City Of Independence

Water Quality Trading Plan

10/27/2020

VERSION 2

Contents

APPENDICES

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List of Abbreviations

Abbreviation	Term/Phrase/Name
Credit Generator	HGS, LLC (HGS)
Credit User	City of Independence Wastewater Treatment Facility or the City
Estimator	NRCS Streambank and Irrigation Ditch Erosion Estimator (Direct Volume Method)
Guidance	Guidance for Implementing Water Quality Trading in WPDES Permits – Edition 2 (June 2020)
MDV	Multi-discharger variance
MGD	Million gallons per day
NOI	Notice of Intent
NPS	Nonpoint source
NRCS	Natural Resources Conservation Service
Permit	WPDES permit No. WI-0024287-10-0
Plan	Water Quality Trading Plan for the City of Independence
Practice location	The specific location of a proposed land best management practice on a given subject property
Practice(s)	Nutrient Reduction Practice(s)
Report	Evaluation Report - Final Phosphorus Compliance Alternatives Evaluation, Independence, Wisconsin; produced by SEH
RES	Resource Environmental Solutions, LLC
Site(s)	The properties where the TP reduction practice(s) are located
SWDV	Surface Water Data Viewer
The City	The City of Independence, Wisconsin
TP	Total phosphorus

Abbreviation	Term/Phrase/Name
TSS	Total Suspended Solids
USGS	United States Geological Survey
WDNR	Wisconsin Department of Natural Resources
WisCALM	Wisconsin 2020 Consolidated Assessment and Listing Methodology
Worksheet	Phosphorus Optimization Report Worksheet
WPDES	Wisconsin Pollutant Discharge Elimination System
WQT	Water Quality Trade or Water Quality Trading
WWTF	Wastewater treatment facility

Table 1: Water Quality Trading Plan – Checklist

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1.0 EXECUTIVE SUMMARY

The City of Independence (the City) Wastewater Treatment Facility (WWTF) is located within the municipal limits, located above the confluence of Elk Creek and the Trempealeau River. The WWTF outfall discharges to the Trempealeau River. On October 01, 2019, the current Wisconsin Pollution Discharge Elimination System (WPDES) permit (No. WI-0024287-10-0) (Permit), became effective and contains a compliance schedule for total phosphorus (TP) reductions. From the effective date of the Permit until August 31, 2024, the TP limit is set at 4.0 mg/L. On September 1, 2024, this limit drops to the current state standard of 0.1 mg/L.

The City has conducted an optimization assessment of WWTF process and a benefit/cost analysis of reasonable WWTF upgrades, and has determined that the permanent addition of ferric chloride and a water quality trade (WQT) are the most cost effective measures that can be implemented to meet the final Permit limit of 0.1 mg/L.

Through an analysis conducted by SEH, the City has determined that it will need to obtain 198 lbs/year of TP reduction from a WQT credit generating entity to meet the final WPDES permit limit. This WQT Plan (Plan) documents:

1. The City's credit specific rationale for their credit need,
2. The credit generator and the proposed Sites where credits will be generated
3. The specific practices and methods that will be implemented and evaluated to demonstrate TP reductions to generate credits
4. The proposed credit generation ratio for the reductions generated at each proposed Site.
5. The schedule for implementation of all aspects of the WQT Plan.
6. The plan for implementation and monitoring of TP reduction practices.
7. All required documents and information needed to certify the proposed WQT Plan.

2.0 PURPOSE OF WATER QUALITY TRADING PLAN

The purpose of this Plan is to describe the how the City's WWTF will utilize a WQT to comply with the TP limits of the Permit, which expires on September 30, 2024. This Plan will require a WQT Agreement with the Wisconsin Department of Natural Resources (WDNR). The agreement will be developed pursuant to a Notice of Intent (NOI) - Form 3400-206 to conduct a WQT. The NOI is included in Appendix G of this Plan.

3.0 CREDIT NEED

3.1 Pollutant for which Credits Will be Generated

For this WQT, the nutrient reduction practices (Practices) that will be constructed will generate TP credits. These Practices will provide other benefits to the target stream, such as total suspended solids (TSS) reductions and improved in-stream habitat improvement for cold-water fish species.

3.2 Summary of Discharge and Existing Treatment Including Optimization

The Independence WWTF treats domestic waste from the City and industrial influent from Pilgrim Chicken. The annual average design flow at the facility is 0.165 million gallons per day (MGD). The actual annual average effluent flow in 2018 was 0.093 MGD.

Primary treatment consists of screening and grit removal. Effluent is further treated at the existing secondary package activated sludge plant with an aeration basin and secondary clarification. Sludge is aerobically and anaerobically digested and thickened on a gravity belt thickener and stored onsite prior to bandspreading on WDNR-approved fields. Effluent is disinfected with chlorination (followed by dechlorination) prior to discharge to the Trempealeau River.

Significant effluent monitoring and limitation changes that were enacted in the current WPDES permit term are:

1. the addition of weekly average & monthly average chlorine limits,
2. a weekly geometric mean fecal coliform limit
3. weekly average & monthly average copper limits
4. the addition of zinc limits & an associated compliance schedule
5. the conditional approval of a multi-discharger variance (MDV) for TP, which was approved statewide by USEPA on February 6, 2017, and is effective until February 5, 2027.
6. the imposition of a lower monthly average interim TP limit along with associated compliance schedules
7. an increase in the TP monitoring frequency from weekly to 3 times/week. Also, the sample type has been changed from 24-hour flow proportional composite to 24-hour composite for influent & effluent samples.

For the current WPDES permit (No. WI-0024287-10-0), which became effective on October 01, 2019, and will expire on September 30, 2024, a compliance schedule with interim TP limits was established:

Table 2: City of Independence Monitoring Requirements and Effluent Limitations

Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
TP	Monthly Avg	4.0 mg/L	3/Week	24-Hr Comp	This is an interim limit effective through 08/31/2024
TP	Monthly Avg	1.0 mg/L	3/Week	24-Hr Comp	This is an interim MDV limit effective 09/01/2024

Currently, the phosphorus limit is 4 mg/L, which will decrease to 1.0 mg/l in September of 2024. As per s. 283.16, Wis. Stats, the MDV can be renewed a maximum of four permit cycles. At the end of the

functional use of the MDV, the City will need to meet a water quality based effluent limitation for phosphorus of 0.1 mg/L.

In 2015, the City submitted to the WDNR a Phosphorus Optimization Report Worksheet (Worksheet). This Worksheet identified areas within the system where TP might be minimized or eliminated. This is a required step in the MDV renewal process.

In 2018, the City contracted SEH to conduct an evaluation of alternatives at the WWTF that could be implemented to improve TP treatment and reduce end-of-pipe TP discharge. The final report, entitled "Evaluation Report - Final Phosphorus Compliance Alternatives Evaluation, Independence, Wisconsin" (Report) summarized the results of actions taken to determine possible changes that could be made to optimize the WWTF and the associated water quality treatment systems for greater removal of TP from the effluent.

The Report summarized the results from the optimization assessment conducted at the WWTF. The optimization strategies evaluated, and the associated results are as follows:

Filtrate Return from Sludge Thickener: The first minimization item was an assessment of the filtrate return from the sludge thickener to determine if it was a significant source of TP. Results from testing showed that the filtrate TP concentration was 8.48 mg/L, but that this source is such a small flow that it was not deemed significant. No further actions were taken.

Digester supernatant return: An assessment was conducted to determine if the return water from the digester was a significant source of TP. This side stream's TP concentration was 7.67 mg/L, but it is also a small enough flow that it was not deemed significant. No further actions were taken.

Chemical addition to Reduce TP: The City of Independence performed a full scale pilot study of adding ferric chloride to the treatment process, beginning in May 2016. The lowest effluent result was 0.98 mg/L, with the average monthly effluent in May of 2016 of 2.36 mg/L. With additional testing and narrowing in on the proper amount of chemicals, it is believed that 0.8 mg/L TP can be achieved with chemical addition. Currently, ferric chloride is being added to the treatment process to achieve an effluent end-of-pipe value of 0.8 mg/L.

Industrial Source Reduction: Two potential industrial sources of TP were identified in the Worksheet - Green Roof Laundry and Gold'n Plump (now Pilgrim's). Gold'n Plump had, prior to 2018, increased their pre-treatment processes for BOD and TSS, which resulted in a decrease in TP. Green Roof Laundry has not been contacted, but it is believed that since Wisconsin has banned the use of TP in detergents, they are not a significant discharger of TP.

The Report concluded that reduction of TP to the 0.1 mg/L limit is likely not feasible with the current WWTF configuration and optimization measures alone, even with the WWTF operating at its highest TP removal efficiency and the permanent addition of ferric chloride to the treatment process.

3.3 Credits Needed to Meet Permit Requirements

The Report assessed the costs/benefits of a number of other compliance options, designed to reduce TP in the effluent to the final WPDES permit limit of 0.1 mg/L. The most practical and cost effective option was determined to be a combination of a WQT and the permanent addition of ferric chloride to the wastewater treatment process, which would permanently reduce TP concentrations in the effluent to 0.8 mg/L.

Assuming the WWTF is able to decrease their TP effluent concentration to 0.8 mg/L with permanent chemical addition, the City would need to obtain, in a WQT, the following TP reduction:

(0.8 mg/L – 0.1 mg/L) × 0.093 MGD × 8.34 × 365 days/year = 198 lbs/year

Where:

0.8 mg/L = Point Source A's current average discharge of total phosphorus;

0.1 mg/L = Total phosphorus WQBEL expressed as a six-month average concentration;

1.3 MGD = Point Source A's current average discharge flow rate;

8.34 = A factor for converting effluent concentration and flow rate to a daily mass (lbs./day)

The City has determined that, beyond the credits needed to meet the future 0.1 mg/l effluent limit, additional credits will be obtained to account for future increases in influent flow to the WWTF due to population and industrial growth over the next 20 years and includes a safety factor to allow for inherent variability in influent loadings and wastewater treatment performance. The safety factor that accounts for future growth is set at 20% of the credits needed to meet the 0.1 mg/L TP discharge limit.

HGS, LLC (HGS) will provide the needed TP credits through the implementation of Practices that will meet the City's needs. Table 3 below summarizes the target credit need, based on the information presented above.

Table 3: Summary of Credit Need for the City of Independence

Credit Need	Lbs/ Year
TP credits needed to reduce effluent concentration to 0.1 mg/L	198
20% safety factor	39.6
Total TP credit need for the City	237.6

4.0 PROPOSED SITES AND CREDIT GENERATOR

For this nutrient trade, two parcels of land were identified with sections of streams determined, after visual inspection and assessment, to have one or more of the following nonpoint sources (NPS) of TP:

1. Eroded banks:
2. Eroded or head cutting of the stream bottom:
3. Field gullies leading to a surface water; and/or
4. Minimal to no buffer between the top of bank and adjacent row crops.

For this WQT Plan, the two parcels of land where specific NPS of TP will be addressed will be referred to individually as the Blaha Site (located on Bruce Valley Creek) and Four Seasons Park (located on the Trempealeau River). Refer to Appendix A for maps depicting the Sites.

4.1 Blaha Site

4.1.1 History of Site

A review of historic aerial photos was performed to assess land use at the Blaha Site. The oldest aerial photo available, taken in 1938, shows row cropping and land clearing in a nearly identical pattern to current agricultural use. Other aerial photos, taken over the past 20 years, also show that land use on the Blaha Site has not changed. It is reasonable to conclude that the Blaha Site has been used for row crop agriculture and some limited grazing for the past 80 years. Cropping practices do not appear to have changed over this period.

4.1.2 Description of Existing Land Uses

From a pollutant loading perspective, the land surrounding Bruce Valley Creek, including the Blaha Site, is impacted by row crop agricultural practices, some on steep slopes, and grazing of cattle. Land use in the watershed is primarily forest (41.90%), agricultural (28.70%) and a mix of grassland (23.30%) and other uses (6.20%). This watershed has 284.80 miles of stream, 47.13 acres of open water, and 3,310.85 acres of wetlands.

Bruce Valley Creek flows directly south to Elk Creek, which in turn flows roughly south and west to the confluence of the Trempealeau River. There has been some in-channel restoration of trout habitat performed by Trout Unlimited; however, many sections of the creek have steep, eroded banks, unstable bed and bends, and limited riparian corridor perennial vegetation. Within the Bruce Valley Creek watershed, more than 60% of the area is underlain with soils rated as “very severe” to “severe’ for erosion risk. These soil types are typically located upslope of the creek channel and are, in many cases, under intensive row crop agriculture. Mobility of pollutants such as TP is considered high in these locations.

Bruce Valley Creek is a 6.49-mile long, Class III trout stream, located a rural, portion of the north-central portion of Trempealeau County, Wisconsin. The creek is also considered a Cool-Cold Headwater, Cool-Cold Mainstem under the state's Natural Community Determinations. Bruce Valley Creek is located in the Elk Creek watershed, which is 112.95 mi^2.

Bruce Valley Creek was recently evaluated during the ten-year period of 2009 through 2018 for results that were reported to the USEPA for the 2020 Clean Water Act condition report. The waterbody is considered impaired, or in poor condition for designated uses, which include the quality of fish and aquatic life, recreational use, and public health and welfare (fish consumption and related). Pollutants or problems encountered during sampling (impairments) are determined based on water quality standards outlined in Wisconsin 2020 Consolidated Assessment and Listing Methodology (WisCALM). Assessment results show water conditions that are potentially harmful for

Aquatic Life use due to values for TP that fall into the range expected for an aquatic community in poor health. As a result, this water is listed as impaired.

Assessment results during the 2020 listing cycle show TP levels too high for healthy aquatic communities like plants, fish, and bugs according to 2020 WisCALM standards. However, fish sample data were in excellent condition (i.e. no fish or macroinvertebrate Index of Biotic Integrity scored in the poor condition category). Based on the most updated information, this water was proposed for the impaired waters list in 2020.

This watershed is ranked "Not Available" for runoff impacts on streams, "Not Available" for runoff impacts on lakes and "High" for runoff impacts on groundwater and therefore has an overall rank of High.

4.1.3 Location of Credit Generator in Proximity to Receiving Water and Credit User

The Blaha Site, one of two that will be used to generate credits, is located 6.86 miles northeast from the City's WWTF outfall, on a stream that drains into a waterbody that flows past the City's WWTF. This places the Site upstream of the WWTF's outfall; Bruce Valley Creek drains to Elk Creek, which in turn drains to the Trempealeau River. The confluence of Elk Creek and the Trempealeau River is just upstream of the WWTF outfall.

4.1.4 Location Where Credits will be Generated

The Blaha Site is located in Trempealeau County, approximately 2.4 miles northeast of the town of Elk Creek. The Blaha Site is located in the Pleasantville U.S. Geological Survey (USGS) Quadrangle, Range 8W, Township 22N, Section 25. The UTM coordinates of the stream crossing that splits the reach of Bruce Valley Creek on the Blaha Site into North and South sections are 630395.41 m Easting and 4923211.89 m Northing. The Blaha Site is roughly bounded by Thoma Road to the south, County Road D to the west, and Loga Road to the north.

4.2 Four Seasons Park Site

4.2.1 History of Site

A review of historic aerial photos was performed to assess land use at the Site. The oldest aerial photo available, taken in 1938, shows row cropping in the area of interest. Other aerial photos, taken over the past 20 years, show that the Site has become forested, most likely coinciding with the creation of the City Park. It is unclear at what point land use changed at this Site, but it has likely not been farmed for at least 30 years. The specific area of interest is the river bend (See Maps in Appendix A) where erosion has been occurring for at least 20 years. The City Park currently offers recreational opportunities for the residents of Trempealeau County and the City. Improving the City Park through this Project and protecting it from further erosion is a priority of the community.

4.2.2 Description of Existing Land Uses

Land use in the Trempealeau River watershed is primarily forest (38.50%), agricultural (31%) and a mix of grassland (21.40%) and other uses (9.00%). This watershed has 489.89 miles of stream, 396.56 acres of open water, and 5,115.26 acres of wetlands. Land use within the areas immediately adjacent to the Site is mostly forested and urban.

In a typical portion of the watershed encompassing areas adjacent to the Trempealeau River, more than 84% of the area is underlain with soils rated low for erosion risk. These soil types are typically located in the floodplain of the Trempealeau River and are largely forested due to the frequency of flooding. Mobility of pollutants such as phosphorus is considered normal to low in these locations.

The Trempealeau River is 81 miles long and spans 3 counties. The Trempealeau River is a Class II brook and brown trout fishery for 15 miles above Lake Henry up to the confluence of the North and South branches, which includes the 11 mile stretch from CTH P near Taylor to Highway 95 in Hixton.

Downstream from Lake Blair to CTH P near Taylor is a Class III trout water. The Four Seasons Park Site is located in the Middle Trempealeau River watershed, which is 205.47 mi^2 in size.

The Trempealeau River was recently evaluated during the ten-year period of 2009 through 2018 for results that were reported to the USEPA for the 2020 Clean Water Act condition report. The waterbody is considered impaired, or in poor condition for designated uses, which include the quality of fish and aquatic life, recreational use, and public health and welfare (fish consumption and related). Pollutants or problems encountered during sampling (impairments) are determined based on water quality standards outlined in WisCALM. Assessment results show water conditions that are potentially harmful for Aquatic Life use due to values for TP that fall into the range expected for an aquatic community in poor health, therefore this water is listed as impaired.

The 2018 assessments of the Trempealeau River segment containing the Site (Main St. in Arcadia to Lake Henry dam in Blair, miles 31.28-61.32; From CTH P near Taylor to the confluence of the North and South branches near Hixton, (miles 69.85-81.51) showed impairment by phosphorus; new total phosphorus sample data overwhelmingly exceeded the 2018 WisCALM listing criteria for the Fish and Aquatic Life use. However, available biological data did not indicate impairment (i.e. no macroinvertebrate or fish Index of Biotic Integrity scored in the "poor" condition category). Based on the most updated information, this water was proposed for the 2020 impaired waters list.

This watershed is ranked “Not Available” for runoff impacts on streams, “Not Available” for runoff impacts on lakes and “High” for runoff impacts on groundwater and therefore has an overall rank of High.

4.2.3 Location of Credit Generator in Proximity to Receiving Water and Credit User

The Four Seasons Park Site, one of two that will be used to generate credits, is located 0.27 miles east from the City’s WWTF outfall on the Trempealeau River. This places the Site upstream of the WWTF’s outfall.

4.2.4 Location Where Credits will be Generated

The Four Seasons Park Site is located in Trempealeau County, approximately 0.27 miles upstream of the WWTF outfall. The Site is located in the Independence USGS Quadrangle, Range 9W, Township 23, Section 28. The UTM coordinates of the stream bend proposed for stabilization are 626656.11 m Easting and 4912734.10 m Northing. The Site is roughly bounded by the Trempealeau River to the west, south, and east; and a railroad owned by Wisconsin Central Limited to the north.

4.3 Credit Generators

For the WQT, credits will be generated by HGS (HGS or Credit Generator), a wholly owned subsidiary of Resource Environmental Solutions, LLC (RES). Credits for TP will be generated through the construction and implementation of a number of Practices designed to reduce erosion at the Blaha Site. RES has restored, enhanced, and protected over 55,000+ acres of wetlands and 350+ miles of streams in the United States, as well as converted over 3,150 acres to perennial grassland for the purpose of nutrient credit generation. RES has successfully developed over 40 nutrient projects or banks in Virginia and is able to build upon that in-house expertise for this Site in Wisconsin. A company profile can be found at www.res.us.

The City will be generating TP credits at the Four Seasons Site. HGS will provide the technical support to design and construct Practices that will generate credits at this Site.

5.0 CREDIT GENERATION METHODS

5.1 Description of Nutrient Reduction Practices

To generate TP reductions and associated credits, HGS will install Practices as noted in Table 4. Practices will be designed for the specific conditions at individual locations on the Sites.

These Practices will be designed and implemented to deliver a minimum of 436 lbs/year of TP reduction. HGS will, however, construct these practices to deliver a target of 480.7 lbs/year of TP reduction. The extra 44.7 lbs/year of TP reductions will be used by HGS as contingency credits to account for events that could reduce the efficacy of the targeted practices.

Table 4: Nutrient Reduction Practices to be used to Generate TP Credits

Practice Specification	Definition	Treatment Types
NRCS CPS 580 Streambank and Shoreline Protection	A waterway or protected outlet section having an erosion-resistant lining of stone, synthetic turf reinforcement fabrics, or other permanent material. This includes establishing native perennial vegetation per NRCS CPS 342 Critical Area Planting.	• Streambank grading & bioengineering • Stone bank toes • Coir or log toes or soil lifts • Live siltation
NRCS CPS 584 Channel Bed Stabilization	Measure(s) used to stabilize the bed or bottom of a channel.	• Stone grade controls
NRCS CPS 468 Lined Waterway or Outlet	A waterway or protected outlet section having an erosion-resistant lining of stone, synthetic turf reinforcement fabrics, or other permanent material. This includes establishing native perennial vegetation per NRCS CPS 342 Critical Area Planting.	• Regenerative stormwater conveyance
NRCS CPS 395 Stream Habitat and Management	Maintain, improve, or restore physical, chemical, and biological functions of a stream, and its associated riparian zone, necessary for meeting the life history requirements of desired aquatic species.	• Rock riffles • Woody plantings (for shade and overhanging vegetation) • Toe wood

Appendix E contains the full narrative for each specification, as well as a typical drawing for the method to be used to implement the Practice. Final, location-specific plans and specifications will be developed for permitting and construction.

5.2 Model Used to Derive the Amount of Credits

For each Practice location, existing phosphorus loss (PL) was derived using the Natural Resources Conservation Service's (NRCS) Streambank and Irrigation Ditch Erosion Estimator (Direct Volume Method) (Estimator). This Excel-based worksheet uses a common formula to provide an estimate of annual soil and TP loss for a given Practice location.

The NRCS Estimator uses the following equation to derive results:

$$PL = (L)\ (H)\ (R)\ (Pc)$$

where:

L = Linear feet of eroded bank,

H = Average streambank height of eroded bank, or average width of eroded streambed

R = Streambank or streambed erosion recession rate

PC = Total soil phosphorus concentration in units of % P

Appendix D presents the completed Estimator sheet, which depicts TP loss at each Practice location. HGS collected field data at each Site, including soil samples that were analyzed for phosphorus concentration (see Appendix C for soil test results), to determine the phosphorus loss at specific Practice locations. Soil samples at each Practice location were gathered by taking a number of individual grab samples and combining them into a single composite soil sample. Table 5 summarizes the Practice locations, the estimated annual TP loss at that Practice location, and the results for the associated soil composite sample.

Table 5: TP Reduction Practices, Estimated TP loss, and Soil TP Levels

Practice Location	Leachable Soil P (Percent)	Estimated TP Loss (lbs / year)
Blaha Site		
PL-A (Stream bank)	0.09	29.9
PL-B (Stream bank)	0.18	57.2
PL-C (Stream bank)	0.14	27.9
PL-D (Stream bank)	0.11	4.5
PL-E (Stream bank)	0.12	28.0
PL-F (Stream bank)	0.12	10.2
PL-G (Stream bank)	0.28	270.0
PL-X (Stream bed)	0.11	53.0
	TOTAL:	480.7
Four Seasons Park Site		
PL-1 (Stream bank)	0.105	70.3

5.3 Applicable Trade Ratios for Each Site

The WDNR will make the final decision on the Trade Ratio applicable to both the Blaha Site and the Four Seasons Site, as described in this Plan. This section covers the trade ratio criteria, as described in the Guidance, and how the specifics of each Site were analyzed to develop draft trade ratios. These draft ratios should align with WDNR's final trade ratios, as they were developed following the Guidance.

Trade ratios are derived from the following formula:

Trade Ratio = (Delivery+ Downstream + Equivalency + Uncertainty):1

The following sections describe each factor and the information assessed to derive a draft trade ratio for each Site.

5.3.1 Delivery Factor

From the Guidance, the delivery factor accounts for the distance between the credit generator and the credit user and the impact that this distance has on the fate and transport of the pollutant in surface waters. In most cases, a delivery factor will not be necessary when the credit generator and credit user are both located in the same 12-digit hydrological unit (HUC-12) because of the negligible impacts of fate and transport at this scale. For this WQT, the Blaha Site is located in the Bruce Valley/ Elk Creek (070400050304) watershed, while the credit user is located in the adjacent Plum Creek/Trempealeau River (070400050401) watershed. In contrast, the Four Seasons Site is located in the same 12-digit watershed as the credit user. For the Four Seasons Site, since the credit generator and user are in the same 12-digit watershed, the delivery factor for the Four Seasons Site is zero (0).

For the Blaha Site, the Guidance allows for the use of the SPARROW model to derive a delivery factor in the case where the credit user and generator are in different 12-digit watersheds. The SPARROW model was developed by the USGS and relies on regression equations from monitoring data to create a delivery fraction between two points in a watershed. Since there are no approved TMDLs for Bruce Valley Creek, Elk Creek, or the Trempealeau River for TP, the SPARROW model may be used to derive delivery fractions for TP when fate and transport need to be addressed.

The SPARROW model produces a delivery fraction (0 to 1) which represents the fraction of the load leaving a reach that arrives at the end of a selected downstream target reach or outfall after accounting for the mass of the constituent of interest that is removed by natural attenuation processes. The delivery factor that should be used in the trade ratio equation equals:

Delivery Factor = (1/SPARROW delivery fraction) – 1

The Guidance details the procedure for deriving a delivery fraction for a given WQT and the associated delivery factor. Using the WDNR Surface Water Data Viewer (SWDV), it is possible to determine the SPARROW catchments for both the credit generator and the credit user. From the SWDV, the credit user is in the SPARROW Trempealeau River Catchment and the credit generator is in the SPARROW Elk Creek Catchment. Each SPARROW Catchment has an associated delivery fraction, labeled on the SWDV map. In this specific case, both the delivery fractions for the credit generator and the credit user are the same (1), which means that the delivery factor for the Blaha Site is zero (0).

5.3.2 Downstream Factor

The credit generator for both Sites are upstream of the credit user; therefore, the downstream factor for the both the Blaha and Four Seasons Sites is zero (0).

5.3.3 Equivalency Factor

The WQT for the credit user is based upon total phosphorus (TP). According to the Guidance, when accounting for the equivalency factor for TP, the equivalency factor is zero. This is because the differences between soluble and sediment-bound P have been accounted for in the delivery factor. The equivalency factor for both the Blaha and Four Seasons Sites is therefore zero (0).

5.3.4 Uncertainty Factor

The uncertainty factor is used to compensate for the uncertainty of the effectiveness of the WQT Practices. The uncertainty, especially with non-point discharges, is due to many factors that are not controllable. These factors determine the overall effectiveness of each Practice, and include conditions such as climate, potential inaccuracies from field testing, or the reliability of the chosen Practices to perform under various hydrological conditions. The WDNR has established, in the Guidance, a table of uncertainty factor values that are assigned to typical Practices.

For bank stabilization Practices, WDNR assigned an uncertainty factor value of two (2), provided there is also associated in-channel aquatic habitat restoration. For bank stabilization practices that will not include in-channel aquatic habitat restoration, the assigned uncertainty factor is three (3). Practices at the Blaha site will entail bank stabilization with in-channel aquatic habitat restoration, therefore the uncertainty factor value is two (2). In contrast, practices at the Four Seasons site will entail bank stabilization with no in-channel aquatic habitat restoration, therefore the uncertainty factor value is three (3).

At the Blaha site, in-channel aquatic habitat restoration habitat will focus on the following:

- ***Canopy / top-of-bank cover***

Reseeding and replanting of sections of Bruce Valley Creek that will be stabilized will be conducted in a manner to maintain a favorable temperature regime. Trout-sheltering areas will be enhanced with low stream-edge plants that drape into the water. Overshading of the creek will be avoided thru the selection of deep-rooted shrubs and grasses that provide an optimal level of temperature regulation as well as slope stability. HGS will coordinate with WDNR fisheries biologists on a revegetation plan that will best meet the goal of habitat enhancement for the conditions present in the creek.

- ***Streambed stabilization / riffle creation***

The three proposed grade control structures will use a combination of larger stone and gravel to create spawning grounds, nurseries and food-producing areas for indigenous trout species, as well as reduce channel bottom erosion and degradation of trout habitat downstream of the Blaha site.

- ***In-channel habitat enhancement***

In addition to the proposed streambed stabilization noted above, HGS will use toe wood with live lift stabilization at a number of bank stabilization areas (as appropriate) to create edge-of-bank refuge areas for fry and juveniles to conceal themselves or to avoid high current flood events.

- ***Fine-particle sediment control***

Bank stabilization of eroding areas along Bruce Valley Creek will greatly slow the influx of sand and other fine grain particles into the creek. A reduction in siltation and sedimentation allows natural processes to, over time, expose vital gravel that is used by trout species for spawning, as well as by aquatic insect for reproduction. Aquatic insects are consumed by trout species, therefore increased food production will support larger trout populations.

5.3.5 Summary

Table 6: Trade Ratio Factors and Rationale

Factor Name	Rationale for Value	Factor Value (Blaha)	Factor Value (Four Seasons)
Delivery	SPARROW Delivery fractions are equal	0	0
Downstream	Credit generator is upstream of credit user	0	0
Equivalency	Differences between soluble and sediment-bound P are accounted for in the delivery factor	0	0
Uncertainty	See Section 5.3.4 for rationale	2	3

Based on this analysis, the proposed trade ratio for the Blaha Site is:

Trade Ratio = (0 + 0 + 0 + 2): 1 = 2:1

The proposed trade ratio for the Four Seasons Site is:

Trade Ratio = (0 + 0 + 0 + 3): 1 = 3:1

5.4 Amount of Credits Available

HGS will provide 436 lbs/year of TP reductions (credits) for this WQT, based on the suite of Practices planned for the Blaha Site. In addition, the City will generate 70.3 credits at the Four Seasons site. Assuming a final WDNR-approved trade ratio of 2:1 for the Blaha Site and a ratio of 3:1 for the Trempealeau Site, this translates to:

- Credits generated at the Blaha site (2:1 trade ratio): 218.0 lbs/year
- Credits generated at Four Seasons Park (3:1 trade ratio): 23.4 lbs/year

Based on the draft ratios and TP reduction potential at each Site, there are enough available credits to meet the City's stated need of 237.6 lbs/year.

6.0 TRADE TIMELINES

Table 7, excerpted from the Guidance, presents the critical documents and recommended timelines for submittal and approval by WDNR to successfully complete the WQT Trade process:

Table 7: WQT Documentation

Trading Document	Purpose	Parties Involved
Notice of Intent Form #: 3400-206	• Credit user submits to WDNR for review and approval • Allows permittee to confirm trading eligibility prior to plan development • Typically submitted no later than the preliminary facility plan step of the compliance schedule for TP WQBELs or at least 24 months prior to permit expiration[2]	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator
Trade Agreement	• Document required of permittee/credit user by s. 283.84, Wis. Stats. to formalize the trade • Typically completed prior to submittal of the WQT plan or at least 9 months prior to permit expiration[2]	• Permittee/credit user • Credit generator • WDNR or local governmental unit (if applicable)
WQT Checklist & Plan Form #: 3400-208	• Credit user submits to WDNR for review and approval • Documents will be public noticed with permit reissuance • Outlines the content of the WQT strategy • Typically submitted with the final facility plan step of the compliance schedule or with the permit application for reissuance at least 6 months prior to permit reissuance[2]	• Permittee/credit user • WDNR basin engineer/local trading coordinator • Statewide trading • coordinator, if necessary
Management Practice Registration[1] Form #: 3400-207	• Submitted to WDNR to verify that the management practice has been properly installed in accordance with the WQT plan, or, if a management practice is adopted prior to submittal of trading plan, to document intent to be used within a trading plan • WDNR reviews and tracks registration using docket numbering system • Information can be reviewed later for trade verification and auditing	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator • Statewide trading coordinator, if necessary
Annual Report Summary[1]	• Submitted to WDNR to verify management practices identified in the WQT plan are maintained • Informs WDNR of any changes made to the Trade Agreement or WQT plan • WDNR reviews, tracks, and modifies permit as necessary	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator • Statewide trading • coordinator
Notice of Termination[1] Form #: 3400-209	• Submitted to WDNR prior to practice termination or as soon as the permittee becomes aware of the failure of a practice • Should be submitted no later than the annual report submittal date	• Permittee/credit user • WDNR wastewater engineer/local trading coordinator

[1]-Only required if the credit generator is a nonpoint source.

[2]- Assumes that the permit contains a compliance schedule that is consistent with the P implementation guidance and is longer than five years.

6.1 Duration of Agreement

The lifespan of all Practices detailed in this Plan will be 20 years, per HGS's agreement with the City, but, with proper maintenance, these Practices are likely to continue to function beyond 20 years.

HGS will be responsible for the long-term maintenance of the Practices on the Blaha Site, while the City will be responsible for the Practices on the Four Seasons Site. The owner of the Blaha Site, in coordination with HGS, will record a site protection instrument over all areas utilized to implement the Practices. The City owns the Four Seasons Site and will continue to maintain the area as a public park and record a site protection instrument over all areas utilized to implement the Practices.

6.2 Schedule for Installation/Construction of the Practice

Table 8 below summarizes the proposed schedule for construction of Practices at both Sites. This schedule assumes all required permits have been obtained and that the Plan has been approved. At this time HGS anticipates construction will occur at both Sites concurrently.

Table 8: Proposed Construction Schedule for Practices

Construction Milestone	Start Date	End Date
Mobilization	3/1/2021	3/2/2021
Clearing and Grubbing	3/2/2021	5/12/2021
E&S controls	5/13/2021	5/17/2021
Earthwork	5/18/2021	8/11/2021
Instream habitat structures and bank toe work	5/18/2021	7/2/2021
Plantings	8/10/2021	8/25/2021
Seeding and stabilization	8/26/2021	9/10/2021

To minimize impacts to streams, fisheries, and riparian corridor vegetation, elements of the Practices can be initiated when frozen ground conditions are present, such as material stockpiling and vegetation clearing to allow access to eroded banks. In-channel work would commence in the spring and continue into the summer, potentially requiring a Site-specific waiver of in-channel restrictions as a part of the permitting process. Construction will, at both Sites, include reshaping of the streambank and placement of properly sized riprap or toe logs, installation of slope stabilization measures, and bank/riparian corridor revegetation.

6.3 Timeline for Credits and Agreements

6.3.1 Credits

The Guidance specifies, for WQT involving nonpoint source credit generators, that the Practices that will generate credits must be in place and effective before credits become available for trading. Based on the schedule presented in Section 6.2, the Practices will be installed and functional (generating TP load reductions) by December 1, 2021. Should delays occur that require additional work on the Sites, the credits will become available, at the latest, by September 30, 2022.

6.3.2 Agreements

A water quality trade agreement, executed as two contracts for professional services, has been formalized between HGS and the City (Appendix F). The certification confirms the trade agreements were executed on June 16, 2020 and August 10, 2020. A landowner agreement was executed by HGS and John Blaha for the property on Bruce Valley Creek and is dated February 6, 2020. A memorandum of this agreement has been attached (Appendix F).

7.0 NUTRIENT REDUCTION PRACTICE IMPLEMENTATION

7.1 Operation and Maintenance Plan

Operation and maintenance of the Practices at the Blaha Site will be the responsibility of HGS. At the Four Seasons Site, operation and maintenance of the Practices will be the responsibility of the City. At both sites, operation and maintenance activities will consist of the following:

1. Assess all Practices for evidence of erosion, displacement, or excessive weathering. Repair, replace, or conduct other appropriate work to restore functionality.
2. Remove all accumulated debris at or adjacent to the Practices that is clogging or rerouting of water in the channel. Remove live trees or woody vegetation that have the potential to compromise the structural integrity of the Practice.
3. Address any sloughing, erosion, or damage to vegetative cover on the top of banks where Practices are located or on the Practice itself. Damaged areas will be regraded, reshaped, and re-vegetated as soon as practicable.
4. Periodically maintain vegetation at or on Practices to control invasive plant species, as well as encourage growth of desirable plant species.
5. Eliminate burrowing animals whose activities are adversely impacting the Practices and repair damage.
6. Repair any damages to Practices caused by vandalism, farming practices, and/or vehicular intrusion as soon as practicable.

7.2 Tracking Procedures

7.2.1 Inspection Conditions

Both Sites will be monitored onsite via pedestrian surveys. For the Blaha Site, biannual surveys will be conducted by HGS whereas surveys conducted after flood events may be performed by the landowner or HGS. For the Four Seasons Site, biannual surveys and post-flood surveys will be conducted by the City or their authorized agent. Maintenance needs identified after onsite monitoring will be addressed as soon as practicable, based on conditions at the Site of interest, prevailing weather, and the type of work needed to repair or maintain the Practice of concern.

The performance of all Practices will be tracked with photography before, during, and after installation. At each monitoring event photos will be taken at fixed photo stations, as well as photos of any observed conditions at or near the Practice location that could pose a threat to the Practice. All information collected at the onsite monitoring event, including field notes, will be maintained in an electronic logbook, which may be made available to WDNR upon request. The landowner will provide updates on the condition of the Practice on an ad hoc basis, with their focus on reporting information after flooding or large rainfall events.

7.2.2 Reporting Requirements

For the Blaha Site, HGS will submit an annual report to both the City and to the WDNR by December 31st of each year the Practices are in place and generating credits. For the Four Seasons Site, the City or their designated agent will submit an annual report to the WDNR by December 31st of each year the Practices are in place and generating credits.

Each annual report will inform WDNR of the status of all implemented Practices, provide WDNR with an update of the Plan as a whole, and submit any needed changes to the Plan to WDNR for review and approval.

Annual reports will contain the following:

- Verification that Site inspections occurred;
- Summary of Site inspection findings;
- Identification of noncompliance or failure to implement any terms or conditions of the trading plan that have not been reported in discharge monitoring reports;
- Any applicable notices of termination or practice registration;
- Amount of credit used each month over the calendar year; and
- Other requirements as stated in the WPDES permit.

When identifying noncompliance in the annual report, the report will:

- describe the noncompliance and its cause;
- identify the period of noncompliance including exact dates and times, and
- if the noncompliance has not been corrected, specify the anticipated time that compliance will be attained, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

7.2.3 Procedure for Failure of Practices

In the unlikely event one or more Practices cease to function, the WDNR's West Central regional office will be notified by HGS or the City via email within 72 hours of becoming aware that one or more Practices are not functional. This notice will include reasons for the noncompliance, along with any actions taken to limit further damage. The notice will include any suggested future remedial actions and a timeline for repairing the Practice. The written notice will also include any preventative measures taken to reduce the likelihood of another occurrence.

Remedial actions will be taken once an agreement has been made between WDNR and the responsible entity. Any remedial actions will be performed in compliance with applicable local, state, and federal regulations.

8.0 SUMMARY

The City has determined that the most cost-effective method to meet the 0.1 mg/L TP effluent discharge limit for their Permit is to conduct a water quality trade to obtain a total 237.6 lbs/year of TP reductions from a credit generator.

HGS has been selected as the credit generator, and will provide the following credits:

1. 436 lbs/year of TP reductions, based on the suite of Practices planned for the Blaha site, at a 2:1 trade ratio, with a useful life of 20 years.

2. 70.3 lbs/year of TP reductions, based on the suite of Practices planned for the Four Seasons site, at a 3:1 trade ratio, with a useful life of 20 years.

Overall, this WQT will generate a total of 551 lbs/year of TP reduction, which will be used to offset the City's basic WDPES permit need of 198 lbs/year. The installed Practices will stabilize eroding banks, enhance fisheries, and reduce TP loadings to the Trempealeau River, which will result in a cost-effective solution to improving water quality for the City.

9.0 WATER QUALITY TRADE CERTIFICATION

9.1 Permittee's WPDES Permit Number

The City of Independence's WPDES Permit Number is WI-0024287-10-0. The WPDES permit is effective October 01, 2019 and expires on September 30, 2024.

9.2 Permittee's Contact Information

Joe Galewski
23688 Adams Street
PO BOX 189
Independence, WI 54747
indeews@tcc.coop
715-538-3682

9.3 Plan Certification

This plan was prepared by HGS. This Water Quality Trading Plan is complete, accurate and correct, to the best of our knowledge and belief.

Prepared By: HGS

By:_____

Andrew Pelloso
Regulatory Manager
HGS
33 N Dearborn St Suite 330
Chicago, IL 60602

Owner: City of Independence

By:_____

Robert Baecker
Mayor
City of Independence
23688 Adams Street
Independence, WI 54747

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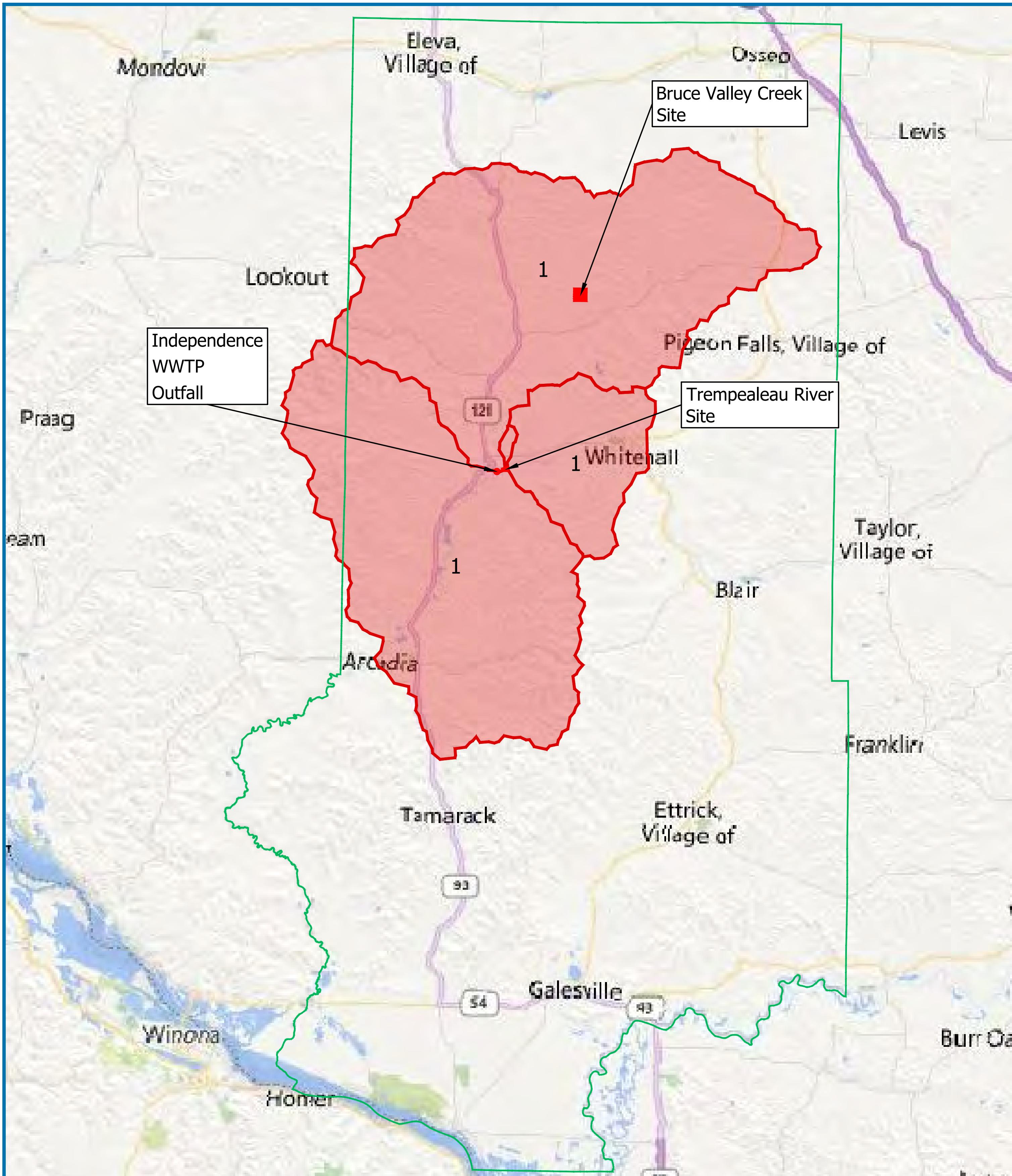
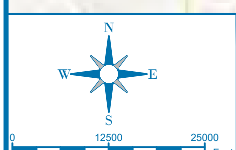
Appendix A / Figures





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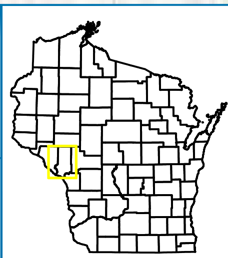
Imagery: BING Maps



APPENDIX A
FIGURE 1

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
SPARROW BASINS

TREMPEALEAU COUNTY, WISCONSIN

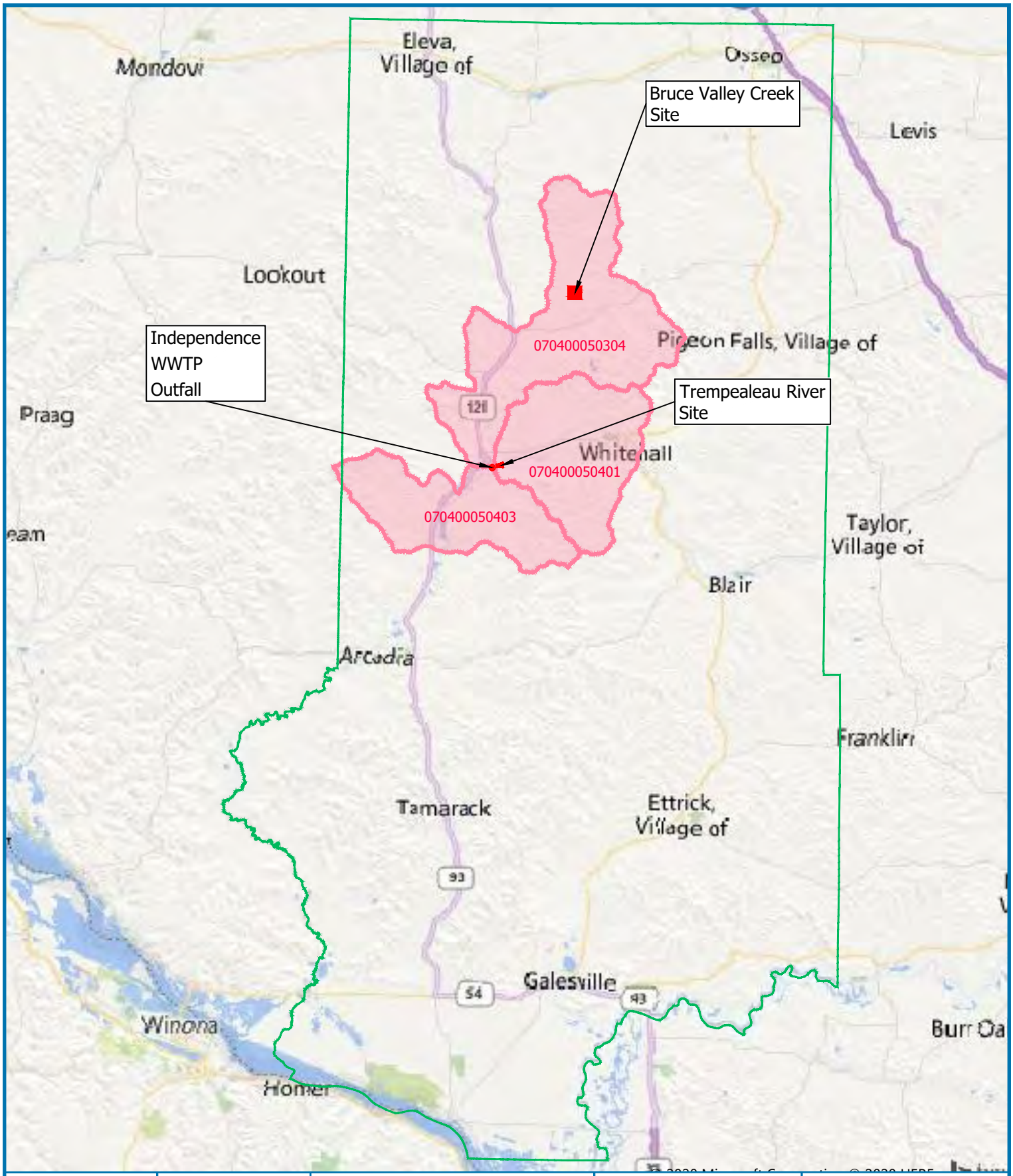
LEGEND

- Trempealeau County
- SPARROW Basins
- 1 SPARROW Delivery Fraction Values
- Site Locations
- Independence WWTP Outfall

res

Date: 08/31/2020

Drawn by: MR



Horizontal Datum: NAD 83 WI State Plane Central Zone

Imagery: BING Maps

APPENDIX A
FIGURE 2

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
12-DIGIT HUCS

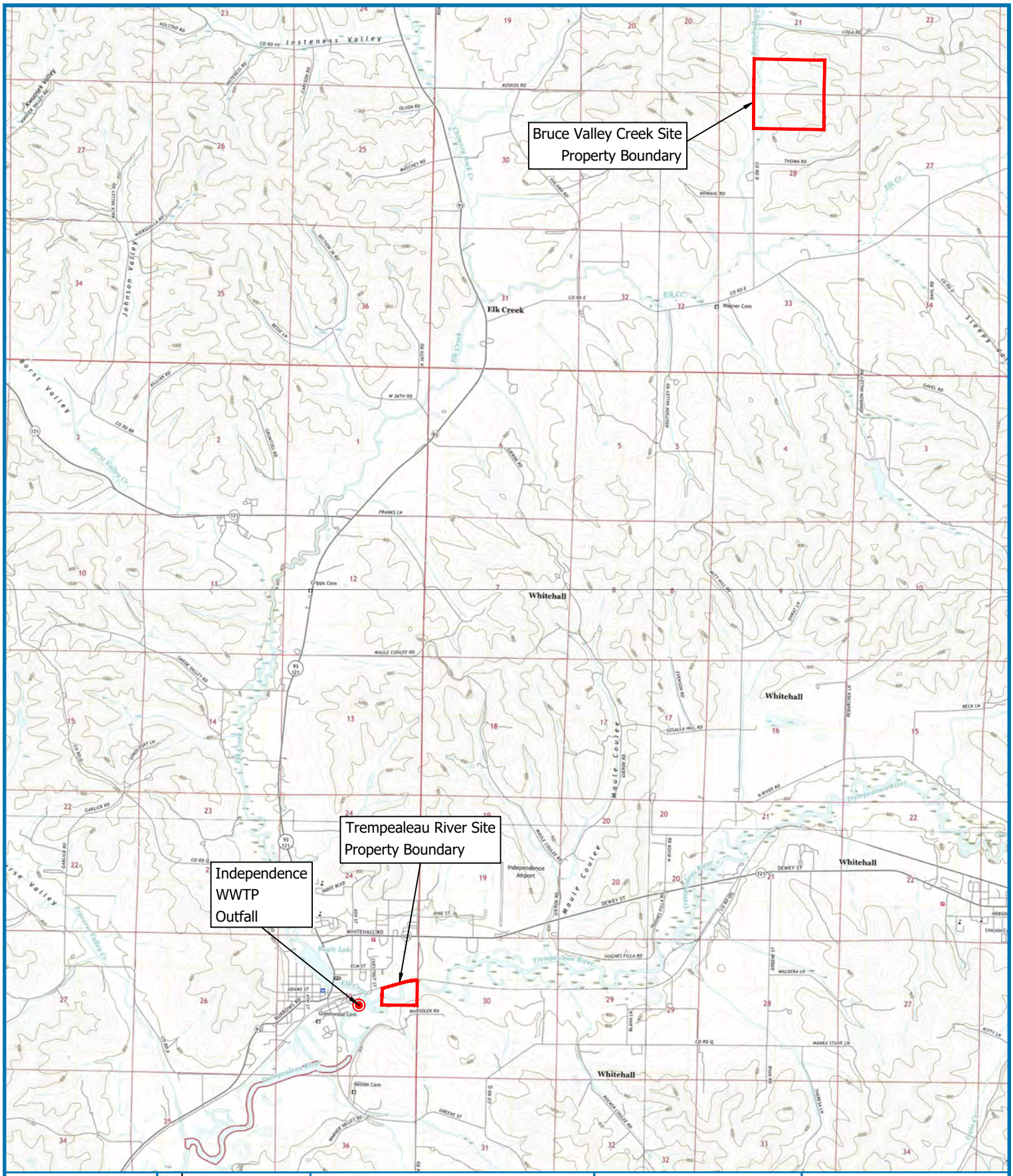
TREMPEALEAU COUNTY, WISCONSIN

LEGEND

- Trempealeau County
- 12-Digit HUC Boundaries
- 123456 12-Digit HUC Numbers
- Site Locations
- Independence WWTP Outfall

Date: 08/31/2020

Drawn by: MR



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Horizontal Datum: NAD 83 WI State Plane Central Zone

Imagery: 2018 USGS 1:24000 Topographic Map

APPENDIX A
FIGURE 3

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
SITE LOCATIONS

TREMPEALEAU COUNTY, WISCONSIN

LEGEND

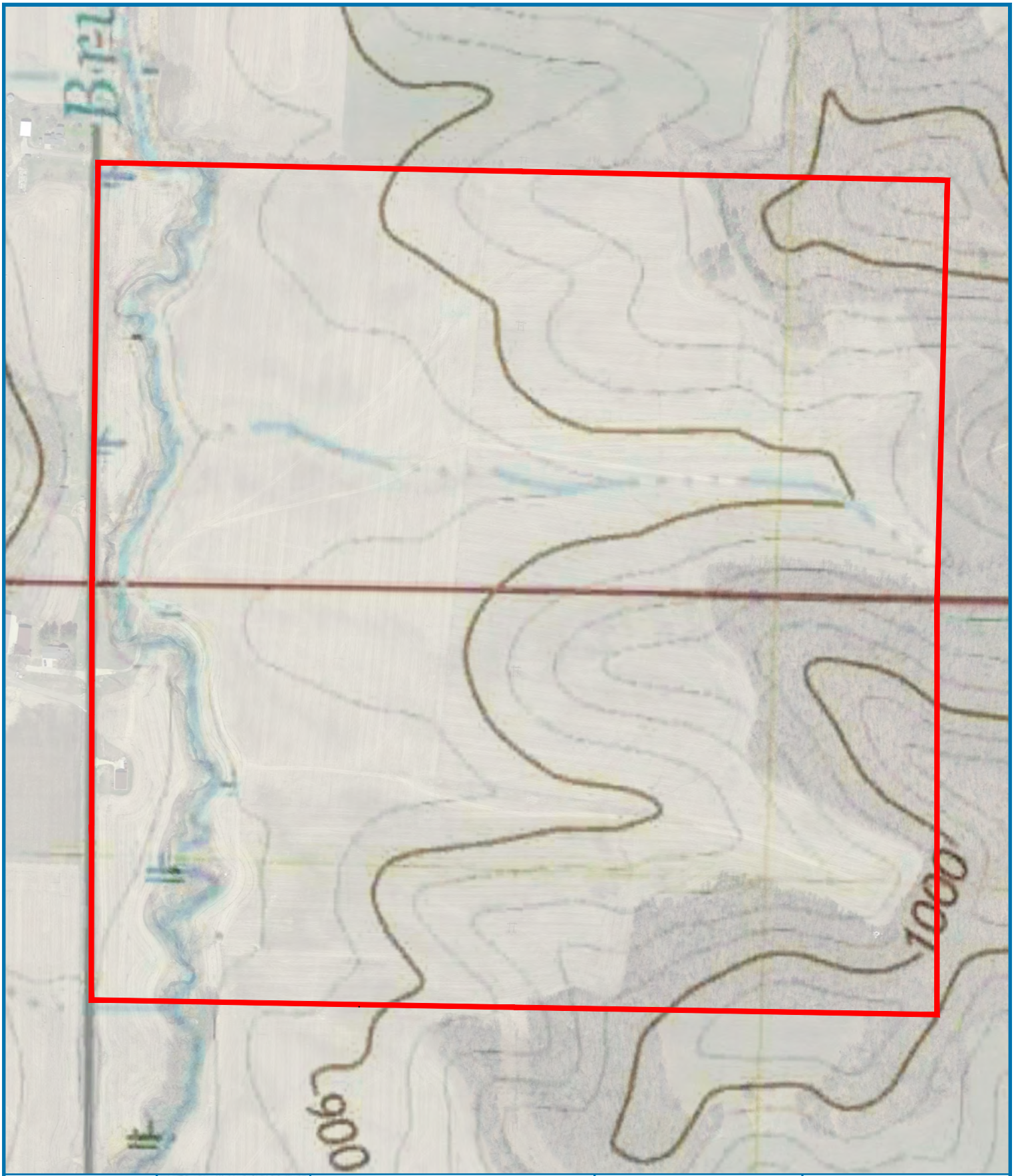
Site Boundaries

Independence WWTP Outfall

res

Date: 08/31/2020

Drawn by: MR



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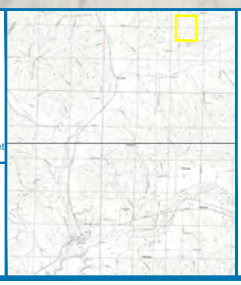
Horizontal Datum: NAD 83 WI State Plane Central Zone

Imagery: 2018 USGS 1:24000 Topographic Map; Google Image Service



APPENDIX A
FIGURE 4

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
BRUCE VALLEY CREEK SITE
TOPOGRAPHIC MAP

TREMPEALEAU COUNTY, WISCONSIN

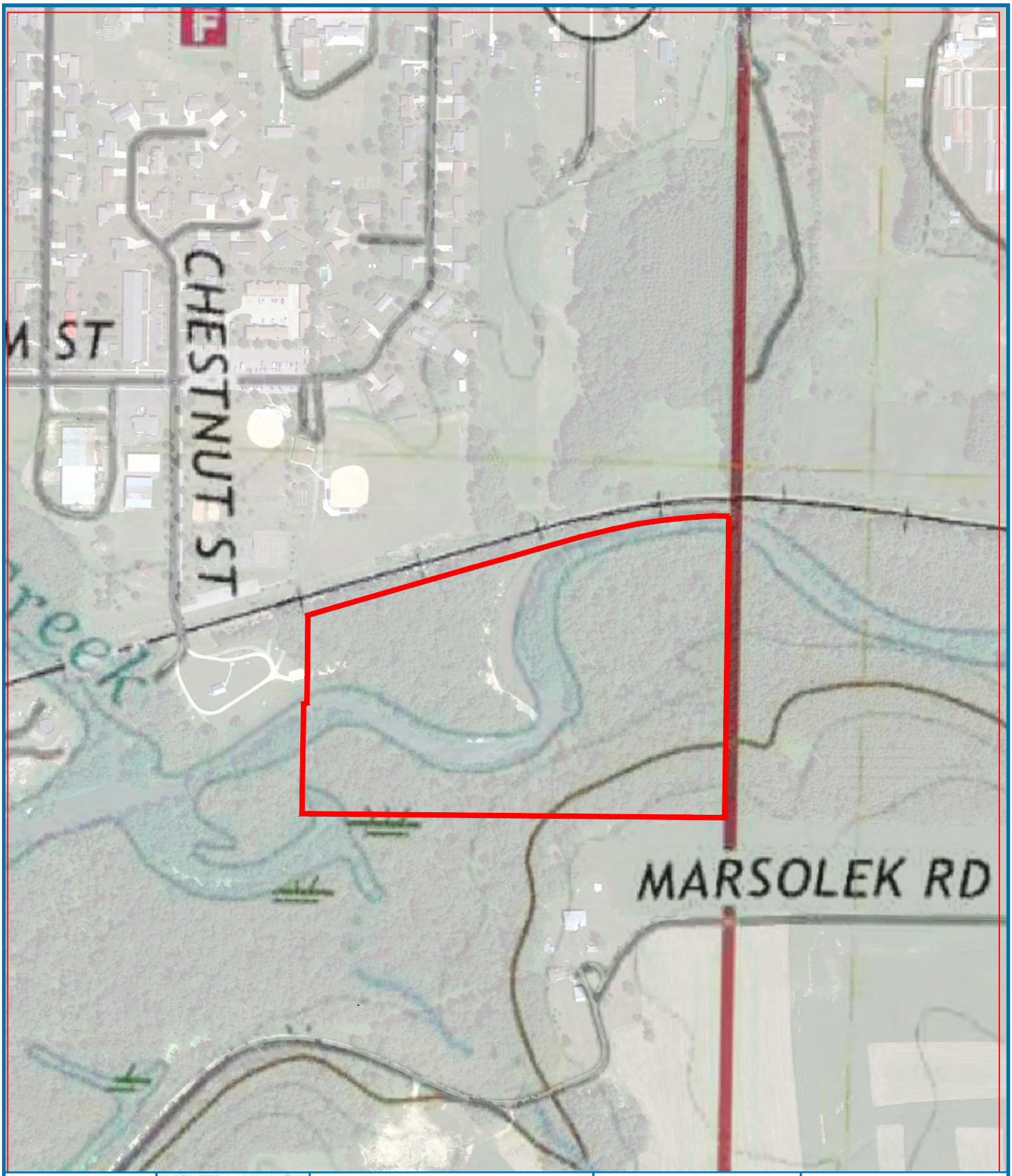
LEGEND

Site Boundary

res

Date: 08/31/2020

Drawn by: MR



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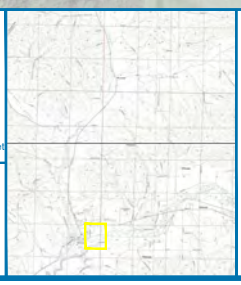
Horizontal Datum: NAD 83 WI State Plane Central Zone

Imagery: 2018 USGS 1:24000 Topographic Map; Google Image Service



APPENDIX A
FIGURE 5

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
TREMPEALEAU RIVER SITE
TOPOGRAPHIC MAP

TREMPEALEAU COUNTY, WISCONSIN

LEGEND

Site Boundary

res

Date: 08/31/2020

Drawn by: MR

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Horizontal Datum: NAD 83 WI State Plane Central Zone

Imagery: Google Image Service

APPENDIX A
FIGURE 7

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
BRUCE VALLEY CREEK SITE
SOIL SAMPLE LOCATIONS

TREMPEALEAU COUNTY, WISCONSIN

LEGEND

Site Boundaries

187 Soil Samples

res

Date: 08/31/2020

Drawn by: MR

N
W E
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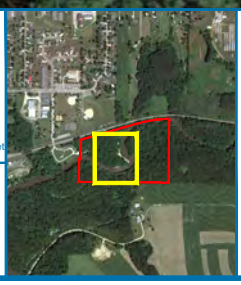
0 40 80 Feet

Horizontal Datum: NAD 83 WI State Plane Central Zone

Imagery: Google Image Service



APPENDIX A
FIGURE 6

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
TREMPEALEAU RIVER SITE
SOIL SAMPLE LOCATIONS

TREMPEALEAU COUNTY, WISCONSIN

LEGEND

Site Boundaries

187 Soil Samples

res

Date: 08/31/2020

Drawn by: MR

Appendix B / Site Photographs

Blaha – Bruce Valley Creek Site Photos

1: Downstream end of Blaha site, facing upstream

2: Facing upstream, above Photo 1, person shown for scale.

3: Vertical bank, facing east

4: Erosional feature, upstream of project terminus, facing east

Blaha – Bruce Valley Creek Site Photos

5. Eroded banks with herbaceous vegetation, facing upstream

6: Close up of herbaceous vegetation on area of bank slumping

7: Near vertical banks showing evidence of streambed recession

8: Row crops on top of vertical streambank, looking northwest

Blaha – Bruce Valley Creek Site Photos

9: Heavy bank erosion, row crops at top of bank

10. Stream bed incising, vertical banks, face south west.

11: Streambank undercutting

3: Closeup of undercutting on Bruce Valley Creek

Four Seasons – Trempealeau River Site Photos

1. Downstream of Site, facing upstream, north bank

2. Riffle in Trempealeau River downstream of Site

3: Downstream of Site, facing downstream, north bank

4. Downstream of Site, facing upstream, north bank

Four Seasons – Trempealeau River Site Photos

1: Scour hole in north bank of river

2: Facing downstream, recently scoured bank.

3: Toe cutting and erosion, north bank

4: Toe cutting and erosion, north bank

Four Seasons – Trempealeau River Site Photos

5: Bank erosion, north side of river

6: Bank erosion, north side of river

7: Vertical banks and erosion, north bank

8: Silt deposit and eroded banks, Four Seasons Park

Appendix C/ Soil Sample Test Results

Soil and Forage Analysis Lab
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

2611 Yellowstone Drive
Marshfield WI 54449
715-387-2523
http://uwlab.soils.wisc.edu

Mat Rogers- RES
6575 West Loop, S, Suite 300
Ballaire TX 77401
Trempeleau County

Date 8/3/2020
Account # 558972
Report # 2580

Soil Total Mineral Analysis

Sample ID	*P* %
187	0.09
191	0.18
196	0.11
197	0.14
200	0.12
209	0.28
216	0.09
221	0.13
226	0.12
239	0.09
243	0.12
TR1	0.04
TR2	0.11
TR3	0.1

Appendix D/ Phosphorus Loss Calculations

NRCS Excel Workbook Estimating 'Other' Erosion Types June 2006

Annual soil loss predictions for conservation planning purposes are made with current soil loss prediction technology (RUSLE2). RUSLE2 estimates sheet, rill and interrill erosion. Erosion that is seasonal in nature and caused by concentrated flow, however, is not predicted by RUSLE2.

This workbook provides conservation planners with simple tools and processes to help estimate the amount of erosion occurring in ephemeral gullies, classic gullies and on streambank erosion sites.

Definitions:

Rill Erosion: consists of the removal of soil by concentrated water running through little streamlets, or headcuts. Detachment in a rill occurs if the sediment in the flow is below the amount the load can transport and if the flow exceeds the soil's resistance to detachment. As detachment continues or flow increases, rills will become wider and deeper. Rills may be of any size but are usually less than four inches deep. Rills are:

<> generally parallel on the slope, but may converge,
<> generally of uniform spacing and dimension,
<> generally appear at different locations on the landscape from year to year,
<> generally shorter than ephemeral cropland gullies,
<> usually end at a concentrated flow channel, or an area where the slope flattens and deposition occurs,
<> are on the same portion of the slope that is used to determine the length of slope (L) for RUSLE2,
<> many small, but conspicuous channels running in the direction of slope gradient

Rill erosion is considered in the RUSLE2 calculations.

Ephemeral Gully Erosion: Small erosion channels formed on crop fields as a result of concentrated flow of runoff water. These channels are routinely eliminated by tillage of the field but return following subsequent runoff events. Ephemeral Gullies are small enough to be eliminated (temporarily) with the use of typical farm tillage equipment and they:

<> recur in the same area of concentrated flow each time they form,
<> frequently form in well-defined depressions in natural drainage ways,
<> are generally wider, deeper, and longer than the rills in the field,

Ephemeral Gullies are **not** calculated by the RUSLE2 program.

Gully Erosion: Permanent gullies are formed when channel development has progressed to the point where the gully is too wide and too deep to be tilled across. These channels carry large amounts of water after rains and deposit eroded material at the foot of the gully. They disfigure landscape and make the land unfit for growing crops. Gullies:

<> may grow or enlarge from year to year by head cutting and lateral enlarging,
<> often occur in depressions or natural drainage ways,
<> may begin as ephemeral gullies that were left in the field untreated,
<> may, over time, become partially stabilized by grass, weeds or woody vegetation,

Gully erosion is not calculated by the RUSLE2 program.

Streambank Erosion: The wearing away of streambanks by flowing water. The removal of soil from streambanks is typically caused by the direct action of stream flow and/or wind/wave action, typically occurring during periods of high flow. Streambank erosion:

<> is a natural process that generally increases when unprotected streambanks (e.g. no woody vegetation) are subject to the actions of flowing water and ice damage.

<> is a common occurrence on many Vermont river channels that are experiencing geomorphic adjustments

---

The soil loss from ephemeral gullies, gullies and streambank erosion areas can be estimated by calculating the volume of soil removed by erosion processes. The volume of soil loss can be multiplied by the typical unit weight of the soil (based on soil texture) which is eroded. Approximate soil unit weights are expressed below[1]:

Soil Texture	Density lb/ft^3
Gravel	110
Sand	105
Loamy Sand	100
Sandy Loam	100
Fine Sandy Loam	100
Sandy Clay Loam	90
Silt Loam	85
Silty Clay Loam	85
Silty Clay	85
Clay Loam	85
Organic	22

Procedure for estimating Ephemeral Soil Erosion:

The following formula will be used to calculate annual estimated ephemeral gully erosion:

$$\frac{\text{Ephemeral Gully } \underline{\textbf{Length}} \times \text{Gully Average } \underline{\textbf{Width}} \times \text{Gully Average } \underline{\textbf{Depth}}}{2000} \times \underline{\text{Soil Weight}}\ (\text{lbs/ft}^3) \times \text{Occurrences per Year} = \underline{\textbf{Estimated}}\ \text{Soil Loss (Tons per Year)}$$

* Ephemeral gully erosion may reform multiple times per year, and under certain conditions it may not form in a given year. The voided volume which would be calculated after a runoff event is not necessarily representative of an annual rate, but is representative of only the specific event. This erosion can be calculated for individual storms and can be summed for a yearly estimate.

[1] Data from published soil surveys, laboratory data, and soil interpretation record are to be used where available. Parent materials, soil consistency, soil structure, pore space, soil texture, and coarse fragments all influence unit weight.

Procedure for estimating Gully Soil Erosion:

The following formula will be used to calculate annual estimated classic gully erosion:

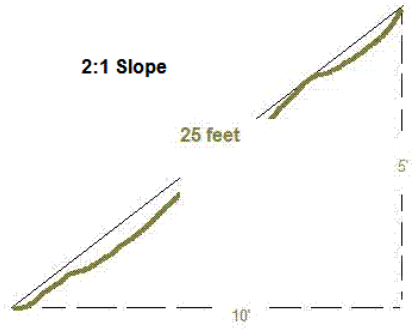
$$\frac{\text{Gully } \underline{\textbf{Length}} \times (\text{Average } \underline{\textbf{Width}} \times \text{Average } \underline{\textbf{Depth}} \times 0.5) \times \underline{\textbf{Soil Weight}}\ (\text{lbs/ft3})}{2000} / \text{Formation Years} = \underline{\textbf{Estimated}}\ \text{Soil Loss Per Year (Tons)}$$

Procedure for estimating Streambank Soil Erosion (Direct Volume Method):

The following formula will be used to calculate annual estimated streambank erosion unless a field measurement procedure[2] is

$$\frac{\text{g Bank } \underline{\textbf{Length}} \times \text{Eroding Bank } \underline{\text{Height}} \times \underline{\text{Lateral Recession Rate}}\ (\text{FT/YR}) \times \underline{\text{Soil Weight}}\ (}{2000} = \underline{\textbf{Estimated}}\ \text{Soil Loss Per Year (Tons)}$$

** Eroding bank height is measured along the bank, not the vertical height of bank. Example: if vertical height of an eroding streambank is 5 feet, and the bank is on a 2:1 slope, the total eroding bank distance is 25 feet -- 1/2 (Base X Height).



***The average annual recession rate is the thickness of soil eroded from a bank surface (perpendicular to the face) in an average year.

Stream bank erosion sometimes presents itself as a major occurance in a given year, whereas the same bank may not erode significantly for a period of years if no major runoff events occur. Recession rates need to be calculated as an average of years when erosion does and does not occur. Recession rate is not calculated as the erosion occurring after a single event.

Use available resources to assist in the estimation of recession rate: use past and present aerial photography, old survey records, and any other information that helps to determine the bank condition at known times in the past. When such information is lacking or insufficient, field observations and professional judgement are needed to estimate recession rates.
It is often not possible to directly measure recession rates in the field. Therefore, the following table has been included which relates recession rates to narrative descriptions of banks eroding at different rates (Table from NRCS Wisconsin guidance).

Lateral Recession Rate (ft/yr)	Category	Description
0.01-0.05	Slight	Some bare bank but active erosion not readily apparent. Some rills but no vegetative overhang. No exposed tree roots.
0.06-0.2	Moderate	Bank is predominantly bare with some rills and vegetative overhang. Some exposed tree roots but no slumps or slips.
0.3-0.5	Severe	Bank is bare with rills and severe vegetative overhang. Many exposed tree roots and some fallen trees and slumps or slips. Some changes in cultural features such as fence corners missing and realignment of roads or trails. Channel cross section becomes U-shaped as opposed to V-shaped.
0.5+	Very Severe	Bank is bare with gullies and severe vegetative overhang. Many fallen trees, drains and culverts eroding out and changes in cultural features as above. Massive slips or washouts common. Channel cross section is U-shaped and stream course may be meandering.

2 The best way to quantify streambank erosion is to measure it directly in the field. The basic procedure in measuring streambank erosion is to survey, flag, or in some way fix a “before" image of the channel you are evaluating in order to establish the baseline condition. Changes due to erosion can then be monitored over time by going back to the study area and re-measuring from the fixed reference points.
Channel cross-sections can be surveyed and plotted on a periodic basis to monitor change. Stakes or pins can be driven into channel banks flush with the surface. The amount of stake or pin exposed due to erosion is the amount of change at the streambank erosion site between your times of observation.
The time required to monitor a site often precludes this method of data collection. The Direct Volume Method can be used to estimate streambank erosion at your site.

Acknowledgements: This Excel workbook was created as a planning tool for use by conservation planners. The basic format and content of the tool is a compilation of various similar tools, processes and procedures employed by NRCS in several states including: Indiana, Iowa, Kansas, Maryland, Michigan, Missouri, Nebraska, Oklahoma, South Dakota and Wisconsin. Some of the terminology in the 'Definitions' section of this Readme document closely mirrors these sources.

Stream Bed Erosion Estimator (Direct Volume Method)

Farmer / Cooperator Name:	Independence WWTP	**Evaluated By:**	Mat Rogers
Tract Number:	Bruce Valley Creek	**Evaluation Date:**	July 17, 2020

Field Number	*Incising Stream Bed Reach #;*	*Incising Bed Length (Feet)*	*Incising Bed Width (Feet)*	*Area of Incising Stream Bed (FT^2)*	*Stream Bed Incision Rate (Estimated) (FT / Year)*	*Estimated Volume (FT^3) Eroded Annually*	*Soil Series*	*Soil Bulk Density (g/cm^3)*	*Soil Bulk Density (lb/ft^3)*	*Estimated Soil Loss (Tons/Year)*	*Leachable Soil Phosphorus (%)*	*Estimated Erosion Phosphorus Loss (lb/year)*
Downstream of Farm Crossing	0+00 - 9+00	900	12.0	10800.0	0.05	540.0	Orion silt loam	1.43	89.3	24.1	0.11	53.0

Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons): 24.1

Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs): 53.0

NRCS Streambank and Irrigation Ditch Erosion Estimator (Direct Volume Method)

Project Name:	Independence WWTP	**Evaluated By:**	Mat Rogers
Site Name:	Bruce Valley Creek	**Evaluation Date:**	July 17, 2020

Reach	*Eroding Streambank #; or Ditch Side/Bottom*	*Eroding Bank or Ditch Length (Feet)*	*Eroding Bank Height; or Ditch Bottom Width* (Feet)*	*Area of Eroding Streambank or Ditch (FT^2)*	*Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)*	*Estimated Volume (FT^3) Eroded Annually*	*Soil Series*	*Soil Bulk Density (g/cm^3)*	*Soil Bulk Density (lb/ft^3)*	*Estimated Soil Loss (Tons/Year)*	*Leachable Soil Phosphorus (%)*	*Estimated Erosion Phosphorus Loss (lb/year)*
Downstream of Farm Crossing	A	70	13.3	931.0	0.4	372.4	Orion silt loam	1.43	89.3	16.6	0.09	29.9
	B	77	15.4	1185.8	0.3	355.7	Orion silt loam	1.43	89.3	15.9	0.18	57.2
	C	180	6.2	1116.0	0.2	223.2	Orion silt loam	1.43	89.3	10.0	0.14	27.9
	D	59	3.9	230.1	0.2	46.0	Orion silt loam	1.43	89.3	2.1	0.11	4.5
	E	102	12.8	1305.6	0.2	261.1	Orion silt loam	1.43	89.3	11.7	0.12	28.0
	F	113	4.2	474.6	0.2	94.9	Orion silt loam	1.43	89.3	4.2	0.12	10.2
	G	211	12.8	2700.8	0.4	1080.3	Orion silt loam	1.43	89.3	48.2	0.28	270.0
							Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):			**108.6**		
							Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs):					**427.7**

NRCS Streambank and Irrigation Ditch Erosion Estimator (Direct Volume Method)

Project Name:	Independence WWTP	**Evaluated By:**	Mat Rogers
Site Name:	Four Seasons Park	**Evaluation Date:**	July 21, 2020

Reach	Eroding Streambank #; or Ditch Side/Bottom	Eroding Bank or Ditch Length (Feet)	Eroding Bank Height; or Ditch Bottom Width* (Feet)	Area of Eroding Streambank or Ditch (FT^2)	Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT^3) Eroded Annually	Soil Series	Soil Bulk Density (g/cm^3)	Soil Bulk Density (lb/ft^3)	Estimated Soil Loss (Tons/Year)	Leachable Soil Phosphorus (%)	Estimated Erosion Phosphorus Loss (lb/year)
Four Seasons Park	A	271	6.4	1729.0	0.4	691.6	Gosil loamy sand	1.55	96.8	33.5	0.105	70.3
				Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):						**33.5**		
						Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs):						**70.3**

Reach	Eroding Streambank #; or Ditch Side/Bottom	Eroding Bank or Ditch Length (Feet)	Eroding Bank Height; or Ditch Bottom Width* (Feet)	Area of Eroding Streambank or Ditch (FT^2)	Lateral or Ditch Bottom Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT^3) Eroded Annually	Soil Series	Soil Bulk Density (g/cm^3)	Soil Bulk Density (lb/ft^3)	Estimated Soil Loss (Tons/Year)	Leachable Soil Phosphorus (%)	Estimated Erosion Phosphorus Loss (lb/year)
				Total Estimated Annual Streambank or Ditch Erosion Soil Loss (Tons):								
						Total Estimated Annual Streambank or Ditch Erosion Phosphorus Loss (lbs):						

* Eroding bank height is measured along the bank, not the vertical height of bank.

Streambank or Ditch Erosion Calculation Formula:

$$\frac{\text{Eroding Bank/Ditch Length} \times \text{Eroding Bank Ht or Ditch Bottom Width} \times \text{Lateral or Ditch Bottom Recession Rate (FT/YR)} \times \text{Soil Weight (lbs/ft}^3\text{)}}{2000} = \text{Estimated Soil Loss Per Year (Tons)}$$

Appendix E/ Practice Specifications

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

CRITICAL AREA PLANTING

CODE 342

(ac)

DEFINITION

Establishing permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have physical, chemical, or biological conditions that prevent the establishment of vegetation with normal seeding/planting methods.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Stabilize areas with existing or expected high rates of soil erosion by wind or water
- Stabilize stream and channel banks, pond and other shorelines, earthen features of structural conservation practices
- Stabilize areas such as sand dunes and riparian areas

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to highly disturbed areas such as—

- Active or abandoned mined lands.
- Urban restoration sites.
- Construction areas.
- Conservation practice construction sites.
- Areas needing stabilization before or after natural disasters such as floods, hurricanes, tornados, and wildfires.
- Eroded banks of natural channels, banks of newly constructed channels, and lake shorelines.
- Other areas degraded by human activities or natural events.

CRITERIA

General Criteria Applicable to All Purposes

Site preparation

Conduct a site investigation to identify any physical, chemical, or biological conditions that could affect the successful establishment of vegetation.

Clear areas to be planted of unwanted materials and smooth or shape, if needed, to meet planting purpose(s).

Prepare a suitable seedbed for all seeded species. Rip compacted layers and re-firm the soil prior to seedbed preparation, as needed.

As site conditions dictate, when grading slopes, stockpile topsoil to be redistributed over area to be planted.

For details on seedbed preparation, refer to Wisconsin Agronomy Technical Notes 5, Establishing and Maintaining Native Grasses, Legumes, and Forbs; and 6, Establishing and Maintaining Introduced Grasses and Legumes.

Species selection
Select species for seeding or planting that are suited to local site conditions and intended uses, and common to the site or location.

Selected species will have the capacity to achieve adequate density and vigor to stabilize the site within an appropriate period.

Establishment of vegetation
Plant seeds using the method or methods best suited to site and soil conditions.

Limit sod placement to areas that can naturally supply needed moisture or sites that can be irrigated during the establishment period. Place and anchor sod using techniques to ensure that it remains in place until established.

Specify species, rates of seeding or planting, legume inoculation, minimum quality of planting stock (e.g., pure live seed (PLS) or stem caliper), method of seedbed preparation, and method of establishment before application. Use only viable, high-quality seed or planting stock. Increase the seeding rate for legumes to accommodate percentage of hard seed.

Seeding rates will be based on Pure Live Seed (PLS). Actual adjusted seeding rates will be based on the equivalent of 100 percent PLS, determined by multiplying the percent purity by total percent germination.

Untested introduced and native grass and forb seed are not approved for planting.

Introduced and native legume seed shall be inoculated immediately prior to planting. Rhizobia inoculant shall be specific to the legume seeded. When more than one legume specie is used, each specie will be inoculated separately.

Seed or plant at a time and in a manner that best ensures establishment and growth of the selected species.

Seeding Periods
Seeding will follow planting zone dates. Refer to Figure 1 for planting zones and Tables 1 and 2 for seeding dates.

The specific date that provides the best chance for success will vary from south to north and from year to year with prevailing moisture and temperature conditions. Late summer seeding is generally riskier than spring seeding. Planting at either end of the allowable range is riskier than the middle of the range.

Seeding outside of the recommended dates must be approved by the Area Resource Conservationist or State Agronomist.

Frost seeding is not an authorized seeding method when using this standard.

Dormant seeding can be used when planting introduced species. When dormant seeding in concentrated flow areas, the site must be mulched according to the engineering design (if applicable) and Wisconsin NRCS Conservation Practice Standard (WI NRCS CPS), Mulching (Code 484).

Figure 1. Planning Zones

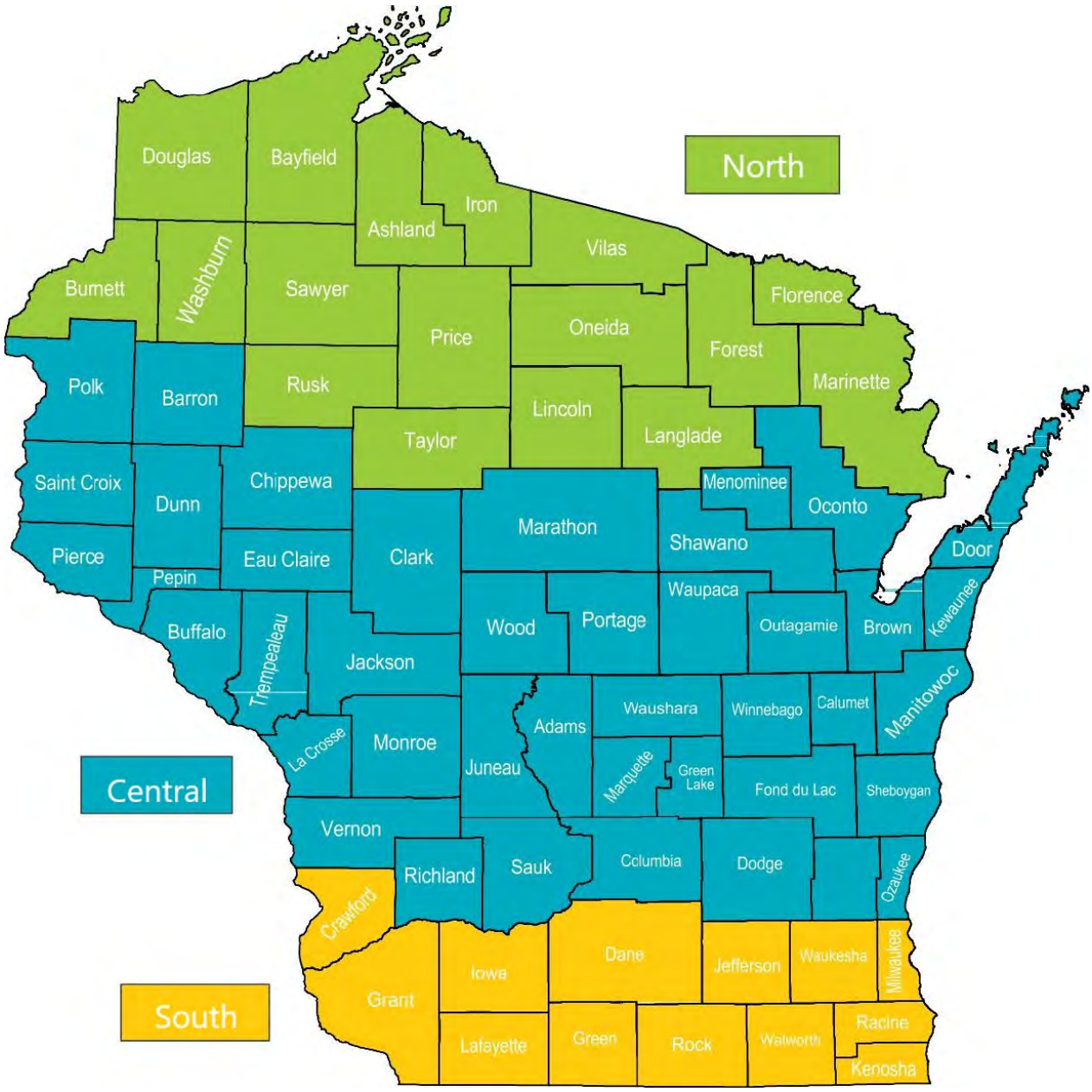


Table 1. Seeding Date/Ranges for Native Mixtures and Companion Crops

Zone	Spring Seeding
Northern	Thaw - 7/15
Central	Thaw - 6/30
Southern	Thaw - 6/30

Table 2. Seeding Date/Ranges for Introduced Grasses, Legumes, and Companion Crops

Planting Zone	Spring	Late Summer	Dormant
North	5/1 - 6/15	7/15 - 8/10	11/1 - Freeze Up
Central	4/15 - 6/1	8/1 - 8/21	11/1 - Freeze Up
South	4/1 - 5/15	8/7 - 8/29	11/1 - Freeze Up

Nutrient and Soil Amendment Requirements
When seeding introduced species, soil fertility and pH level will be amended to satisfy the needs of the plant species to be established. Fertilizer andlime recommendations will be determined by a soil test, and all nutrients will be applied following WI NRCS CPS, Nutrient Management (Code 590). If no soil test is available, apply a minimum of 150 pounds of 20-10-10 fertilizer and 2 tons of 80-89 lime or equivalent per acre. Soil amendments may be waived at the discretion of a certified conservation planner. The basis for waiving the use of soil amendments shall be documented in the client's case file.

For establishment of native species, use of soil amendments should not be used.

Seedbed Preparation
A minimum of 4 inches of friable soil material or topsoil shall be added and mixed to exposed rocky, sandy, gravelly, shale material, or extremely fine textured subsoil.

All gullies and deep rills will be filled and leveled during seedbed preparation.

Prior to planting into cropland fields, verify that herbicides previously applied to the site will not "carry over" and damage the new seeding.

Site preparation shall be adequate to assure weed suppression and to promote germination and growth of the species planted.

Planting equipment type, use, and timing shall be appropriate for the site conditions, soil characteristics, and type of seeds (size, etc.) selected to assure uniform placement and germination.

Refer to Wisconsin Agronomy Technical Notes 5 and 6 for detailed guidance for specific situations.

Mulching, Temporary Cover, and Companion Crop
Plantings shall be mulched as necessary to ensure establishment. Other disturbed areas shall be mulched as necessary to prevent erosion.

Mulching, temporary cover, and companion crops are vital practices utilized to support the establishment of a critical area planting. Temporary cover and companion crops suppress weed growth and limit soil erosion during the establishment period. Use depends on the site conditions, method of planting, and seed mixture.

For further details on mulching, temporary cover and companion crop recommendations, refer to Wisconsin Agronomy Technical Notes 5 and 6.

Criteria for Seed Mixture Development
Seeding rates are based on seeds per square foot of Pure Live Seeds. Refer to Wisconsin Agronomy Technical Notes 5 and 6 for the recommended species and seeding rates.

Approved species for critical area planting can be found in Wisconsin Agronomy Technical Notes 5 and 6. Species not listed in the technical notes must be approved in advance by the State Agronomist.

Introduced Grass and Legume Plantings on Critical Sites
Custom and standard mixtures will contain at least 50 percent grass seed of which 25 percent will be sod forming (not bunch) grass.

A minimum of 160 seeds per square foot is required for either a solid stand of grasses or a combination of grasses and legumes.

Increase seeding rate by 15 percent when dormant seeding occurs.

Refer to Table 8 of Agronomy Technical Note 6 for suggested seed mixes.

Native Herbaceous Plantings on Critical Sites
Native species are generally not recommended for critical area plantings due to their slow establishment and because they are clump grasses rather than sod forming. Only sod forming grasses are permitted in concentrated flow channels.

Competition and poor establishment of some species. Seeds per square foot should not exceed 25 percent of the minimum requirement, with the exception of mixtures designed for wet mesic and wet sites.

Additional Criteria to Stabilize Stream and Channel Banks, Pond and Other Shorelines, Earthen Features of Structural Conservation Practices

Bank and channel Slopes
Shape channel side slopes so that they are stable and allow establishment and maintenance of desired vegetation.

A combination of vegetative and structural measures may be necessary on slopes steeper than 3:1 to ensure adequate stability.

On sites that are too steep for regular seeding equipment to operate, the use of hydro-seeding and mechanically blown mulch is recommended. For more information regarding hydro-seeding, refer to Wisconsin Agronomy Technical Note 6.

Species selection.
Plant material used for this purpose must:

- Be adapted to the hydrologic zone into which they will be planted.
- Be adapted and proven in the regions in which they will be used.
- Be compatible with existing vegetation in the area.
- Protect the channel banks but not restrict channel capacity.

Establishment of vegetation.
Specify species, planting rates, spacing, methods and dates of planting based on local planting guides or technical notes.

Identify and protect desirable existing vegetation during practice installation.

Use a combination of vegetative and structural practices with living and inert material when flow velocities, soils, and bank stability preclude stabilization by vegetative establishment alone. Use Conservation Practice Standard (CPS) Streambank Stabilization (Code 580) for the structural measures.

Control existing vegetation on a site that will compete with species to be established vegetatively (e.g.. bare-root, containerized, ball-and-burlap, potted) to ensure successful establishment of the planted species.

Plant streambank stabilization vegetation in accordance with the NRCS Engineering Field Handbook Part 650, Chapter 16, “Streambank and Shoreline Protection,” and Chapter 18, “Soil Bioengineering for Upland Slope Protection & Erosion Reduction.”

Site protection and access control.
Restrict access to planted areas until fully established.

Additional Criteria to Stabilize Areas with Existing or expected High Rates of Erosion by Wind and Water

The amount of plant biomass and cover needed to reduce wind and water erosion to the planned soil loss objective shall be determined using the current approved wind and/or water erosion prediction technology.

Do not use tillage where desirable vegetation is already present or where soil disturbance will increase the potential for erosion or cause sedimentation to environmentally sensitive areas.

Use a companion crop as added protection.

The toe of the slope, or the outlet of the concentrated flow channel, shall be stable before attempting seeding on the slope.

Concentrated flow may need to be diverted from the critical area during the establishment period.

Additional Criteria to Stabilize Areas Such As Sand Dunes and Riparian Areas

Plants for sand dunes and coastal sites must be able to survive being buried by blowing sand, sand blasting, salt spray, salt water flooding, drought, heat, and low nutrient supply.

Include sand trapping devices such as sand fences or brush matting in the revegetation/stabilization plans where applicable.

CONSIDERATIONS

Species or diverse mixes that are adapted to the site and have multiple benefits should be considered. Native species may be used when appropriate for the site.

Consider planting native vegetation and/or local genotypes when restoring sites adjacent to remnant prairies.

To benefit pollinators and other wildlife, flowering shrubs and wildflowers with resilient root systems and good soil-holding capacity also should be considered for incorporation as a small percentage of a larger grass-dominated planting. Where appropriate consider a diverse mixture of forbs to support pollinator habitat.

Planning and installation of other CPSs such as Diversion (Code 362), Obstruction Removal (Code 500), Subsurface Drain (Code 606), Underground Outlet (Code 620), or Anionic Polyacrylamide Application (Code 450) may be necessary to prepare the area or ensure vegetative establishment.

Areas of vegetation established with this practice can create habitat for various type of wildlife. Maintenance activities, such as mowing or spraying, can have detrimental effects on certain species. Perform management activities at the times and in a manner that causes the least disruption to wildlife (May 15th – August 31st).

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or management unit according to the criteria and operation and maintenance sections of this standard. Record practice specifications using approved Implementation Requirements document.

Address the following elements in the plan, as applicable, to meet the intended purpose(s):

- Practice purpose(s)
- Site preparation
- Topsoil requirements
- Fertilizer application

- Seedbed/planting area preparation
- Timing and method of seeding/planting
- Selection of species
- Seed/plant source
- Seed analysis/pure live seed (PLS)
- Seeding rate/plant spacing
- Mulching, PAM, or other stabilizing materials
- Supplemental water needed for establishment
- Protection of plantings
- Describe successful establishment (e.g., minimum percent ground/canopy cover, percent survival, stand density)

OPERATION AND MAINTENANCE

- Control access to the area to ensure the site remains stable.
- Protect plantings shall be protected from pests (e.g., weeds, insects, diseases, livestock, or wildlife) as necessary to ensure long-term survival.
- Inspections, reseeding or replanting, and fertilization may be needed to ensure that this practice functions as intended throughout its expected life.
- Observe establishment progress and success at regular intervals until the practice has met the criteria for successful establishment and implementation.
- Description of successful establishment (e.g., minimum percent ground/canopy cover, percent survival, stand density).
- Sites may require on-going periodic maintenance consisting of mowing or herbicide treatment to control invasive pressure.
- All areas to be grazed will follow a grazing plan that meets the criteria in the WI CPS, Prescribed Grazing (Code 528).
- Grazing will be permanently excluded on high hazard sites, such as cut banks, areas of seepage, or other potential unstable areas.
- All areas to be grazed will follow a grazing plan that meets the criteria in the WI NRCS CPS, Prescribed Grazing (Code 528).
- Grazing will be permanently excluded on high hazard sites, such as cut banks, areas of seepage, or other potential unstable areas.

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Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

LINED WATERWAY OR OUTLET

CODE 468

(ft)

DEFINITION

A waterway or protected outlet section having an erosion-resistant lining of concrete, stone, synthetic turf reinforcement fabrics, or other permanent material.

PURPOSE

This practice may be applied to accomplish one or more of the following purposes:

- Provide safe conveyance of runoff from conservation practices or other flow concentrations without causing erosion or flooding
- Prevent or stabilize existing gully erosion or scour
- Protect and improve water quality

CONDITIONS WHERE PRACTICE APPLIES

This practice applies if conditions similar to one or more of the following exist:

- Concentrated runoff, pipe flow, steep grades, wetness, prolonged base flow, seepage, or piping is such that a lining is needed to prevent erosion.
- Use by people or animals precludes vegetation as suitable cover.
- Site restrictions necessitate limited waterway or outlet widths with design velocities that require lining protection.
- Soils are highly erosive or other soil or climatic conditions preclude using vegetation only.

CRITERIA

General Criteria Applicable to All Purposes

Design and install measures according to a site-specific plan in accordance with all local, State, Tribal, and Federal laws and regulations. Apply measures that are compatible with improvements planned or being carried out by others.

Capacity

The minimum capacity must be adequate to carry the peak rate of runoff from a 10-year, 24- hour frequency storm with the following exceptions:

- When the lined waterway or outlet slope is less than 1 percent, minimum design capacity may be reduced to the capacity of the waterway leading to it.
- When the immediate downstream conveyance capacity of the channel, structure, or pipe is less than that resulting from a 10-year, 24-hour frequency storm, minimum design capacity may be reduced to the capacity of downstream conveyance.

- When the lined waterway or outlet protects components of manure management systems, the minimum design capacity shall convey the peak discharge from a 25-year, 24-hour frequency storm.

Velocity
Compute velocity using Manning's Equation with a coefficient of roughness appropriate for the selected lining material. See Table 1.

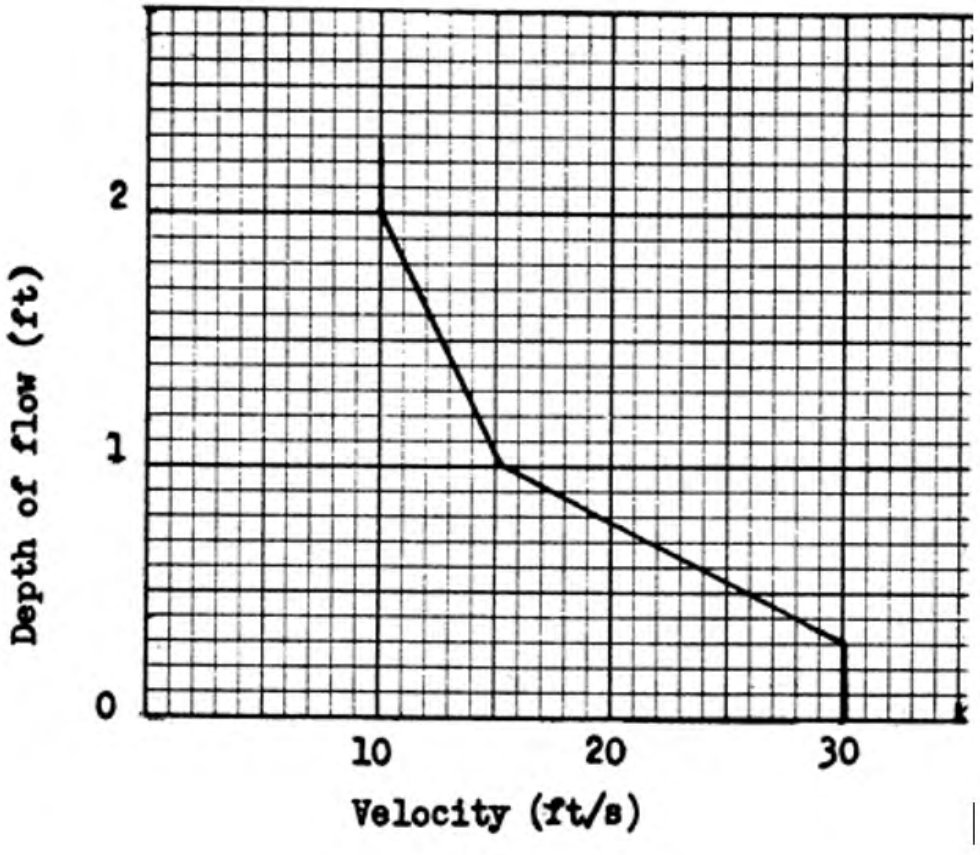


Figure 1. Maximum velocity vs. depth of flow for concrete-lined channels

Table 1. Manning's "n" Values

Lining	"n" Value
Concrete – trowel finish	0.0110 – 00.015
Concrete – float finish	0.013 – 0.016
Shotcrete	0.016 – 0.025
Flagstone	0.020 – 0.025
Riprap[1] (Angular Rock)	$n=0.047\ (D50*S)^{0.147}$
Synthetic Turf Reinforcement Fabrics and Grid Pavers	Manufacturer's recommendations

[1] Applies on slopes between 2 and 40 percent with a rock mantle thickness of 2 x D_{50}.

Where:

D_{50} = median rock diameter (in.)

S = lined section slope (ft. / ft.) ($.02 \leq S \leq 0.4$)

Design maximum velocity and rock gradation limits for rock riprap-lined channel sections and outlets from concentrated flow area using the National Engineering Handbook (NEH), Part 650, Engineering Field Handbook, Chapter 16, Appendix 16A; or NEH 654, Technical Supplement 14C, unless a detailed design analysis appropriate to the specific slope, flow depth, and hydraulic conditions indicate that a higher velocity is acceptable.

Do not exceed manufacturer's recommendations for maximum design velocity for synthetic turf reinforcement fabrics and grid pavers.

Maximum design velocity for concrete-lined sections using Figure 1.

Avoid channel slopes between 0.7 and 1.3 of the critical slope except for short transition sections. Restrict supercritical flow to straight reaches.

Waterways or outlets with supercritical flow must discharge into an energy dissipator to reduce discharge velocity to less than critical. For a lined outlet downstream of a pipe, provide a lined waterway or outlet adequate to contain the outflow from the design flow event.

Rock Riprap Linings
The following criteria apply to all rock riprap linings:

- Stable rock sizes and flow depths for rock-lined channels having gradients between 2 percent and 40 percent shall be determined using the process from Design of Rock Chutes by Robinson, Rice, and Kadavy.

  $z = [(n)\ (q)\ /\ ((1.486)\ (S)^{0.5})]^{0.6}$

  For channel slopes between 2% and 10%:

  $D_{50} = (FS)\ (SF)\ [q\ (S)^{1.5}/\ (4.75(10)^{-3})]^{0.53}$

  For channel slopes between 10% and 40%:

  $D_{50} = (FS)\ (SF)\ [q\ (S)^{0.58}\ /\ (3.93\ (10)^{-2})]^{0.53}$

  Where:

  D_{50} = Particle size for which 50% (by weight) of the sample is finer, in.

  S = Bed slope, ft. / ft.

  z = Flow depth, ft.

  n=Manning's roughness coefficient

  q = Unit discharge, $ft^3/s/ft$.

- Rock shall meet the material requirements of Wisconsin Construction Specification 9, Loose Rock Riprap.
- A minimum factor of safety (FS) of 1.2 shall be used to size the rock.
- A shape factor (SF) of 1.0 shall be used for cubical rock.
- An additional shape factor (SF) of 1.4 shall be used for spherical rock.
- The cross section of the completed lined waterway shall be trapezoidal. Side slopes shall be 2 horizontal to 1 vertical or flatter.
- The rock-lined slope shall be on slopes between 2 percent and 40 percent.
- The minimum depth for the rock riprap linings shall be the design flow depth needed to pass the

design flow through a trapezoidal-shaped plus freeboard.

- The minimum rock thickness shall be 2 times the D50 rock size.
- A geotextile must be placed beneath the rock. If a sand-gravel bedding is used, the bedding thickness shall be a minimum of 2 inches and placed beneath the geotextile.
- The rock gradation shall be as shown in Table 2.

Table 2. Rock Gradation

Percent Passing	$1.5 \times D_{50} - 2.0 \times D_{50}$
100	$1.5 \times D_{50} - 2.0 \times D_{50}$
85	$1.3 \times D_{50} - 1.8 \times D_{50}$
50	$1.0 \times D_{50} - 1.5 \times D_{50}$
10	$0.8 \times D_{50} - 1.3 \times D_{50}$
[1] Round up to nearest inch.	

Cross section
The cross-section of the lined waterway or outlet with a defined channel must be triangular, parabolic, or trapezoidal. Cross-section made of monolithic concrete may be rectangular.

The steepest permissible side slopes, horizontal to vertical (h:v), shall be as listed in Table 3.

Table 3. Steepest Permissible Side Slopes

Lining Material	Side Slope (h:v)
Hand-placed, formed concrete* Height of lining, 1.5 feet or less	Vertical
Hand-placed screeded concrete* or mortared-in-place flagstone Height of lining, less than 2 feet Height of lining, more than 2 feet	 1:1 2:1
Slip form concrete Height of lining, less than 3 feet	 1:1
Rock riprap	2:1
Synthetic Turf Reinforcement Fabrics	2:1
Grid Pavers	1:1
*Non-reinforced concrete.	

Freeboard
The minimum freeboard for lined waterways or outlets must be 0.25 ft above design high water in areas where erosion-resistant vegetation cannot be grown adjacent to the paved or reinforced side slopes. No freeboard is required if vegetation can be grown and maintained.

Lining thickness
Minimum lining thickness must not be less than:

Concrete..... 4 in. (minimum thickness is 5 in. if the liner is reinforced)

Rock riprap..... Maximum stone size plus thickness of filter or bedding

Flagstone..... 4 in., including mortar bed

Synthetic turf reinforcement

Fabrics and Grid Pavers..... Manufacturer's recommendations

Lining Durability
Nonreinforced concrete or mortared flagstone linings may only be used in areas of low shrink-swell soils that are well drained or where subgrade drainage facilities are installed.

Related structures
Side inlets, drop structures, and energy dissipators must meet the hydraulic and structural requirements for the site. Grade stabilization structures must meet the criteria of Wisconsin NRCS Conservation Practice Standard (WI NRCS CPS), Grade Stabilization Structures (Code 410). Crossings must meet the criteria in WI NRCS CPS, Stream Crossing (Code 578).

Outlets
All lined waterways and outlets must have a stable outlet with adequate capacity to prevent erosion and flooding damages.

Geotextiles
Use geotextiles where appropriate as a separator between rock, flagstone, or concrete linings and soil to prevent migration of soil particles from the subgrade, through the lining material. Specify geotextile requirements in accordance with the American Association of State Highway and Transportation Officials (AASHTO) M288, Section 7.3.; NEH 654, Technical Supplement 14D; or NRCS Design Note 24, "Guide for the Use of Geotextiles."

Filters or bedding
Use filters or bedding to prevent piping, where appropriate. Use drains to reduce uplift pressure and to collect water, as required. Design filters, bedding, and drains in accordance with NEH Part 633, Chapter 26. Weep holes may be used with drains if needed.

Concrete. Proportion concrete so that it is plastic enough for thorough consolidation and stiff enough to stay in place on side slopes. A dense, durable product is required. Specify a mix that can be certified as suitable to produce a minimum strength (28 day) of 3,000 pounds per square inch. Specify requirements for curing in the construction specifications.

Contraction joints
Contraction joints in concrete linings, if required, must be formed transversely to a depth of approximately one-third the thickness of the lining, at a uniform spacing between 8 to 15 feet. Provide steel reinforcement or other uniform support to the joint to prevent unequal settlement.

Site and Subgrade Preparation
Proper site preparation is necessary to provide a stable, uniform foundation for the waterway lining. The site should be graded to remove any rutting or uneven surfaces and to provide good surface drainage throughout the construction period and the design life of the waterway or outlet. Proof rolling can be used to identify soft pockets of soil, additional rutting, or other soil conditions that require removal and replacement by compacted soil to provide a uniform surface for base, subbase, or concrete liner.

CONSIDERATIONS

Incorporate trees, shrubs, forbs, and grasses into or adjacent to the lined portions of the channel. This may improve aesthetics and habitat benefits as well as reduce erosion potential. Plantings are especially beneficial where the channel transitions to natural ground. However, such plantings are not appropriate in all circumstances. Guidance on the use of plantings is available in NEH 654, Technical Supplement 14I and 14K.

Fish and Wildlife Resources

This practice may impact important fish and wildlife habitats such as streams, creeks, riparian areas, floodplains, and wetlands.

Seepage from unlined waterways may benefit wetlands, migratory bird habitat, and floodplain recharge. Consider site-specific resource concerns with regard to efficient water delivery and instream flow as compared to wetland habitat benefits.

Aquatic organism passage concerns (e.g., velocity, depth, slope, air entrainment, screening, etc.) should be evaluated to minimize negative impacts. Swimming and leaping performance for target species should be considered.

Important fish and wildlife habitat, such as woody cover or wetlands, should be avoided or protected if possible when siting the lined waterway. If trees and shrubs are incorporated, they should be retained or planted in the periphery of the grassed portion of the lined waterways so they do not interfere with hydraulic functions and roots do not damage the lined portion of the waterway. Mid-or-tall bunch grasses and perennial forbs may also be planted along waterway margins to improve wildlife habitat.

Plant selections that benefit pollinators should be incorporated into the design. Waterways with these wildlife features are more beneficial when connecting other habitat types (e.g., riparian areas, wooded tracts, and wetlands).

Other Considerations

- Cultural resources need to be considered when planning this practice. Where appropriate, local cultural values need to be incorporated into practice design in a technically sound manner.
- Filter strips established on each side of the waterway may improve water quality.
- Consideration should be given to livestock and vehicular crossings as necessary to prevent damage to the waterway. Crossing design must not interfere with design-flow capacity.
- Reinforcement of concrete liners should be considered where high pore-water pressures exist in the subgrade, movement of the subgrade may occur, or in reaches where failure would endanger public safety or property.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for lined waterways or outlets that describe the requirements for applying the practice to achieve its intended purpose(s).

As a minimum the plans and specifications must include:

- A plan view of the layout of the lined waterway or outlet.
- Typical cross section of the lined waterway or outlet.
- Profile of the lined waterway or outlet.
- Specifications for the lining material.
- Disposal requirements for excess soil material.
- Site-specific construction specifications that describe the installation of the lined waterway or outlet. Include a specification for control of concentrated flow during construction if required.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for use by the client. As a minimum, the plan shall address the following items:

- Regular inspection of lined waterways, especially following heavy rains. Promptly repair damaged areas and remove sediment deposits to maintain capacity of lined waterways.

- Control noxious weeds. Avoid areas where forbs have been established when applying herbicides.
- Avoid using the lined waterways as turn-rows during tillage and cultivation operations.
- Prescribed burning and mowing may be appropriate to enhance wildlife values, but must be conducted to avoid peak nesting seasons and reduced winter cover.
- Do not use the lined waterway as a field road.
- Avoid crossing the lined waterway or outlet with heavy equipment.

REFERENCES

AASHTO M288. Standard Specification for Geotextile Specification for Highway Applications.

National Engineering Handbook (NEH), Part 654, Stream Restoration Design, August 2007.

NEH, Part 650, Engineering Field Handbook: Chapter 16, Streambank and Shoreline Protection.

NEH, Part 650, Engineering Field Handbook: Chapter 3, Hydraulics.

NEH, Part 633, Soil Engineering: Chapter 26, Gradation Design of Sand and Gravel Filers.

Robinson, K.M., C.E. Rice, and K.C. Kadavy. 1998. Design of Rock Chutes Transactions of ASAE, Vol. 41(3): 621-626.

USDA, NRCS Guide for the Use of Geotextiles. Design Note 24 (210-VI-DN-24, 1991).

USDA, NRCS, Pollinator Conservation
https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/pollinate/ (accessed July 20, 2016)

United States Department of Agriculture

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

STREAMBANK AND SHORELINE PROTECTION

CODE 580

(ft)

DEFINITION

Treatment(s) used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Prevent the loss of land or damage to land uses or facilities adjacent to the banks of streams or constructed channels, shoreline of lakes, reservoirs, or estuaries. This includes the protection of known historical, archeological, and traditional cultural properties.
- Maintain the flow capacity of streams or channels.
- Reduce the offsite or downstream effects of sediment resulting from bank erosion.
- To improve or enhance the stream corridor or shoreline for fish and wildlife habitat, aesthetics, recreation.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to streambanks of natural or constructed channels and shorelines of lakes, reservoirs, or estuaries susceptible to erosion. It does not apply to erosion problems on main ocean fronts, beaches, or similar areas of complexity.

CRITERIA

General Criteria Applicable to All Purposes

Design and install treatments in accordance with all applicable local, State, Tribal, and Federal laws and regulations.

Design treatments to avoid adverse effects to endangered, threatened, and candidate species and their habitats, whenever possible.

Avoid adverse effects to archeological, historic, structural, and traditional cultural properties, whenever possible.

Minimize adverse effects to existing wetland functions and values.

Assess unstable streambank or shoreline sites in sufficient detail to identify the causes contributing to the instability (e.g., livestock access, watershed alterations resulting in significant modifications of discharge or sediment production, in-channel modifications such as gravel mining, head cutting, water level fluctuations, boat-generated waves, etc.).

Design treatments compatible with planned improvements or improvements installed by others.

Design treatments compatible with the bank or shoreline materials, water chemistry, channel or lake hydraulics, and slope characteristics above and below the water line.

Install protective treatments that result in stable slopes based on the bank or shoreline materials and the type of measure proposed.

Provide protection of installed treatments from overbank flows resulting from upslope runoff and flood return flows.

Provide internal drainage for bank seepage when needed. Incorporate geotextiles or properly design filter or bedding, as appropriate, with structural measures where there is the potential for piping or erosion of material from behind the measure.

Anchor end sections of treatment to existing treatments or stable areas to prevent flanking of the treatment.

Design treatments to account for any anticipated ice action, wave action, and fluctuating water levels.

Protect all disturbed areas around protective treatments from erosion.

Select appropriate vegetation for the site conditions and the intended purpose(s).

In order to ensure plant community establishment and integrity, prepare a vegetative management plan in accordance with NRCS Conservation Practice Standard (CPS) Critical Area Planting (Code 342). Do not use species on noxious plant lists.

Limit livestock traffic along treated streambanks and shorelines to stable access points, using applicable NRCS Conservation Practice Standards.

Additional Criteria for Streambanks

Classify stream segments requiring protection according to a system deemed appropriate by the State. Evaluate incised segments or segments that contain the 5-year return period (20-percent probability) or greater flows for further degradation or aggradation.

Perform a site assessment to determine if the causes of instability are local (e.g., poor soils, high water table in banks, alignment, obstructions deflecting flows into bank, etc.) or systemic in nature (e.g., aggradation due to increased sediment from the watershed, increased runoff due to urban development in the watershed, degradation due to channel modifications, etc.). The assessment need only provide the detail necessary for design of the bank treatments and reasonable confidence that the treatments will perform adequately for the design life of the measure.

Do not realign the channel without an assessment of upstream and downstream fluvial geomorphology that evaluates the impacts of the proposed alignment. Determine the current and future discharge-sediment regime using an assessment of the watershed upstream of the proposed channel alignment.

Do not install bank protection treatment in channel systems undergoing rapid and extensive changes in bottom grade and/or alignment unless designing the treatments to control or accommodate the changes. Construct bank treatment to a depth at or below the anticipated lowest depth of streambed scour.

If the failure mechanism is a result of the degradation or removal of riparian vegetation, implement stream corridor restoration, where feasible, as well as bank treatment.

Stabilize toe erosion by treatments that redirect the stream flow away from the toe or by structural treatments that armor the toe.

Where toe protection alone is inadequate to stabilize the bank, shape the upper bank to a stable slope and establish vegetation, or stabilize with structural or soil-bioengineering treatments.

Only remove stumps, fallen trees, debris, and sediment bars which could cause unacceptable bank erosion, flow restriction, or damage to structures. To the extent possible, retain or replace habitat-forming elements that provide cover, food, pools, and water turbulence.

Design treatments to remain functional and stable for the design flow, and sustainable for higher flow conditions.

Do not design treatments that result in negative offsite impacts or increase natural erosion.

Do not design treatments to limit stream flow access to the floodplain.

Evaluate the effects of changes to flow levels compared with the preinstallation flow levels, for low and high flow conditions. Mitigate negative impact as necessary.

Additional Criteria for Shorelines

Limit revetments, bulkheads, or groins to no higher than 3 feet above mean high tide, or mean high water in nontidal areas.

Key structural shoreline protective treatments to a depth to prevent scour during low water.

For the design of structural treatments, evaluate the site characteristics below the waterline for a minimum of 50 feet horizontal distance from the shoreline measured at the design water surface.

Base the height of the protection on the design water surface plus the computed wave height and freeboard. Use mean high tide as the design water surface in tidal areas.

When selecting vegetation as the protective treatment, use a temporary breakwater during establishment when wave run-up would damage the vegetation.

Additional Criteria for Stream Corridor Improvement

Establish stream corridor vegetative components as necessary for ecosystem functioning and stability. The appropriate composition of vegetative components is a key element in preventing excess long-term channel migration in reestablished stream corridors. Establish vegetation on channel banks and associated areas according to CPS Critical Area Planting (Code 342).

Design treatments to achieve habitat and population objectives for fish and wildlife species or communities of concern as determined by a site-specific assessment or management plan. Establish objectives on the survival and reproductive needs of populations and communities, which include habitat diversity, habitat linkages, daily and seasonal habitat ranges, limiting factors and native plant communities. Develop the requirements for the type, amount, and distribution of vegetation using the requirements of the fish and wildlife species or communities of concern to the extent possible.

Design treatments to meet aesthetic objectives as determined by a site-specific assessment or management plan. Establish aesthetic objectives based on human needs, including visual quality, noise control, and microclimate control. Use construction materials, grading practices, and other site development elements compatible with adjacent land uses.

CONSIDERATIONS

When designing protective treatments, consider changes that may occur in the watershed hydrology and sedimentation over the design life of the treatments.

Incorporate debris removed from the channel or streambank into the treatment design when it is compatible with the intended purpose to improve benefits for fish, wildlife, and aquatic systems.

Use construction materials, grading practices, vegetation, and other site development elements that minimize visual impacts and maintain or complement existing landscape uses such as pedestrian paths, climate controls, buffers, etc. Avoid excessive disturbance and compaction of the site during installation.

Use vegetative species that are native and/or compatible with local ecosystems. Avoid introduced species that could become nuisances. Consider species that have multiple values such as those suited for biomass, nuts, fruit, browse, nesting, aesthetics, and tolerance to locally used herbicides. Avoid species that may be alternate hosts to disease or undesirable pests. Consider species diversity to avoid loss of function due to species-specific pests.

Select plant materials that provide habitat requirements for desirable wildlife and pollinators. The addition of native forbs and legumes to grass mixes will increase the value of plantings for both wildlife and pollinators.

Use treatments that promote beneficial sediment deposition and the filtering of sediment, sediment-attached, and dissolved substances.

Maintain or improve fish and wildlife habitat by including treatments that provide aquatic habitat in the treatment design and that may lower or moderate water temperature and improve water quality.

Stabilize side channel inlets and outlets, and outlets of tributary streams from erosion.

Maximize adjacent wetland functions and values with the project design to the extent practicable.

To maintain plant community integrity, exclude livestock during establishment of vegetative treatments and apply appropriate grazing practices after establishment.

Control wildlife during establishment of vegetative treatments. Use temporary and local population control methods with caution and within applicable regulations.

When appropriate, consider establishing a buffer strip and/or diversion at the top of the bank or shoreline protection zone to help maintain and protect installed treatments, improve their function, filter out sediments, nutrients, and pollutants from runoff, and provide additional wildlife habitat.

Consider safety hazards to boaters, swimmers, or people using the shoreline or streambank when designing treatments. Place warning signs as necessary.

Consider installing self-sustaining or minimal maintenance treatments.

PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for applying the practice according to this standard. Include provisions to minimize erosion and sediment production during construction and provisions necessary to comply with conditions of any environmental agreements, biological opinions, or other terms of applicable permits. At a minimum, include the following items:

- A plan view of the layout of the streambank and shoreline protection.
- Typical profiles and cross sections of the streambank and shoreline protection.
- Structural drawings adequate to describe the construction requirements.
- Requirements for vegetative establishment and mulching, as needed.
- Safety features.
- Site-specific construction and material requirements.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for the operator.

At a minimum, include—

- Instructions for operating and maintaining the system to insure that it functions properly.
- Periodic inspections and prompt repair or replacement of damaged components or erosion.
- Instructions for maintaining healthy vegetation, when required.
- Instructions for controlling undesirable vegetation.

REFERENCES

USDA NRCS. National Engineering Handbook (Title 210), Part 650, Chapter 16, Streambank and Shoreline Protection. Washington, D.C. https://directives.sc.egov.usda.gov/

USDA NRCS. National Engineering Handbook (Title 210), Part 653, Stream Corridor Restoration: Principles, Processes, and Practices. Washington, D.C.

USDA NRCS. National Engineering Handbook (Title 210), Part 654, Stream Restoration Design. Washington, D.C.

USDA NRCS. National Engineering Manual (Title 210). Washington, D.C.

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

CHANNEL BED STABILIZATION

CODE 584

(ft)

DEFINITION

Measure(s) used to stabilize the bed or bottom of a channel.

PURPOSE

This practice may support one or more of the following:

- Maintain or alter channel bed elevation or gradient
- Modify sediment transport or deposition
- Manage surface water and groundwater levels in floodplains, riparian areas, and wetlands

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to the beds of existing or newly constructed alluvial or threshold channels undergoing damaging aggradation or degradation that cannot be feasibly controlled by clearing or snagging, establishment of vegetative protection, installation of bank protection, or installation of upstream water control measures.

This practice also applies to channels where the removal of barriers to aquatic organism passage would result in destabilization of the channel bed.

CRITERIA

General Criteria Applicable to All Purposes

Design and install measures according to a site-specific plan in accordance with all local, State, Tribal, and Federal laws and regulations. Apply measures that are compatible with improvements planned or being carried out by others.

Evaluate effects of channel work on existing structures such as culverts, bridges, buried cables, pipelines, and irrigation flumes to determine impact on their intended functions. Analyze the quantity and character of sediments entering the channel reach under consideration on the basis of both present and projected conditions caused by changes in land use or land treatment and upstream improvements or structural measures. Select measures that are compatible with the bank or shoreline materials, water chemistry, channel hydraulics, and slope characteristics, both above and below the waterline.

Design measures to:

- Withstand flow duration, depth of inundation, buoyancy, uplift, scour, angle of attack, stream velocity, and higher-flow conditions, based on acceptable risk.
- Maintain sufficient depth to provide adequate outlets for subsurface drains, tributary streams, ditches, or other channels.

- Maintain the appropriate sediment transport regime in order to avoid detrimental erosion or sedimentation upstream and downstream.
- Anticipate ice action, debris impact, and fluctuating water levels.
- Avoid adverse effects on endangered, threatened, proposed, and candidate species and their habitats.
- Avoid adverse effects on archaeological, historical, structural, and traditional cultural properties.
- Minimize safety hazards to boaters, swimmers, or people using the channel.

Measures must not:

- Impair the floodway or floodplain functions.
- Cause detrimental changes in water surface elevations when water surface elevations are a concern.
- Impede the upstream or downstream passage of aquatic organisms, unless the objective is to restrict invasive species access.

Dispose of spoil material from clearing, grubbing, and channel excavation in a manner that will not interfere with the function of the channel. Protect all disturbed areas around measures from erosion. Select vegetation or other measures that are best suited for the anticipated site conditions.

Clear the channel to remove stumps, fallen trees, debris, and sediment bars only when they are causing, or could cause, detrimental bank erosion, structural failure, or reduction of channel capacity that results in above-average overflows on adjacent floodplains. Retain or replace habitat-forming elements that provide cover, food, pools, and water turbulence to the extent possible.

CONSIDERATIONS

Assess channel stabilization needs in sufficient detail to identify the causes contributing to instability (e.g., watershed alterations resulting in significant modifications of discharge or sediment production). Due to the complexity of such an assessment, consider using an interdisciplinary team and watershed modeling.

When designing protective measures:

- Conduct area-wide planning efforts for proper design, function, and management of protective measures if the design reach involves multiple stakeholders.
- Consider the changes that may occur in the watershed hydrology and sedimentation over the design life of the measure.
- Use woody material removed during construction in the overall practice design.
- Maintain or improve the habitat value for fish and wildlife, which includes providing cover, lowering or moderating water temperature, and improving water quality.
- Improve habitat for threatened, endangered, and other species of concern, where applicable.
- Maximize adjacent wetland functions and values and minimize adverse effects to existing wetland functions and values.
- Protect side channel inlets and outlets from erosion or sedimentation.

Plan for the type of human use and social and safety aspects when designing protective measures. Use construction materials, grading practices, vegetation, and other site-development elements that enhance aesthetics, recreational use, and maintain or complement existing landscape uses such as pedestrian paths, climate controls, and buffers. Avoid excessive disturbance and compaction of the site during installation.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for specific channel reaches and field sites that describe the requirements for applying the practice to achieve its intended purpose(s). At the minimum the plan will include:

- Topographic map
- Drainage area
- Channel velocities
- Safety requirements

OPERATION AND MAINTENANCE

Prepare an Operation and Maintenance plan that provides specific instructions for operating and maintaining the system to ensure it functions properly. Provide for periodic inspections and promptly repair or replacement of damaged components.

REFERENCES

USDA, NRCS, Conservation Engineering Division, National Engineering Handbook, Part 653, Stream Corridor Restoration.

USDA, NRCS, Conservation Engineering Division, National Engineering Handbook Part 654, Stream Restoration Design.

USDA, NRCS, Stream Restoration Planning and Design, Fluvial System Stabilization and Restoration Field Guide.

N
W E
S

Horizontal Datum: NAD 83 WI State Plane Central Zone

Imagery: Google Image Service

APPENDIX E
FIGURE 1

CITY OF INDEPENDENCE, WI WWTP
NUTRIENT TRADING PLAN
BRUCE VALLEY CREEK SITE
NUTRIENT REDUCTION PRACTICES

TREMPEALEAU COUNTY, WISCONSIN

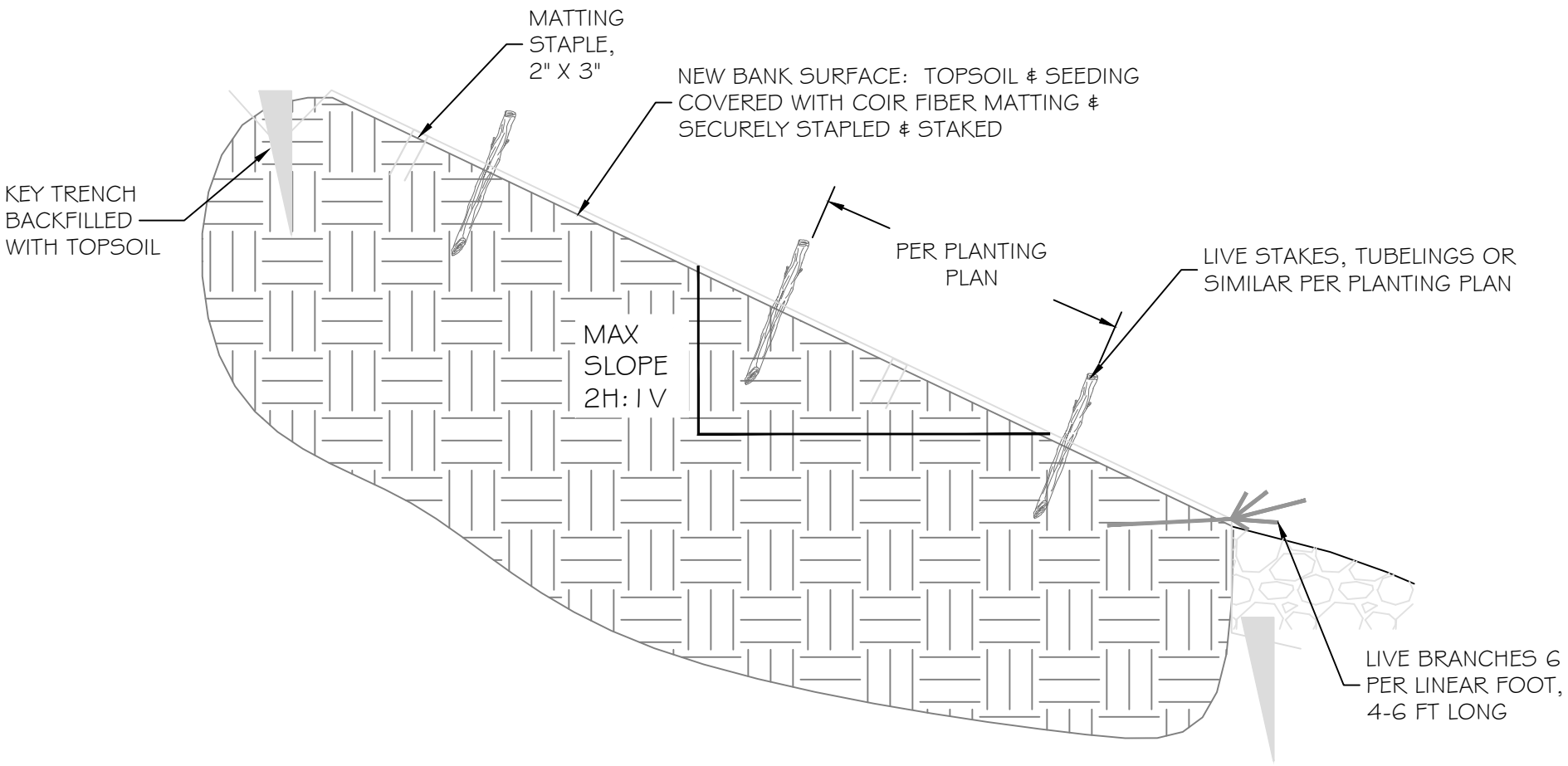
LEGEND

- Site Boundaries
- Bruce Valley Creek
- 1+00 Stream Station
- A Streambank Stabilization Area
- M Gully Stabilization Area
- Grade Control Location

res

Date: 08/28/2020

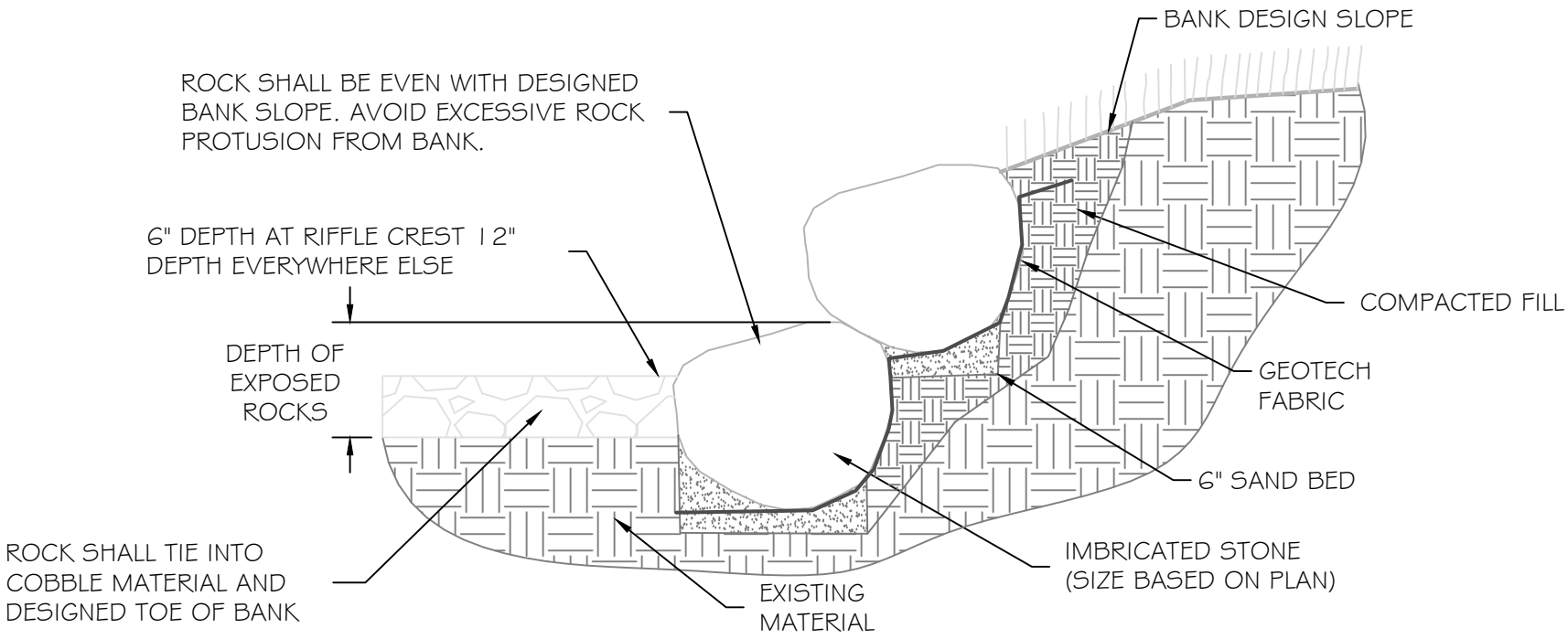
Drawn by: MR



COIR FIBER MATTING WITH LIVE STAKES

NOT TO SCALE

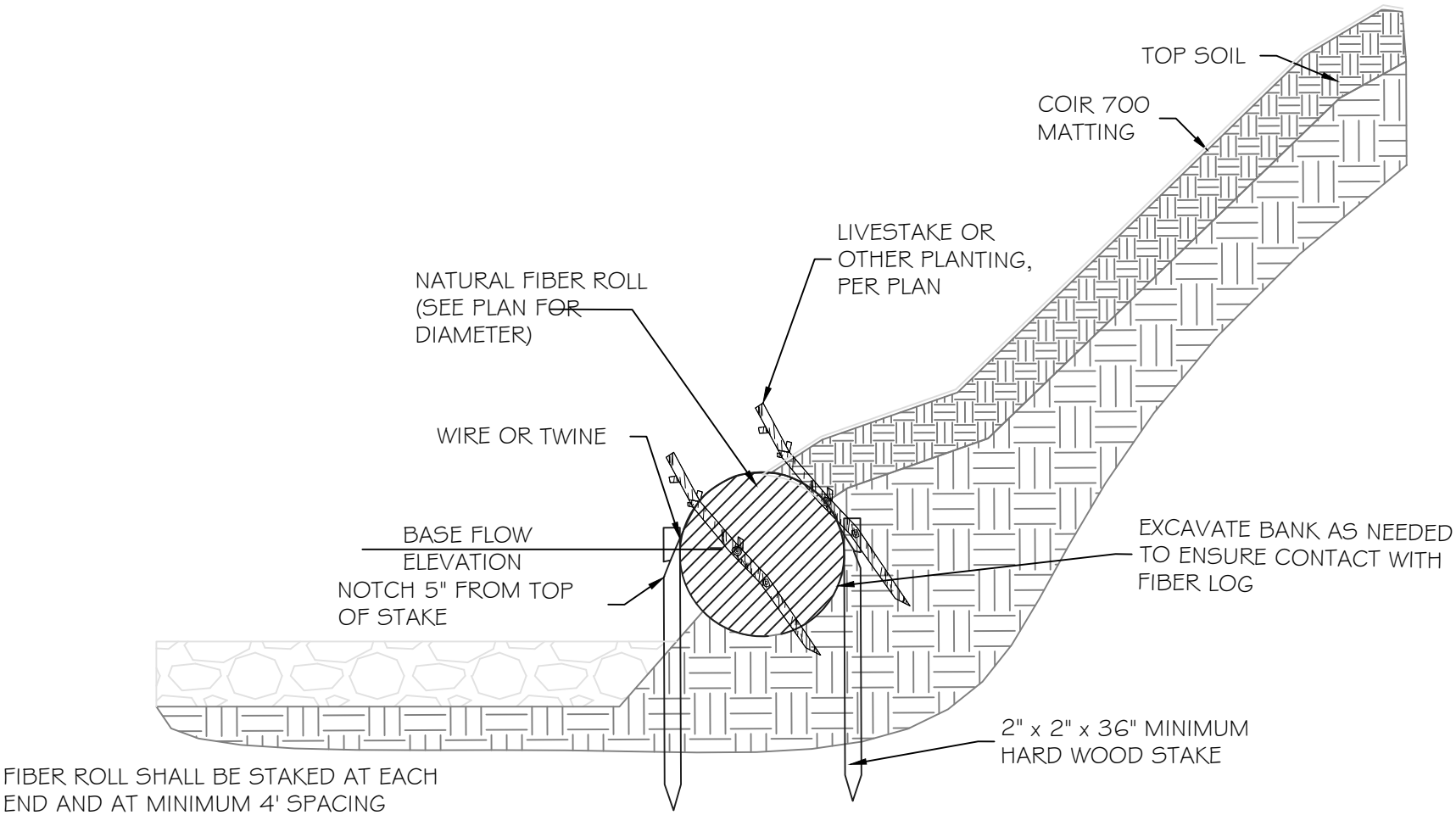
	APPENDIX E FIGURE 2 BANK GRADING AND BIOENGINEERING STABILIZATION TYPICAL DETAIL	CITY OF INDEPENDENCE, WI WWTP NUTRIENT TRADING PLAN TREMPEALEAU COUNTY, WISCONSIN	Date: 8/31/20 Drawn by:RES Checked by:MR



STONE TOE PROTECTION

NOT TO SCALE

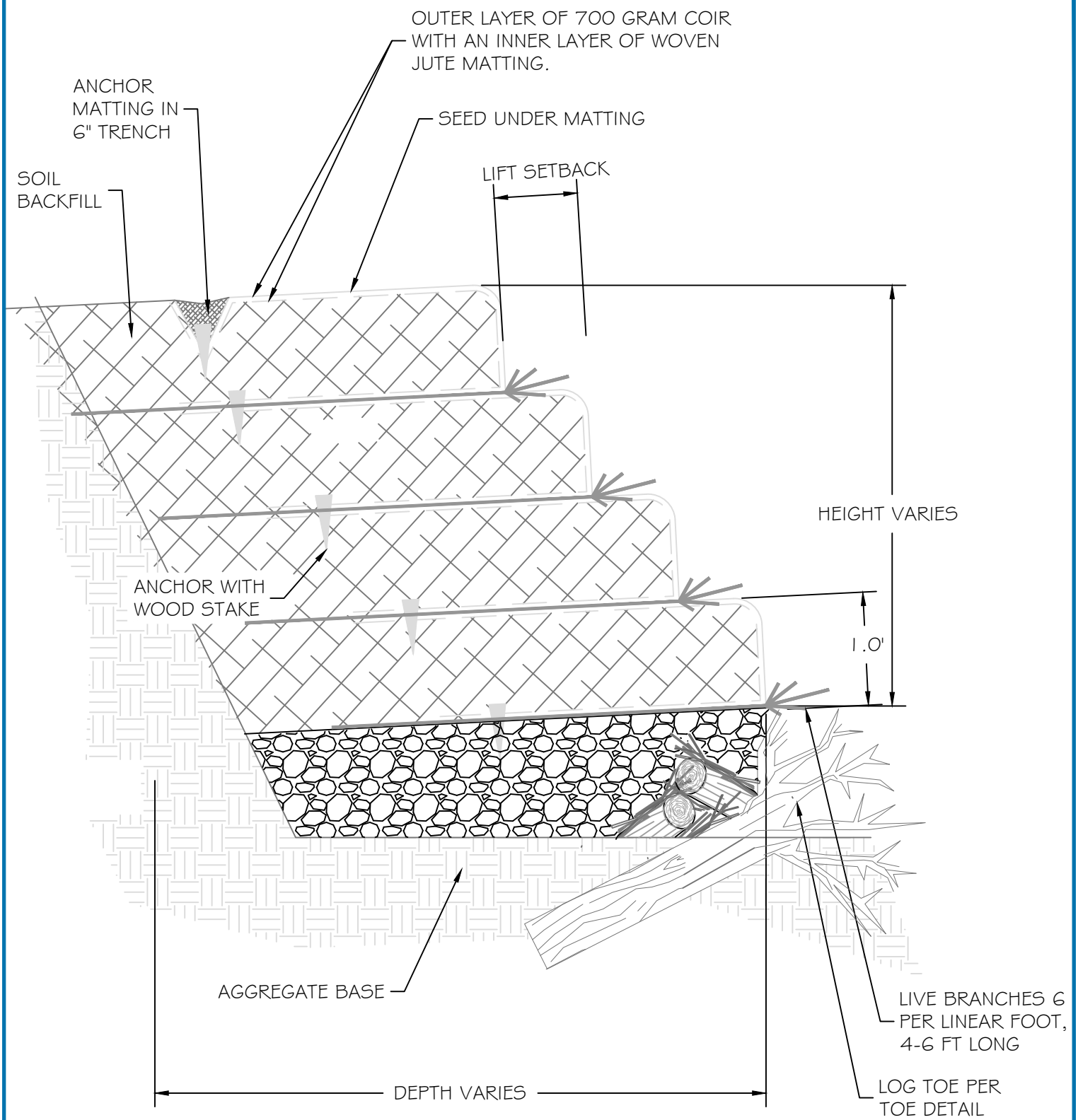
	APPENDIX E FIGURE 3 STONE TOE PROTECTION TYPICAL DETAIL	CITY OF INDEPENDENCE, WI WWTP NUTRIENT TRADING PLAN TREMPEALEAU COUNTY, WISCONSIN	Date: 8/31/20 Drawn by:RES Checked by:MR



COIR OR FIBER ROLL TOE PROTECTION

NOT TO SCALE

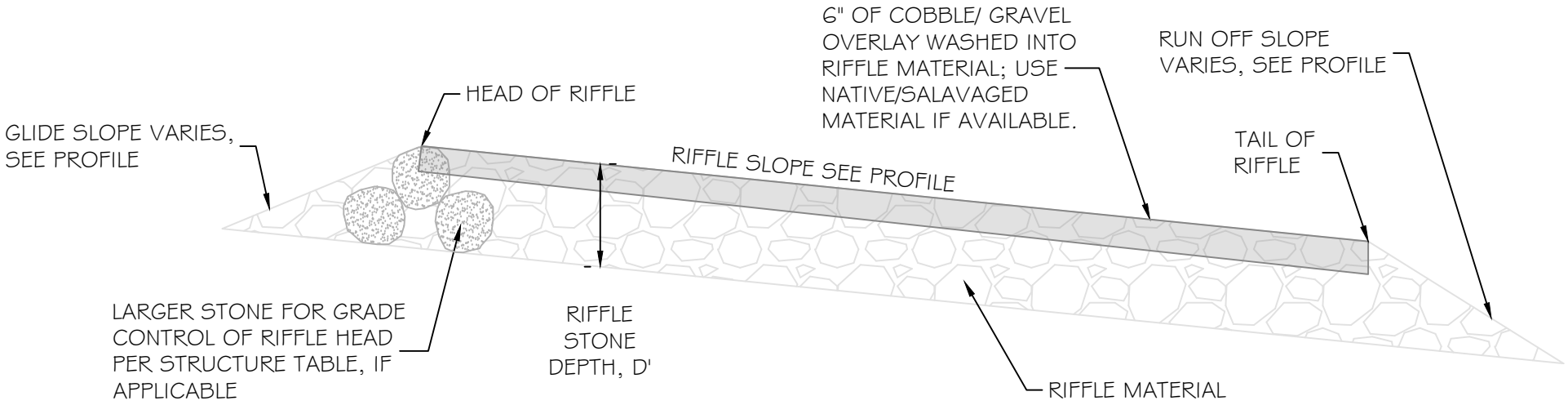
	APPENDIX E FIGURE 4 COIR OR FIBER ROLL TOE PROTECTION TYPICAL DETAIL	CITY OF INDEPENDENCE, WI WWTP NUTRIENT TRADING PLAN TREMPEALEAU COUNTY, WISCONSIN	Date: 8/31/20 Drawn by:RES Checked by:MR	res



TOE-WOOD WITH LIVE LIFT SLOPE STABALIZATION

NOT TO SCALE

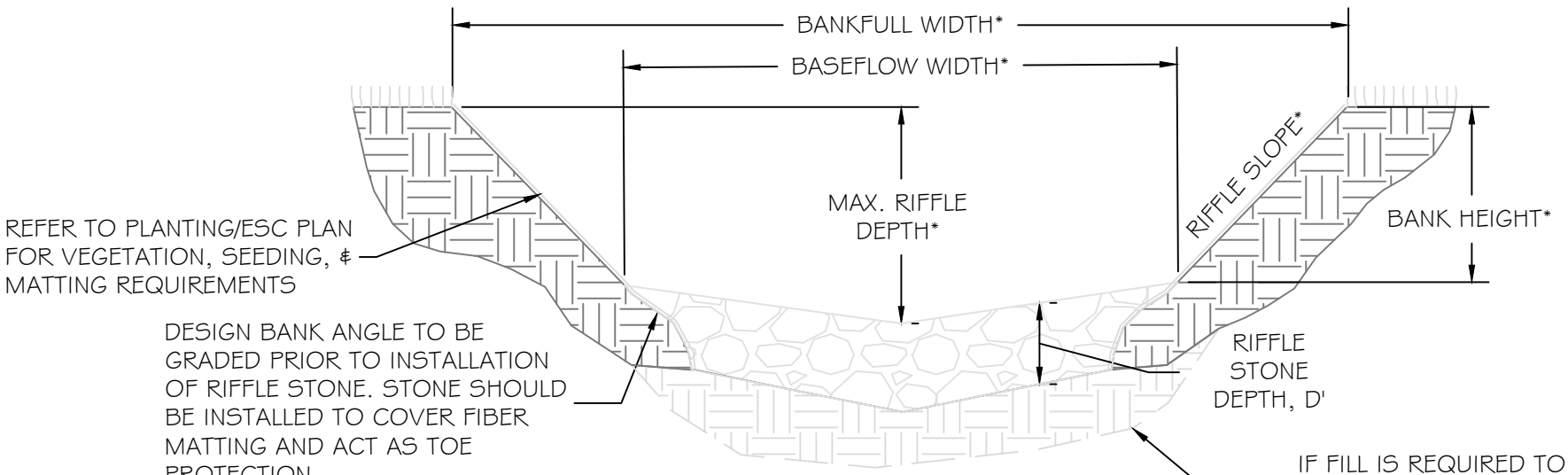
APPENDIX E FIGURE 5 TOE WOOD AND LIVE LIFT TYPICAL DETAIL	CITY OF INDEPENDENCE, WI WWTP NUTRIENT TRADING PLAN TREMPEALEAU COUNTY, WISCONSIN	Date: 08/31/2020 Drawn by: RES Checked by: MR	res



PROFILE
NOT TO SCALE

CONSTRUCTED RIFFLE
NOT TO SCALE

	APPENDIX E FIGURE 6 STONE RIFFLE GRADE CONTROL PROFILE TYPICAL DETAIL	CITY OF INDEPENDENCE, WI WWTP NUTRIENT TRADING PLAN TREMPEALEAU COUNTY, WISCONSIN	Date: 8/31/20 Drawn by:RES Checked by:MR

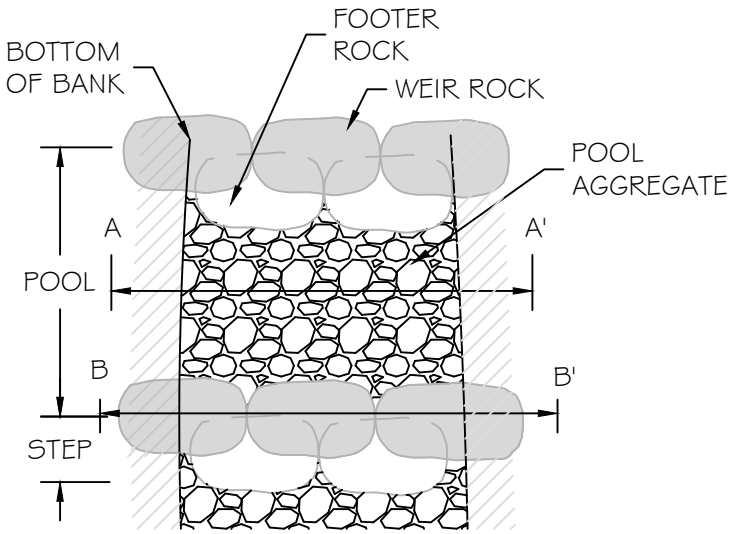


CROSS SECTION
NOT TO SCALE

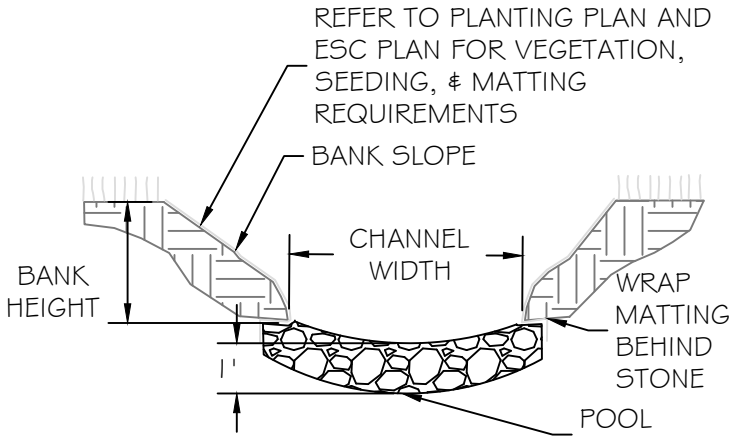
CONSTRUCTED RIFFLE

NOT TO SCALE

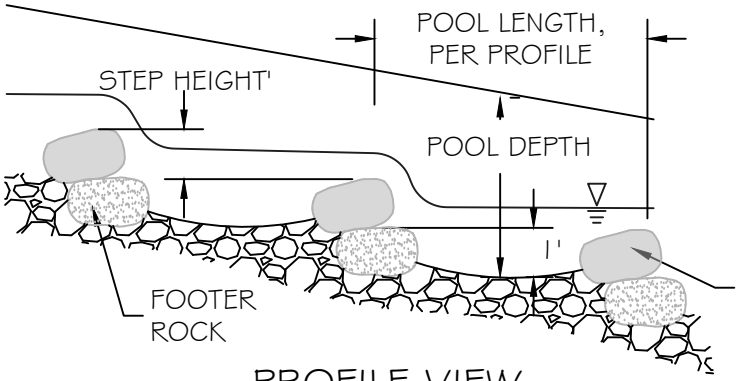
	APPENDIX E FIGURE 7 STONE RIFFLE GRADE CONTROL CROSS SECTION TYPICAL DETAIL	CITY OF INDEPENDENCE, WI WWTP NUTRIENT TRADING PLAN TREMPEALEAU COUNTY, WISCONSIN	Date: 8/31/20 Drawn by:RES Checked by:MR



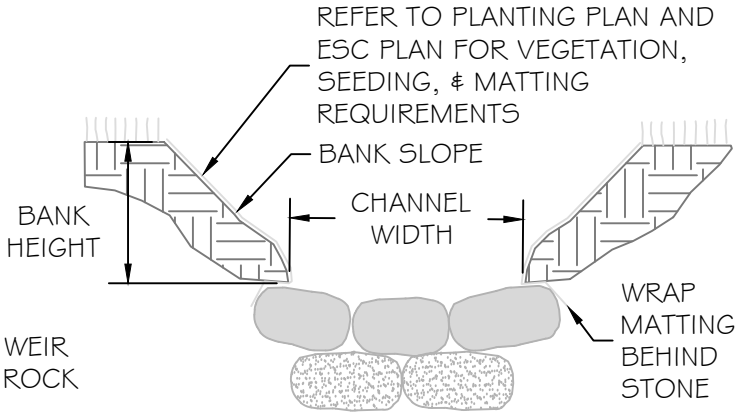
PLAN VIEW
NOT TO SCALE



SECTION A - A'
NOT TO SCALE



PROFILE VIEW
NOT TO SCALE



SECTION B - B'
NOT TO SCALE

REGENERATIVE STORMWATER CONVEYANCE

NOT TO SCALE

	APPENDIX E FIGURE 8 REGENERATIVE STORMWATER CONVEYANCE TYPICAL DETAIL	CITY OF INDEPENDENCE, WI WWTP NUTRIENT TRADING PLAN TREMPEALEAU COUNTY, WISCONSIN	Date: 8/31/20 Drawn by:RES Checked by:MR

Appendix F/ WQT Agreement Certification and Landowner Agreement

STATE OF WISCONSIN

COUNTY OF TREMPEALEAU

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement (this "Memorandum") is made for the purpose of providing recordable evidence of that certain written Mitigation Project Agreement dated effective February 6, 2020 (the "Effective Date") (as amended, modified, or supplemented from time to time, the "Agreement"), entered into by and between John L. Blaha, with a mailing address of 1501 S. Highland Drive, Sparta, Wisconsin 54656 (the "Owner"), and HGS, LLC, a Virginia limited liability company, with a mailing address of c/o Resource Environmental Solutions, LLC, 6575 West Loop South, Suite 300, Bellaire, Texas 77401 ("Project Sponsor" and, together with Owner, the "Parties" and, each individually, a "Party"). Capitalized terms used but not defined herein shall have the meanings set forth in the Agreement.

RECITALS

WHEREAS, Project Sponsor is engaged in the business of restoring, establishing, enhancing, and/or preserving aquatic or other natural resources (including, without limitation, habitat for endangered species);

WHEREAS, Owner owns certain real property comprising approximately 160 acres, located in Trempealeau County, Wisconsin, as more particularly described and/or depicted on Exhibit A attached hereto and made a part hereof (the "Property");

WHEREAS, the Property includes streams, wetlands, other aquatic resources, and/or habitat or other features that may be suitable for use by Project Sponsor and/or its affiliates for the restoration, establishment, enhancement, and/or preservation of aquatic or other natural resources (including, without limitation, habitat for endangered species) or any other use that is consistent with the business objectives of Project Sponsor and/or its affiliates (a "Mitigation Project");

WHEREAS, Project Sponsor has identified an area of the Property contemplated to be used in one or more Mitigation Projects, which such area is preliminarily described and/or depicted on Exhibit B attached hereto and made a part hereof (the "Conservation Area"); and

WHEREAS, on the terms and conditions set forth in the Agreement, Owner and Project Sponsor have entered into the Agreement to, among other things, (i) allow Project Sponsor to evaluate the Property (or portions thereof) for use in one or more Mitigation Projects, (ii) allow Project Sponsor to seek approvals for the Mitigation Project(s) from applicable federal, state, and local regulatory authorities, (iii) set forth the various instruments and documents that will be required to be executed by the Parties in connection with the foregoing, (iv) if and when required under the Agreement, require the future execution by Owner of the Conservation Instruments (defined below), and (v) set forth the various payments and consideration to be paid by the Parties in connection with the foregoing.

NOW, THEREFORE, Owner and Project Sponsor hereby agree to execute this Memorandum for purposes of stating the following with respect to the Agreement and notifying third parties of the existence and terms thereof:

1. Recitals. The foregoing recitals are incorporated by reference into this Memorandum and shall be binding on the Parties hereto.

2. Owner. The name and address of Owner are as set forth above.

3. Project Sponsor. The name and address of the Project Sponsor are as set forth above.

4. Effective Date. The Effective Date of the Agreement is as set forth above.

5. Property Description. The Property affected by the Agreement is the immovable property described and/or depicted on Exhibit A attached hereto.

6. Conservation Area Description. That area of the Property that may be suitable for use as a Mitigation Project(s), as preliminarily described and/or depicted on Exhibit B attached hereto.

7. Delivery of Conservation Instrument(s). For each Mitigation Project that Project Sponsor intends to establish within the Conservation Area, Owner shall execute and deliver to Project Sponsor: (i) the following documents (collectively, the "Conservation Instruments"), each of which shall be in suitable form for recording in the applicable real property records: (A) an easement, declaration of restrictive covenants, deed restriction, or similar protective instrument in favor of the Project Sponsor and/or any third-party holder designated by Project Sponsor to perpetually conserve the Conservation Area; (B) such access easements through the remaining portions of the Property that will allow Project Sponsor access to the Conservation Area to perform such conservation activities; and (C) a notice of Mitigation Project in favor of Project Sponsor; and (ii) such additional documents as are customary in such transactions or requested by Project Sponsor to effectuate the purposes and intent of the Agreement and/or Conservation Instruments.

8. Owner's Covenants. From the Effective Date through the Closing Date, Owner shall take no action to adversely modify the Conservation Area's natural state, flora, fauna, and/or wetland character, including any of the following: (i) construction of any structure or structures; (ii) cutting, burning, removal, or destruction of vegetation (including trees); (iii) building of roads, trails, or paths on the Conservation Area; (iv) changing the elevation of or contours of the Conservation Area; (v) pumping, draining, or causing the Conservation Area to be drained; (vi) placing, filling, storing, or dumping of refuse, trash, vehicle bodies or parts, rubbish, debris, junk, waste, or similar items on the Conservation Area; (vii) mechanized land clearing; (viii) deposition of soil, shell, rock, or other fill on the Conservation Area; (ix) grazing of animals on the Conservation Area; (x) allowing commercial, industrial, or agricultural activities on the Conservation Area; or (xi) any other activity inconsistent with preserving the Conservation Area's natural state, flora, fauna, and/or wetland character. If any event (whether caused by Owner or otherwise) occurs prior to the Closing Date that adversely modifies the

Conservation Area's natural state, flora, fauna, and/or wetland character including any of the foregoing, then Owner shall promptly notify Project Sponsor in writing of the same.

9. Conflicts. In the event of any conflict between the terms of this Memorandum and the terms of the Agreement, the terms of the Agreement shall prevail.

10. Successors and Assigns. The Agreement shall be a covenant that runs with the land and shall be binding on all of Owner's successors and assigns. Any party who acquires all or any portion of the Property, or any interest therein, whether by sale, foreclosure sale, deed in lieu of foreclosure, or in any other manner, shall take the Property (or such interest therein) subject to all of the provisions of the Agreement.

11. Exhibits. All exhibits attached to this Memorandum are incorporated into this Memorandum by reference.

[SIGNATURE PAGES FOLLOW]

IN WITNESS WHEREOF, intending to be legally bound, the Parties have executed this Memorandum the day and year first above written.

OWNER:

John L. Blaha

WITNESS:

STATE OF WISCONSIN :

: SS

COUNTY OF MONROE :

I, Hede A Petroselli, Notary Public for said County and State, certify that John L. Blaha personally came before me this 10 day of July 2020 and acknowledged that he is the authorized landowner of the Property referenced above, and that by authority duly given, he signed the foregoing instrument as Owner.

Notary Public, State of WISCONSIN

Printed Name: Hede A Petroselli

Notary Commission Number:

My Commission Expires: 11-6-21

(SEAL)

PROJECT SPONSOR:

HGS, LLC,
a Virginia limited liability company

By: _____
Name: David Hill
Title: Authorized Signatory

WITNESS:

_____

STATE OF TEXAS :
: SS
COUNTY OF HARRIS :

On July 15, 2020, before me, a Notary Public for the State aforesaid, personally appeared David Hill who acknowledged herself/himself to be the authorized signatory of HGS, LLC, a Virginia limited liability company, and that s/he, in the capacity set forth above, on behalf of Project Sponsor, being authorized to do so, executed, in my presence, the within instrument, and acknowledged that s/he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I have set my hand and official seal.

STEPHEN CARPENTER COLOMB
Notary Public, State of Texas
Comm. Expires 09-09-2023
Notary ID 130360955

_____
Notary Public
My commission expires:
September 9, 2023

EXHIBIT A
to Memorandum of Agreement

Description of Property

Being the same property acquired by Owner per Warranty Deed dated July 15, 2010 and recorded at Volume 870, Page 167, Instrument No. 404387 in the Office of Register of Deeds, Trempealeau County, Wisconsin being described as follows:

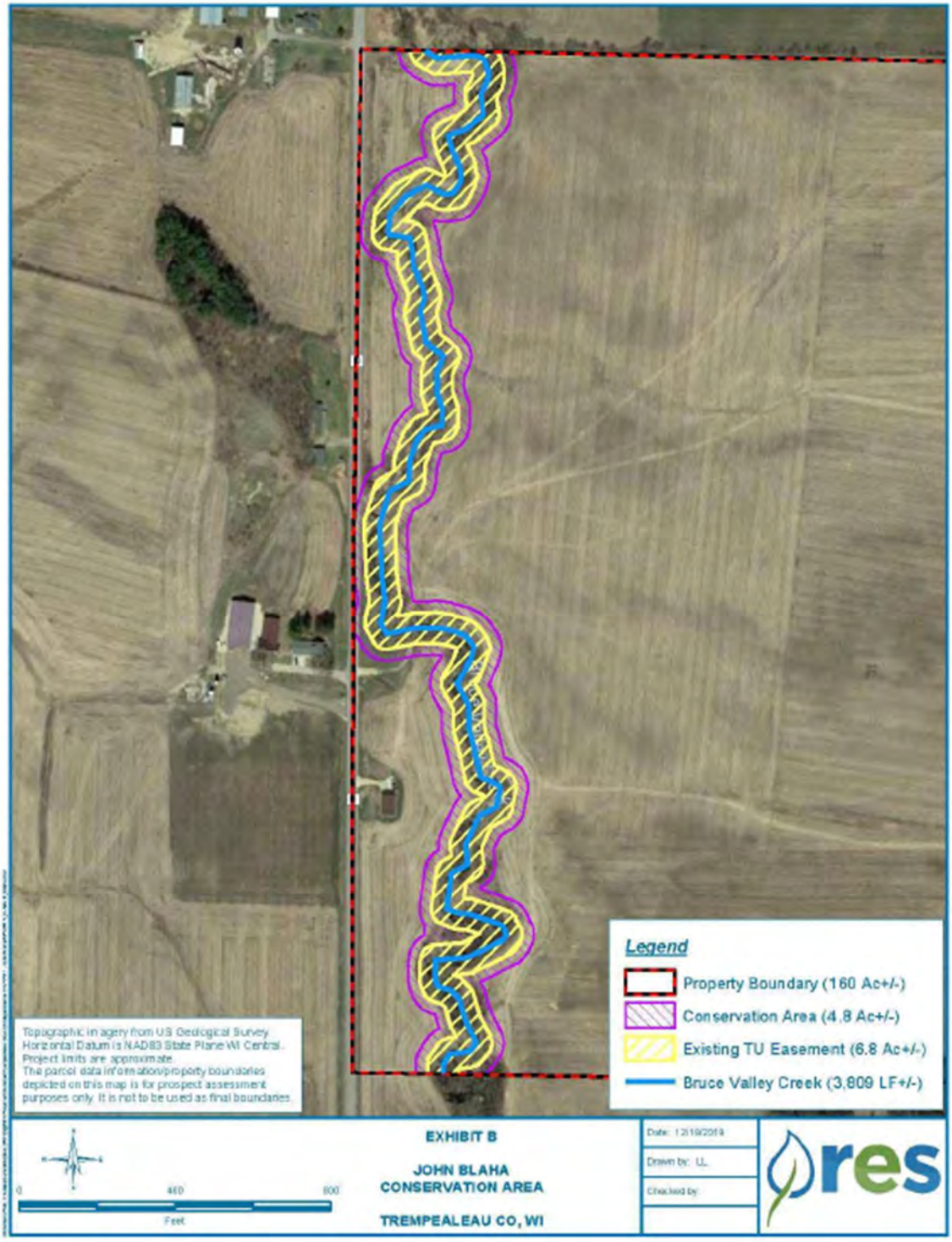
The Southwest Quarter of the Southeast Quarter (SW ¼ SE ¼) and the Southeast Quarter of the Southwest Quarter (SE ¼ SW ¼), Section Twenty-One (21), Township Twenty-Three (23) North, Range Eight (8) West; and The Northeast Quarter of the Northwest Quarter (NE ¼ NW ¼) and the Northwest Quarter of the Northeast Quarter (NW ¼ NE ¼), Section Twenty-Eight (28), Township Twenty-Three (23) North, Range Eight (8) West.

Further identified as follows:

Parcel: 018012860000
Parcel: 018012830000
Parcel: 018011240000
Parcel: 018011200000

EXHIBIT B
to Memorandum of Agreement

Description of Conservation Area(s)



WATER QUALITY TRADING AGREEMENT

THIS WATER QUALITY TRADING AGREEMENT ("Agreement") is entered into as of June 16, 2020, by and between HGS, LLC, a Virginia limited liability company ("HGS") and the City of Independence ("Permittee"). HGS is a wholly owned subsidiary of Resource Environmental Solutions, LLC, and HGS is registered to do business in the state of Wisconsin.

Background:

1. The Permittee operates a wastewater treatment plant (the "WWTP") located in Trempealeau County, Wisconsin, and holds a Wisconsin Pollutant Discharge Elimination System permit No. WJ-0024287-10-0 (the "Permit");
2. The Wisconsin Department of Natural Resources (the "WDNR") implements phosphorus water quality requirements for Wisconsin Pollutant Discharge Elimination System permits;
3. The Permittee desires to adjust its compliance strategy by purchasing tradeable phosphorus credits ("Credits") to offset phosphorus discharge from its WWTP, requiring a modification to and a reissuance of its Permit (any reference herein to the reissuance of Permittee's Permit shall mean the first occurring reissuance of the Permit by WDNR following WDNR's approval of the Plan (defined below) and is referred to herein as "Permit Reissuance");
4. The Permittee has agreed, through two separate contract documents, to have HGS provide the Credits needed to achieve Permit limits.

Certification of Execution of Trade Agreement:

As per WDNR Water Quality Trade Guidance, this document certifies that a trade agreement has been reached between the signatories below to conduct a water quality trade for total phosphorus credits.

Credit Generator

By:_____

Andrew Pelloso
Regulatory Manager
HGS, LLC
33 N Dearborn St Suite 330
Chicago, IL 60602

Credit User

By:_____

Robert Baecker
Mayor
City of Independence
23688 Adams Street
Independence, WI 54747

Appendix G / Notice of Intent (Form 3400-206)

State of Wisconsin
Department of Natural Resources
101 South Webster Street
Madison WI 53707-7921
dnr.wi.gov

Notice of Intent to Conduct Water Quality Trading

Form 3400-206 (1/14)

Notice: Pursuant to s. 283.84, Wis. Stats., and ch. NR 217 Wis. Adm. Code, this form must be completed by any WPDES permittee that is using water quality trading as a method of complying with a permit limitation. Failure to complete this form would not result in penalties. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31 - 19.39, Wis. Stats.).

Applicant Information

Permittee Name	Permit Number	Facility Site Number
City of Independence	WI- 0024287-10-0	662006950

Facility Address	City	State	ZIP Code
23510 Cleveland St	Independence	WI	54747

Project Contact Name (if applicable)	Address	City	State	ZIP Code
Andrew Pelloso	33 N. Dearborn Suite 330	Chicago	IL	60602

Project Name: Blaha/Four Seasons Park Bank Stabilization

Receiving Water Name	Parameter(s) being traded	HUC 12(s)
Trempealeau River	Total phosphorus	070400050403, 070400050401

Is the permittee in a point or nonpoint source dominated watershed? (See PRESTO results - http://dnr.wi.gov/topic/surfacewater/presto.html)
- ○ Point source dominated
- ◉ Nonpoint source dominated

Credit Generator Information

Credit generator type (select all that apply):
- ☐ Permitted Discharge (non-MS4/CAFO)
- ☐ Permitted MS4
- ☐ Permitted CAFO
- ☐ Urban nonpoint source discharge
- ☒ Agricultural nonpoint source discharge
- ☒ Other - Specify: Urban park nonpoint source

Are any of the credit generators in a different HUC 12 than the applicant?
- ◉ Yes; HUC 12: 070400050403
- ○ No
- ○ Unsure

Are any of the credit generators downstream of the applicant?
- ○ Yes
- ◉ No
- ○ Unsure

Will a broker/exchange be used to facilitate trade?
- ○ Yes; Name:
- ◉ No
- ○ Unsure

Point to Point Trades (Traditional Municipal / Industrial Discharge, MS4, CAFO)

Discharge Type	Permit Number	Name	Contact Address	Is the point source credit generator currently in compliance with their permit requirements?
○ Traditional ○ MS4 ○ CAFO				○ Yes ○ No ○ Unsure
○ Traditional ○ MS4 ○ CAFO				○ Yes ○ No ○ Unsure
○ Traditional ○ MS4 ○ CAFO				○ Yes ○ No ○ Unsure
○ Traditional ○ MS4 ○ CAFO				○ Yes ○ No ○ Unsure
○ Traditional ○ MS4 ○ CAFO				○ Yes ○ No ○ Unsure

Point to Nonpoint Trades (Non-permitted Agricultural, Non-Permitted Urban, etc.)

List the practices that will be used to generate credits:

A combination of the following Practices will be used, tailored to site specific conditions at the points of bank erosion at each Credit Generator Site:

NRCS CPS 580 Streambank and Shoreline Protection
NRCS CPS 584 Channel Bed Stabilization
NRCS CPS 468 Lined Waterway or Outlet
NRCS CPS 395 Stream Habitat and Management
NRCS CPS 342 Critical Area Planting

Method for quantifying credits generated:

- ☐ Monitoring
- ☒ Modeling, Names: NRCS Streambank Erosion Estimator
- ☐ Other: _____

Projected date credits will be available: 09/30/2022

The preparer certifies all of the following:

- I am familiar with the specifications submitted for this application, and I believe all applicable items in this checklist have been addressed.
- I have completed this document to the best of my knowledge and have not excluded pertinent information.

Signature of Preparer	Date Signed
[signature]	9-2-2020

Authorized Representative Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. Based on my inquiry of those persons directly responsible for gathering and entering the information, the information is, to the best of my knowledge and belief, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Authorized Representative	Date Signed
[signature]	Sept 3, 2020

Appendix H / Water Quality Trade Plan Checklist (Form 3400-208)

State of Wisconsin
Department of Natural Resources
101 South Webster Street
Madison WI 53707-7921
dnr.wi.gov

Water Quality Trading Checklist

Form 3400-208 (1/14)

Notice: Pursuant to s. 283.84, Wis. Stats., this form must be completed by any WPDES permittee that intends to pursue pollutant trading as a method of complying with a permit limitation. Failure to complete this form would not result in penalties. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31 - 19.39, Wis. Stats.).

Applicant Information

Permittee Name	Permit Number	Facility Site Number
City of Independence	WI- 0024287-10-0	662006950

Facility Address	City	State	ZIP Code
23510 Cleveland St	Independence	WI	54747

Project Contact Name (if applicable)	Address	City	State	ZIP Code
Andrew Pelloso	33 North Dearborn, Suite 330	Chicago	IL	60602

Project Name: Blaha/Four Seasons Park Bank Stabilization

Receiving Water Name	Parameter(s) being traded	HUC 12(s)
Trempealeau River	Total Phosphorus	070400050403, 070400050401

Credit Generator Information

Credit generator type (select all that apply):

- ☐ Permitted Discharge (non-MS4CAFO)
- ☐ Permitted MS4
- ☐ Permitted CAFO
- ☐ Urban nonpoint source discharge
- ☒ Agricultural nonpoint source discharge
- ☒ Other - Specify: Urban park nonpoint source

Are any of the credit generators in a different HUC 12 than the applicant?
- ◉ Yes; HUC 12: 070400050403
- ○ No

Are any of the credit generators downstream of the applicant?
- ○ Yes
- ◉ No

Will a broker/exchange be used to facilitate trade?
- ○ Yes *(include description and contact information in WQT plan)*
- ◉ No

Point to Point Trades (Traditional Municipal / Industrial, MS4, CAFO)

Are each of the point source credit generators identified in this section in compliance with their WDPES permit requirements?
- ○ Yes
- ○ No

Discharge Type	Permit Number	Name	Contact Information	Trade Agreement Number
○ Traditional ○ MS4 ○ CAFO	N/A	N/A	N/A	N/A
○ Traditional ○ MS4 ○ CAFO				
○ Traditional ○ MS4 ○ CAFO				
○ Traditional ○ MS4 ○ CAFO				
○ Traditional ○ MS4 ○ CAFO				

Point to Point Trades (Traditional Municipal / Industrial, MS4, CAFO) *cont.*

Does plan have a narrative that describes:			Plan Section
a. Summary of discharge and existing treatment including optimization	◉ Yes	○ No	3.2
b. Amount of credit being generated	◉ Yes	○ No	5.4
c. Timeline for credits and agreements	◉ Yes	○ No	6.3
d. Method for quantifying credits	◉ Yes	○ No	5.2
e. Tracking and verification procedures	◉ Yes	○ No	7.0
f. Location of credit generator in proximity to receiving water and credit user	◉ Yes	○ No	4.0
g. Other: _____	○ Yes	○ No	

Point to Nonpoint Trades (Non-Permitted Urban, Agricultural, Other)

Discharge Type	Practices Used to Generate Credits	Method of Quantification	Trade Agreement Number	Have the practice(s) been formally registered?
○ Urban NPS ◉ Agricultural NPS ○ Other	NRCS CPS 580 Streambank and Shoreline Protect	NRCS Streambank Erosion Estimator	IND-HGS-01	○ Yes ◉ No ○ Only in part
○ Urban NPS ◉ Agricultural NPS ○ Other	NRCS CPS 584 Channel Bed Stabilization	NRCS Streambank Erosion Estimator	IND-HGS-01	○ Yes ◉ No ○ Only in part
○ Urban NPS ◉ Agricultural NPS ○ Other	NRCS CPS 468 Lined Waterway or Outlet	NRCS Streambank Erosion Estimator	IND-HGS-01	○ Yes ◉ No ○ Only in part
○ Urban NPS ◉ Agricultural NPS ○ Other	NRCS CPS 395 Stream Habitat and Management	NRCS Streambank Erosion Estimator	IND-HGS-01	○ Yes ◉ No ○ Only in part
○ Urban NPS ○ Agricultural NPS ○ Other				○ Yes ○ No ○ Only in part
○ Urban NPS ○ Agricultural NPS ○ Other				○ Yes ○ No ○ Only in part
○ Urban NPS ○ Agricultural NPS ○ Other				○ Yes ○ No ○ Only in part
○ Urban NPS ○ Agricultural NPS ○ Other				○ Yes ○ No ○ Only in part

Does plan have a narrative that describes:			Plan Section
a. Description of existing land uses	◉ Yes	○ No	4.1.2, 4.2.2
b. Management practices used to generate credits	◉ Yes	○ No	5.1
c. Amount of credit being generated	◉ Yes	○ No	5.4
d. Description of applicable trade ratio per agreement/management practice	◉ Yes	○ No	5.3
e. Location where credits will be generated	◉ Yes	○ No	4.0
f. Timeline for credits and agreements	◉ Yes	○ No	6.3
g. Method for quantifying credits	◉ Yes	○ No	5.2

Does plan have a narrative that describes:			Plan Section
h. Tracking procedures	(●) Yes	( ) No	7.2
i. Conditions under which the management practices may be inspected	(●) Yes	( ) No	7.2.1
j. Reporting requirements should the management practice fail	(●) Yes	( ) No	7.2.3
k. Operation and maintenance plan for each management practice	(●) Yes	( ) No	7.1
l. Location of credit generator in proximity to receiving water and credit user	(●) Yes	( ) No	4.1.3, 4.2.3
m. Practice registration documents, if available	( ) Yes	(●) No	
n. History of project site(s)	(●) Yes	( ) No	4.1.1, 4.2.1
o. Other: _____	( ) Yes	( ) No	

The preparer certifies all of the following:

- I am familiar with the specifications submitted for this application, and I believe all applicable items in this checklist have been addressed.
- I have completed this document to the best of my knowledge and have not excluded pertinent information
- I certify that the information in this document is true to the best of my knowledge.

Signature of Preparer	Date Signed
[signature]	9-2-2020

Authorized Representative Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. Based on my inquiry of those persons directly responsible for gathering and entering the information, the information is, to the best of my knowledge and belief, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Authorized Representative	Date Signed
[signature]	9-3-2020

Appendix I / Practice Registration (FORM 3400-207) EXAMPLE

State of Wisconsin
Department of Natural Resources
101 South Webster Street
Madison WI 53707-7921
dnr.wi.gov

Water Quality Trading Management Practice Registration

Form 3400-207 (R 1/14)

Notice: Pursuant to s. 283.84, Wis. Stats., this form must be completed by any WPDES permittee that is using water quality trading as a method of complying with a permit limitation. Failure to complete this form would not result in penalties. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31 - 19.39, Wis. Stats.).

Applicant Information

Permittee Name	Permit Number	Facility Site Number
City of Independence	WI- 0024287-10	662006950

Facility Address	City	State	ZIP Code
23510 Cleveland St	Independence	WI	54747

Project Contact Name (if applicable)	Address	City	State	ZIP Code
Andrew Pelloso	33 North Dearborn, Suite 330	Chicago	IL	60602

Project Name
Blaha/Four Seasons Park Bank Stabilization

Broker/Exchange Information (if applicable)

Was a broker/exchange be used to facilitate trade? ◯ Yes ◉ No

Broker/Exchange Organization Name	Contact Name

Address	Phone Number	Email

Trade Registration Information (Use a separate form for each trade agreement)

Type	Trade Agreement Number	Practices Used to Generate Credits	Anticipated Load Reduction	Trade Ratio	Method of Quantification
◯ Urban NPS ◉ Agricultural NPS ◯ Other	IND-HGS-01	NRCS Practice Number		2:1	NRCS Streambank Erosion Estimator

County	Closest Receiving Water Name	Land Parcel ID(s)	Parameter(s) being traded
Trempealeau	Bruce Valley Creek	018012860000	Total Phosphorus

The preparer certifies all of the following:

- I have completed this document to the best of my knowledge and have not excluded pertinent information.
- I certify that the information in this document is true to the best of my knowledge.

Signature of Preparer	Date Signed

Authorized Representative Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. Based on my inquiry of those persons directly responsible for gathering and entering the information, the information is, to the best of my knowledge and belief, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Authorized Representative	Date Signed

Leave Blank – For Department Use Only

Date Received		Trade Docket Number
Entered in Tracking System ☐ Yes	Date Entered	Name of Department Reviewer

Appendix J/City of Independence WPDES Permit and Factsheet

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

City of Independence

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
23510 Cleveland St., Independence, WI
to
Trempealeau River in the Elk Creek Watershed
of the Buffalo-Trempealeau River Basin in Trempealeau County

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Michelle Balk
Wastewater Field Supervisor

_____
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - October 01, 2019 **EXPIRATION DATE - September 30, 2024**

TABLE OF CONTENTS

1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
702	Representative influent samples shall be collected after primary screening and grit removal.

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 702 - INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total		mg/L	3/Week	24-Hr Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Comp	

2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
004	Representative composite effluent samples shall be collected before the effluent weir and after secondary clarification prior to discharge to the Trempealeau River; grab samples shall be collected after disinfection.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 004 - EFFLUENT TO TREMPEALEAU RIVER

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Comp	
BOD_5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Comp	
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Copper, Total Recoverable	Daily Max	23 µg/L	Monthly	24-Hr Comp	See copper subsection below.
Copper, Total Recoverable	Daily Max	0.071 lbs/day	Monthly	Calculated	
Copper, Total Recoverable	Monthly Avg	23 µg/L	Monthly	24-Hr Comp	
Copper, Total Recoverable	Weekly Avg	23 µg/L	Monthly	24-Hr Comp	
Hardness, Total as $CaCO_3$		mg/L	Quarterly	24-Hr Comp	See hardness subsection below.
Zinc, Total Recoverable	Daily Max	185 µg/L	Monthly	24-Hr Comp	Limits effective 10/01/2022 See zinc subsection below.
Zinc, Total Recoverable	Daily Max	1.28 lbs/day	Monthly	Calculated	
Zinc, Total Recoverable	Monthly Avg	185 µg/L	Monthly	24-Hr Comp	

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Zinc, Total Recoverable	Weekly Avg	185 µg/L	Monthly	24-Hr Comp	
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	Weekly	Grab	Limits & monitoring apply May-Sept
Fecal Coliform	Geometric Mean - Wkly	656 #/100 ml	Weekly	Grab	
Chlorine, Total Residual	Daily Max	38 µg/L	Daily	Grab	
Chlorine, Total Residual	Weekly Avg	38 µg/L	Daily	Grab	
Chlorine, Total Residual	Monthly Avg	38 µg/L	Daily	Grab	
Acute WET		TU_a	See Listed Qtr(s)	24-Hr Comp	See subsection below on WET testing.
Phosphorus, Total	Monthly Avg	4.0 mg/L	3/Week	24-Hr Comp	This is an interim limit effective through 08/31/2024. See the MDV/Phosphorus subsections and phosphorus schedules.
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Comp	This is an interim MDV limit effective 09/01/2024. See the MDV/Phosphorus subsections and phosphorus schedules.
Phosphorus, Total		lbs/month	Monthly	Calculated	Report the total monthly phosphorus discharged in lbs/month on the last day of the month on the DMR. See Standard Requirements for 'Appropriate Formulas' to calculate the Total Monthly Discharge in lbs/month.
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharges for the calendar year on the Annual report form.

2.2.1.1 Annual Average Design Flow

The annual average design flow of the permittee's wastewater treatment facility is 0.165 million gallons per day (MGD).

2.2.1.2 Copper Monitoring & Limits

A monthly copper sample shall be collected at the same time as a quarterly sample for hardness. Copper monitoring frequency is weekly in recognition of occasional use of polymer. In the event polymer use is permanently discontinued, the department shall be notified and the permittee may request that the copper monitoring frequency be changed to monthly. If the request is approved by the department, the monitoring frequency change may occur without public notice thereof. A log of polymer addition shall be maintained at the WWTF.

2.2.1.3 Hardness Monitoring

A quarterly effluent sample for hardness shall be collected at the same time as a monthly effluent zinc and copper sample.

2.2.1.4 Zinc Monitoring & Limits

Zinc monitoring is required at the effective date of the permit. Zinc limits become effective 10/01/2022 according to the associated compliance schedule. A monthly zinc sample shall be collected at the same time as a quarterly sample for hardness.

2.2.1.5 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Trempealeau River

Acute Mixing Zone Concentration: N/A

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.

Acute WET Testing Frequency: Acute tests shall be conducted in the quarters listed below in order to collect seasonal information about the discharge. Tests are required during the following quarters:

2nd quarter (Jan-March) 2020

4th quarter (Oct-Dec) 2023

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in **4th quarter (Oct-Dec) 2024**.

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: $TU_a = 100 \div LC_{50}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90 day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

2.2.1.6 MDV (Multi-Discharger Variance) Requirements

Optimization: The permittee shall optimize performance to control phosphorus discharges in accordance with s. 283.16(6), Wis. Stats. See the Schedules section for optimization requirements.

Watershed Provisions: The permittee is required to implement watershed measures to reduce the amount of phosphorus entering the receiving water. The permittee has selected the following approved watershed measure.

Payment to County for Phosphorus Reduction: The permittee shall make payments for phosphorus reduction to the county or counties approved by the Department per s. 283.16(8), Wis. Stats. The permittee shall make a total payment by March 1 of each year in the amount equal to the per pound amount of $53.01 times the number of pounds by which the effluent phosphorus discharged during the previous year exceeded the permittee's target value or $640,000, whichever is less. The target value is 0.2 mg/L per s. 283.16(1)(h), Wis. Stats., and is applicable during the months that the MDV is in effect. The MDV is in effect year-round. Refer to the Schedules section for the scheduled annual requirements.

Annual Payment Calculation: The annual payment is equal to the phosphorus load that exceeds the target value multiplied by $53.01 per pound. Use the steps shown below to calculate the annual payment. In addition, the Department shall send a statement to the permittee specifying total payment due to the participating counties each year in accordance with the Schedules section.

Annual Payment = [Annual Phosphorus Load – Annual Target Load] × Price Per Pound
Calculation Steps:

- Calculate pounds of phosphorus discharged for each month that the MDV is in effect:

Monthly Phosphorus Load (lbs/month) = Total Monthly Flow (MG) × Monthly Avg. TP effluent conc. (mg/L) × 8.34

- Sum the lbs/month discharged for the months that the MDV is in effect to calculate the annual phosphorus load:

Annual Phosphorus Load (lbs/year) = ∑ [Monthly Phosphorus Load (lbs/month)]

- Calculate the Target Load (lbs/month) for each month that the MDV is in effect.

Target Value = 0.2 mg/L:
Monthly Target Load (lbs/month) = Total Monthly Flow (MG) × 0.2 mg/L × 8.34

- Sum the lbs/month for the months that the MDV is in effect to calculate the Annual Target Load:

Annual Target Load (lbs/year) = ∑ [Monthly Target Load (lbs/month)]

- Calculate the annual payment:

Annual Payment ($) = [Annual Phosphorus Load – Annual Target Load] × Price Per Pound

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
005	Representative sludge samples shall be collected from the sludge storage tank (while aerating) and monitored for Lists 1, 2, 3 & 4 annually, and once in 2020 for PCBs.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 005 - SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH_4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2020
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2020

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

3.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed for the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

3.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

3.2.1.3 Multiple Sludge Sample Points (Outfalls)

If there are multiple sludge sample points (outfalls), but the sludges are not subject to different sludge treatment processes, then a separate List 2 analysis shall be conducted for each sludge type which is land applied, just prior to land application, and the application rate shall be calculated for each sludge type. In this case, List 1, 3, and 4 and PCBs need only be analyzed on a single sludge type, at the specified frequency. If there are multiple sludge sample points (outfalls), due to multiple treatment processes, List 1, 2, 3 and 4 and PCBs shall be analyzed for each sludge type at the specified frequency.

3.2.1.4 Sludge Which Exceeds the High Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

3.2.1.5 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2020**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

3.2.1.6 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3
PATHOGEN CONTROL FOR CLASS B SLUDGE

The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control.

The following requirements shall be met prior to land application of sludge.

Parameter	Unit	Limit
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent Process	

***** The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.

List 4
VECTOR ATTRACTION REDUCTION

The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option.

One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

3.2.1.7 Daily Land Application Log

Daily Land Application Log		
Discharge Monitoring Requirements and Limitations The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements.		
Parameters	**Units**	**Sample Frequency**
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

4 Schedules

4.1 Zinc Compliance Schedule

This compliance schedule requires the permittee to achieve compliance by the specified date

Required Action	Due Date
Report on Effluent Discharges: Submit a report on effluent discharges of zinc with conclusions regarding compliance.	09/30/2020
Action Plan: Submit an action plan for complying with the effluent limitation. If construction is required, include plans and specifications with the submittal.	09/30/2021
Initiate Actions: Initiate actions identified in the plan.	04/01/2022
Complete Actions: Complete actions necessary to achieve compliance with the effluent limitations for zinc. Zinc limits become effective 10/01/2022.	09/30/2022

4.2 Phosphorus Schedule - Optimization Plan

The permittee is required to optimize performance to control phosphorus discharges per the following schedule.

Required Action	Due Date
Optimization Plan: The permittee shall prepare an Optimization Plan and submit it for Department approval. The plan shall include an evaluation of collected effluent data, possible source reduction measures and operational improvements to optimize performance to control phosphorus discharges. The plan shall contain a schedule for implementation of the measures and improvements. Once the plan is approved by the Department, the permittee shall take the steps called for in the Optimization Plan and follow the schedule of implementation as approved.	09/30/2020
Progress Report #1: Submit a progress report on optimizing removal of phosphorus.	09/30/2021
Progress Report #2: Submit a progress report on optimizing removal of phosphorus.	09/30/2022
Progress Report #3: Submit a progress report on optimizing removal of phosphorus.	09/30/2023
Progress Report #4: Submit a progress report on optimizing removal of phosphorus.	09/30/2024

4.3 Phosphorus Multi-Discharger Variance Interim Limit (1.0 mg/L)

The permittee shall comply with the 1.0 mg/L MDV interim effluent limit by the end of this compliance schedule.

Required Action	Due Date
Submit Final Compliance Plan: The permittee shall submit a Facility Plan per s. NR 110.09, Wis. Adm. Code. The permittee may submit an abbreviated facility plan if the modifications are determined to be minor according to the Department.	09/30/2020
Submit Plans & Specifications: The permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Wis. Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with the interim phosphorus effluent limit and a schedule for completing construction of the upgrades by the 'Complete Construction' date specified below.	09/30/2021

Treatment Plant Upgrade: Upon approval of the final construction plans and schedule by the Department and pursuant to s. 281.41, Wis. Stats., the permittee shall initiate construction of the treatment plant upgrades in accordance with the approved plans and specifications.	09/30/2022
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades.	08/31/2023
Complete Construction and Achieve Compliance: The permittee shall complete construction and achieve compliance with the phosphorus interim effluent limit of 1.0 mg/L. The MDV limit of 1.0 mg/L becomes effective 09/01/2024.	08/31/2024

4.4 Phosphorus Payment per Pound to County

The permittee is required to make annual payments for phosphorus reductions to the participating county or counties in accordance with s. 283.16(8), Wis. Stats, and the following schedule. The price per pound will be set at the time of permit reissuance and will apply for the duration of the permit.

Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times ($53.01)] or $640,000, whichever is less. See the payment calculation steps in the Surface Water section. The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date. Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is $50.00 adjusted for CPI.	03/01/2020
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2021
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2022
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2023
Annual Verification of Payment #5: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2024
Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	

5 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted and certified by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

The CMAR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The certification verifies that the electronic report is true, accurate and complete.

5.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings or electronic data records for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

5.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.1.8 Reporting Requirements – Alterations or Additions

The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

- The alteration or addition to the permitted facility may meet one of the criteria for determining whether a facility is a new source.
- The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification requirement applies to pollutants which are not subject to effluent limitations in the existing permit.
- The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use of disposal sites not reported during the permit application process nor reported pursuant to an approved land application plan. Additional sites may not be used for the land application of sludge until department approval is received.

5.2 System Operating Requirements

5.2.1 Noncompliance Reporting

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.

The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from a bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill**. **To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-555, Wis. Adm. Code.

5.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

5.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

5.2.6 Bypass

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled 'Scheduled Bypass', 'Blending' (if approved), 'SSO's and Sewage Treatment Facility Overflows' and 'Controlled Diversions' of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve a bypass if the permittee demonstrates all the following conditions apply:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

5.2.7 Scheduled Bypass

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the 'Controlled Diversions' section of this permit,

the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee's written request for Department approval of a scheduled bypass shall demonstrate that the conditions for bypassing specified in the above section titled 'Bypass' are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

5.2.8 Controlled Diversions

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion does not include blending as defined in s. NR 210.03(2e), Wis. Adm. Code, and as may only be approved under s. NR 210.12. A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and
- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

5.2.9 Ammonia Limit Not Needed - Continue to Optimize Removal of Ammonia

Applying the procedures in s. NR 106.05, Wis. Adm. Code, to ammonia data that is representative of the current operations of the wastewater treatment plant resulted in a determination that ammonia effluent limits are not necessary in this permit. Pursuant to NR 106.33, throughout the term of this permit, the wastewater treatment plant shall continue to be operated in a manner that optimizes the removal of ammonia within the design capabilities of the wastewater treatment plant.

5.2.10 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.2.11 Operator Certification

The wastewater treatment facility shall be under the direct supervision of a state certified operator. In accordance with s. NR 114.53, Wis. Adm. Code, every WPDES permitted treatment plant shall have a designated operator-in-charge holding a current and valid certificate. The designated operator-in-charge shall be certified at the level and in all subclasses of the treatment plant, except laboratory. Treatment plant owners shall notify the department of any changes in the operator-in-charge within 30 days. Note that s. NR 114.52(22), Wis. Adm. Code, lists types of facilities that are excluded from operator certification requirements (i.e. private sewage systems, pretreatment facilities discharging to public sewers, industrial wastewater treatment that consists solely of land disposal, agricultural digesters and concentrated aquatic production facilities with no biological treatment).

5.3 Sewage Collection Systems

5.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows

5.3.1.1 Overflows Prohibited

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, other than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;
- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

5.3.1.2 Permittee Response to Overflows

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

5.3.1.3 Permittee Reporting

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:

  ◦The date and location of the overflow;
  ◦The surface water to which the discharge occurred, if any;
  ◦The duration of the overflow and an estimate of the volume of the overflow;
  ◦A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  ◦The estimated date and time when the overflow began and stopped or will be stopped;
  ◦The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
  ◦Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
  ◦A description of the actual or potential for human exposure and contact with the wastewater from the overflow;

◦Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
◦To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and
◦The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

NOTE: A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at http://dnr.wi.gov/topic/wastewater/SSOreport.html. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

5.3.1.4 Public Notification

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

5.3.2 Capacity, Management, Operation and Maintenance (CMOM) Program

- The permittee shall have written documentation of the Capacity, Management, Operation and Maintenance (CMOM) program components in accordance with s. NR 210.23(4), Wis. Adm. Code. Such documentation shall be available for Department review upon request. The Department may request that the permittee provide this documentation or prepare a summary of the permittee's CMOM program at the time of application for reissuance of the WPDES permit.
- The permittee shall implement a CMOM program in accordance with s. NR 210.23, Wis. Adm. Code.
- The permittee shall at least annually conduct a self-audit of activities conducted under the permittee's CMOM program to ensure CMOM components are being implemented as necessary to meet the general standards of s. NR 210.23(3), Wis. Adm. Code.

5.3.3 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.
- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

5.4 Surface Water Requirements

5.4.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.4.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

5.4.3 Effluent Temperature Requirements

Weekly Average Temperature – The permittee shall use the following formula for calculating effluent results to determine compliance with the weekly average temperature limit (as applicable): Weekly Average Temperature = the sum of all daily maximum results for that week divided by the number of daily maximum results during that time period.

Cold Shock Standard – Water temperatures of the discharge shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock. 'Cold Shock' means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavior or physiological performance and may lead to death.

Rate of Temperature Change Standard – Temperature of a water of the state or discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

5.4.4 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.4.5 Surface Water Uses and Criteria

In accordance with NR 102.04, Wis. Adm. Code, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

d) Substances in concentrations or in combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

5.4.6 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

5.4.7 Fecal Coliforms

The weekly and monthly limit(s) for fecal coliforms shall be expressed as a geometric mean.

5.4.8 Seasonal Disinfection

Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection or other uses, the limitations and monitoring requirements for residual chlorine shall apply. A dechlorination process shall be in operation whenever chlorine is used.

5.4.9 Total Residual Chlorine Requirements (When De-Chlorinating Effluent)

Test methods for total residual chlorine, approved in ch. NR 219 - Table B, Wis. Adm. Code, normally achieve a limit of detection of about 20 to 50 micrograms per liter and a limit of quantitation of about 100 micrograms per liter. Reporting of test results and compliance with effluent limitations for chlorine residual and total residual halogens shall be as follows:

- Sample results which show no detectable levels are in compliance with the limit. These test results shall be reported on Wastewater Discharge Monitoring Report Forms as "< 100 µg/L". (Note: 0.1 mg/L converts to 100 µg/L)

- Samples showing detectable traces of chlorine are in compliance if measured at less than 100 µg/L, unless there is a consistent pattern of detectable values in this range. These values shall also be reported on Wastewater Discharge Monitoring Report Forms as "<100 µg/L." The facility operating staff shall record actual readings on logs maintained at the plant, shall take action to determine the reliability of detected results (such as re-sampling and/or calculating dosages), and shall adjust the chemical feed system if necessary to reduce the chances of detects.

- Samples showing detectable levels greater than 100 µg/L shall be considered as exceedances, and shall be reported as measured.

- To calculate average or mass discharge values, a "0" (zero) may be substituted for any test result less than 100 µg/L. Calculated values shall then be compared directly to the average or mass limitations to determine compliance.

5.4.10 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.4.11 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

5.4.12 Reopener Clause

Pursuant to s. 283.15(11), Wis. Stat. and 40 CFR 131.20, the Department may modify or revoke and reissue this permit if, through the triennial standard review process, the Department determines that the terms and conditions of this permit need to be updated to reflect the highest attainable condition of the receiving water.

5.5 Land Application Requirements

5.5.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

5.5.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

5.5.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

5.5.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility's DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

5.5.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =

[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

5.5.6 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for "PCB, Total Dry Wt" is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note**: It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

5.5.7 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.8 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.9 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

5.5.10 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

5.5.11 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

5.5.12 Class B Sludge: Fecal Coliform Limitation

Compliance with the fecal coliform limitation for Class B sludge shall be demonstrated by calculating the geometric mean of at least 7 separate samples. (Note that a Total Solids analysis must be done on each sample). The geometric mean shall be less than 2,000,000 MPN or CFU/g TS. Calculation of the geometric mean can be done using one of the following 2 methods.

Method 1:

Geometric Mean = $(X_1 \times X_2 \times X_3 \ldots \times X_n)^{1/n}$

Where X = Coliform Density value of the sludge sample, and where n = number of samples (at least 7)

Method 2:

Geometric Mean = antilog$[(X_1 + X_2 + X_3 \ldots + X_n) \div n]$

Where X = $\log_{10}$ of Coliform Density value of the sludge sample, and where n = number of samples (at least 7)

Example for Method 2

Sample Number	Coliform Density of Sludge Sample	$\log_{10}$
1	6.0×10^5	5.78
2	4.2×10^6	6.62
3	1.6×10^6	6.20
4	9.0×10^5	5.95

5	4.0×10^5	5.60
6	1.0×10^6	6.00
7	5.1×10^5	5.71

The geometric mean for the seven samples is determined by averaging the $\log_{10}$ values of the coliform density and taking the antilog of that value.
$(5.78 + 6.62 + 6.20 + 5.95 + 5.60 + 6.00 + 5.71) \div 7 = 5.98$
The antilog of $5.98 = 9.5 \times 10^5$

5.5.13 Class B Sludge - Vector Control: Incorporation

Class B sludge shall be incorporated within 6 hours of surface application, or as approved by the Department.

6 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
Zinc Compliance Schedule -Report on Effluent Discharges	September 30, 2020	11
Zinc Compliance Schedule -Action Plan	September 30, 2021	11
Zinc Compliance Schedule -Initiate Actions	April 1, 2022	11
Zinc Compliance Schedule -Complete Actions	September 30, 2022	11
Phosphorus Schedule - Optimization Plan -Optimization Plan	September 30, 2020	11
Phosphorus Schedule - Optimization Plan -Progress Report #1	September 30, 2021	11
Phosphorus Schedule - Optimization Plan -Progress Report #2	September 30, 2022	11
Phosphorus Schedule - Optimization Plan -Progress Report #3	September 30, 2023	11
Phosphorus Schedule - Optimization Plan -Progress Report #4	September 30, 2024	11
Phosphorus Multi-Discharger Variance Interim Limit (1.0 mg/L) -Submit Final Compliance Plan	September 30, 2020	11
Phosphorus Multi-Discharger Variance Interim Limit (1.0 mg/L) -Submit Plans & Specifications	September 30, 2021	11
Phosphorus Multi-Discharger Variance Interim Limit (1.0 mg/L) - Treatment Plant Upgrade	September 30, 2022	12
Phosphorus Multi-Discharger Variance Interim Limit (1.0 mg/L) - Construction Upgrade Progress Report	August 31, 2023	12
Phosphorus Multi-Discharger Variance Interim Limit (1.0 mg/L) -Complete Construction and Achieve Compliance	August 31, 2024	12
Phosphorus Payment per Pound to County -Annual Verification of Phosphorus Payment to County	March 1, 2020	12
Phosphorus Payment per Pound to County -Annual Verification of Payment #2	March 1, 2021	12
Phosphorus Payment per Pound to County -Annual Verification of Payment #3	March 1, 2022	12
Phosphorus Payment per Pound to County -Annual Verification of Payment #4	March 1, 2023	12
Phosphorus Payment per Pound to County -Annual Verification of Payment #5	March 1, 2024	12
Phosphorus Payment per Pound to County -Continued Coverage	See Permit	12
Phosphorus Payment per Pound to County -Annual Verification of Payment After Permit Expiration	See Permit	12
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	14

General Sludge Management Form 3400-48	prior to any significant sludge management changes	23
Characteristic Form 3400-49 and Lab Report	by January 31 following each year of analysis	23
Land Application Report Form 3400-55	by January 31, each year whether or not non-exceptional quality sludge is land applied	24
Other Methods of Disposal or Distribution Report Form 3400-52	by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied	25
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	13

Report forms shall be submitted electronically in accordance with the reporting requirements herein. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Water Quality, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to: West Central Region, 1300 W. Clairemont Ave., Eau Claire, WI 54701

CITY of INDEPENDENCE FACT SHEET

GENERAL INFORMATION	
Permit Number: WI-0024287-10	**FID:** 662006950
Permittee: City of Independence, PO Box 189, Independence, WI 54747	
Discharge Location: Independence Wastewater Treatment Plant, 23510 Cleveland St., Independence, WI 54747	
Receiving Water: Trempealeau River in the Elk Creek Watershed of the Buffalo-Trempealeau River Basin in Trempealeau County	
Stream Classification: Warmwater Sportfish, Nonpublic Water Supply	**$Q_{(7,10)}$:** 329:1
Annual Average Design Flow: 0.165 MGD	
Discharge Type: Existing, Continuous	**Permit Application Waivers?** No

Sample Points/Outfalls	
Sample Point 702, Influent	0.091 MGD Actual Average influent flow to plant in 2018
Outfall 004, Effluent to the Trempealeau River	0.093 MGD Actual Average Effluent Flow 2018
Outfall 005, Land Application of Sludge	Approximately 29 dry US tons landspread annually

FACILITY DESCRIPTION

Facility Description: The Independence Wastewater Treatment Plant treats domestic waste from the City of Independence and industrial influent from Pilgrim Chicken. The annual average design flow at the facility is 0.165 million gallons per day (MGD). The actual annual average effluent flow in 2018 was 0.093 MGD. Primary treatment consists of screening and grit removal. Effluent is further treated at the existing secondary package activated sludge plant with an aeration basin and secondary clarification. Sludge is aerobically and anaerobically digested and thickened on a gravity belt thickener and stored onsite prior to landspreading on Department approved fields. Effluent is disinfected with chlorination (followed by dechlorination) prior to discharge to the Trempealeau River. No major operational changes occurred during the last permit term. The permittee will make changes to their treatment during the upcoming permit term to meet the lower effluent phosphorus limits, as well as the new zinc limits. Significant effluent monitoring and limitation changes in the upcoming term are as follows: 1) the addition of weekly average & monthly average chlorine limits, a weekly geometric mean fecal coliform limit and weekly average & monthly average copper limits to comply with the recent changes to ss. NR 106.07 and NR 205.065(7) regarding the expression of limits, 2) the addition of zinc limits & an associated compliance schedule, 3) the conditional approval of a multi-discharger variance (MDV) for phosphorus and the imposition of a lower monthly average interim phosphorus limit along with associated compliance schedules to comply with s. 283.16, Wis. Stats. requirements for phosphorus, and 4) an increase in the phosphorus monitoring frequency from weekly to 3/week. Also, the sample type has been changed from 24 hour flow proportional composite to 24 hour composite for influent & effluent samples.

Publishing Newspaper: The Whitehall Times, PO Box 95, Whitehall, WI 54773-0095
See associated public notice document for additional contact and procedural information.

Significant Industrial Loading? Yes, Pilgrim Chicken

SUBSTANTIAL COMPLIANCE DETERMINATION - Overall

	Compliance	Comments
Discharge Limits	Yes	
Sampling/testing requirements	Yes	
Groundwater standards	N/A	
Reporting requirements	Yes	
Compliance schedules	Yes	
Other:	N/A	
Operator at Proper Grade?	Yes	
Enforcement considerations	No	
In substantial compliance? Yes	**Name:** Woody Myers	**Date:** April 16, 2019

SUBSTANTIAL COMPLIANCE DETERMINATION - Landspreading

	Compliance	Comments
Discharge Limits	Yes	
Sampling/testing requirements	Yes	
Groundwater standards	n/a	
Reporting requirements	Yes	
Compliance schedules	n/a	
Other:	n/a	
Enforcement considerations	none	
In substantial compliance? Yes	**Name:** Leanne Hinke	**Date:** 04/16/2109

PERMIT MONITORING– INFLUENT

Sample Number: 702	**Sample Description:** Representative influent samples shall be collected after primary screening and grit removal.		
PARAMETER	**UNIT**	**SAMPLE FREQ.**	**SAMPLE TYPE**
Flow Rate	MGD	Continuous	
Total BOD_5	mg/L	3/Week	24-hr Comp
Total Suspended Solids	mg/L	3/Week	24-hr Comp
Changes from previous permit: The influent sample type has been changed from 24 hour flow proportional composite to 24 hour composite influent samples.			

PERMIT MONITORING AND LIMITATIONS – EFFLUENT

Outfall Location: NW1/4 SE1/4, Section 25, T22N R9W, Town of Burnside, City of Independence, Trempealeau County, WI

Outfall No: 004	**Sample Description**: Representative composite effluent samples shall be collected before the effluent weir and after secondary clarification prior to discharge to the Trempealeau River; grab samples shall be collected after disinfection.

PARAMETER	**LIMITATION**	**SAMPLE FREQ**	**SAMPLE TYPE**
Flow Rate	MGD	Continuous	
BOD_5, Total	45 mg/L Weekly Ave, 30 mg/L Monthly Avg	3/Week	24hr Comp
Total Suspended Solids	45 mg/L Weekly Avg, 30 mg/L Monthly Avg	3/Week	24hr Comp
pH, Field	9.0 su Daily Max, 6.0 su Daily Min	Daily	Grab
Copper, Total Recoverable[1,2]	23 µg/L & 0.071 lbs/day Daily Max 23 µg/L Weekly Avg, 23 µg/L Monthly Avg	Weekly	24hr Comp /Calculated
Hardness, Total as $CaCO_3$[2]	mg/L	Quarterly	24hr Comp
Zinc, Total Recoverable (limits effective 10/01/2022)[2,3]	185 µg/L & 1.28 lbs/day Daily Max 185 µg/L Weekly Avg, 185 µg/L Monthly Avg	Quarterly	24hr Comp /Calculated
Fecal Coliform, May-Sept	400#/100 mL, Monthly Geo Mean 656#/100 mL, Weekly Geo Mean	Weekly	Grab
Chlorine, Total Residual, May-Sept	38 µg/L Daily Max, 38 µg/L Weekly Avg, 38 µg/L Monthly Avg	Daily	Grab
Acute WET[4]	TU_a	Twice	24hr Comp
Phosphorus, Total (Interim limit, effective through 08/31/2024)[5]	4.0 mg/L Monthly Avg	3/Week	24hr Comp
Phosphorus, Total (Interim MDV limit effective 09/01/2024)[5]	1.0 Monthly Avg	3/Week	24hr Comp
Phosphorus, Total [5]	lbs/month	Monthly	Calculated
Phosphorus, Total [5]	lbs/year	Annual	Calculated

[1] Copper monitoring frequency is weekly in recognition of occasional use of polymer. In the event polymer use is permanently discontinued, the department shall be notified and the permittee may request that the copper monitoring frequency be changed to monthly. If the request is approved by the department, the monitoring frequency change may occur without public notice thereof. A log of polymer addition shall be maintained at the WWTF.

[2] Samples for hardness and copper, and hardness and zinc shall be collected concurrently.

[3] Monitoring for zinc is required at permit effective date. Limits become effective 10/01/2022. See the zinc section below and the associated compliance schedule for more info.

[4]Acute WET testing shall occur in the following quarters: 2nd quarter (Jan-March) 2020 and 4th quarter (Oct-Dec) 2023

[5] See "Phosphorus" section below and the associated phosphorus compliance schedules for additional info.

Explanation of limits and monitoring: Limits and monitoring were determined for the City of Independence's existing discharge to the Trempealeau River using chs. NR 102, 104, 105, 106, 107, 205, 210 and 217 of the Wisconsin Administrative Code (where applicable). The effluent limits for BOD5, TSS, fecal coliform, and pH are based on NR 210. For additional information on the rationale behind the permit limits & monitoring, see the June 3, 2019 limits memo from Wade Strickland to Holly Heldstab titled "Water Quality-Based Effluent Limitations for the City of Independence Wastewater Treatment Facility WPDES Permit No. WI-0024287".

Changes from last permit: 1) the addition of weekly average and monthly average chlorine limits, as well as a

weekly geometric mean fecal coliform limit and the addition of weekly average & monthly average copper limits to comply with the recent changes to ss. NR 106.07 and NR 205.065(7) regarding the expression of limits, 2) the addition of zinc limits and an associated compliance schedule to meet those limits, 3) the conditional approval of a multi-discharger variance (MDV) for phosphorus and the imposition of a lower monthly average interim phosphorus limit along with associated compliance schedules to comply with s. 283.16, Wis. Stats. requirements for phosphorus, 4) the sample type has been changed from 24 hour flow proportional composite to 24 hour composite samples, and 5) an increase in the phosphorus monitoring frequency from weekly to 3/week.
Ammonia: No limits or monitoring. Results from four effluent samples for ammonia nitrogen were submitted with the permit application. Based on a comparison of the sample results to the calculated limits, there is no reasonable potential for the discharge to exceed the calculated limit.
Temperature: Due to the amount of upstream flow available for dilution in the limit calculation (Qs:Qe >20:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a)). For activated sludge treatment systems of domestic waste, there is no reasonable potential for the discharge to exceed this limit, therefore temperature limits and monitoring are not required.
Copper: Weekly monitoring with daily max limits of 23 ug/L and 0.071 lbs/day is required throughout the permit. Monthly average and weekly average limits of 23 ug/L have been added and are also effective throughout the permit term. These limits have been added to comply with the recent changes to ss. NR 106.07 and NR 205.065(7) regarding the expression of limits.
Zinc: Because the 1-day P_{99} exceeds the calculated daily maximum WQBEL, daily maximum, weekly average and monthly average effluent limits of 185 µg/L are needed, along with a daily mass limit of 1.28 lbs/day. Monitoring is required at the permit effective date. Limits become effective 10/01/2022 per the associated compliance schedule.
Chlorine: Daily monitoring & daily max limit of 38 µg/L
Phosphorus: Phosphorus rules became effective December 1, 2010 per NR 217, Wis. Adm. Code, that required the permittee to comply with water quality based effluent limits (WQBELs) for total phosphorous. The final phosphorus WQBELs for the City of Independence are 0.100 mg/L & 0.14 lbs/day (6-month average) and 0.300 mg/L (monthly average) and were to become effective as scheduled unless a variance was granted. For this permit term, the permittee has applied for the Multi-Discharger Variance (MDV) for phosphorus as provided for in s. 283.16, Wis. Stats., and approved by USEPA on February 6, 2017 until February 5, 2027. The permittee qualifies for the MDV because it is an existing source and a major facility upgrade is needed to comply with the applicable phosphorus WQBELs, thereby creating a financial burden. The MDV interim limit for total phosphorus is 1.0 mg/L as a monthly average. As the facility cannot currently meet this limitation, the monthly average limit of 4.0 mg/L will be effective until the 1.0 mg/L becomes effective on 09/01/2024. Conditions of the MDV require the permittee to optimize phosphorus removal throughout the proposed permit term, comply with interim limits and make annual payments to participating county(s) by March 1 of each year based on the pounds of phosphorus discharged during the previous year in excess of the specified target value. The "price per pound" value is $53.01 adjusted for CPI annually during the first quarter as defined by s. 283.16(8)(a)2, Wis. Stats and takes effect for reissued permits with effective dates starting April 1. This may differ from the "price per pound" that is public noticed; however, the "price per pound" is set upon reissuance and is applicable for the entire permit term. The participating county(s) uses these payments to implement non-point source (agricultural) phosphorus control strategies at the watershed level. For additional information see the following documents: • The "Phosphorus Multi-discharger Variance Application for Municipal Facilities" submitted by the permittee, dated 11/30/2018 • The 12/17/2018 "Multi-discharger Variance Evaluation Checklist" completed by the department • The 12/18/2018 letter from the DNR granting "Conditional Approval of the Multi-discharger Phosphorus Variance"

BIOMONITORING REQUIREMENTS

Is biomonitoring required at this outfall? Yes, Acute WET testing shall occur in the following quarters: 2nd quarter (Jan-March) 2020 and 4th quarter (Oct-Dec) 2023.	**Primary Control Water Location**: Trempealeau River
Q_s:Q_e: 329:1	**Discussion of existing biomonitoring data**: For additional whole effluent toxicity information please consult the WET checklist in SWAMP and the WQBEL memo referenced above.
If the stream class at the discharge point is other than Full Fish and Aquatic Life (FFAL), how far down stream is the next Fish and Aquatic Life stream? Discharge is directly to FFAL waters (Trempealeau River)	

DISINFECTION

Is disinfection required for this discharge? Yes	
Frequency: Seasonally, May-Sept	**Type of disinfection**: Chlorination
Discussion: Disinfection is required from May 1 through September 30. The discharge is to the Trempealeau River, a warmwater sportfish community	

SLUDGE REQUIREMENTS

All sludge management requirements were determined ch. NR 204, Wis. Adm. Code

Outfall No: 005	**Sample Description**: Representative sludge samples shall be collected from the sludge storage tank (while aerating) and monitored for Lists 1, 2, 3 & 4 annually, and once in 2020 for PCBs.

Sludge # (3 digits)	Sludge Class (A or B)	Liquid or Cake	Pathogen Reduction Method	Vector Attraction Reduction Method	Reuse Option
005	B	Liquid	Fecal Coliform	Incorporation	Landspreading

Sludge Management Adequate? Yes
Sludge Storage Required? 180 days are provided, both onsite and offsite
Radium Requirements: Is radium-226 present in the water supply at a level greater than 2 pCi/L? No
Is a priority pollutant scan required? No
Quantity of sludge used/disposed of annually: 29 dry US tons

PROPOSED COMPLIANCE SCHEDULES

Zinc Compliance Schedule

Required Action	Due Date
Report on Effluent Discharges: Submit a report on effluent discharges of zinc with conclusions regarding compliance.	09/30/2020
Action Plan: Submit an action plan for complying with the effluent limitation. If construction is required, include plans and specifications with the submittal.	09/30/2021
Initiate Actions: Initiate actions identified in the plan.	04/01/2022
Complete Actions: Complete actions necessary to achieve compliance with the effluent limitations for zinc. Zinc limits become effective 10/01/2022.	09/30/2022

Explanation of Compliance Schedule: The compliance schedule for zinc provides a schedule to comply with the new limits. The compliance schedule lays out a time line for the permittee to investigate and implement a plan to comply with the limits by the end of the schedule.

Phosphorus Schedule - Optimization Plan

The permittee is required to optimize performance to control phosphorus discharges per the following schedule.

Required Action	Due Date
Optimization Plan: The permittee shall prepare an Optimization Plan and submit it for Department approval. The plan shall include an evaluation of collected effluent data, possible source reduction measures and operational improvements to optimize performance to control phosphorus discharges. The plan shall contain a schedule for implementation of the measures and improvements. Once the plan is approved by the Department, the permittee shall take the steps called for in the Optimization Plan and follow the schedule of implementation as approved.	09/30/2020
Progress Report #1: Submit a progress report on optimizing removal of phosphorus.	09/30/2021
Progress Report #2: Submit a progress report on optimizing removal of phosphorus.	09/30/2022
Progress Report #3: Submit a progress report on optimizing removal of phosphorus.	09/30/2023
Progress Report #4: Submit a progress report on optimizing removal of phosphorus.	09/30/2024

Explanation of compliance schedule: Per s. 283.16(6)(a), Wis. Stats. the Department may include a requirement that the permittee optimize the performance of a point source in controlling phosphorus discharges, which may be necessary to achieve compliance with multi-discharger variance interim limits. This compliance schedule requires the permittee to prepare an optimization plan with a schedule for implementation and submit it for Department approval. The permittee shall take the steps called for in the optimization plan and submit annual progress reports on optimizing the removal of phosphorus.

Phosphorus Multi-Discharger Variance Interim Limit (1.0 mg/L)

The permittee shall comply with the 1.0 mg/L MDV interim effluent limit by the end of this compliance schedule.

Required Action	Due Date
Submit Final Compliance Plan: The permittee shall submit a Facility Plan per s. NR 110.09, Wis. Adm. Code. The permittee may submit an abbreviated facility plan if the modifications are	09/30/2020

determined to be minor according to the Department.	
Submit Plans & Specifications: The permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Wis. Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with the interim phosphorus effluent limit and a schedule for completing construction of the upgrades by the 'Complete Construction' date specified below.	09/30/2021
Treatment Plant Upgrade: Upon approval of the final construction plans and schedule by the Department and pursuant to s. 281.41, Wis. Stats., the permittee shall initiate construction of the treatment plant upgrades in accordance with the approved plans and specifications.	09/30/2022
Construction Upgrade Progress Report: The permittee shall submit a progress report on construction upgrades.	08/31/2023
Complete Construction and Achieve Compliance: The permittee shall complete construction and achieve compliance with the phosphorus interim effluent limit of 1.0 mg/L. The MDV limit of 1.0 mg/L becomes effective 09/01/2024.	08/31/2024

Explanation of Compliance Schedule: Subsection 283.16(6), Wis. Stats., establishes required interim phosphorus effluent limits that must be met for multi-discharger variance (MDV) eligibility. Subsection 283.16(6)(am), Wis. Stats., allows a technology based phosphorus limit of 1.0 mg/L as the MDV interim limit if a permittee certifies that its treatment facility cannot achieve compliance with the MDV interim limit without a major facility upgrade. The permittee qualifies for a 1.0 mg/L total phosphorus MDV interim limit and the schedule above provides the permittee with almost five years to comply with that limit.

Phosphorus Payment per Pound to County

The permittee is required to make annual payments for phosphorus reductions to the participating county or counties in accordance with s. 283.16(8), Wis. Stats, and the following schedule. The price per pound will be set at the time of permit reissuance and will apply for the duration of the permit.

Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times ($53.01 per pound)] or $640,000, whichever is less. See the payment calculation steps in the Surface Water section. The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date. Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is $50.00 adjusted for CPI.	03/01/2020
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2021
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2022
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2023
Annual Verification of Payment #5: Submit Form 3200-151 to the Department indicating total	03/01/2024

amount remitted to the participating counties.	
Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	

Explanation of Phosphorus Compliance Schedules: The permittee applied for the multi-discharger variance (MDV) for the effluent phosphorus limitations and was conditionally approved for the MDV on 12/18/2018. Subsection 283.16(6)(b), Wis. Stats., requires permittees that have received approval for the multi-discharger variance (MDV) to implement a watershed project that is designed to reduce non-point sources of phosphorus within the HUC 8 watershed in which the permittee is located. The permittee has selected the "Payment to Counties" watershed option described in s. 283.16(8), Wis. Stats. Under this option the permittee shall make annual payment(s) to participating county(s) that are calculated based on the amount of phosphorus actually discharged during a calendar year in pounds per year less the amount of phosphorus that would have been discharged had the permittee discharged phosphorus at a target value concentration of 0.2 mg/L. The pounds of phosphorus discharged in excess of the target value is multiplied by a per pound phosphorus charge that will equal $53.01 per pound. This schedule requires the permittee to submit Form 3200-151 to the Department indicating the total amount remitted to the participating county(s).

SPECIAL REPORTING REQUIREMENTS

None

OTHER COMMENTS

None

Proposed expiration date: September 30, 2024
Prepared by: Holly Heldstab **Date**: September 4, 2019

Appendix K /SEH Optimization Analysis and Optimization Worksheet

Independence WWTP

Phosphorus Optimization Action Plan

September 2015

Item #	Item	Action Plan	Start Date	End Date	Time Frame	Anticipated Outcome
1	Sludge Thickener Filtrate Return-Phosphorus assessment	Evaluate phosphorus levels in Filtrate from the Sludge thickener prior to return to influent	1/1/2016	3/31/2016	3 months	Assess significance of Filtrate on phosphorus load that may be treated separately prior to return to the WWTP
2	Digester Supernatant Return-Phosphorus assessment	Evaluate phosphorus levels in from the supernatant from the sludge tank prior to return to influent	1/1/2016	3/31/2016	3 months	Assess significance of Supernatant on phosphorus load that may be treated separately prior to return to the WWTP
3	Filtrate and supernatant phosphorus reduction	If appropriate from above assessments, proceed with actions (chemical feed to sidestreams, etc)to evaluate phosphorus reduction potential	3/31/2016	12/31/2016	9 months	Optimize chemical effectiveness and/or reduce effluent total phosphorus
4	Pilot Study-Chemical Feed Alum	Full scale pilot study of Alum addition for Phosphorus reduction	4/30/2016	9/30/2016	5 months	Assess phosphorus reduction with chemical precipitation using Alum
5	Pilot Study-Chemical Feed Ferric Chloride	Full scale pilot study of Ferric Chloride addition for Phosphorus reduction	4/30/2017	9/30/2017	5 months	Assess phosphorus reduction with chemical precipitation using Ferric Chloride
6	Evaluate Industrial Source Reduction	Evaluate Industrial Chemicals & Processes for possible source reduction of Phosphorus.	1/1/2016	9/30/2016	9 months	Identify and evaluate viable industrial source reduction options
7	Implement Industrial Source Reduction	Change Chemicals or Processes per evaluation to reduce phosphorus	9/30/2016	9/30/2017	12 months	Implement viable industrial source reduction options

Evaluation Report

Final Phosphorus Compliance Alternatives Evaluation

Independence, Wisconsin

INDEW 145720 | September 24, 2018

SEH

Building a Better World for All of Us®

Engineers | Architects | Planners | Scientists

Evaluation Report

Final Phosphorus Compliance Alternatives Evaluation
Independence, Wisconsin

Prepared for:
City of Independence
Independence, Wisconsin

Prepared by:
Short Elliott Hendrickson Inc.
10 North Bridge Street
Chippewa Falls, WI 54729-2550
715.720.6200

I, Jerry Doriott, PE, hereby certify that I am a registered Professional Engineer in the State of Wisconsin in accordance with ch. A-E 4, Wis. Adm. Code and that this report has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code.

Jerry Doriott, PE, PE Project Manager	28960 PE Number	September 24, 2018 Date

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Evaluation Report

Final Phosphorus Compliance Alternatives Evaluation

Prepared for City of Independence

1 Introduction

The purpose of this evaluation is to address alternatives the City of Independence may utilize to meet the new wastewater effluent phosphorus limit. A 20-year present worth analysis was prepared for each of the feasible compliance alternatives. Currently, the phosphorus limit is 4 mg/L with the final calculated water quality based effluent limitation for phosphorus at 0.1 mg/L. A copy of the WPDES permit, including the phosphorus effluent limits and compliance schedule, is included as Appendix A. This report is being submitted to meet the Final Facilities Plan compliance item. The current achievable phosphorus concentration used to determine the costs for compliance option evaluation was 3.1 mg/L.

The following compliance alternatives are evaluated in this report:

- Optimization of the Existing WWTP
- Existing WWTP modifications
- Adaptive Management
- Water Quality Trading
- Alternate Discharge Location
- Land Disposal of Effluent
- Individual Economic Variance
- Statewide Multi-user Variance (Act 378)

1.1 Optimization

1.1.1 Introduction

This item addresses how the existing WWTP's phosphorus treatment can be optimized. Such optimization efforts may include source reduction from industrial users, switching the type of chemical added, and improving treatment process efficiency where phosphorus would be removed.

A Phosphorus Optimization Report Worksheet was submitted to the WDNR in 2015. This worksheet identified areas within the system where phosphorus might be minimized or eliminated. The full worksheet is included as Appendix B.

1.1.2 Feasibility

As shown on the Phosphorus Optimization Report Worksheet in Appendix B, the first minimization item was addressing if the filtrate return from the sludge thickener was a significant source of phosphorus. Results from testing show that the filtrate phosphorus concentration was 8.48 mg/L, but is such a small flow that this side stream is not significant.

The second optimization item was determining if the digester supernatant return was a significant source of phosphorus. This side stream's phosphorus concentration was 7.67 mg/L, but is a small enough flow that it is insignificant. Since this side stream and the filtrate return side stream were both deemed insignificant, the third item on the Worksheet is not needed.

The next two items are pilot studies for chemical addition. The WWTP performed a full scale pilot study of adding ferric chloride to the treatment process beginning in May 2016. The lowest effluent result was 0.98 mg/L, with the average monthly effluent in May 2016 of 2.36 mg/L. With additional testing and narrowing in on the proper amount of chemicals, it is believed that 0.8 mg/L phosphorus can be achieved with chemical addition.

The final item is evaluating and implementing industrial source reduction if applicable. The OER identified two potential phosphorus contributors, Green Roof Laundry and Gold'n Plump (now Pilgrims). Gold'n Plump recently increased their pre-treatment processes for BOD and TSS, which resulted in a decrease in phosphorus. Green Roof Laundry has not been contacted yet, but it is believe that since Wisconsin has banned the use of phosphorus in detergents, they are not a significant discharger of phosphorus.

Reduction of phosphorus to the 0.1 mg/L limit is likely not feasible with the current treatment plant, even with it operating at its highest phosphorus removal efficiency and adding a permanent chemical addition.

1.1.3 Cost Analysis

Since this is likely not a feasible option to reach the WPDES limit of 0.1 mg/L, no cost analysis was performed. This section will be updated next year with the pilot study results.

1.2 Existing WWTP Modifications

1.2.1 Introduction

The current activated sludge treatment system will not be able to meet the 0.1 mg/L phosphorus limit without tertiary treatment. Permanent chemical addition, along with tertiary treatment like discfilters, reactive sand filters, or Clearas ABNR, would be needed. These systems have shown success in consistently meeting 0.1 mg/L phosphorus limits.

Clearas completed a one week pilot study at the Independence WWTP in May 2017. Influent into Clearas' ABRN system ranged from 2.49 mg/L to 3.24 mg/L and average effluent from the ABNR system was 0.026 mg/L. The other systems have not been piloted at the Independence WWTP, but have shown to be able to meet 0.1 mg/L and below in municipal installations.

Another modification option is replacing the current WWTP process with a membrane bio-reactor (MBR) treatment process. MBRs have shown that effluent limits of 0.1 mg/L may be achievable.

1.2.2 Feasibility

Based on an earlier Engineering Report which determined the condition of the WWTP and collection system, the WWTP will require upgrades to treat future flows. Any tertiary treatment system that would be added on the existing WWTP should be sized for the future flows. Either of these units would require at least one new building. An MBR system would likely not be able to reutilize any of the existing tanks and would require significant new construction. The MBR system would be sized to treat future flows and provide adequate treatment for phosphorus as well as BOD, TSS, and other contaminants.

1.2.3 Cost Analysis

An estimate of the capital and O&M cost of permanent chemical addition and discfilters was prepared. Other types of tertiary filtration, such as sand filters, are approximately the same cost, but may have lower operational costs. These items can be evaluated further in the upcoming Facility Plan for the entire WWTP. The initial construction cost is estimated to be $1,819,700. Additional operation and maintenance costs are estimated at $50,000 per year more than the current operational costs. The net present worth of this option is $2,463,100. See Appendix C for the estimate and present worth calculations.

A cost estimate of the capital costs for Clearas was prepared. The initial construction cost is estimated to be $5,002,000, with the operational and maintenance costs increasing by $9,000 after buyback of the biomass product was factored in. The net present worth of this option is $5,118,000. See Appendix C for the estimate and present worth calculations.

An estimate of the capital and O&M cost of the MBR system was also prepared. The MBR construction cost is estimated to be $3,575,300. Operation and maintenance costs are expected to increase by $33,000 per year. The net present worth of the MBR compliance option is $4,000,000. See Appendix C for the estimate and present worth calculations.

1.3 Adaptive Management

1.3.1 Introduction

Adaptive Management allows point sources with strict effluent phosphorus limits to reduce the overall phosphorus pollution in the watershed so that water quality standards in the stream are met. The point source helps implement projects that will reduce the phosphorus loading to the body of water and bring it into compliance. Adaptive Management may be the choice of point sources when the discharge body of water is very close to being in compliance.

The DNR has developed guidance manuals describing the Adaptive Management compliance option. To be eligible for Adaptive Management, the point source needs to be in a nonpoint source dominated watershed, a watershed with an approved TMDL, or a watershed where nonpoint sources must be controlled to meet water quality goals. Other requirements include: the receiving water must exceed the applicable phosphorus criteria; the point source must be able to meet an interim limit of 0.6 mg/L; and the point source must be willing to work with partners within the watershed to improve water quality.

1.3.2 Feasibility

The Trempealeau River in Independence is located in the Middle Trempealeau River and Elk Creek Watersheds as shown on the map in Appendix D. Phosphorus contribution estimates made by the DNR using the PRESTO modeling program indicate that the drainage area for the Trempealeau River near Independence is nonpoint source dominated (1:99). Testing by the DNR in 2015 shows the Trempealeau River has an average total phosphorus concentration of 0.326 mg/L. With this concentration, the receiving water exceeds the applicable phosphorus criteria. With the permanent addition of phosphorus removing chemicals, like alum or ferric, the WWTP may be able to meet the 0.6 mg/L interim limit and the City is willing to work with partners within the watershed.

1.3.3 Cost Analysis

Due to the Trempealeau River's high phosphorus concentration (over four times the water quality standard), adaptive management would require comprehensive control of many dispersed non-

point phosphorus sources across multiple counties, making adaptive management an impractical alternative. Since this is not a feasible option for the City, no cost estimates were prepared.

1.4 Water Quality Trading

1.4.1 Introduction

Water Quality Trading allows a point source to offset their phosphorus load by arranging with another party to achieve less costly pollutant reduction with the same or greater water quality benefit. This may include trading with another point source in the watershed, or may involve trading with non-point sources such as the agricultural community to control phosphorus associated with agricultural runoff or field erosion. This is often accomplished by funding best management practices (BMP) on farm fields in an adjacent portion of the watershed. Credits are generated by the BMPs and must be used in the same calendar year by the credit user. Stormwater runoff control may also be used in pollutant trading.

The DNR has developed guidance manuals describing the Water Quality Trading compliance option. Trading with the agricultural community would be the most likely trading option for Roberts, considering the predominant land use in the watershed is agricultural. Generally mild slopes in this watershed results in moderate erodibility potential of cultivated land. These types of slopes would likely result in low masses of phosphorus removed per project. There are areas in the watershed with steep slopes that may result in a higher number of pounds of phosphorous removed per project, but soil mapping indicates that the soils in the area are not highly erodible.

Trade ratios are used to account for uncertainty when analyzing the phosphorus removed by the chosen BMP. Five different uncertainties are used to determine the final trade ratio; Delivery (distance between the credit generator and the credit user), Downstream (accounts for impacts if the credit generator is downstream from the credit user), Equivalency (accounts for the different form of a pollutant), Uncertainty (modeling inaccuracies), and Habitat Adjustment (if the practice also benefits certain habitats, a lower trade ratio is used).

The best value BMPs in terms of cost per pound of phosphorus removed are likely those that are located in the same 12 digit local Hydrogeologic Unit Code (HUC-12) portion of the watershed. Independence has multiple HUC 12 watersheds within the City limits. A map with these HUC 12 Watersheds is attached as Appendix E. By choosing a site within these HUC 12s, Delivery and Downstream factors are 0. Equivalency for Phosphorus is 0. A common BMP, filter strip, has an uncertainty factor of 2, but doesn't allow for any Habitat Adjustment. The final trade ratio will be 2:1 meaning 2 pounds of Phosphorus must be removed by the filter strip for every 1 pound over the limit that the point source discharges. The minimum trade ratio for point to nonpoint sources is 1.2:1, with the minimum trade ratio for point to point sources 1.1:1.

1.4.2 Feasibility

Water quality trading is a potentially feasible option for the City of Independence. Assuming an average 2:1 trade ratio for trading with non-point sources, Independence would need to find projects that remove at least 23,379 pounds of phosphorus per year to meet the minimum DNR trading guidelines. A safety factor (assumed at an additional 10 percent) should also be included to remove more phosphorus than the minimum needed, since BMPs may fail to be installed properly or not at all during a certain year. The point source takes all responsibility for ensuring the BMPs are installed correctly and functioning as they should. Independence would therefore need to locate trading credits that total about 25,716 pounds of phosphorus per year. This large amount of pounds of phosphorus would be nearly impossible to find and manage within the HUC 12 watershed, so this option is not deemed viable.

If a permanent chemical feed system was installed at the WWTP, these would minimize the amount of pounds needed for trading, but would increase the operation and maintenance costs at the WWTP. Assuming the WWTP is able to decrease their phosphorus effluent concentration from 3.1 mg/L to 0.8 mg/L with permanent chemical addition, the City would need to find at least 273 pounds of phosphorus every year. With a safety factor of 10 percent, the City would need to find at least 300 pounds of phosphorus per year.

1.4.3 Cost Analysis

The cost per pound of phosphorus removed by trading varies with the type of trade and individual site specific factors. General trading costs vary widely, with common ranges indicated from $20 to $160 per pound of phosphorus removed. For the purposes of this evaluation, $100/lb was used to estimate the cost of trading for Independence. Permanent chemical addition at the WWTP would also be needed.

Total trading cost, based on the 300 pounds of trades needed as described above at a cost of $100/lb, would be $30,000 per year. The initial capital costs of adding permanent chemical addition to the WWTP is estimated at $35,000. The total 20 year present worth value of the water quality trading alternative with permanent chemical addition is estimated as $742,800.

1.5 Alternate Discharge Location

1.5.1 Introduction

In some cases, discharging effluent to an alternate discharge location may result in less restrictive effluent requirements, including phosphorus. If a high flowrate stream can be located that already meets the target water quality standard, then dilution calculations are used to determine how much additional phosphorus can be discharged and still result in the standard being met in the stream. Another option is sending wastewater to another community or having another community send its wastewater to Independence.

1.5.2 Feasibility

No streams within a reasonable piping distance would likely be found in the Independence area that would result in a less stringent phosphorus discharge limits for the City.

The nearest community to Independence that might be considered for joint treatment is Whitehall (6 miles east). This was previous looked at and the City Board determined that the cost of pumping was too costly. The Whitehall WWTP is also not currently able to handle a large increase in flow.

1.5.3 Cost Analysis

Since this was deemed an unfeasible option in the past, no cost analysis was prepared.

1.6 Land Disposal of Effluent

1.6.1 Introduction

Land disposal of effluent involves eliminating the discharge to the surface water and discharging instead to a disposal system that promotes effluent infiltration into the ground. The effluent percolates thru the soil to the groundwater system. Since phosphorus does not impact groundwater like it does surface waters, the phosphorus discharge requirement is eliminated. However, since nitrogen is a groundwater contaminant that is present in wastewater, discharges

to land disposal systems have total nitrogen discharge limits as well as possible other constituent discharge limits to protect the groundwater.

Two basic types of land disposal systems are commonly used in Wisconsin. Spray irrigation ("slow rate land disposal) on crops utilizes the nitrogen uptake capability of the crop to limit the amount of nitrogen that reaches the groundwater.

Rapid infiltration systems, or seepage cells, utilize higher permeability soils without vegetative cover. Since there is no vegetation to take up the nitrogen, a total nitrogen discharge limit of 10 mg/l to seepage cells is applied.

1.6.2 Feasibility

A slow rate spay irrigation system would require large amounts of land, a significant piping system, and storage for at least 180 days during late fall, winter and early spring when crops are not growing and irrigation equipment is susceptible to freezing. Storage for 270 days is often used to provide additional ability to store effluent during wetter years when marketable crops may not withstand additional water. Effluent storage ponds require an impermeable liner. Considering the storage requirements and large land needs for disposal, and degree of residential development in the area, it is unlikely that sufficient spray irrigation system sites could be found.

A seepage cell land disposal system would require treatment to remove nitrogen to 10 mg/l prior to discharge to the seepage system. Nitrogen removal from wastewater is most commonly done using the biological processes of nitrification (converting ammonia and organic nitrogen to nitrates) followed by denitrification, which releases the nitrogen to the atmosphere. To meet treatment requirements prior to seepage cell land disposal, modifications would be needed to the activated sludge basin and operation to promote nitrification-denitrification operation.

Seepage cells must also be located a minimum of 500 feet from residential buildings.

1.6.3 Cost Analysis

The soils surrounding the WWTP are mainly 'somewhat limited' or 'very limited'. The few areas that are not limited by the soils are likely too small when the setback from residential buildings is taken into effect. The WWTP site also does not have any room for 180 days of effluent storage and is in a very residential area. It is unlikely that land disposal is a feasible alternative, therefore no cost estimates were prepared.

1.7 Individual Economic Variance

1.7.1 Introduction

An economic variance to water quality standards may be granted if the impact of complying with the standard causes "widespread adverse social and economic impacts". EPA guidance documents for economic variances identify preliminary and secondary screeners in assessing "widespread adverse social and economic impacts" of complying with the standard. The preliminary screener for public entities is the impact complying with the water quality standard will have on sewer user charges, using the post-compliance user charge expressed as a percent of median household income (MHI). For user charges between 1 and 2 percent of the MHI, the impacts are expected to be "mid-range". EPA guidance indicates that user charges that exceed 2 percent of the MHI "may place an unreasonable financial burden on many of the households". Secondary indicators related to debt, socioeconomic and financial management data are also assessed to determine overall impact.

1.7.2 Feasibility

The DNR has developed a Phosphorus Variance Application Form (Form 3200 143) for municipalities. A copy of the form is included in Appendix F. The form includes general information about the WWTP, operation and users of the system. The form directs municipalities to the EPA economic worksheets to determine if the community may be eligible for an individual variance. Table 2-2 (Assessment of Substantial Impacts Matrix) of the Interim Economic Guidance for Water Quality Standards indicates whether a community will be eligible or not. A check mark indicates that the potential project will likely not cause substantial impacts. An 'X' indicates that the project will likely cause substantial impacts, while a '?' is up for determination by the EPA.

Based on these worksheets, Independence's average secondary indicators falls into the strong side of the Mid-range category. With the percent of MHI between 1 and 2, Independence is unlikely to be eligible for an individual economic variance. Determination of the post compliance sewer rates and percent of MHI is available as Appendix G.

A draft of the completed EPA economic worksheets related to preliminary screener determination and the substantial impacts matrix for Independence are included in Appendix F.

1.7.3 Cost Analysis

If an individual economic variance were granted, no additional capital or O&M costs would be incurred.

1.8 Statewide (multi-discharger) Economic Variance – Act 378

1.8.1 Introduction

Act 378 is an approved statewide variance predicated on the presumption that other compliance options are not economically feasible. The permit holder will have up to 4 permit terms (20 years) to comply with the water quality based effluent limit. Each permit term, the permittee will need to meet a specific declining limit (0.8 mg/L, 0.6 mg/L, 0.5 mg/L, and 0.1 mg/L) and also pay approximately $50/lb for every pound discharged above 0.2 mg/L. The $50/lb payment is made to the County to find and implement BMPs that will reduce the phosphorus in the watershed. The exact payment amount would be specified in the WPDES permit when renewed and will include inflation costs.

If a more economical solution is found during the four permit terms, the variance will no longer be valid. WWTPs that are utilizing this compliance option would need to switch to the new solution to remain in compliance with the permit. If no solution is found before the four permit cycles are up, the State will need to reevaluate if another statewide variance is needed.

Municipalities with sewer use charges expressed as a percent of the MHI between 1 and 2 percent need to meet 3 secondary indicators of financial hardship on a county level. Communities with sewer use charges over 2 percent of the MHI need to meet 2 indicators of financial hardship on the county level. This differs from the individual economic variance as these indicators have been provided and are on a county-wide, not a community-wide level.

1.8.2 Feasibility

The existing treatment plant will likely be able to meet all of the staged effluent requirements to qualify for the statewide variance except for the final 0.1 mg/l limit after permanent chemical addition has been added to the treatment system. This staged permit limits give municipalities

more time to evaluate options and for new technology to emerge or current technology to become more affordable.

The City of Independence current user charges are at 1.39 percent of the MHI and would remain between 1 and 2 percent of the MHI including costs of compliance. Trempealeau County has four secondary indicators, meaning the City is eligible. Post compliance sewer rates and percent of MHI are included in Appendix G.

The City has been raising sewer rates by 2 percent per year to cover additional operating costs and debts at the WWTP. These rates are believed to be adequate.

1.8.3 Cost Analysis

Costs associated with the MDV include permanent chemical addition and an approximately $50 per pound charge for phosphorus above the 0.2 mg/L that the City would not be able to remove. The pilot study will confirm that the WWTP can meet the 0.8 mg/L limit and possibly the more stringent limits without additional optimization of the chemical feed system. For the purposes of this cost estimate, we will assume that the WWTP will be able to meet 0.8 mg/L. At 170 pound of phosphorus above 0.2 mg/L, the City would need to make an annual payment to the County of approximately $8,500. As with the water quality trading option, the City would need to also budget an additional $25,000 per year for chemical addition. Present worth estimates for the MDV are $431,000 and are included in Appendix H.

1.9 Phosphorus Recommendation

A summary of compliance alternative costs is included in Table 1.

Table 1 – Summary of Costs

Compliance Option	Capital Cost	Additional Annual O&M Costs	Total Present Worth
Optimization of the Existing WWTP	N/A	N/A	N/A
Existing WWTP Modifications (Discfilter Tertiary Treatment)	$1,819,700	$50,000	$2,463,100
Existing WWTP Modifications (Clearas)	$5,002,000	$9,000	$5,118,000
Existing WWTP Modifications (MBR)	$3,575,300	$33,000	$4,000,000
Adaptive Management	N/A	N/A	N/A
Water Quality Trading – No Chemical Addition	N/A	N/A	N/A
Water Quality Trading – Permanent Chemical Addition	$35,000	$30,000	$742,000
Alternate Discharge Location	N/A	N/A	N/A
Land Disposal of Effluent	N/A	N/A	N/A
Individual Economic Variance	$0	$0	$0
Statewide(multi-discharger) Economic Variance(Act 378)	$35,000	$33,500	$431,000

An individual economic variance is the lowest cost option, but it is not recommended as there is a very small chance that the City would qualify for the variance. Therefore, it is recommended that the City pursue the multi-discharger variance with permanent chemical addition.

Facility planning for the entire WWTP is currently underway. This evaluation will determine what actions to take for the rest of the WWTP and will re-evaluate the phosphorus options available to the City.

KJJ/ch

Appendix A

WPDES Permit

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
West Central Region Headquarters
1300 W. Clairemont Ave.
Eau Claire, WI 54701

Scott Walker, Governor
Cathy Stepp, Secretary
Dan Baumann, Regional Director
Telephone (715) 839-3700
FAX (715) 839-6076
TDD (715) 839-2786

Robert Baecker
Mayor
City of Independence
23688 Adams Street
PO Box 189
Independence, WI 54747

SUBJECT: WPDES Permit Reissuance No. WI-0024287-09-0
Independence Wastewater Treatment Plant, 23510 Cleveland St., Independence, WI

Dear Permittee:

Your Wisconsin Pollutant Discharge Elimination System (WPDES) Permit is enclosed. The conditions of the enclosed permit reissuance were determined using the permit application, information from your WPDES permit file, other information available to the Department, comments received during the public notice period, and applicable Wisconsin Administrative Codes. All discharges from this facility and actions or reports relating thereto shall be in accordance with the terms and conditions of the enclosed permit.

This enclosed permit requires you to submit monitoring results to the Department on a periodic basis. Monitoring forms, which must be submitted electronically, are available on the Department's web page. Go to the DNR Switchboard page at http://dnr.wi.gov/topic/switchboard/ to log in and access your monitoring forms. For your convenience, there is a 'Summary of Reports Due' at the end of the enclosed permit that shows a synopsis of the required reports and monitoring forms.

The WPDES permit program has been approved by the Administrator of the U.S. Environmental Protection Agency pursuant to Section 402(b) of the Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. Section 1342 (b)). The terms and conditions of the enclosed permit are accordingly subject to enforcement under ss. 283.89 and 283.91, Stats., and Section 309 of the Federal Act (33 U.S.C. Section 1319).

The Department has the authority under chs. 160 and 283, Stats., to establish effluent limitations, monitoring requirements, and other permit conditions for discharges to groundwater and surface waters of the State. The Department also has the authority to issue, reissue, modify, suspend, or revoke WPDES permits under ch. 283, Stats.

The enclosed permit contains water quality-based effluent limitations that are necessary to ensure the water quality standards for Trempealeau River are met. You may apply for a variance from the water quality standard used to derive the limitations pursuant to s. 283.15, Stats., by submitting an application to the Director of the Bureau of Water Quality, P.O. Box 7921, Madison, Wisconsin 53707 within 60 days of the date the permit was issued (see "Date Permit Signed/Issued" after the signature on the front page of the enclosed permit). This statute also allows the permittee to apply for a variance to the water quality standard when applying for reissuance of the permit. Subchapter III of ch. NR 200, Wis. Adm. Code, specifies the procedures that must be followed and the information that must be included when submitting an application for a variance.

If your permit contains a stringent Water Quality Based Effluent Limit for Phosphorus, there is a Compliance Schedule requirement to complete a Phosphorus Operational Evaluation and Optimization Report. To streamline

the Report preparation and review process the Department has prepared a Worksheet which should be used to develop the report. The worksheet may be found at : http://dnr.wi.gov/topic/surfacewater/phosphorus.html. To challenge the reasonableness of or necessity for any term or condition of the enclosed permit, s. 283.63, Stats., and ch. NR 203, Wis. Adm. Code, require that you file a verified petition for review with the Secretary of the Department of Natural Resources within 60 days of the date the permit was issued (see "Date Permit Signed/Issued" after the signature on the front page of the enclosed permit). For permit-related decisions that are not reviewable pursuant to s. 283.63, Stats., it may be possible for permittees or other persons to obtain an administrative review pursuant to s. 227.42, Stats., and s. NR 2.05(5), Wis. Adm. Code, or a judicial review pursuant to s. 227.52, Stats. If you choose to pursue one of these options, you should know that Wisconsin Statutes and Administrative Code establish time periods within which requests to review Department decisions must be filed.

Sincerely,

Larry Wildstab for

Michael Vollrath
Wastewater Field Supervisor

Dated: 09/25/2014

cc: Cyndi Barr, WT/3
U.S. Fish and Wildlife Service (Electronic Copy via Email)
Lori Fassbender – BRF
Leanne Hinke - BRF

WISCONSIN
DEPT. OF NATURAL RESOURCES

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

City of Independence

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
23510 Cleveland St., Independence, WI
to
Trempealeau River in the Elk Creek Watershed
of the Buffalo-Trempealeau River Basin in Trempealeau County

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By Harry Hilobetab for
Michael Vollrath
Wastewater Field Supervisor

09/25/2014
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - October 01, 2014 **EXPIRATION DATE - September 30, 2019**

TABLE OF CONTENTS

1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
702	Representative influent samples shall be collected after primary screening and grit removal.

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 702 - INFLUENT TO PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
004	Representative composite effluent samples shall be collected before the effluent weir and after secondary clarification prior to discharge to the Trempealeau River; grab samples shall be collected after disinfection.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 004 - EFFLUENT TO TREMPEALEAU RIVER

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD_5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Copper, Total Recoverable	Daily Max	23 µg/L	Weekly	24-Hr Flow Prop Comp	See copper & hardness footnote below
Copper, Total Recoverable	Daily Max	0.071 lbs/day	Weekly	Calculated	See copper & hardness footnote below
Zinc, Total Recoverable		µg/L	Quarterly	24-Hr Flow Prop Comp	
Hardness, Total as $CaCO_3$		mg/L	Quarterly	24-Hr Flow Prop Comp	See copper & hardness footnote below
Fecal Coliform	Geometric Mean	400 #/100 ml	Weekly	Grab	Monitoring & limit apply May-Sept
Chlorine, Total Residual	Daily Max	38 µg/L	Daily	Grab	Monitoring & limit apply May-Sept
Acute WET		TU_a	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET footnote below
Phosphorus, Total	Monthly Avg	4.0 mg/L	Weekly	24-Hr Flow Prop Comp	See phosphorus footnotes below

2.2.1.1 Average Annual Design Flow

The average annual design flow of the permittee's wastewater treatment facility is 0.165 MGD.

2.2.1.2 Copper & Hardness Monitoring

Samples for a monthly hardness sample shall be collected concurrently with one of the weekly copper samples. Copper monitoring is weekly in recognition of occasional use of polymer. In the event polymer use is permanently discontinued, the department shall be notified and the permittee may request that the copper monitoring frequency be changed to monthly. If the request is approved by the department, the monitoring frequency change may occur without public notice thereof. A log of polymer addition shall be maintained at the WWTF.

2.2.1.3 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Trempealeau River

Instream Waste Concentration (IWC): N/A

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 30, 10, 3, 1% (if the IWC $\leq$30%) or 100, 75, 50, 25, 12.5% (if the IWC >30%) and any additional selected by the permittee.

WET Testing Frequency:

Acute tests shall be conducted twice during the permit term in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Acute:** 4th quarter (Oct-Dec) 2016 and 3rd quarter (July-Sept) 2018

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the fourth calendar year of this permit. For example, the next test would be required in 4th quarter (Oct-Dec) 2019

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: If $LC_{50} \geq 100$, then $TU_a = 1.0$. If LC_{50} is < 100, then $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Relative Toxic Unit - Chronic (rTU_c) is greater than 1.0 for either species. The rTU_c shall be calculated as follows: If $IC_{25} \geq$ IWC, then $rTU_c = 1.0$. If $IC_{25} <$ IWC, then $rTU_c =$ IWC $\div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90 day reporting period shall begin the day after the test which showed a positive result. The retests

shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

2.2.1.4 Phosphorus Water Quality Based Effluent Limitation(s)

Interim Phosphorus Limit: The interim phosphorus limit, effective throughout the permit term, is 4.0 mg/L monthly average.

Final Phosphorus Limits: The final water quality based effluent limits for phosphorus are 0.100 mg/L (6-month average) and 0.300 mg/L (monthly average) unless:

(A) As part of the application for the next reissuance, or prior to filing the application, the permittee submits either: 1.) a watershed adaptive management plan and a completed Watershed Adaptive Management Request Form 3200-139; or 2.) an application for water quality trading; or 3.) an application for a variance; or 4.) new information or additional data that supports a recalculation of the numeric limitation; and

(B) The Department modifies, revokes and reissues, or reissues the permit to incorporate a revised limitation before the expiration of the compliance schedule*.

Note: The permittee may also submit an application for a variance within 60 days of this permit reissuance, as noted in the permit cover letter, in accordance with s. 283.15, Stats.

If Adaptive Management or Water Quality Trading is approved as part of the permit application for the next reissuance or as part of an application for a modification or revocation and reissuance, the plan and specifications submittal, construction, and final effective dates for compliance with the total phosphorus WQBEL may change in the reissued or modified permit. In addition, the numeric value of the water quality based effluent limit may change based on new information (e.g. a TMDL) or additional data. If a variance is approved for the next reissuance, interim limits and conditions will be imposed in the reissued permit in accordance with s. 283.15, Stats., and applicable regulations. A permittee may apply for a variance to the phosphorus WQBEL at the next reissuance even if the permittee did not apply for a phosphorus variance as part of this permit reissuance.

Additional Requirements: If a water quality based effluent limit has taken effect in a permit, any increase in the limit is subject to s. NR 102.05(1) and ch. NR 207, Wis. Adm. Code. When a six-month average effluent limit is specified for Total Phosphorus the applicable averaging periods are May through October and November through April.

*Note: The Department will prioritize reissuances and revocations, modifications, and reissuances of permits to allow permittees the opportunity to implement adaptive management or nutrient trading in a timely and effective manner.

2.2.1.5 Alternative Approaches to Phosphorus WQBEL Compliance

Rather than upgrading its wastewater treatment facility to comply with WQBELs for total phosphorus, the permittee may use Water Quality Trading or the Watershed Adaptive Management Option, to achieve compliance under ch. NR 217, Wis. Adm. Code, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. The permittee may also implement an upgrade to its wastewater treatment facility in combination with Water Quality Trading or the Watershed Adaptive Management Option to achieve compliance, provided that the permit is modified, revoked and reissued, or reissued to incorporate any such alternative approach. If the Final Compliance Alternatives Plan concludes that a variance will be pursued, the Plan shall provide information regarding the basis for the variance.

2.2.1.6 Submittal of Permit Application for Next Reissuance and Adaptive Management or Pollutant Trading Plan or Variance Application

The permittee shall submit the permit application for the next reissuance at least 6 months prior to expiration of this permit. If the permittee intends to pursue adaptive management to achieve compliance with the phosphorus water quality based effluent limitation, the permittee shall submit with the application for the next reissuance: a completed Watershed Adaptive Management Request Form 3200-139, the completed Adaptive Management Plan and final plans

for any system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the permittee intends to pursue pollutant trading to achieve compliance, the permittee shall submit an application for water quality trading with the application for the next reissuance. If system upgrades will be used in combination with pollutant trading to achieve compliance with the final water quality-based limit, the reissued permit will specify a schedule for the necessary upgrades. If the permittee intends to seek a variance, the permittee shall submit an application for a variance with the application for the next reissuance.

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
005	Representative sludge samples shall be collected from the sludge storage tank (while aerating) and monitored for Lists 1, 2, 3 & 4 annually, and once in 2015 for PCBs.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 005 - SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	
Nitrogen, Ammonium (NH_4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Potassium, Total Recoverable		Percent	Annual	Composite	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2015
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2015

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

3.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed for the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

3.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

3.2.1.3 Multiple Sludge Sample Points (Outfalls)

If there are multiple sludge sample points (outfalls), but the sludges are not subject to different sludge treatment processes, then a separate List 2 analysis shall be conducted for each sludge type which is land applied, just prior to land application, and the application rate shall be calculated for each sludge type. In this case, List 1, 3, and 4 and PCBs need only be analyzed on a single sludge type, at the specified frequency. If there are multiple sludge sample points (outfalls), due to multiple treatment processes, List 1, 2, 3 and 4 and PCBs shall be analyzed for each sludge type at the specified frequency.

3.2.1.4 Sludge Which Exceeds the High Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

3.2.1.5 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2015**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

3.2.1.6 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3
PATHOGEN CONTROL FOR CLASS B SLUDGE

The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control.

The following requirements shall be met prior to land application of sludge.

Parameter	Unit	Limit
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent Process	

* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.

List 4
VECTOR ATTRACTION REDUCTION

The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option.

One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

3.2.1.7 Daily Land Application Log

Daily Land Application Log		
Discharge Monitoring Requirements and Limitations The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements.		
Parameters	**Units**	**Sample Frequency**
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

4 Schedules

4.1 Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus

The permittee shall comply with the WQBELs for Phosphorus as specified. No later than 30 days following each compliance date, the permittee shall notify the Department in writing of its compliance or noncompliance. If a submittal is required, a timely submittal fulfills the notification requirement.

Required Action	Due Date
Operational Evaluation Report: The permittee shall prepare and submit to the Department for approval an operational evaluation report. The report shall include an evaluation of collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that will optimize reductions in phosphorus discharges from the treatment plant during the period prior to complying with final phosphorus WQBELs and, where possible, enable compliance with final phosphorus WQBELs by 09/30/2017. The report shall provide a plan and schedule for implementation of the measures, improvements, and modifications as soon as possible, but not later than 09/30/2017 and state whether the measures, improvements, and modifications will enable compliance with final phosphorus WQBELs. Regardless of whether they are expected to result in compliance, the permittee shall implement the measures, improvements, and modifications in accordance with the plan and schedule specified in the operational evaluation report. If the operational evaluation report concludes that the facility can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the permittee shall comply with the final phosphorus WQBEL by 09/30/2017 and is not required to comply with the milestones identified below for years 3 through 9 of this compliance schedule ('Preliminary Compliance Alternatives Plan', 'Final Compliance Alternatives Plan', 'Final Plans and Specifications', 'Treatment Plant Upgrade to Meet WQBELs', 'Complete Construction', 'Achieve Compliance'). STUDY OF FEASIBLE ALTERNATIVES - If the Operational Evaluation Report concludes that the permittee cannot achieve final phosphorus WQBELs with source reduction measures, operational improvements and other minor facility modifications, the permittee shall initiate a study of feasible alternatives for meeting final phosphorus WQBELs and comply with the remaining required actions of this schedule of compliance. If the Department disagrees with the conclusion of the report, and determines that the permittee can achieve final phosphorus WQBELs using the existing treatment system with only source reduction measures, operational improvements, and minor facility modifications, the Department may reopen and modify the permit to include an implementation schedule for achieving the final phosphorus WQBELs sooner than 09/30/2023.	09/30/2015
Compliance Alternatives, Source Reduction, Improvements and Modifications Status: The permittee shall submit a 'Compliance Alternatives, Source Reduction, Operational Improvements and Minor Facility Modification' status report to the Department. The report shall provide an update on the permittee's: (1) progress implementing source reduction measures, operational improvements, and minor facility modifications to optimize reductions in phosphorus discharges and, to the extent that such measures, improvements, and modifications will not enable compliance with the WQBELs, (2) status evaluating feasible alternatives for meeting phosphorus WQBELs.	09/30/2016
Preliminary Compliance Alternatives Plan: The permittee shall submit a preliminary compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment facility is necessary to achieve final phosphorus WQBELs, the submittal shall include a preliminary engineering design	09/30/2017

report. If the plan concludes Adaptive Management will be used, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 without the Adaptive Management Plan. If water quality trading will be undertaken, the plan must state that trading will be pursued.	
Final Compliance Alternatives Plan: The permittee shall submit a final compliance alternatives plan to the Department. If the plan concludes upgrading of the permittee's wastewater treatment is necessary to meet final phosphorus WQBELs, the submittal shall include a final engineering design report addressing the treatment plant upgrades, and a facility plan if required pursuant to ch. NR 110, Wis. Adm. Code. If the plan concludes Adaptive Management will be implemented, the submittal shall include a completed Watershed Adaptive Management Request Form 3200-139 and an engineering report addressing any treatment system upgrades necessary to meet interim limits pursuant to s. NR 217.18, Wis. Adm. Code. If the plan concludes water quality trading will be used, the submittal shall identify potential trading partners. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2018
Progress Report on Plans & Specifications: Submit progress report regarding the progress of preparing final plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2019
Final Plans and Specifications: Unless the permit has been modified, revoked and reissued, or reissued to include Adaptive Management or Water Quality Trading measures or to include a revised schedule based on factors in s. NR 217.17, Wis. Adm. Code, the permittee shall submit final construction plans to the Department for approval pursuant to s. 281.41, Stats., specifying treatment plant upgrades that must be constructed to achieve compliance with final phosphorus WQBELs, and a schedule for completing construction of the upgrades by the complete construction date specified below. (Note: Permit modification, revocation and reissuance, and reissuance are subject to s. 283.53(2), Stats.) Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	09/30/2020
Treatment Plant Upgrade to Meet WQBELs: The permittee shall initiate construction of the upgrades. The permittee shall obtain approval of the final construction plans and schedule from the Department pursuant to s. 281.41. Stats. Upon approval of the final construction plans and schedule by the Department pursuant to s. 281.41, Stats., the permittee shall construct the treatment plant upgrades in accordance with the approved plans and specifications. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2020
Construction Upgrade Progress Report #1: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2021
Construction Upgrade Progress Report #2: The permittee shall submit a progress report on construction upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	12/31/2022
Complete Construction: The permittee shall complete construction of wastewater treatment system upgrades. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface	09/01/2023

Water section of this permit.	
Achieve Compliance: The permittee shall achieve compliance with final phosphorus WQBELs. Note: See 'Alternative Approaches to Phosphorus WQBEL Compliance' in the Surface Water section of this permit.	10/01/2023

5 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a principal executive officer, a ranking elected official or other duly authorized representative. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

A separate CMAR certification document, that is not part of the electronic report form, shall be mailed to the Department at the time of electronic submittal of the CMAR. The CMAR certification shall be signed and submitted by an authorized representative of the permittee. The certification shall be submitted by mail. The certification shall verify the electronic report is complete, accurate and contains information from the owner's treatment works.

5.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

5.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.2 System Operating Requirements

5.2.1 Noncompliance Reporting

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.

The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from an unscheduled bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-536, Wis. Adm. Code.

5.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

5.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;

- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

5.2.6 Bypass

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled 'Scheduled Bypass', 'Blending' (if approved), 'SSO's and Sewage Treatment Facility Overflows' and 'Controlled Diversions' of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve an unscheduled bypass provided all the following conditions are met:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

5.2.7 Scheduled Bypass

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the 'Controlled Diversions' section of this permit, the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee's written request for Department approval of a scheduled bypass shall demonstrate that the conditions for unscheduled bypassing are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

5.2.8 Controlled Diversions

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and

- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

5.2.9 Ammonia Limit Not Needed - Continue to Optimize Removal of Ammonia

Applying the procedures in s. NR 106.05, Wis. Adm. Code, to ammonia data that is representative of the current operations of the wastewater treatment plant resulted in a determination that ammonia effluent limits are not necessary in this permit. Pursuant to NR 106.33, throughout the term of this permit, the wastewater treatment plant shall continue to be operated in a manner that optimizes the removal of ammonia within the design capabilities of the wastewater treatment plant.

5.2.10 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. The wastewater treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2), Wis. Adm. Code. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.3 Sewage Collection Systems

5.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows

5.3.1.1 Overflows Prohibited

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, other than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;
- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

5.3.1.2 Permittee Response to Overflows

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

5.3.1.3 Permittee Reporting

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:

  ◦The date and location of the overflow;
  ◦The surface water to which the discharge occurred, if any;
  ◦The duration of the overflow and an estimate of the volume of the overflow;
  ◦A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  ◦The estimated date and time when the overflow began and stopped or will be stopped;
  ◦The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
  ◦Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
  ◦A description of the actual or potential for human exposure and contact with the wastewater from the overflow;
  ◦Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
  ◦To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and
  ◦The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

  NOTE: A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at http://dnr.wi.gov/topic/wastewater/SSOreport.html. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

5.3.1.4 Public Notification

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of

this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

5.3.2 Capacity, Management, Operation and Maintenance (CMOM) Program

- The permittee shall by August 1, 2016 submit to the Department verification that a CMOM program for the sewage collection system has been developed which is consistent with the requirements of NR 210.23, Wis. Adm. Code.
- The permittee shall develop and maintain written documentation of the CMOM program components, and shall verify each year with the submittal of the Compliance Maintenance Annual Report required under the 'Compliance Maintenance Annual Reports' section of this permit that the CMOM program documentation is current and meets the requirements in NR 210.23, Wis. Adm. Code.
- The permittee shall implement a CMOM program consistent with the permittee's program documentation and with the requirements of NR 210.23, Wis. Adm. Code.
- The permittee shall annually conduct a self-audit of activities to ensure the CMOM program is being implemented as necessary to meet the requirements contained in the CMOM program documentation.
- The permittee shall make available CMOM program documentation, a record of implementation activities and the results of the self-audit to the Department on request.

5.3.3 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.
- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

5.4 Surface Water Requirements

5.4.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.4.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

5.4.3 Effluent Temperature Requirements

Weekly Average Temperature – The permittee shall use the following formula for calculating effluent results to determine compliance with the weekly average temperature limit (as applicable): Weekly Average Temperature = the sum of all daily maximum results for that week divided by the number of daily maximum results during that time period.

Cold Shock Standard – Water temperatures of the discharge shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock. 'Cold Shock' means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavior or physiological performance and may lead to death.

Rate of Temperature Change Standard – Temperature of a water of the state or discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

5.4.4 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.4.5 Surface Water Uses and Criteria

In accordance with NR 102.04, Wis. Adm. Code, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

d) Substances in concentrations or in combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

5.4.6 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

5.4.7 Fecal Coliforms

The limit for fecal coliforms shall be expressed as a monthly geometric mean.

5.4.8 Seasonal Disinfection

Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection or other uses, the limitations and monitoring requirements for residual chlorine shall apply. A dechlorination process shall be in operation whenever chlorine is used.

5.4.9 Total Residual Chlorine Requirements (When De-Chlorinating Effluent)

Test methods for total residual chlorine, approved in ch. NR 219 - Table B, Wis. Adm. Code, normally achieve a limit of detection of about 20 to 50 micrograms per liter and a limit of quantitation of about 100 micrograms per liter. Reporting of test results and compliance with effluent limitations for chlorine residual and total residual halogens shall be as follows:

- Sample results which show no detectable levels are in compliance with the limit. These test results shall be reported on Wastewater Discharge Monitoring Report Forms as "< 100 µg/L". (Note: 0.1 mg/L converts to 100 µg/L)

- Samples showing detectable traces of chlorine are in compliance if measured at less than 100 µg/L, unless there is a consistent pattern of detectable values in this range. These values shall also be reported on Wastewater Discharge Monitoring Report Forms as "<100 µg/L." The facility operating staff shall record actual readings on logs maintained at the plant, shall take action to determine the reliability of detected results (such as re-sampling and/or calculating dosages), and shall adjust the chemical feed system if necessary to reduce the chances of detects.

- Samples showing detectable levels greater than 100 µg/L shall be considered as exceedances, and shall be reported as measured.

- To calculate average or mass discharge values, a "0" (zero) may be substituted for any test result less than 100 µg/L. Calculated values shall then be compared directly to the average or mass limitations to determine compliance.

5.4.10 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.4.11 Whole Effluent Toxicity (WET) Identification and Reduction

This standard requirement applies only to acute or chronic WET monitoring that is not accompanied by a WET limit. Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

5.5 Land Application Requirements

5.5.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

5.5.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

5.5.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

5.5.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the 'eReport Certify' page by a principal executive officer, ranking elected official or duly authorized representative. The 'eReport Certify' page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility's DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

5.5.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =
[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

5.5.6 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for "PCB, Total Dry Wt" is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note**: It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

5.5.7 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a principal executive officer, ranking elected official or duly authorized representative. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.8 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a principal executive officer, ranking elected official or duly authorized representative. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.9 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

5.5.10 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

5.5.11 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

5.5.12 Class B Sludge: Fecal Coliform Limitation

Compliance with the fecal coliform limitation for Class B sludge shall be demonstrated by calculating the geometric mean of at least 7 separate samples. (Note that a Total Solids analysis must be done on each sample). The geometric mean shall be less than 2,000,000 MPN or CFU/g TS. Calculation of the geometric mean can be done using one of the following 2 methods.

Method 1:
Geometric Mean = $(X_1 \times X_2 \times X_3 \ldots \times X_n)^{1/n}$
Where X = Coliform Density value of the sludge sample, and where n = number of samples (at least 7)

Method 2:
Geometric Mean = antilog$[(X_1 + X_2 + X_3 \ldots + X_n) \div n]$
Where X = $\log_{10}$ of Coliform Density value of the sludge sample, and where n = number of samples (at least 7)
Example for Method 2

Sample Number	Coliform Density of Sludge Sample	$\log_{10}$
1	6.0×10^5	5.78
2	4.2×10^6	6.62
3	1.6×10^6	6.20
4	9.0×10^5	5.95
5	4.0×10^5	5.60
6	1.0×10^6	6.00
7	5.1×10^5	5.71

The geometric mean for the seven samples is determined by averaging the $\log_{10}$ values of the coliform density and taking the antilog of that value.
$(5.78 + 6.62 + 6.20 + 5.95 + 5.60 + 6.00 + 5.71) \div 7 = 5.98$
The antilog of $5.98 = 9.5 \times 10^5$

5.5.13 Class B Sludge - Vector Control: Incorporation

Class B sludge shall be incorporated within 6 hours of surface application, or as approved by the Department.

6 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Operational Evaluation Report	September 30, 2015	11
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Compliance Alternatives, Source Reduction, Improvements and Modifications Status	September 30, 2016	11
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Preliminary Compliance Alternatives Plan	September 30, 2017	11
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Compliance Alternatives Plan	September 30, 2018	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Progress Report on Plans & Specifications	September 30, 2019	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Final Plans and Specifications	September 30, 2020	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Treatment Plant Upgrade to Meet WQBELs	December 31, 2020	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Construction Upgrade Progress Report #1	December 31, 2021	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Construction Upgrade Progress Report #2	December 31, 2022	12
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Complete Construction	September 1, 2023	13
Water Quality Based Effluent Limits (WQBELs) for Total Phosphorus - Achieve Compliance	October 1, 2023	13
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	15
General Sludge Management Form 3400-48	prior to any significant sludge management changes	23
Characteristic Form 3400-49 and Lab Report	by January 31 following each year of analysis	23
Land Application Report Form 3400-55	by January 31, each year whether or not non-exceptional quality sludge is land applied	25
Report Form 3400-52	by January 31, each year whether or not sludge is hauled,	25

	landfilled, incinerated, or exceptional quality sludge is distributed or land applied	
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	14

Report forms shall be submitted electronically in accordance with the reporting requirements herein. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be submitted to the Bureau of Water Quality, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to: West Central Region - BRF, 910 Hwy 54 E, Black River Falls, WI 54615

Appendix B

Phosphorous Optimization Worksheet

PHOSPHORUS OPTIMIZATION REPORT WORKSHEET

Facility Name: Independence Wastewater Treatment Facility

WPDES Permit #: WI-0024287-09-0

PART I - BACKGROUND INFORMATION

(A) Briefly describe wastewater treatment facility processes and operations and the means of treating phosphorus, including any chemicals used. Attach a flow schematic which shows the point(s) of chemical addition for TP control. Include both liquid and solids treatment trains.

See attached WWTP Schematic

Treatment includes screening, grit removal, activated sludge secondary treatment, secondary settling and effluent disinfection. Sludge is pumped to the aerobic digester. Digested sludge is thickened and stored in the sludge storage tank for periodic land spreading. Supernatant from the sludge tank and thickener filtrate are returned to the plant influent.

(B) Baseline Year: 2014/2015

Month	Influent Avg. Flow (MGD)	Influent Avg. TP Concentration (mg/l)	Influent TP Mass (lb/day)	Effluent Avg. Flow (MGD)	Effluent Avg. TP Concentration (mg/l)	Effluent TP Mass (lb/day)
October 2014	0.087	No data	No data	0.091	2.9	2.2
November 2014	0.089	No data	No data	0.092	3.2	2.5
December 2014	0.089	No data	No data	0.106	2.2	2.0
January 2015	0.090	No data	No data	0.104	3.0	2.6
February 2015	0.081	No data	No data	0.104	3.3	2.9
March 2015	0.085	No data	No data	0.104	3.2	2.7
April 2015	0.088	10.2	7.45	0.104	3.1	2.7
May 2015	0.084	9.0	6.29	0.099	3.6	3.0
June 2015	0.085	10.1	7.13	0.101	3.2	2.7
July 2015	0.082	9.8	6.68	0.100	3.6	3.0
August 2015	0.089	8.4	6.27	0.095	2.8	2.2
September 2015	pending	pending	pending	pending	pending	pending
Avg	0.086	9.5	6.8	0.100	3.1	2.6

(C) Possible Contributors: For municipalities, list all possible industries, other commercial buildings and hauled in wastes that could be introducing phosphorus into the collection system.

Name Source	Type of Process	Already Contacted?	If so, possible contributor?
Gold'n Plump	Poultry Processing	No	yes
Green Roof Laundry	Laundry	No	yes
Independence High School	School	No	no

Possible Contributors: For industrials list processes that could be introducing phosphorus into the collection system.

Type of Process	Chemicals used?	Product containing P?
To be determined	*To be determined*	*To be determined*

Water Supply: What are the phosphorus levels within your water supply? Does the water utility add phosphorus for corrosion control or iron and manganese sequestration?

Not Applicable-polyphosphate is not added to the water supply

PART 2 - OPTIMIZATION ACTION PLANS

List the items that will address to reduce the phosphorus in the effluent and provide a schedule for accomplishing each item. Note that all items must be completed by no later than 3 years after the date of permit reissuance. For each optimization action fill out a separate plan sheet.

Optimization Action: (example: Address Phosphorus from Industries)

See attached Phosphorus Optimization Action Plan

Briefly describe optimization action plan: (example: determine contributors of phosphorus throughout the sewer area and work with them to reduce the incoming phosphorus. Parts of the plan include meeting with the industries, etc.)

See attached Phosphorus Optimization Action Plan

Anticipated Time Frame for Optimization Action Plan:

Main Item to Complete	Date Start	Date Complete
See attached Phosphorus Optimization Action Plan		

Overall Optimization Action Plan Time Frame: 21 months

Overall Completion Date: 9/30/2017

Outcome hoping for:

Reduce Phosphorus to 0.5 mg/l or less to assess compliance options.

Anticipated reduction and/or comments:

To be determined by the evaluation.

PART 3 - OPTIMIZATION APPROVAL

Facility Name: Independence WWTP **WPDES Permit#:** WI-0024287-09-0

Name and Contact Information of Person Preparing Report:

Name: Paul Gont, PE **E-mail Address:** pgont@sehinc.com

Telephone #: 715.720.6252

OPTIMIATION ACTION PLANS

Please provide a summary of the proposed action items and projected completion dates. The completion dates should be developed to enable the incorporation of the action items into the Preliminary Facilities Plan that is required in the WPDES Permit Phosphorus Compliance Schedule.

INSERT OPTIMIZATION ITEMS (TITLE FROM EACH SHEET)

Action Item	Proposed Date of Completion
See attached Phosphorus Optimization Action Plan	

For DNR use only

☐ **Complete**

☐ **Not Complete**

☐ **Request more information?**

Comments:

Submitted for Approval by: [signature] **(signed)** **Date of Submittal:** 10/30/15

Robert Baecker **(printed)**

Authorized Permit Representative

Approved by: _____ **Date of Approval:** _____

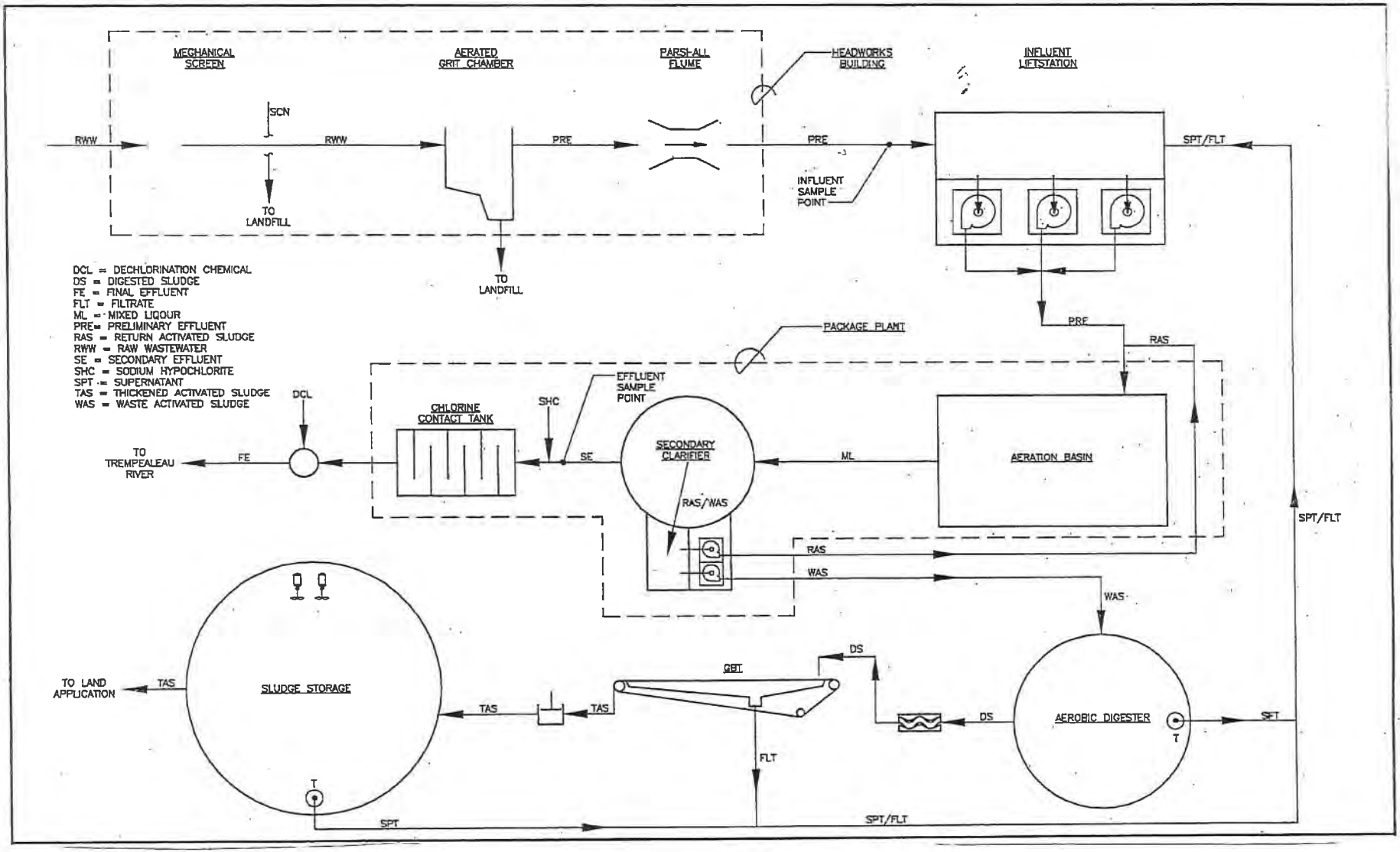
DNR Wastewater Engineer or Designee

Independence WWTP

Phosphorus Optimization Action Plan

September 2015

Item #	Item	Action Plan	Start Date	End Date	Time Frame	Anticipated Outcome
1	Sludge Thickener Filtrate Return-Phosphorus assessment	Evaluate phosphorus levels in Filtrate from the Sludge thickener prior to return to influent	1/1/2016	3/31/2016	3 months	Assess significance of Filtrate on phosphorus load that may be treated separately prior to return to the WWTP
2	Digester Supernatant Return-Phosphorus assessment	Evaluate phosphorus levels in from the supernatant from the sludge tank prior to return to influent	1/1/2016	3/31/2016	3 months	Assess significance of Supernatant on phosphorus load that may be treated separately prior to return to the WWTP
3	Filtrate and supernatant phosphorus reduction	If appropriate from above assessments, proceed with actions (chemical feed to sidestreams, etc)to evaluate phosphorus reduction potential	3/31/2016	12/31/2016	9 months	Optimize chemical effectiveness and/or reduce effluent total phosphorus
4	Pilot Study-Chemical Feed Alum	Full scale pilot study of Alum addition for Phosphorus reduction	4/30/2016	9/30/2016	5 months	Assess phosphorus reduction with chemical precipitation using Alum
5	Pilot Study-Chemical Feed Ferric Chloride	Full scale pilot study of Ferric Chloride addition for Phosphorus reduction	4/30/2017	9/30/2017	5 months	Assess phosphorus reduction with chemical precipitation using Ferric Chloride
6	Evaluate Industrial Source Reduction	Evaluate Industrial Chemicals & Processes for possible source reduction of Phosphorus.	1/1/2016	9/30/2016	9 months	Identify and evaluate viable industrial source reduction options
7	Implement Industrial Source Reduction	Change Chemicals or Processes per evaluation to reduce phosphorus	9/30/2016	9/30/2017	12 months	Implement viable industrial source reduction options



Independence WWTP Schematic

Appendix C

Existing WWTP Modifications – Estimates and Present Worth Analyses

City of Independence
WWTP Modifications - Discfilter Tertiary Treatment
Cost Estimate
3/16/2018

Discfilter		
Excavation and sitework	$	25,000
Equipment Costs	$	350,000
Equipment Install	$	115,500
Permanent Chem Feed Equip	$	25,000
Chem Feed Install	$	6,250
Building Cost	$	200,000
HVAC/Plumbing	$	45,000
Process Piping	$	100,000
Electrical Costs	$	300,000
Site Restoration	$	10,000
Subtotal	**$**	**1,176,750**
Contractor Mobilization/GC (7%)	$	82,373
Contractor O&P (15%)	$	176,513
Contingency (10%)	$	117,675
	$	**1,553,310**
Design Engineering (10%)	$	117,675
Construction Engineering(10%)	$	117,675
Legal and Admin (2%)	$	31,066
Estimated Project Total	**$**	**1,819,726**

City of Independence
WWTP Modifications - Discfilter Tertiary Treatment
Present Worth Analysis
3/16/2018

PW Interest Rate	4.63%
PW Factor Initial Cost	1.00
PW Factor Annual Cost for 20 Years	12.8682

Capital Cost

Item	Cost	PW Factor	Present Worth
Discfilter Option	***$ 1,819,726.00***	***1.00***	***$ 1,819,726.00***

Annual Costs

Item	Cost	PW Factor	Present Worth
Operation and Maintenance	$ 50,000.00		
Subtotal	***$ 50,000.00***	***12.8682***	***$ 643,410***

TOTAL 20 YR PRESENT WORTH **$ 2,463,136**

City of Independence
WWTP Modifications - Clearas
Cost Estimate
3/16/2018

Clearas		
Excavation and sitework	$	35,000
Clearas Provided Equipment	$	1,480,000
Underground EQ concrete tank	$	300,000
Concrete tanks for separators	$	30,000
CO2 Delivery System	$	250,000
HVAC/Plumbing	$	50,000
EQ Tank Pumps	$	50,000
Dewatering and Processing Building	$	300,000
Cooler	$	50,000
Process Piping	$	90,000
Electrical Costs	$	400,000
Site Restoration	$	20,000
Subtotal	**$**	**3,055,000**
Contractor Mobilization/GC (7%)	$	213,850
General Contractor O&P (15%)	$	458,250
Contingency (10%)	$	372,710
	$	**4,099,810**
Design Engineering (10%)	$	409,981
Construction Engineering(10%)	$	409,981
Legal and Admin (2%)	$	81,996
Estimated Project Total	**$**	**5,001,768**

City of Independence
WWTP Modifications - Clearas
Present Worth Analysis
3/16/2018

PW Interest Rate	4.63%
PW Factor Initial Cost	1.00
PW Factor Annual Cost for 20 Years	12.8682

Capital Cost

Item		Cost	PW Factor		Present Worth
Clearas Option Scenario 1	***$***	***5,001,768***	***1.00***	***$***	***5,001,768***

Additional Annual Costs

Item	Cost		PW Factor		Present Worth
Power	$	10,000	***12.8682***	***$***	***128,682***
Membrane Replacement	$	5,000	***12.8682***	***$***	***64,341***
Operation of Clearas Equipment	$	22,118	***12.8682***	***$***	***284,619***
Maintenance	$	15,000	***12.8682***	***$***	***193,023***
Biomass Sale (yearly)	$	(43,097)	***12.8682***	***$***	***(554,574)***
Subtotal	***$***	***9,022***	***Cost***	***$***	***116,090***

TOTAL 20 YR PRESENT WORTH **$ 5,117,859**

City of Independence
WWTP Modifications - MBR
Cost Estimate
3/16/2018

MBR		
Excavation and sitework	$	25,000
Equipment Costs	$	846,000
Equipment Install	$	846,000
HVAC/Plumbing	$	25,000
Process Piping	$	100,000
Electrical Costs	$	400,000
Concrete Tank	$	60,000
Site Restoration	$	10,000
Subtotal	**$**	**2,312,000**
Contractor Mobilization/GC (7%)	$	161,840
Contractor O&P (15%)	$	346,800
Contingency (10%)	$	231,200
	$	**3,051,840**
Design Engineering (10%)	$	231,200
Construction Engineering(10%)	$	231,200
Legal and Admin (2%)	$	61,037
Estimated Project Total	**$**	**3,575,277**

City of Independence
MBR
Present Worth Analysis
3/16/2018

PW Interest Rate	4.63%
PW Factor Initial Cost	1.00
PW Factor Annual Cost for 20 Years	12.8682

Capital Cost

Item	Cost	PW Factor	Present Worth
MBR Option	***$ 3,575,300.00***	***1.00***	***$ 3,575,300.00***

Additional Annual Costs

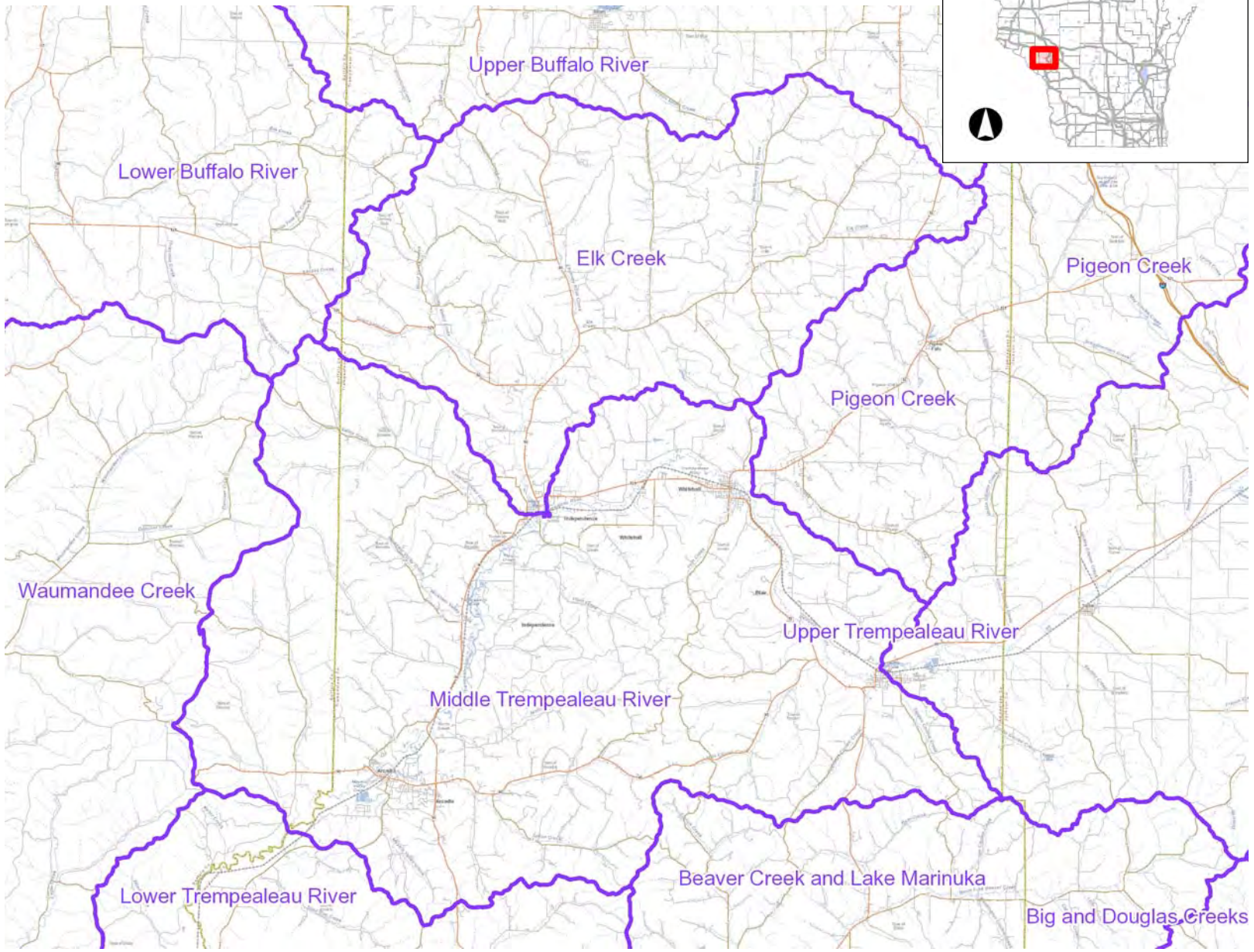
Item	Cost	PW Factor	Present Worth
Chemicals	$ 10,000.00	***12.8682***	***$ 128,682***
Power	$ 3,000.00	***12.8682***	***$ 38,605***
Membrane Replacement	$ 7,000.00	***12.8682***	***$ 90,077***
Operation and Maintenance	$ 13,000.00	***12.8682***	***$ 167,287***
Subtotal	***$ 33,000.00***	***12.8682***	***$ 424,651***

TOTAL 20 YR PRESENT WORTH **$ 3,999,951**

Appendix D

Elk Creek Watershed Map

Surface Water Data Viewer Map



Legend

- DNR Priority Watersheds
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

Notes

8.0 0 4.00 8.0 Miles

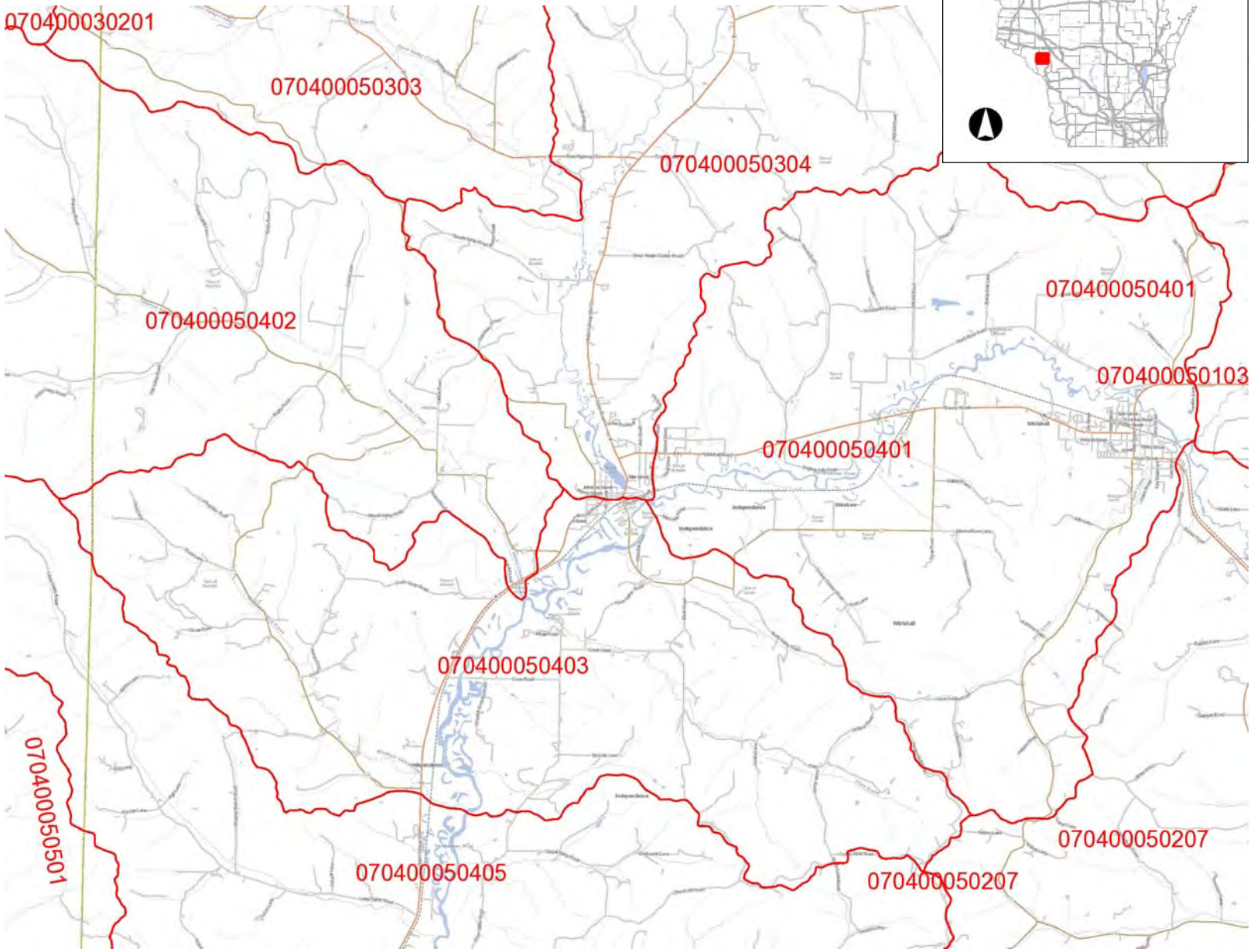
NAD_1983_HARN_Wisconsin_TM

1: 253,440

Appendix E

Watershed HUC-12 Delineation

Surface Water Data Viewer Map



Legend

- 12-digit HUCs (Subwatersheds)
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

Notes

3.0 0 1.50 3.0 Miles

NAD_1983_HARN_Wisconsin_TM

1: 95,040

Appendix F

Draft Individual Economic Variance Worksheets

Worksheet E

Data Used in the Secondary Test

Please list the following values used in deter mining the Secondary Score. Potential sources of the data are indicated.

A. Data Collection

Data	Potential Source	Value
Direct Net Debt	Community Financial Statements Town, County or State Assessor's Office	$ 1,982,569 (1)
Overlapping Debt	Community Financial Statements Town, County or State Assesor's Office	$ N/A (2)
Market Value of Property	Community Financial Statements Town, County or State Assessor's Office	$ 85,204,283 (3)
Bond Rating	Standard and Poors or Moody's	Not Rated (4)
Community Unemployment Rate	1990 Census of Population Regional Data Centers	3.1 %(5)
National Unemployment Rate	Bureau of Labor Statistics (202) 606-6392	4.5 %(6)
Community Median Household Income	1990 Census of Population	$ 34,415 (7)
State Median Household Income	1990 Census of Population	$ 52,738 (8)
Property Tax Collection Rate	Community Financial Statements Town, County or State Assessor's Office	Not Available %(9)
Property Tax Revenues	Community Financial Statements Town, County or State Assessor's Office	$ 794,373 (10)

Worksheet E, Continued

B. Calculation of Indicators

1. Overall Net Debt as a Percent of Full Market Value of Taxable Property

Overall Net Debt (Calculate: (1) + (2))	$ 1,982,569	(11)
Overall Net Debt as a Percent of Full Market Value of Taxable Property (Calculate: [(11)/(3)] x 100)	2.33	%(12)

2. Property Tax Revenues as a Percent of Full Market Value of Taxable Property

Property Tax Revenues as a Percent of Full Market Value of Taxable Property (Calculate: [(10)/(3)] x 100)	0.93	%(13)

Worksheet F

Calculating The Secondary Score

Please check the appropriate box in each row, and record the corresponding score in the final column. Then, sum the scores and compute the average. Remember, if one of the debt or socioeconomic indicators is not available, average the two financial management indicators and use this averaged value as a single indicator with the remaining indicators.

	Secondary Indicators			Score
Indicator	Weak*	Mid-Range**	Strong***	
Bond Rating Worsksheet E, (4)	Below BBB (S&P) Below Baa (Moody's) ☐	BBB (S&P) Baa (Moody's) ☐	Above BBB (S&P) or Baa (Moody's) ☐	N/A
Overall Net Debt as Percent of Full Market Value of Taxable Property Worksheet E, (12)	Above 5% ☐	2%-5% X	Below 2% ☐	2
Unemployment Worksheet E, (5)& (6)	Above National Average ☐	National Average ☐	Below National Average X	3
Median Household Income Worksheet E, (7) & (8)	Below State Median X	State Median ☐	Above State Median ☐	1
Property Tax Revenues as a Percent of Full Market Value of Taxable Property Worksheet E, (13)	Above 4% ☐	2%-4% ☐	Below 2% X	3
Property Tax Collection Rate Worksheet E, (9)	< 94% ☐	94% - 98% ☐	> 98% ☐	N/A

* Weak is a score of 1 point

** Mid-Range is a score of 2 points

*** Strong is a score of 3 points

SUM 9

AVERAGE 2.25

Table 2-2
Assessment of Substantial Impacts Matrix

Secondary Score	Municipal Preliminary Screener		
	Less than 1.0 Percent	Between 1.0 and 2.0 Percent	Greater than 2.0 Percent
Less than 1.5	?	X	X
Between 1.5 and 2.5	✓	?	X
Greater than 2.5	✓	✓	?

State of Wisconsin
Department of Natural Resources
Bureau of Watershed Management
PO Box 7921, Madison WI 53707-7921
dnr.wi.gov

Phosphorus Variance Application for Municipal Facilities - s. 283.15, Wis. Stats.

Form 3200-143 (3/15)

Notice: Pursuant to s. 283.15, Wis. Stats, and ss. NR 200.21 and 200.22, Wis. Adm. Code, an owner of an existing permitted wastewater treatment system may apply for a variance to phosphorus water quality based effluent limits (WQBEL). This form should be completed and submitted to the Department to request a variance. Personally identifiable information collected will be used for administrative purposes and may be provided to requestors to the extent required by Wisconsin's Open Records law [ss. 19.31-19.39, Wis. Stats.]

Facility and Permit Information			Facility Contact Information		
WPDES Permit No. **WI-** | | | | | |			Contact Name		
Facility Name			Title		
Facility Street Address			Address		
City	State	ZIP Code	City	State	ZIP Code
Receiving Water			Phone Number	Fax Number	
Source of Water Supply	Average Discharge Flow Rate _____ MGD		Email Address		

Variance Request Deadlines

1. This variance is being requested at the time of application for permit reissuance ◯
2. This variance is being requested from a current WPDES Permit and, if approved, will require permit modification ◯

   Date of Current Permit Issuance _____

Variance Requirements

1. Phosphorus Water Quality Standard from which variance is sought: _____ mg/L

   Do you believe this limit could be achieved during the term of the permit? ◯ Yes ◯ No

2. Effluent level currently achievable: _____ mg/L

3. Variance Limit being requested: _____ mg/L

   Provide phosphorus monitoring data to support this request in accordance with NR 200.22(1)(e), Wis. Adm. Code.

4. If granted, would the variance limit result in increased phosphorus discharge to surface water from the effluent limit in the current permit? ◯ Yes ◯ No

   If yes, provide information to justify the increase in accordance with ch. NR 207, Wis. Adm. Code.

5. Does the requested variance limit pose any increased risk to human health and the environment? ◯ Yes ◯ No

   If yes, explain:

Facility Information (provide attachments as necessary)

1. Describe the wastewater treatment facility processes and operations and the means of treating phosphorus, including any chemicals used. Attach a flow schematic which shows the point(s) of chemical addition for total phosphorus (TP) control, including both liquid and solids treatment trains.

2. What are the phosphorus levels within your water supply? _____ mg/L

3. Does the water utility add phosphorus for corrosion control or for iron or manganese sequestration? ◯ Yes ◯ No

Facility Operation and Performance

1. **Current P Removal Capability** – If the facility is currently required by a WPDES permit to monitor effluent phosphorus (P), provide a summary of the influent and effluent annual average P concentrations for each of the past three (3) years. If permit required P data is not available, the applicant should provide any other P data that may be applicable and available. If no data is available, the Department may estimate the P effluent concentration based on data from other similar facilities.

2. **Facility Operation** – Provide a summary description of overall facility operation. If not a continuously discharging facility, describe storage procedures and the time periods when effluent discharge occurs.

3. **Sludge Management** – For facilities that monitor the treatment system sludge for phosphorus, provide the most recent three (3) years of sludge testing, along with volumes disposed of so as to perform an approximate mass balance of phosphorus entering and leaving the plant.

4. **Previous Studies** – Reference or attach any facility planning or evaluation study that evaluated facility performance capabilities (Note – Only include studies that are recent or otherwise applicable for the evaluation of the existing facility and current conditions).

Service Area Information – Provide the following information for each municipality included in the wastewater facility service area.

Municipality Name	Population Served	Customer Households Served	Median Household Income (MHI)

Non-Residential Customers:

Percent of wastewater flow attributed to commercial, industrial, large institutional and any other special customer category: _____%

Describe types of non-domestic wastewater contributions that constitute a significant pollutant contribution or that significantly affect the capabilities of the treatment facility (for example, large food processors, dairies, or industries with unique wastewater).

Alternatives

1. This variance is being sought in accordance with s. 283.15(4)(a)(1), Wis. Stats. (select all that apply)

- ☐ Naturally occurring pollutant concentrations prevent the attainment of the standard
- ☐ Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the standard, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating water conservation requirements
- ☐ Human caused conditions or sources of pollution prevent the attainment of the standard and cannot be remedied or would cause more environmental damage to correct than to leave in place
- ☐ Dams, diversions, or other types of hydrologic modifications preclude the attainment of the standard, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the standard
- ☐ Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses
- ☐ The standard, as applied to the permittee, will cause substantial and widespread adverse social and economic impacts in the area where the permittee is located

2. What are the primary sources of phosphorus to your facility?

3. What feasible actions (e.g. pollution prevention or installation of treatment technology) have you taken and could you take to reduce phosphorus discharge levels to sufficiently meet, or make progress toward meeting, the water quality based effluent limit?

4. What types of waste materials or byproducts would be produced by these steps and what would be the ultimate means of disposal of those wastes?

5. What are the estimated costs of these actions? $ _____ Capital $ _____ Annual Operational

How do these costs compare with current treatment costs?

Affordability to Municipal Discharger and Wide Spread Economic Impact

The U.S. EPA Interim Economic Guidance for Water Quality Standards Workbook that discusses these considerations is available on the following site:

http://water.epa.gov/scitech/swguidance/standards/economics/

If you are applying for a variance based on substantial and widespread adverse social and economic impacts, please provide any information that is believed to be relevant as identified in the attached guidance document as well as other relevant information to support your variance request.

Variance Request and Certification

Based on the information provided, I believe that attainment of the applicable water quality standards for phosphorus are justified based on s. 283.15(4), Wis. Stats., in the area where this discharge is located. I understand that as a condition of the variance, the Department will impose initial limitations, interim limitations and source reduction measures in accordance with s. 283.15(5)(c), Wis. Stats.

I understand that these conditions will be included in the WPDES permit issued to this facility. I certify that the information provided is true, accurate, and complete.

Print or type name of individual submitting request*	Title

Signature of Official _____ _____

* must be an Authorized Representative for the treatment facility (Date Signed)

Appendix G

MHI Calculations

City of Independence
Percent MHI Calculations
3/16/2018

Based on the 2016 PSC report, the City of Bloomer has
516 residential class users with
15,261,000 gallons of water used per year within the residential class

Average Residential Water Use
29576 Per Year
2465 Per Month

Total Water Use
32,766,000 gallons of water

Residential percentage of total water use
47%

Current Average Residential User Rates

Independence's Wastewater Rates
$9.00 Monthly Fixed Rate
$12.55 Per Every 1000 gallons used

Average Residential User's Monthly Sewer Bill
$39.93

Average Residential User's Yearly Sewer Bill
$479.17

Independence's MHI $34,415

Sewer Rate % of MHI **1.39%**

Discfilter Yearly Costs

Annual Debt Payment on Discfilter (No Grants)
$124,585

Additional Annual Operations and Maintenance Costs
$50,000

Total Annual Discfilter Costs
$174,585

Residential Portion of Annual Discfilter Costs
$81,314.33

Estimated Average Residential User Rates After Tertiary Treatment

Average Residential User's Portion of Annual Discfilter Costs
$157.59

Average Residential User's Yearly Sewer Bill
$636.76

Sewer Rate % of MHI **1.85%**

Appendix H

MDV Present Worth

City of Independence
State Wide Variance (MDV)
Present Worth Analysis
4/17/2018

PW Interest Rate	4.63%
PW Factor Initial Cost	1.00
PW Factor Annual Cost for 20 Years	12.8682

Capital Cost

Item		Cost	PW Factor	Present Worth	
Capital Improvements (Permanent Chemical Addition)	***$***	***35,000***	***1.00***	***$***	***35,000.00***

Annual Costs

Item	Cost		PW Factor	Present Worth	
Trade Cost (170 lbs at $50/lb)	$	8,500			
Chemical Costs	$	25,000			
Subtotal	***$***	***33,500***	***12.8682***	***$***	***431,085***

TOTAL 20 YR PRESENT WORTH **$ 431,085**

Building a Better World for All of Us®

Sustainable buildings, sound infrastructure, safe transportation systems, clean water, renewable energy and a balanced environment. Building a Better World for All of Us communicates a companywide commitment to act in the best interests of our clients and the world around us.

We're confident in our ability to balance these requirements.

SEH

Appendix L / Sample Site Inspection Form

Inspection Checklist
City of Independence WQT

	Yes	No
1. Do any of the installed structures show signs of displacement or damage?	☐	☐
2. Are there any logs, trees, driftwood, or other debris lodged in or near the installed strctures?	☐	☐
3. Is there any bank sloughing, erosion, or damage to vegetative cover in the areas where structures where installed?	☐	☐
4. Is there vegetation growth that requires management?	☐	☐
5. Are there any signs of livestock damage or burrowing rodents along the banks?	☐	☐
6. Are there any other areas of concern?	☐	☐

ATTENTION: If inspector checks **"YES"** to any of the conditions above then he/she must take corrective action measures to address the area of concern. Attach photos and additional pages as needed.

Corrective Action Description:

_____
_____
_____
_____
_____

Certification statement: I certify that management practices identified in the approved water quality trading plan as the source of pollutant reduction credits are installed, established, and properly maintained.

INSPECTOR NAME_____

SIGNATURE_____

DATE_____

Prepared By:

HGS, LLC

a wholly owned subsidiary of Resource Environmental Solutions, LLC

6575 West Loop South, Suite 300

Bellaire, TX 77401