.5	0	2	SSEA-1
T6-2	9/23/2014	193	25.3	0	2	SSEA-1
T6-3	9/23/2014	329	42	0	2	SSEA-1
T6-4	9/23/2014	46	36	0	2	SSEA-1
T7-1	9/23/2014	24	19.5	0	2	SSEA-1
T7-2	9/23/2014	421	30	0	2	SSEA-1
T7-3	9/23/2014	196	62	0	2	SSEA-1
T7-4	9/23/2014	54	44	0	2	SSEA-1
T8-1	9/23/2014	29	40	0	2	SSEA-1
T8-2	9/23/2014	45	14.8	0	2	SSEA-1
T8-3	9/23/2014	315	70	0	2	SSEA-1
T8-4	9/23/2014	45	47	0	2	SSEA-1
T9-1	9/23/2014	22	21.8	0	2	SSEA-1
T9-2	9/23/2014	108	16.9	0	2	SSEA-1
T9-3	9/23/2014	160	20.1	0	2	SSEA-1
T9-4	9/23/2014	673	101	0	2	SSEA-1
T9-5	9/23/2014	68	40.5	0	2	SSEA-1
F2013-D3-01-2-6	11/20/2013	87	NA	2	6	SSEA-1
F2013-D3-01-2-6	11/20/2013	99	NA	2	6	SSEA-1
F2013-D3-07-2-6	11/23/2013	390	NA	2	6	SSEA-1
F2013-D3-07-2-6	11/23/2013	492	NA	2	6	SSEA-1
F2013-S1-01Y-2-6	11/23/2013	64	NA	2	6	SSEA-1
F2013-S1-02-2-6	11/20/2013	112	NA	2	6	SSEA-1
F2013-S1-03-2-6	11/20/2013	36	NA	2	6	SSEA-1
F2013-D3-01-6-12	11/20/2013	26	NA	6	12	SSEA-1
F2013-D3-07-6-12	11/23/2013	41	NA	6	12	SSEA-1
F2013-S1-01Y-6-12	11/23/2013	27	NA	6	12	SSEA-1
F2013-S1-02-6-12	11/20/2013	27	NA	6	12	SSEA-1
F2013-S1-02-6-12	11/20/2013	40	NA	6	12	SSEA-1
F2013-S1-03-6-12	11/20/2013	15	NA	6	12	SSEA-1
F2013-D3-01-12-18	11/20/2013	27	NA	12	18	SSEA-1
F2013-S1-02-12-18	11/20/2013	14	NA	12	18	SSEA-1
F2013-S1-03-12-18	11/20/2013	21	NA	12	18	SSEA-1
F2013-D3-01-18-24	11/20/2013	26	NA	18	24	SSEA-1
F2013-S1-02-18-24	11/20/2013	22	NA	18	24	SSEA-1
F2013-S1-03-18-24	11/20/2013	25	NA	18	24	SSEA-1
F2013-D1-04-DTS12	11/22/2013	20	NA	0	2	SSEA-2
F2013-D1-04-DTS4	11/22/2013	82	NA	0	2	SSEA-2
F2013-D1-04-DTS8	11/22/2013	277	NA	0	2	SSEA-2
T1-4S-1	9/24/2014	90	62	0	2	SSEA-2
T1-5S-1	9/24/2014	34	54	0	2	SSEA-2
F2013-D1-03-DTN0	11/22/2013	188	NA	0	2	SSEA-3
F2013-D1-03-DTN4	11/22/2013	30	NA	0	2	SSEA-3
F2013-D1-03-DTS12	11/22/2013	61	NA	0	2	SSEA-3
F2013-D1-03-DTS4	11/22/2013	381	NA	0	2	SSEA-3
F2013-D1-03-DTS8	11/22/2013	235	NA	0	2	SSEA-3
T1-10S-1	9/24/2014	37	59	0	2	SSEA-3
T1-EtoW-63	9/25/2014	40	66	0	2	SSEA-3
T1-EtoW-64	9/25/2014	70	124	0	2	SSEA-3
T1-EtoW-65	9/25/2014	70	50	0	2	SSEA-3
T1-EtoW-65 R	9/25/2014	68	53	0	2	SSEA-3
T1-EtoW-66	9/25/2014	172	37	0	2	SSEA-3
T2-EtoW-17	9/24/2014	257	662	0	2	SSEA-3
T2-EtoW-18	9/24/2014	42	36	0	2	SSEA-3
T2-EtoW-19	9/24/2014	44	53	0	2	SSEA-3

SAMPLE ID	SAMPLE DATE	COPPER (Mg/Kg)	ZINC (Mg/Kg)	START DEPTH (INCHES)	END DEPTH (INCHES)	PROPOSED SOIL EXCAVATION AREA
F2013-N4-04-0-2	11/21/2013	76	NA	0	2	SSEA-4
F2013-N4-04-0-2	11/21/2013	104	NA	0	2	SSEA-4
SEcrn-T1-528	10/1/2014	71	27.4	0	2	SSEA-4
T1-EtoW-70	9/25/2014	332	32	0	2	SSEA-4
T1-EtoW-71	9/25/2014	107	34	0	2	SSEA-4
T1-EtoW-71-R	9/25/2014	117	38	0	2	SSEA-4
F2013-N4-04-2-6	11/21/2013	63	NA	2	6	SSEA-4
F2013-N4-04-6-12	11/21/2013	21	NA	6	12	SSEA-4
F2013-N4-01-0-2	11/22/2013	500	NA	0	2	SSEA-5
F2013-N4-01-0-2	11/22/2013	595	NA	0	2	SSEA-5
SWcrn-489	10/2/2014	47	44	0	2	SSEA-5
SWcrn-490	10/2/2014	347	51	0	2	SSEA-5
SWcrn-492	10/2/2014	141	57	0	2	SSEA-5
SWcrn-493	10/2/2014	314	44	0	2	SSEA-5
F2013-N4-01-2-6	11/22/2013	230	NA	2	6	SSEA-5
F2013-N4-01-2-6	11/22/2013	297	NA	2	6	SSEA-5
F2013-N4-01-6-12	11/22/2013	26	NA	6	12	SSEA-5
T5-W-E-40	9/24/2014	101	54	0	2	SSEA-6
T6-E-W-57	9/24/2014	172	118	0	2	SSEA-6
T7-EtoW-138	9/25/2014	109	51	0	2	SSEA-7
F2013-N3-02-0-2	11/19/2013	110	NA	0	2	SSEA-8
F2013-N3-02-0-2	11/19/2013	139	NA	0	2	SSEA-8
F2013-N3-02-2-6	11/19/2013	80	NA	2	6	SSEA-8
F2013-N3-02-6-12	11/19/2013	17	NA	6	12	SSEA-8
F2013-N3-02-12-18	11/19/2013	10	NA	12	18	SSEA-8
F2013-N3-02-18-24	11/19/2013	10	NA	18	24	SSEA-8
F2013-D2-01-0-2	11/20/2013	89	NA	0	2	SSEA-9
F2013-D2-01-0-2	11/20/2013	128	NA	0	2	SSEA-9
F2013-D2-01-DTE4	11/22/2013	21	NA	0	2	SSEA-9
F2013-D2-01-DTE8	11/22/2013	110	NA	0	2	SSEA-9
F2013-D2-01-DTW0	11/22/2013	0	NA	0	2	SSEA-9
F2013-D2-01-DTW4	11/22/2013	40	NA	0	2	SSEA-9
F2013-D2-01-DTW8	11/22/2013	39	NA	0	2	SSEA-9
HW27-StoN-361	9/29/2014	123	102	0	2	SSEA-9
HW27-StoN-362	9/29/2014	57	64	0	2	SSEA-9
HW27-StoN-363	9/29/2014	117	69	0	2	SSEA-9
HW27-StoN-364	9/29/2014	142	96	0	2	SSEA-9
Hwy27-Detail361-555	10/2/2014	54	47	0	2	SSEA-9
Hwy27-Detail361-555	10/2/2014	60	61	0	2	SSEA-9
Hwy27-Detail361-556	10/2/2014	52	69	0	2	SSEA-9
Hwy27-Detail361-557	10/2/2014	57	64	0	2	SSEA-9
Hwy27-Detail361-558	10/2/2014	12	97	0	2	SSEA-9
Hwy27-Detail361-559	10/2/2014	30	95	0	2	SSEA-9
Hwy27-Detail361-560	10/2/2014	21	41	0	2	SSEA-9
Hwy27-Detail364-556	10/2/2014	137	93	0	2	SSEA-9
Hwy27-Detail364-557	10/2/2014	23	46	0	2	SSEA-9
Hwy27-Detail364-558	10/2/2014	68	105	0	2	SSEA-9
Hwy27-Detail364-559	10/2/2014	59	78	0	2	SSEA-9
Hwy27-Detail364-560	10/2/2014	51	99	0	2	SSEA-9
Hwy27-Detail364-561	10/2/2014	75	50	0	2	SSEA-9
Hwy27-NS-547	10/2/2014	22	31	0	2	SSEA-9
F2013-D2-01-2-6	11/20/2013	32	NA	2	6	SSEA-9
F2013-D2-01-2-6	11/20/2013	38	NA	2	6	SSEA-9
F2013-D2-01-6-12	11/20/2013	21	NA	6	12	SSEA-9
F2013-D2-01-6-12	11/20/2013	32	NA	6	12	SSEA-9
F2013-D2-01-12-18	11/20/2013	24	NA	12	18	SSEA-9
F2013-N2-03-0-2	11/21/2013	172	NA	0	2	SSEA-10
F2013-N2-03-2-6	11/21/2013	19	NA	2	6	SSEA-10
F2013-N2-03-6-12	11/21/2013	15	NA	6	12	SSEA-10
F2013-N2-01-0-2	11/21/2013	78	NA	0	2	SSEA-11
F2013-N2-01-0-2	11/21/2013	88	NA	0	2	SSEA-11
F2013-N2-01-2-6	11/21/2013	200	NA	2	6	SSEA-11
F2013-N2-01-2-6	11/21/2013	316	NA	2	6	SSEA-11
F2013-N2-01-6-12	11/21/2013	173	NA	6	12	SSEA-11
F2013-D2-01-DTW12	11/22/2013	39	NA	0	2	SSEA-12
F2013-D2-03-DTW0	11/22/2013	183	NA	0	2	SSEA-12
F2013-D2-03-DTW4	11/22/2013	97	NA	0	2	SSEA-12
F2013-D2-03-DTW8	11/22/2013	79	NA	0	2	SSEA-12

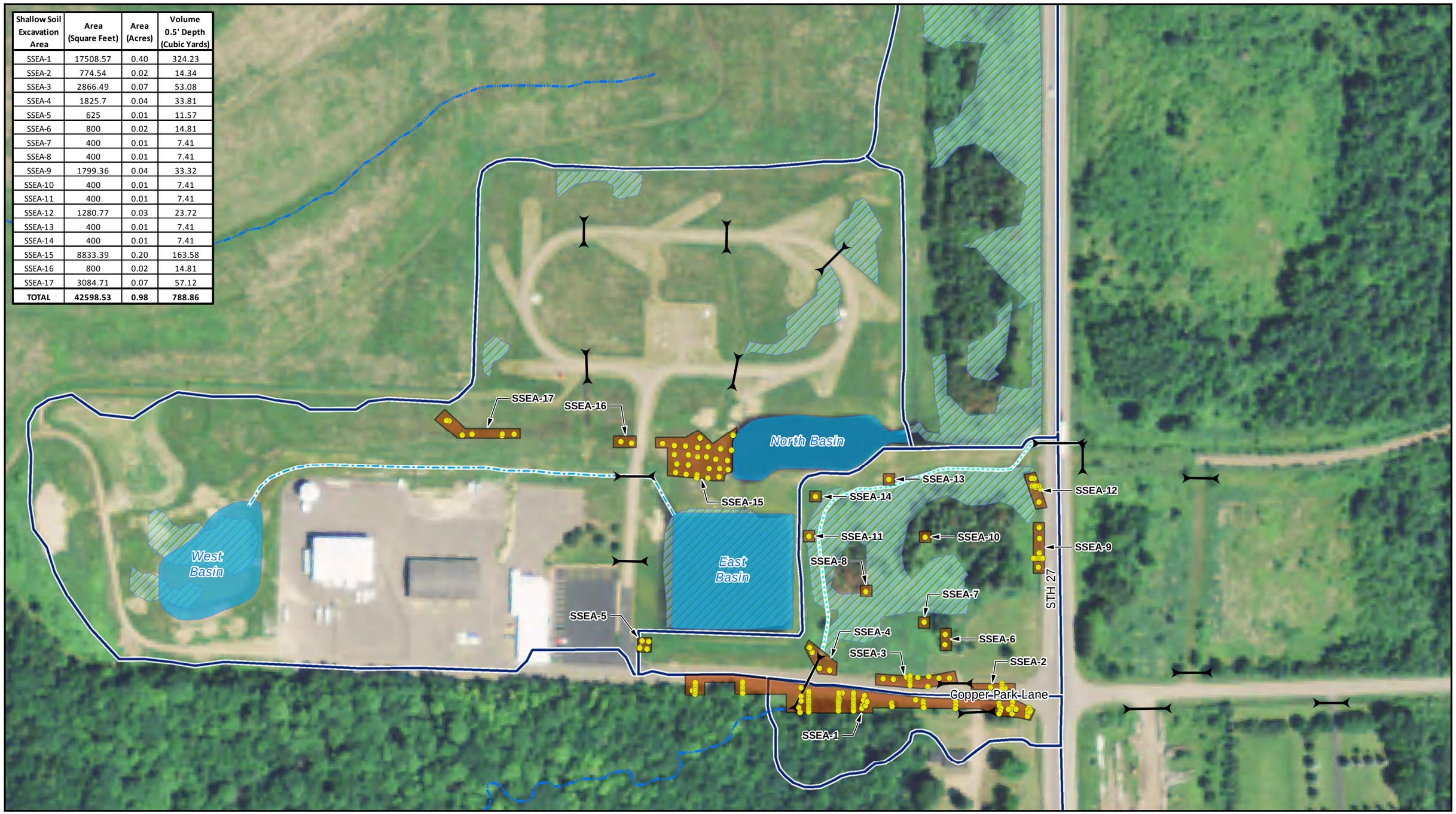
SAMPLE ID	SAMPLE DATE	COPPER (Mg/Kg)	ZINC (Mg/Kg)	START DEPTH (INCHES)	END DEPTH (INCHES)	PROPOSED SOIL EXCAVATION AREA
F2013-N1-03-0-2	11/20/2013	260	NA	0	2	SSEA-12
F2013-N1-03-0-2	11/20/2013	310	NA	0	2	SSEA-12
F2013-N1-03-DTW4	11/22/2013	274	NA	0	2	SSEA-12
F2013-N1-03-DTW8	11/22/2013	49	NA	0	2	SSEA-12
HW27-RR-378	9/29/2014	215	47	0	2	SSEA-12
HW27-StoN-366	9/29/2014	177	55	0	2	SSEA-12
HW27-StoN-367	9/29/2014	69	50	0	2	SSEA-12
F2013-N1-03-2-6	11/20/2013	110	NA	2	6	SSEA-12
F2013-N1-03-2-6	11/20/2013	157	NA	2	6	SSEA-12
F2013-N1-03-6-12	11/20/2013	24	NA	6	12	SSEA-12
F2013-N1-03-6-12	11/20/2013	34	NA	6	12	SSEA-12
HW27-RR-378	9/29/2014	41	48	6	12	SSEA-12
F2013-N1-04W	11/23/2013	132	NA	0	2	SSEA-13
NEcrn-T3NS-546	10/2/2014	205	41	0	2	SSEA-14
F2013-N1-09W	11/24/2013	70	NA	0	2	SSEA-15
T5-WtloE-234	9/26/2014	162	30	0	2	SSEA-15
T5-WtloE-234R	9/26/2014	144	30	0	2	SSEA-15
T6-EtoW-235	9/26/2014	61	39	0	2	SSEA-15
T6-EtoW-236	9/26/2014	139	42	0	2	SSEA-15
T6-EtoW-237	9/26/2014	117	35	0	2	SSEA-15
T6-EtoW-238	9/26/2014	128	38	0	2	SSEA-15
T6-EtoW-239	9/26/2014	166	39	0	2	SSEA-15
T6-EtoW-240	9/26/2014	174	37	0	2	SSEA-15
T6-EtoW-241	9/26/2014	142	36	0	2	SSEA-15
T7-W-E-243	9/26/2014	119	40	0	2	SSEA-15
T7-W-E-244	9/26/2014	68	31	0	2	SSEA-15
T7-W-E-245	9/26/2014	56	32	0	2	SSEA-15
T7-W-E-246	9/26/2014	114	35	0	2	SSEA-15
T7-W-E-247	9/26/2014	79	32	0	2	SSEA-15
T7-W-E-248	9/26/2014	145	41	0	2	SSEA-15
T8-EtoW348a	9/28/2014	127	35	0	2	SSEA-15
T8-EW-249	9/26/2014	104	30	0	2	SSEA-15
T8-EW-250	9/26/2014	120	40	0	2	SSEA-15
T8-EW-251	9/26/2014	90	35	0	2	SSEA-15
T8-EW-252	9/26/2014	120	41	0	2	SSEA-15
T8-EW-253	9/26/2014	94	36	0	2	SSEA-15
T8-EW-258	9/26/2014	131	37	0	2	SSEA-15
T8-EW-259	9/26/2014	91	30	0	2	SSEA-15
T9-WE-260	9/26/2014	111	36	0	2	SSEA-15
T9-WE-261	9/26/2014	77	33	0	2	SSEA-15
T9-WE-262	9/26/2014	155	37	0	2	SSEA-15
T5-WtloE-234	9/26/2014	106	35	6	12	SSEA-15
T6-we-236	9/30/2014	87	45	6	12	SSEA-15
T6-we-240	9/30/2014	94	38	6	12	SSEA-15
T7-we-248	9/30/2014	37	23.4	6	12	SSEA-15
T7-we-248-R	9/30/2014	42	29.2	6	12	SSEA-15
T8-EtoW348a	9/28/2014	75	37	6	12	SSEA-15
T8-EtoW348a-R	9/28/2014	59	38	6	12	SSEA-15
T8-we-252	9/30/2014	57	25.9	6	12	SSEA-15
T2-WE-455	9/30/2014	196	26	0	2	SSEA-16
T2-WE-456	9/30/2014	102	32	0	2	SSEA-16
T2-WE-443	9/30/2014	148	25	0	2	SSEA-17
T2-WE-444	9/30/2014	626	27	0	2	SSEA-17
T2-WE-445	9/30/2014	118	29	0	2	SSEA-17
T2-WE-446	9/30/2014	535	38	0	2	SSEA-17
T2-WE-447	9/30/2014	265	26	0	2	SSEA-17
T3-EW-472	9/30/2014	18	30	0	2	SSEA-17
T3-EW-472a	9/30/2014	109	30	0	2	SSEA-17
T2-WE-446	9/30/2014	326	36	6	12	SSEA-17
T2-WE-446	9/30/2014	81	26.4	12	18	SSEA-17

Notes:

NA = Not Analyzed
Mg/Kg = milligrams/kilogram
SSEA = Shallow Soil Excavation Area
UTM = Universal Transverse Mercator

Prepared By: BJW1
Checked By: SVF

Shallow Soil Excavation Area	Area (Square Feet)	Area (Acres)	Volume 0.5' Depth (Cubic Yards)
SSEA-1	17508.57	0.40	324.23
SSEA-2	774.54	0.02	14.34
SSEA-3	2866.49	0.07	53.08
SSEA-4	1825.7	0.04	33.81
SSEA-5	625	0.01	11.57
SSEA-6	800	0.02	14.81
SSEA-7	400	0.01	7.41
SSEA-8	400	0.01	7.41
SSEA-9	1799.36	0.04	33.32
SSEA-10	400	0.01	7.41
SSEA-11	400	0.01	7.41
SSEA-12	1280.77	0.03	23.72
SSEA-13	400	0.01	7.41
SSEA-14	400	0.01	7.41
SSEA-15	8833.39	0.20	163.58
SSEA-16	800	0.02	14.81
SSEA-17	3084.71	0.07	57.12
TOTAL	**42598.53**	**0.98**	**788.86**



NOTES:
1. 2013 - 1 meter imagery downloaded from the USDA Geospatial Data Gateway.
2. Horizontal datum based on NAD 1983. Horizontal coordinates based on Wisconsin State Plane North (Feet).
3. Drainage areas estimated from 2012 - 1' LiDAR contour data received from Rusk County.

LEGEND

- Golder XRF Soil Sample Locations (2013-2014)
- Approximate Culvert Location
- Intermittent Stream
- Drainage Channel
- Approximate Runoff Flow Path
- Field Delineated Wetlands (Stantec, 2011)
- Infiltration Basin
- Drainage Sub-Basin
- Proposed Soil Excavation Area (0-6")

N

Foth Infrastructure & Environment, LLC			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY: MAN		DATE: MAY '15	
APPROVED BY: SVF		DATE: MAY '15	
APPROVED BY:		DATE:	

FLAMBEAU MINING COMPANY

FIGURE E-1

SOIL SAMPLE LOCATIONS

RECLAIMED FLAMBEAU MINE - LADYSMITH, WISCONSIN

Scale: 0 80 160 Feet | Date: MAY 2015

Prepared by: BJW1 | Project No: 14F779.14

Path: X:\GB\IE\2014\14F779-00\GIS\mxd\Permit_Application\FMC_Proposed_Soil_Excavation_Areas_05042015_with_XRF_samples_11x17.mxd Date: 5/7/2015

Appendix F

Water Resources Application for Project Permits (Includes Individual Chapter 30 Permit Application)

State of Wisconsin
Department of Natural Resources
dnr.wi.gov

Water Resources Application for Project Permits

Form 3500-053 (R 3/14)

Notice: Pursuant to chs. 30 and 31, Wis. Stats., ch. 281, Wis. Stats, and s. 283.33, Wis. Stats., this form is used to apply for coverage under the state construction site storm water runoff general permit, and to apply for a state or federal permit or certification for waterway and wetland projects or dam projects. This form and any required attachments constitute the permit application. Failure to complete and submit this application form may result in a fine and/or imprisonment or forfeiture under the provisions of applicable laws including s. 283.91, Wis. Stats. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Public Records Laws (ss. 19.31-19.39, Wis. Stats.).

Use this form for (select all that apply):

- ☒ Waterway General Permit
- ☒ Waterway Individual Permit
- ☒ Wetland General Permit
- ☐ Wetland Individual Permit
- ☒ Storm water NOI - New land disturbing construction activity
- ☐ Storm water NOI - Renewal FIN # _____
- ☐ Work in waters of the U.S. (Army Corps of Engineers)
- ☐ Dam projects (DNR-ch. 31, Wis. Stats., or Army Corps of Engineers)

Read all instructions provided before completing. If additional space is needed, attach additional pages.

Section 1: Landowner Information

Landowner Name (first and last name, org. or entity)	Authorized Representative		
Flambeau Mining Company	Mr. Dave Cline		
Mailing Address	**City**	**State**	**ZIP Code**
4700 Daybreak Parkway	South Jordan	UT	84095
Email Address	**Phone Number (include area code)**	**Alternate Phone Number**	
Dave.Cline@riotinto.com	(801) 556-1376		

Section 2: Applicant Information ☒ Select if same as landowner

Applicant Name (first and last name, org. or entity)	Contact Person		
Mailing Address	**City**	**State**	**ZIP Code**
Email Address	**Phone Number (include area code)**	**Alternate Phone Number**	

Section 3: Primary Project Contact ☐ Select if same as landowner

◉ Consultant ○ Contractor ○ Other – Specify: _____

Name (Ind., Org. or Entity)	Contact Person (first and last name)		
Foth Infrastructure & Environment, LLC	Sharon Kozicki		
Mailing Address	**City**	**State**	**ZIP Code**
2121 Innovation Drive, P.O. Box 5126	De Pere	WI	54115-5126
Email Address	**Phone Number (include area code)**	**Alternate Phone Number**	
Sharon.Kozicki@foth.com	(920) 496-6737		

Section 4: Project or Site Location

Project Name	County	
Copper Park Business & Recreation Area	Rusk	○ City ◉ Town ○ Village of Grant

Location Address/Description

Approximately 500 feet northwest of the intersection of State Highway 27 and Copper Park Lane

Public Land Survey System (PLSS) – Provide the section, range, township information and latitude and longitude in decimal degrees, if available.

SW ¼ of SW ¼ of Section 9, Township 34 N, Range 6 ○ E ◉ W

45.4375000 Latitude

-91.1122000 Longitude

If this site is not wholly contained in the quarter-quarter section, more description:
Contained on Quarter-Quarter Section

Section 5: Pre-Application Resource Screening

Screening your project site for the presence of sensitive natural or cultural resources before applying for a permit can assist you in planning and designing your project to avoid or minimize impacts to these resources. Please identify any screening you have already completed and attach any supporting documentation to your application. If sensitive resources are identified during the permit review, it may result in delays in processing your application and/or project re-design.

Waterways: Provide the name(s) of closest waterbodies:

Intermittent Stream C a tributary to the Flambeau River

Wetlands: Has the project site been assessed for the presence of wetlands? ◉ Yes ○ No

If yes, select all sources of information used and attach supporting report or documentation:

- ☒ Wisconsin Wetland Inventory
- ☒ Wetland Locator Tool - http://dnr.wi.gov/topic/wetlands/locating.html
- ☒ Wetland Delineation by consultant
- ☒ NRCS Soils Map
- ☐ DNR Wetland Identification letter - http://dnr.wi.gov/topic/wetlands/identification.html
- ☐ DNR Wetland Confirmation letter - http://dnr.wi.gov/topic/wetlands/identification.html
- ☐ Army Corps of Engineers Concurrence letter
- ☐ Other: _____

Are wetlands proposed to be filled, excavated or disturbed during construction or as part of this project? ◉ Yes ○ No

Endangered or Threatened Resources:

Has the presence of endangered or threatened resources been evaluated according to the protocols developed by the DNR Bureau of Natural Heritage Conservation (BNHC)? dnr.wi.gov/topic/ERReview/ ◉ Yes ○ No

If yes, select how evaluation was completed and attach supporting report or documentation:

- ☐ DNR BNHC ER Review Letter
- ☐ Certified ER Review Letter
- ☐ Broad Incidental Take Permit/Authorization - specify (e.g. No/Low Impact Activities, Grassland and Savanna Management, etc.)
- ☒ Other: Mine Permit Application

Section 6: Project Information (attach additional sheets as necessary)

Duration: 08/03/2015 (Anticipated Project Start Date (mm/dd/yyyy)) 11/02/2015 (Anticipated Project End Date (mm/dd/yyyy))

Photos: Provide photographs of the "before" condition. 3-17-15 Photographs can be found in Appendix F
Date of Photographs

Project Purpose and Need: Provide a one to two paragraph description of the proposed project, including land and water alterations and intended use(s) of the project.

The project description can be found in April 2015 Copper Park Business and Recreation Area Work Plan Supplement Report.

Section 7: Certification and Permission

Certification: I hereby certify that I am the owner or authorized representative of the owner of the property which is the subject of this Permit Application. I certify that the information contained in this form and attachments is true and accurate. I certify that the project will be in compliance with all permit conditions. I understand that failure to comply with any or all of the provisions of the permit may result in permit revocation and a fine and/or imprisonment or forfeiture under the provisions of applicable laws.

Permission: I hereby give the Department permission to enter and inspect the property at reasonable times, to evaluate this notice and application, and to determine compliance with any resulting permit coverage.

Signature of Landowner / Authorized Representative – **For Stormwater applications, signature of landowner is required. Authorized representative is not sufficient.**

5-13-15
Date Signed

Dave Cline
Printed Name of Landowner / Authorized Representative

Vice President
Title

Photographic Log

Client's Name:	Site Location:	Project No.
Flambeau Mining Company	Industrial Outlot	14F779

Photo No.	Date:
1	10/29/12

Direction Photo Taken:
East

Photo Taken By:
Foth

Description:
Culvert under Highway 27

Photo No.	Date:
2	10/29/12

Direction Photo Taken:
West

Photo Taken By:
Foth

Description:

North Basin overview

Photographic Log

Client's Name:	Site Location:	Project No.
Flambeau Mining Company	Industrial Outlot	14F779

Photo No.	Date:
3	10/29/12

Direction Photo Taken:
West

Photo Taken By:
Foth

Description:

North Basin overview

Photo No.	Date:
4	10/29/12

Direction Photo Taken:
Southwest

Photo Taken By:
Foth

Description:

East Basin overview

Photographic Log

Client's Name:	Site Location:	Project No.
Flambeau Mining Company	Industrial Outlot	14F779

Photo No.	Date:
5	3/17/15

Direction Photo Taken:
East

Photo Taken By:
Rio Tinto

Description:

Swale between the North Basin and East Basin

Photo No.	Date:
6	6/2/14

Direction Photo Taken:
Northwest

Photo Taken By:
Foth

Description:

East Basin overview

Photographic Log

Client's Name:	Site Location:	Project No.
Flambeau Mining Company	Industrial Outlot	14F779

Photo No.	Date:
7	10/29/12

Direction Photo Taken:
Southeast

Photo Taken By:
Foth

Description:

East Basin overview

Photo No.	Date:
8	10/29/12

Direction Photo Taken:
Northwest

Photo Taken By:
Foth

Description:

Swale between North and East Basins

Photographic Log

Client's Name:	Site Location:	Project No.
Flambeau Mining Company	Industrial Outlot	14F779

Photo No.	Date:
9	3/17/15

Direction Photo Taken:
Northeast

Photo Taken By:
Rio Tinto

Description:

East Basin looking northeast

Photo No.	Date:
10	3/17/15

Direction Photo Taken:
East

Photo Taken By:
Rio Tinto

Description:

East/west ditch looking east

Photographic Log

Client's Name:	Site Location:	Project No.
Flambeau Mining Company	Industrial Outlot	14F779

Photo No.	Date:
11	3/17/15

Direction Photo Taken:
West

Photo Taken By:
Rio Tinto

Description:

East/west ditch looking west

Photo No.	Date:
12	9/14/12

Direction Photo Taken:
Southwest

Photo Taken By:
Foth

Description:

West Basin overview

Appendix G

Wisconsin Department of Transportation Application to Work on Highway Right-of-Way

APPLICATION/PERMIT TO WORK ON HIGHWAY RIGHT-OF-WAY

Wisconsin Department of Transportation (WisDOT)

DT1812 3/2014 s. 86.07(2), 86.16 and other applicable Wis. Stats.

1. Applicant's Name, Address, City, State and ZIP Code

Flambeau Mining Company
N4100 Hwy 27
Ladysmith, WI 54848

2. Work Start Date: 8/1/2015

3. Work Finish Date*: 9/30/2015

4. Highway (Check all that apply)

- ☒ WIS 27
- ☐ US _____
- ☐ Interstate _____
- ☐ _____

5. Work Location (Check/list all that apply)

☒ Town ☐ Village ☐ City of: Ladysmith

County: Rusk

6. Is the work area near a survey monument? If yes, email geodetic@dot.wi.gov or call 866-568-2852.

☐ Yes ☒ No

7. Trans 401 project designation? See provision #13. For all Major projects, provide a formal erosion control plan with this application.

☒ Minor ☐ Major

8. Location Details (Town, range, section, ¼ sect; provide plat map or location sketch)

SE 1/4, SE1/4, Sec 9, T34N, R6W

9. Are any environmental permits, certifications or approvals required from other regulatory agencies, including tribal governments? If yes, provide a copy of each item. If no, proof of agency coordination may still be required with this application. Click on environmental coordination for more information.

☐ Yes ☒ No

10. Work Type (Check all that apply)

- ☐ Access management
- ☐ Crash investigation/cleanup
- ☒ Drainage: Culverts/tiles
- ☒ Drainage: Grading/riprap
- ☐ Drainage: Storm Sewer
- ☐ Environmental assessment
- ☐ Harvesting nature products
- ☐ Hazmat: Cleanup/remediation
- ☐ Hazmat: Monitoring wells
- ☐ Invasive species assessment
- ☐ Landscaping
- ☐ Soil borings
- ☐ Surveying
- ☐ _____

11. Vegetation Management (Check all that apply)

- ☐ Mow ☐ Remove
- ☐ Prune ☐ Cut and/or trim
- ☐ Plant ☐ Chemically treat[13]

12. Work Zone Description (Check all that apply)

- ☐ Not applicable
- ☐ Full road closure: detour**
- ☐ Full road closure: temporary
- ☐ Lane closure: without flagging
- ☒ Lane closure: with flagging
- ☐ Lane encroachment (2 feet or less)
- ☐ Intersection/roundabout
- ☒ Shoulder/parking lane closure

Freeway/expressway location

- ☐ Off shoulder: < 30' off white line
- ☐ Off shoulder: ≥ 30' off white line
- ☐ Near R/W line or fence

Non–Freeway/expressway location

- ☐ Off shoulder: < 15' off white line
- ☐ Off shoulder: ≥ 15' off white line
- ☐ Back of curb: < 2' behind
- ☐ Back of curb: ≥ 2' behind

13. Provide Detailed Description of How Work Will Be Accomplished. Use page 2 or additional pages if needed. For chemical treatment, answer questions on page 2. Provide work plans, drawings and specifications as needed.

The proposed STH 27 Culvert Sediment Removal and Enhancement/Exit Treatment Plan includes regrading the stream base to prevent ponding and sedimention on the east and west side of the culvert crossing. Sedimentation build up within the culvert will be removed. A geo-fabric covered with 2" compacted stone will be constructed to inhibit vegetative growth trapping sediment. The proposed construction items within the Hwy 27 right-of-way are shown on the attached Figure 4.

GET UPDATED FIGURE, CONSTRUCTION DATES, AND ADDITIONAL AGENCY PERMIT APPROVALS!!!!!!!!

It is understood and agreed that approval is subject to the applicant's full compliance with the pertinent Statutes, as well as any codes, rules, regulations, and other jurisdictional agencies' permit requirements. Applicant shall comply with all permit provisions, superimposed notes, and detail drawings that WisDOT may add. Any alteration of this form by the applicant is prohibited and may be cause to revoke this permit. When approved, the permit does not transfer any land; nor give, grant or convey any land right, right in land, nor easement in WisDOT right-of-way. It is not assignable or transferrable. All costs associated with this permit are the permittee's responsibility unless otherwise noted.

Foth Infrastructure & Environment, LLC
(Main Contractor Company Name, If applicable)

Sharon Kozicki — 920-497-2500
(Contractor Representative/Title) — (Area Code/Phone No. – Office)

920-819-8012 — Sharon.kozicki@foth.com
(Area Code/Phone No. – Cell) — (Email Address)

X
(Applicant or Authorized Representative Signature) (If Computer-filled, Brush Script Font) — (Date)

(Printed Name) — (Title)

(Area Code/Phone No.) — (Email Address)

NOTE: If the work described is not completed by the "Work Finish Date" specified, this permit is null and void and the work shall not be completed unless authorized through a subsequent permit or an approved time extension. *ANY PERMIT ISSUED IS REVOCABLE.

For Official Wisconsin DOT Use Only – Do Not Write Below

☐ ***PERMITTEE SHALL NOTIFY THE WISDOT REPRESENTATIVE LISTED BELOW 3 DAYS BEFORE STARTING ANY WORK:***

Region contact, title, office address, area code/phone no., and email address

Lance Burger
Wisconsin DOT
Northwest Region - Superior Office
1701 North 4th St
Superior, WI 54880
715-392-7965
lance.burger@dot.wi.gov

(WisDOT Authorized Representative Signature – If Computer-filled, Brush Script Font)

- ☐ **See Supplemental Permit Provisions (Page 4)**
- ☐ **Special Permit Provisions Also Included**
- ☐ Lane Closure System notification required
- ☐ Insurance or performance bond required
- ☐ Other regulatory agency permits not required
- ☐ **State highway traffic detour permit required
- ☐ Permit issued in conjunction with: _____
- ☐ Permit voids and supersedes permit(s): #_____, Issued _____
- ☐

Date Application Received
Date Application Complete
Permit Issuance Date
Permit Expiration Date
Permit Extension Date
Permit Number

Use this section to provide information on chemical treatment (question #11):	Use this section to provide information that does not fit on front page or #11(a)-(f) on left:
(a) Chemical(s) to be used and EPA Registration Number(s)? (Example: Garlon 4 Ultra, EPA REG. NO. 62719-527) (b) Type of application(s)? (Example: Stump treatment, broadcast, etc.) (c) Applicator name(s) and Wisconsin certification number(s)? (Example: Bill Smith, 146886-CA. Personnel must be licensed as commercial applicators in category 6.0, Right-of-Way, to legally apply herbicides on roadsides.) (d) How will property owners bordering the affected highway R/W be notified prior to spraying? (Examples: In-person, doorknob cards, letters, phone calls, etc.) (e) Will spraying occur near wetlands? (If yes, see question #9) (f) Provide name(s) and cell number(s) for the supervisor or lead worker of each crew:	

INDEMNIFICATION

The Applicant shall save and hold the State, its officers, employees, agents, and all private and governmental contractors and subcontractors with the State under Chapter 84 Wisconsin Statutes, harmless from actions of any nature whatsoever (including any by Applicant itself) which arise out of, or are connected with, or are claimed to arise out of or be connected with any of the work done by the Applicant, or the construction or maintenance of facilities by the Applicant, pursuant to this permit or any other permit issued by the State for location of property, lines or facilities on highway right-of-way, (1) while the Applicant is performing its work, or (2) while any of the Applicant's property, equipment, or personnel, are in or about such place or the vicinity thereof, or (3) while any property constructed, placed or operated by or on behalf of Applicant remains on the State's property or right-of-way pursuant to this permit or any other permit issued by the State for location of property, lines or facilities on highway right-of-way; including without limiting the generality of the foregoing, all liability, damages, loss, expense, claims, demands and actions on account of personal injury, death or property loss to the State, its officers, employees, agents, contractors, subcontractors or frequenters; to the Applicant, its employees, agents, contractors, subcontractors, or frequenters; or to any other persons, whether based upon, or claimed to be based upon, statutory (including, without limiting the generality of the foregoing, worker's compensation), contractual, tort, or whether or not caused or claimed to have been caused by active or inactive negligence or other breach of duty by the State, its officers, employees, agents, contractors, subcontractors or frequenters; Applicant, its employees, agents, contractors, subcontractors or frequenters; or any other person. Without limiting the generality of the foregoing, the liability, damage, loss, expense, claims, demands and actions indemnified against shall include all liability, damage, loss, expense, claims, demands and actions for damage to any property, lines or facilities placed by or on behalf of the Applicant pursuant to this permit or any other permit issued by the State for location of property, lines or facilities on highway right-of-way in the past or present, or that are located on any highway or State property or right-of-way with or without a permit issued by the State, for any loss of data, information, or material; for trademark, copyright or patent infringement; for unfair competition or infringement of personal or property rights of any kind whatever. The Applicant shall at its own expense investigate all such claims and demands, attend to their settlement or other disposition, defend all actions based thereon and pay all charges of attorneys and all other costs and expenses of any kind arising from any such liability, damage, loss, claims, demands and actions.

Any transfer, whether voluntary or involuntary, of ownership or control of any property constructed, placed or operated by or on behalf of the Applicant that remains on the State's property or right-of-way pursuant to this permit shall not release Applicant from any of the indemnification requirements of this permit, unless the State is notified of such transfer in writing. Any acceptance by any other person or entity, whether voluntary or involuntary, of ownership or control of any property constructed, placed or operated by or on behalf of the Applicant that remains on the State's property or right-of-way pursuant to this permit, shall include acceptance of all of the indemnification requirements of this permit by the other person or entity receiving ownership or control.

Notwithstanding the foregoing, a private contractor or subcontractor with the State under Chapter 84 Wisconsin Statutes, that fails to comply with sections 66.0831 and 182.0175 Wisconsin Statutes (2011-2012), remains subject to the payment to the Applicant of the actual cost of repair of intentional or negligent damage by the contractor or subcontractor to any property, lines or facilities placed by or on behalf of the Applicant pursuant to this permit or any other permit issued by the State for location of property, lines or facilities on highway right-of-way, and remains subject to payment to the Applicant for losses due to personal injury or death resulting from negligence by the contractor or subcontractor.

Notwithstanding the foregoing, if the State, or its officers, employees and agents, fail to comply with sections 66.0831 and 182.0175 Wisconsin Statutes (2011-2012), the State or its officers, employees and agents, remain subject to the payment to the Applicant of the actual cost of repair of willful and intentional damage by the State, or its officers, employees and agents, to any property, lines or facilities placed by or on behalf of the Applicant pursuant to this permit or any other permit issued by the State for location of property, lines or facilities on highway right-of-way, and remain subject to payment to the Applicant for losses due to personal injury or death resulting from negligence by the State, its officers, employees and agents.

No indemnification of private contractors or subcontractors with the State under Chapter 84 Wisconsin Statutes, shall apply in the event of willful and intentional damage by such private contractors or subcontractors to the property, lines and facilities of the Applicant located on the highway right-of-way pursuant to this permit or any other permit issued by the State for the location of property, lines or facilities on highway right-of-way.

GENERAL PERMIT PROVISIONS AND CONDITIONS OF APPROVAL (#1-28)

Pursuant to Wisconsin Statutes and once approved by WisDOT, this permit allows performance of the specific work described over which WisDOT has permit authority. ***The permittee shall abide by these general provisions, and any supplemental and/or special provisions.*** (R/W = right-of-way)

1. Warning signs, devices and methods shall be in place and fully functional prior to the start of any permitted work within highway R/W, and shall protect the public until all permit-associated work is complete. Warning signs and devices shall conform to the appropriate sizes, designs and configurations specified within the Manual of Uniform Traffic Control Devices and the Wisconsin MUTCD Supplement, current edition. Provide and maintain the quantity of signs and devices therein described, and supplement those with additional signs, devices and flaggers as necessary to functionally protect people and property from injury or damage at all times and under all conditions, including changed or changing conditions. All personnel shall wear retro-reflective safety vests while working within the highway R/W.

2. Secure the work site and associated traffic control zone against any hazard to the public, both when the site is attended and is unattended during off-hours, holidays, and nighttime hours. This includes vehicles, equipment and materials. Any violation of this permit, particularly any failure to maintain safe work site and traffic control zone, will require immediately cure by the permittee, and may result in WisDOT stopping further work, removal of permittee from the highway R/W, and/or permit revocation.

3. Coordinate the permitted work and in no case interfere with any ongoing highway improvement project.

4. Keep a complete copy of the permit (which may be electronic) at the job site at all times the permitted work is ongoing along with a project manager or supervisor familiar with the permit and all of its details and requirements. Failure to comply with any part of this permit is the permittee's responsibility.

5. Determine the location of, and protect or cause to protect from any damage, any existing facilities in the area affected by the permitted work. All notifications to other facility owners are the permittee's responsibility.

6. Perform all permitted work without obstructing or closing any part of any traffic lane or fully closing any road unless specifically authorized by WisDOT.

7. Alter the permitted facilities as may be ordered by WisDOT to facilitate highway improvement, alteration, safety control, or maintenance. Accept all costs of constructing, maintaining, altering, temporarily moving or relocating the permitted facilities.

8. The permit authorizes only the described work of and for the permittee indicated on this permit. It does not grant authority for the work of any other, either by present or future installation.

9. Any disturbance to, operation within, or use of a highway median is expressly prohibited, unless specifically authorized by WisDOT. **The use of interstate or freeway median crossovers for any reason is prohibited and subject to law enforcement citation.**

10. Construction methods and restorations shall be in accordance with applicable parts of WisDOT's Standard Specifications for Highway and Structure Construction, current edition.

11. Comply with all requirements of applicable regulations and codes, including, but not limited to, the Wisconsin Dept of Workforce Development, Workplace Safety Institute for safety precautions and operations relevant to trenching, tunneling, and excavation.

12. Do not open at any time any greater length of trench than is necessary to maintain essential progress of the work.

13. Implement erosion control best management practices (BMPs) prior to and at all times during work operations. Provide and maintain erosion control BMPS to protect all restored areas upon completion of the permitted work until the replacement vegetation achieves sustained growth. Trans 401 designations for major and minor projects in this permit use the same meanings as utility projects. If a project is not "minor", then it is "major".

14. Derive no direct access to install, maintain or repair the permitted facility from the travel lane or shoulder of any freeway, or from any interchange ramp, unless specifically authorized by WisDOT or if needed due to an emergency. In the latter case, immediately contact the Wisconsin State Patrol and WisDOT Region Office as indicated on this permit.

15. Install the facility in the specified permit location. Move any part of the facility found to be otherwise located to the correct location upon WisDOT order. Any facility part located other than as specified in this permit is at permittee's sole risk. Accordingly, if the same is undetected or is suffered to remain in variance to the permit, the permittee shall hold the State, its employees, agents and officers harmless and free of any cost, claim or liability associated with any accidental damage to such facility that may result from a highway construction, maintenance, traffic control, or R/W management project or function.

16. Promptly restore all highway facilities disturbed by the permitted work or associated operation. WisDOT may issue a notice setting a specific time by which the restoration must be complete if restoration is not done voluntarily without delay. If the permittee fails to satisfactorily complete the restoration within the time established, WisDOT shall arrange for the restoration to be completed and bill the permittee accordingly. The permittee shall pay for all costs of said restoration.

17. Collect any brush, trash or waste materials resulting from the permitted work, and dispose of said materials off the R/W in accordance with applicable solid waste disposal regulations.

18. Send notice **within 10 calendar days** via regular mail or email to the authorized WisDOT representative who approved the permit upon completion of the work and restoration.

19. Smooth and finished slopes shall be constructed at any location where any regraded portion of the highway R/W meets the lands of adjacent property owners.

20. Backfill any excavation permitted within the highway pavement limits or shoulder areas with suitable granular material, placed in lifts or layers 12 inches or less each in depth, and mechanically compact to meet the appropriate density as specified in WisDOT's Standard Specifications for Highway and Structure Construction, current edition. Do not use water jetting to facilitate mechanical compaction. Repair to WisDOT's satisfaction any subsequent heavings, settlings, or other faultings attributable to the permitted work. Use temporary sheeting, shoring and/or trench boxes as needed to prevent trench/tunnel cave-ins.

21. Restore in-kind any curb, gutter, sidewalk, driveway, gravel base, ballast, shoulder material, or other highway R/W element/facility disturbed under this permit to the qualities, grades, compactions and conditions specified in WisDOT's Standard Specifications for Highway and Structure Construction, current edition.

22. Restore any turfed R/W area disturbed under this permit with fine-graded topsoil having a depth of not less than 4 inches, and reseeded to perennial grass or sodded to WisDOT's satisfaction.

23. Adjust manhole covers, shut-off and regulator valves, and like facilities to the level of the immediately adjacent grades.

24. Cure faults related to work or facilities under this permit that, in WisDOT's opinion, obstruct highway drainage or in any other manner adversely affect highway maintenance or operation, and restore the R/W as directed by and to WisDOT's satisfaction.

25. Keep all vehicles/equipment/materials outside the R/W fence including all bore pits of any bored or augered installations under a freeway. Do not keep vehicles/equipment/materials between any freeway travel lane and a bore pit if WisDOT authorizes the pit location within the freeway R/W. Locate all bore pits outside the clear zone and as close to the R/W fence as possible.

26. Do not keep vehicles/equipment/materials related to this permit within the non-freeway R/W limits except as are actively engaged in the work operation.

27. Be aware that future highway improvements may require the adjustment of part or all of the permitted facility, at permittee's cost, to conform to WisDOT's *Utility Accommodation Policy*.

28. Comply with appropriate laws, rules, policies, etc. when within tribal or federal lands. Provide documentation as needed when on WisDOT R/W to prove compliance or coordination with the following agencies:
    - Wisconsin Historical Society to avoid/mitigate any potential cultural resource (archeological, historical, burial site, etc.) impacts per §44.40.
    - Department of Natural Resources to avoid/mitigate any potential storm water runoff, site erosion, wetland, waterway and endangered/threatened species impacts.

SUPPLEMENTAL PERMIT PROVISIONS (#29-50)

The permittee shall abide by the following checked provisions:

TREE & VEGETATION MANAGEMENT

☐ 29. Plant trees/vegetation only in such locations and in such species as indicated on the plans included and approved with this permit, or as WisDOT specifies in the field.

☐ 30. Maintain all plantings according to the attached special permit provisions.

☐ 31. Do not place any sign or marker identifying the plantings within the highway R/W limits.

☐ 32. WisDOT accepts no responsibility for loss that may occur to the plantings. Be fully aware that the plantings are subject to:
    - Thinning and/or mortality
    - Normal hazards due to maintenance operations, snow control, and public utility installation or alteration
    - Trimming or removal, if or when the plantings cause restrictions to sight distance or hazardous snow/ice conditions on the highway
    - Destruction, if highway reconstruction is done
    - Partial or complete abandonment or obliteration, or return to private ownership, if future changes in highway location are made

☐ 33. Do not cut, trim or damage trees/vegetation to facilitate the installation or maintenance of the permitted facility except as authorized by the owner of such tree/vegetation. See Wisconsin Statutes 86.03(2), (4), 86.16(3), and 182.017(5).

☐ 34. Do not cut or prune oak trees between April 15 and October 15 to prevent Oak Wilt Disease from spreading unless a thick coat of asphalt base tree paint is applied immediately after **any** cut, pruning wound, or abrasion made between those dates. Cleanly cut the exposed ends of any roots encountered during grading or trenching with suitable pruning tools immediately after exposure. Adhere to any applicable laws, including local ordinances if they are stricter than WisDOT specifications.

☐ 35. Remove all stumps, branches, logs, and other debris resulting from the cutting and trimming operations and dispose of such materials off the R/W. Tree disposal may also occur by giving them to the adjacent property owner(s) at a storage location approved by the owner(s). Comply with any applicable laws that regulate the sale, transport, or pruning/cutting of trees.

☐ 36. Cut trees flush with the ground. Any remaining stumps shall not interfere with mowing operations.

☐ 37. Cut trees may be chipped and used for mulch on the R/W in a layer not exceeding three inches.

☐ 38. Trim only the trees/vegetation necessary to provide safe clearances or by special provisions. Do not damage non-target trees/vegetation. Do not clear cut trees/vegetation.

☐ 39. Survey the trees/vegetation to be removed and inspect jointly with a WisDOT representative prior to starting any work on the highway R/W.

☐ 40. Treat all deciduous tree stumps with a herbicide approved for this use. Do not treat evergreen tree stumps.

RAILROAD CROSSING WORK

☐ 41. Complete a permit/application form to detour state highway traffic (DT1479). This DT1812 permit shall only be in effect if WisDOT approves the matching DT1479 permit.

☐ 42. Comply with the attached "Special Provisions for Railroad Crossing Work."

WORK RESTRICTIONS

☐ 43. Daily, holiday and/or seasonal work restrictions apply to the permitted work as detailed on page ___. Review the restrictions with the WisDOT Region Office(s) identified on this permit.

MISCELLANEOUS

☐ 44. Contact the WisDOT Region Office(s) identified on this permit to arrange for a Region representative to inspect the work site. Perform no work under this permit prior to his/her arrival.

☐ 45. Contact the WisDOT Region Office(s) identified on this permit prior to completing the permitted work to arrange for a Region representative to inspect the work before the permittee's employees or contractor leaves the site.

☐ 46. Call the State Traffic Operations Center (STOC) / - on a weekly basis or as otherwise determined by the STOC before working on any interstate or other major freeway. The STOC may place restrictions on work times and lane/shoulder closures based upon various special events, oversize freight movements, or daily peak travel times.

☐ 47. Construction by open-trench methods is authorized only if the permitted installation can be accomplished in advance of the highway paving. Bore or dry auger the permitted facility if this cannot be accomplished.

☐ 48. At any location where open-trench installation across highway pavement is authorized, saw-cut the surface full depth to enable it to be restored with smooth joints. Restore concrete pavement to the nearest joint.

☐ 49. Backfill all excavations according to the attached detail.

☐ 50. Blasting within the highway R/W **is authorized** with this permit.

☐ 51.