DAVY ENGINEERING

STORM WATER POLLUTION PREVENTION AND MANAGEMENT PLAN FOR WILLOW HEIGHTS TOWN OF SHELBY LA CROSSE COUNTY, WISCONSIN

PRELIMINARY

APRIL, 2015

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DAVY ENGINEERING CO.
CONSULTING ENGINEERS
LA CROSSE, WISCONSIN
PROJECT NO. 9937-002.020
APRIL, 2015

STORM WATER POLLUTION PREVENTION AND MANAGEMENT PLAN
FOR
WILLOW HEIGHTS
TOWN OF SHELBY, LA CROSS COUNTY, WISCONSIN

APRIL, 2015

OWNER:
ALT INVESTMENTS, LLC
W5674 KOSS ROAD
ONALASKA, WI 54650

SWPPP CONSTRUCTION PHASE CONTACT(S)
[Below shall to be filled out by the Contractors once selected. Provide Name, address, phone, and email]

	Prime Contractor:	Grading Contractor:	Restoration Contractor:
Name:	Ken Gorman	Russ Flower	
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WILLOW HEIGHTS
TOWN OF SHELBY, LA CROSS COUNTY, WISCONSIN

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*Figures and Appendix documents are available upon request.

STORM WATER POLLUTION PREVENTION PLAN AND MANAGEMENT PLAN
WILLOW HEIGHTS
TOWN OF SHELBY, LA CROSS COUNTY, WISCONSIN

1.0 INTRODUCTION

The purpose of this plan is to aid the Home Owners Association in understanding, operating and maintaining the on-site storm water management facilities and to aid the Contractor with preventing water pollution during construction. In addition, it provides information for the County of La Crosse and DNR to review the permit concerning post-construction storm water practices and erosion control practices.

This plan will be updated with the construction of the water main, sanitary sewer and force main, a lift station, and street.

Schedule: The work is scheduled for 2015.

Location: NW ¼ of the SE 1/4, SW ¼ of the SE ¼ and SE ¼ of the SE ¼ of Section 12, NW ¼ of the NE ¼ and the NE ¼ of the NE ¼ of Section 13 in Township 15 North, Range 7 West, Town of Shelby, La Crosse County, Wisconsin.

2.0 MAINTENANCE PLAN DURING CONSTRUCTION

See Section 2.8, Erosion and Sedimentation Control of the specifications and Section 10 Special Provisions. Refer to the erosion control notes on the Erosion Control Plan sheet.

Construction Schedule

1. Mobilize to site.
2. Install silt fence, temporary stone tracking pad, and additional BMP's according to erosion control plan.
3. Clear and grub and strip topsoil from site and stockpile outside of wood preservation areas and upstream of silt fence.
4. Demolish and remove pavement/gravel.
5. Install the storm water outlet discharge pipe, control structure and subsurface drains. Do not install the engineered soil for the rain garden/biofilter until the upstream area is stabilized.
6. Rough road and site. This must be done in phases since the soils are unstable. Do not install the engineered soil for the rain garden/biofilter until the upstream area is stabilized. Stabilize areas of final grading within 7 days.
7. Install utilities and outside of right-of-way install temporary seeding within 14 days of initial disturbance.
8. Install subgrade and base course. The lower half of the HMA pavement could be done now but is not recommended by the Geotechnical Engineer.
9. Final grade the side slopes of the road, well site locations, and detention areas, stabilize, and seed. Do not install the engineered soil for the rain garden/biofilter until the upstream area is stabilized, unless erosion mat in placed upstream and Interim Manufactured Perimeter Control and Slope Interruption Products are placed along the perimeter of the engineered soil area.
10. Install the topsoil and final vegetation seeding. Install phase 2 erosion control such as silt fence, Interim Manufactured Perimeter Control and Slope Interruption Products are placed along the perimeter of the engineered soil area and as ditch checks.
11. Construct wells.
12. Install engineered soil and final grade the rain garden, seed and stabilize with turf reinforcement mat (TRM) during one day for each basin. DO NOT leave a partially installed rain garden to be completed the following day.

3.0 PURPOSE AND GENERAL DESCRIPTION OF THE FACILITIES

The purpose of the storm water management facilities is to improve water quality by reducing suspended solids discharges from the site, reducing peak discharge for the 1-year and 2-year runoff, and where possible infiltrate storm water into the ground. The site is to be disturbed for a road that provides access to a residential development. See the Storm Water Management Plan section of this document for more information.

4.0 DESCRIPTION, OPERATION AND MAINTENANCE OF FACILITY COMPONENTS

Repairing structural problems such as clogged or broken pipes, missing or broken parts (e.g. grates, manhole covers, etc.) and cracked concrete can result in significant costs. The most common repair events are associated with lack of routine maintenance, such as removing sediment and vegetative overgrowth, unclogging outlets and removing debris and trash accumulations. More frequent maintenance of small items can help prevent serious failures that can occur over time. Some of the most common maintenance requirements for storm water facilities are summarized below:

Storm Sewer Inlets

- Sediment accumulation
- Debris accumulation
- Clogged inlet grate or outlet pipe
- Leaks in pipe and manholes

Infiltration Practices (Rain Garden)

- Woody vegetation
- Sediment accumulation
- Trash or debris accumulation
- Inlet or outlet clogged
- Standing water

4.1 DETENTION

4.1.1 Description

The detention is located around the rain garden and assists the rain garden in reducing the peak discharge for the 1-, 2-, 5-, 10-, and 25-year peak runoff for the 24 hour duration. The peak discharge for the 10-year and 100-year increase if the rain garden does encounter loamy soils in the subgrade. The grass weir overflow is provided along with a 4 inch and 18 inch outlet pipe.

4.1.2 Operation

The purpose of the detention to provide storage for the 2-year runoff as the flow is reduced. The outlet pipe is 4 inches.

4.1.3 Maintenance

Inspect the after each significant runoff event of more than 2.0 inches. Repair slides, slumps and eroded areas promptly. Remove trash and debris from the overflow area.

Remove and replace plants and vegetation as necessary.

Remove and dispose of sediment accumulations as directed in the rain garden section.

Once the infiltration rate begins to decrease, the soil outside the wetland may have to be tilled to restore its capacity.

4.2 GRASS SWALES

4.2.1 Description

The grass swales, located on the north and center portions of the proposed street, are usually less than one foot deep initially, but after full development they must be large enough to convey and flood-route the upstream 1% probable recurrence storm so need to be approximately two feet deep, with six feet wide bottoms and discharge to the wetland at the end of each swale. A one foot layer of 80% sand and 20% compost is immediately is the top layer of the swales.

The swales is on City property identification number (PIN) 127103906030 that at this time also includes Xcel property that was sold in 2014.

4.2.2 Operation

The purpose of the swales is to convey storm water downstream. If the swale is over sandy soils it will also filter suspended solids and encourage storm water to infiltrate into the ground thereby removing pollutants and reducing runoff from the site. Filtering is accomplished by the tall grass root intake and the topsoil. If ponding is present after 48 hours, maintenance is necessary.

It is important to encourage the use of native plants in the swales. Native plants have very deep roots that maintain the infiltrative capacity of the engineered soil. In addition, they are very hardy because they are adapted to the local climate.

The soil beneath the swales will not filter out chlorides, which come from the use of salt on the parking lot. The chlorides will travel through the subsurface soil and reach the groundwater. So it is important to store snow away from the swales during winter since the swales. Snow storage is recommended in the proposed roadside ditches. After the ditches are filled as development occurs the snow should be stored in the parkway between the curb and the right-of-way.

4.2.3 Maintenance

Inspect the swales after each significant runoff event of more than 2 inches. Repair slides, slumps and eroded areas promptly. Remove trash and debris from the swales.

Remove and replace plants and vegetation as necessary. Water plants if they look distressed. **MOW THE BOTTOMS OF THE SWALES ONCE A YEAR** to prevent growth of brush and trees. Proper performance of the swales depends on tall grasses. Frequent mowing reduces the infiltration capacity of the swale.

Remove and dispose of sediment accumulations when the depth reaches three inches.

Fill used for the swales needs to be engineered soil so it keeps its treatment and infiltration characteristics. Till areas where water ponds over 48 hours so the swale maintains infiltration capacity.

4.3 RAIN GARDEN (BIOFILTER)

4.3.1 Description

The biofilters, located on the north and center portions of the proposed street, are one foot deep to the overflow in the swale at the downstream end. The biofilter is designed to remove total suspended solids before entering the wetland or the borrow area that will be an infiltration area. The biofilters will be maintained by the City. The biofilter at the southeast part of the borrow area treats the 10 acres of Medium Industrial and has 980 square foot bottom (50'x20') with 36

inches of engineered soil containing 80% sand and 20% compost. This is over the existing native find sandy soil. See detail sheet in plans.

4.3.2 Operation

The purpose of the biofilters is to filter the suspended solids and encourage storm water to infiltrate into the ground thereby removing pollutants and reducing runoff from the site. Filtering is accomplished by both the tall grass and by the sand and compost bottoms of the biofilters. The compost will remove heavy metals, nutrients and other pollutants. The biofilters should drain within approximately 24 hours. If ponding is present after 48 hours, maintenance is necessary.

It is important to encourage the use of native plants in the biofilters. Native plants have very deep roots that maintain the infiltrative capacity of the engineered soil. In addition, they are very hardy because they are adapted to the local climate.

The soil beneath the biofilters will not filter out chlorides, which come from the use of salt on the parking lot. The chlorides will travel through the subsurface soil and reach the groundwater. So it is **extremely important** to store snow away from the biofilters during winter.

4.3.3 Maintenance

Inspect the biofilters after each significant runoff event of more than 2 inches. Repair slides, slumps and eroded areas promptly. Remove trash and debris from the biofilters.

Remove and replace plants and vegetation as necessary. Water plants if they look distressed. **MOW THE BIOFILTERS ONCE A YEAR** to prevent growth of brush and trees. Proper performance of the biofilters depends on tall grasses. Frequent mowing reduces the infiltration capacity of the filter.

Remove and dispose of sediment accumulations when the depth reaches three inches. The biofilter is designed to be 21 inches deep.

Fill used for the biofilters needs to be engineered soil so it keeps its treatment and infiltration characteristics. Till areas where water ponds over 48 hours so the facility maintains infiltration capacity.

5.0 REGULAR INSPECTION AND MAINTENANCE SCHEDULE

A general list of routine maintenance items follows:

After Each Storm Event Greater than 2 Inches

1. Check storm water facilities and wetland to clean as necessary to maintain capacity and prevent deposition of trash and debris into the storm sewer. Grading in requires a permit.
2. Remove trash and debris from the biofilters, swales, wetland and overflows.
3. Repair slides, slumps and eroded areas.
4. Water plants if necessary. This is not necessary with the use of native plants.

Annually

1. Check swales, rain garden and inlets for sediment accumulation.
2. Reseed/replant sparsely vegetated areas.
3. Mow the bottom of the rain garden and swale preferable in late June or in September.

6.0 STORM WATER MANAGEMENT PLAN POST-CONSTRUCTION

6.1 INTRODUCTION

This section of the report contains the hydrologic and hydraulic analyses performed for the residential development of a 48 (+/- 1) acres disturbed area. This site is subject to WisDNR Chapter NR 151.121 and Chapters 21 and 29 of the La Crosse County Code of Ordinance concerning storm water runoff and treatment.

The objectives of this plan is provide the following.

1. Analyze the proposed site conditions to determine the peak runoff rate for the 1-, 2-, 5-, 10-, 25-, and 100-year reoccurrence intervals for the 24 hour duration storm event. DNR only requires the 24 hour duration. Other durations were analyzed for the 3-, 6-, and 12-hour durations to check for critical duration for safe passage of storm water.
2. Size the storm water management facilities to release the 1-, 2-, 5-, 10-, and 25-year reoccurrence intervals peak discharge for developed conditions at or below the pre-development rate for the same reoccurrence interval and 24 hour duration.
3. Analyze the 100-year, critical duration and design the overflow to safely pass this discharge.
4. Analyze and design the storm water quality measures for removing at least 80% of Total Suspended Solids (TSS) from the post-development site.
5. Infiltrate the developed runoff volume base on the average annual rainfall a volume that is a percentage of the pre-development infiltration volume, with a maximum limit of the percent of the site required as and effective infiltration area. The percent impervious is 17, so 90 percent of the pre-development infiltration volume, based on an average annual rainfall must be infiltrated; however, no more than one percent of the post-construction site is required as an effective infiltration area. NR 151.124 (1)

The Wisconsin Department of Natural Recourses (WDNR) requires that continuous sampled borings or test pits be located within detention basin. However, based on the in the borings in the Final Geotechnical Evaluation Report by Braun Intertec, we believe the site consists of lean soils as defined by the US Department of Agriculture (USDA). Considering the site is composed of clay soils, consideration could be given to classifying the site as having an exempt status based on NR 151.124 (4) (c). The site may provide infiltration but because of the clay soils not infiltration analysis was done.

A rain garden (biofilter) and detention treat the total suspended solid and has an underdrain since the soils at the site are sandy clay or clay.

The rainfall distribution used is from Wisconsin DNR and used for floodplain modeling. It is accepted by Federal Emergency Management Administration (FEMA). The rainfall intensity is from the Point Precipitation Frequency Estimates with 90% confidence intervals and supplementary information, NOAA Atlas 14, Volume 8, Version 2 (http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=wi).

6.2 EXISTING PRE-DEVELOPMENT CONDITIONS

The existing tributary is estimated to be 3.2 acres and about 1.3 acres will be disturbed for construction. No wetlands or designated waters were found with search of the DNR data viewer as shown on Figures 1 and 2 respectively. The hydrologic soil group map is in Appendix B. A topographic survey shows the existing conditions. Existing conditions are shown on the Grading sheets. Figure 3 show the pre-developed hydrologic basin and flow paths.

The existing topography consists of slopes draining easterly and southerly toward forested slopes that are at 30% or steeper slope. The property used to be the Irish Hill Golf Course. .

The site contains the following soils:

Mt. Carroll silt loam (HSG B); Churchtown silt loam (HSG B); Brinkman silt loam (HSG B); Dorerton, very stony- Elbaville complex (HSG B); Valton silt loam (HSG C); and Elbaville silt loam (HSG C).

The site has a golf cart path with a gravel surface, woods, and grass. The pond was modeled to have no discharge. The dominate land cover of the portion developed is grass. The existing area has been modelled with individual curve numbers for each land cover and the drainage area was split to separate the east discharges from the west discharges. See Appendix A.

6.3 PROPOSED DEVELOPED CONDITIONS

During larger runoff events, storm water will surcharge in the rain garden as it infiltrates into the sandy clay and clay soils at 0.04 and 0.07 inches per hour respectively. Engineered soil will replace the existing soil to provide treatment. The existing soils were modeled with an infiltration rate of 0.04 inches per hours. What is not discharged in the subsurface drain pipe will infiltrate slowly. In addition, trenches will be performed in this area to determine the actual soils in this location.

Appendix B contains the Geotechnical Report.

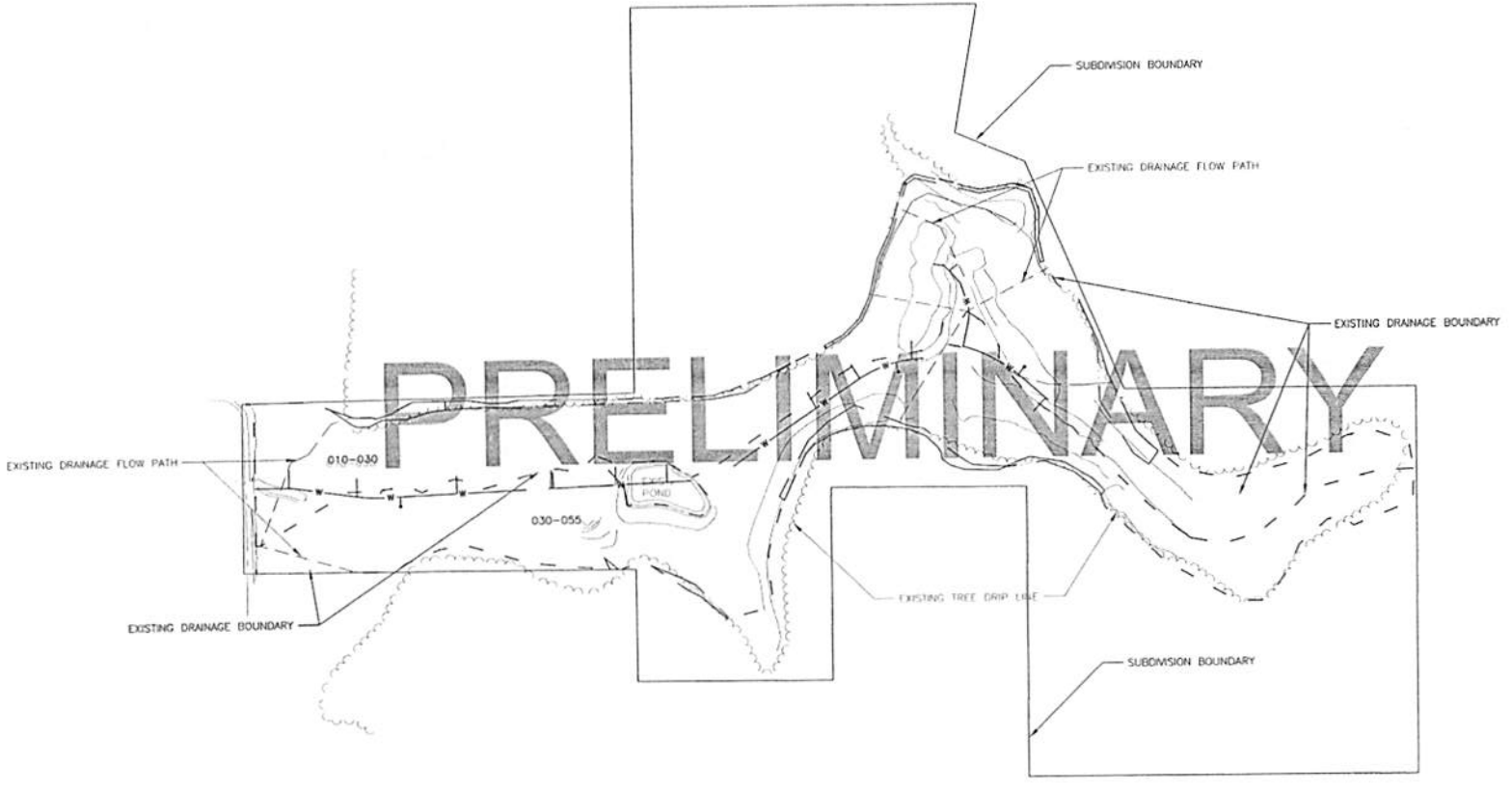
A detention basin with the rain garden reduces the peak flow for the 1-, 2-, 5-, 10-, and 25-year reoccurrence intervals during the 24 hour duration. However, the less 100-year and the shorter duration discharges peak discharges may increase. The detention basin with rain garden will have 3:1 side slopes. See Appendix C for the post-construction hydrologic analyses using HydroCAD software. The results are summarized in a Table in Appendix C. The develop area is show on Figure 4 and the grading is shown on the grading sheets. The pre-developed condition causes some of the outlet orifices to be smaller than 4 inches so a filtration screen will be details for the basin inlet discharge pipe.

The grading and detention basins are in the preliminary design. We noticed that changed need to be made to basins 010, 015, 055 and maybe 050 to provide an area for the septic field on lot 23.

Appendix D will contain the post-construction storm water quality modeling using WinSLAMM. Some addition biofilters are provided upstream of some of the detention basin to remove the larger sediment and to meet the 80% total suspended solid reduction

6.4 CONCLUSION

The storm water design for this project achieves all the design criteria. The rain garden and detention provide post-development conditions for the 1-, 2-, 5-, 10-, and 25-year reoccurrence intervals during the 24 hour duration are less than the pre-development discharge rates. The post-development peak discharge for the 100-year discharges in a non-erosive manner without causing flooding. The storm water quality was exceeded.



N

0 200' 400'

SCALE = 1" = 200' FULL
SCALE = 1" = 400' HALF

FIGURE 3

REMARKS	REVISION DATE

FIELDBOOK
SCALE: AS SHOWN
DRAWN: CBM
CHECKED: DRC
DATE: 04/03/2015

DAVY ENGINEERING CO.
LA CROSSE, WISCONSIN

EXISTING STORM WATER
WILLOW HEIGHTS
TOWN OF SHELBY
LA CROSSE, WISCONSIN

PROJECT NUMBER
9937-002.020

SHEET NO.
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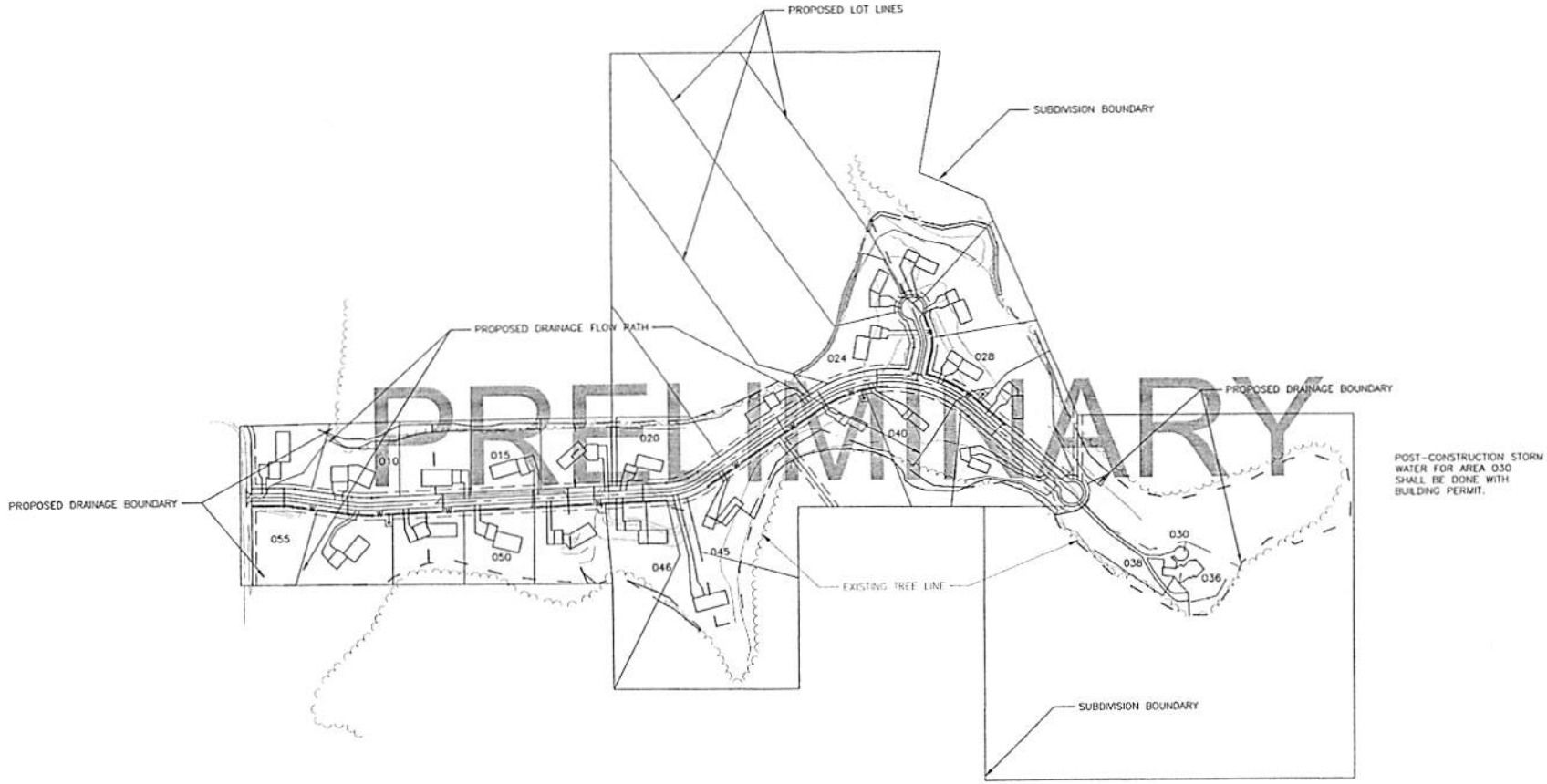

POST-CONSTRUCTION STORM WATER FOR AREA 030 SHALL BE DONE WITH BUILDING PERMIT.

N

0 200' 400'

SCALE = 1" = 200' FULL
SCALE = 1" = 400' HALF

FIGURE 4

REMARKS	REVISION DATE

FIELDBOOK:
SCALE: AS SHOWN
DRAWN: CEM
CHECKED: DHC
DATE: 04/03/2015

DAVY ENGINEERING CO.
LA CROSSE, WISCONSIN

PROPOSED STORM WATER
WILLOW HEIGHTS
TOWN OF SHELBY
LA CROSSE, WISCONSIN

PROJECT NUMBER
9937-002.020

SHEET NO.
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