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Riverside Energy Center

Water Quality Trading Plan



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1 INTRODUCTION

This report describing the water quality trading program at the Riverside Energy Center in Beloit, WI is being updated and resubmitted to the WDNR to account for changes in the planned restoration at the West Riverside Site. This report was originally prepared and submitted to the DNR in November 2017. The plan was revised and resubmitted in June 2018 to address detailed review comments provided by the Department. The Riverside Energy Center Phosphorus Trading Plan was accepted by the DNR in December of 2018 and the final WPDES permit incorporating the water quality trade was issued on 12/20/2018. The water quality trading plan was first implemented in 2019 and the first annual update was provided to the DNR in January 2020.

A 2020 revision of this report addressed changes in the scheduled restoration of the areas associated with the new West Riverside Plant. Due to weather conditions, site conditions, and changes to the planned development throughout the multiyear construction phase, the original anticipated restoration dates could not be met. Alliant Energy has updated the Phosphorus trading plan to account for the change in credits generated over time on site. Additional details are provided in the following report and the final credit calculations are shown in *Tables 8-10*.

A 2022 revision addressed the impact of a small (0.041 acre) increase in impervious area in trading area 03-A from a proposed truck turnout, and a commensurate reduction in pervious area in trading area 04. This change was found not to alter the total available trading credits. In addition, a clerical error in *Table 2* was corrected.

The current (2023) revision removes two trading areas (O1 and O2) from the trading plan as they are being developed, and reduces the trading area claimed in two more (O5 and R3) to compensate for the construction of an access road. Trading areas hereafter reflect a reduction of 0.59 ac from R3 and 2.1 ac from O5 relative to the original areas presented in the 2017 version of this document. Credits listed are updated for years 2023 and later.

1.1 Background and Purpose

Alliant Energy, Wisconsin Power & Light Company owns and operates the Riverside Energy Center, a 603 MW natural gas electrical generating facility in the Town of Beloit, Rock County, WI. The facility holds a WPDES permit issued by WDNR specifying discharge limits for various constituents; including a daily phosphorus (P) discharge limit. Plant operations have been modified to limit the addition of P to the process water and ultimately to plant discharge. However, these modifications have negatively impacted plant operating efficiency. Additionally, the construction of a new facility on the Riverside Energy Center campus will also result in additional P discharge from the operation. To meet existing permit P discharge limits for the existing and future facility, Alliant Energy has developed a Nutrient Trading Plan as a cost effective and environmentally sustainable alternative to construction of a wastewater treatment plant.

The primary source of P in the wastewater stream from the plant is groundwater withdrawn for cooling. Water is withdrawn via a Ranney well adjacent to the facility and cycled through the cooling system. It is eventually discharged untreated to the Rock River. To meet permitted P discharge limits the use of P-based additives to the system have been discontinued at the plant.

The new West Riverside plant on the same site began limited operations in 2019 and will eventually provide 700 MW of electricity at peak generation. Additional cooling water to serve the new plant is drawn from the Ranney well and wastewater is discharged to the existing outfall. The plant uses water more efficiently and utilizes a recirculating sand filter to provide wastewater treatment. Therefore, the portion of the total P discharge from the new plant will be less than that of the Riverside Energy Center.

Alliant Energy established a water quality trading plan on site utilizing land owned by the company near the permitted facility. Approximately 84 acres of land adjacent to the Riverside Plant and 28 acres immediately west of the property, purchased from the Town of Beloit, are included within the trading plan. Both parcels were leased for agricultural production through 2017. The development of this land includes several land uses: as part of the West Riverside Plant, converted to a solar array, developed as an electrical substation, and areas converted to perennial native vegetation. These land use areas are included in the nutrient trading plan and have been evaluated for P runoff reduction from conversion out of agricultural production.

Alliant Energy contracted with Montgomery Associates: Resource Solutions (MARS) to assist in developing the proposed nutrient trading plan. [MARS was acquired by Emmons & Olivier Resources (EOR) in 2019] The remainder of this Water Quality Trading Plan will describe Alliant Energy's plan to meet the current WPDES permitted Total Phosphorus (TP) discharge limits for the combined discharge from the Riverside Energy Center and West Riverside Addition. TP credits have been established for each of the land uses described above.

1.2 Location

Outfall 001 discharges to the Rock River at approximately latitude 42.57436° N and longitude 89.03485° W. The outfall is located in HUC 12 Subwatershed 070900021502, The City of Beloit-Lower Rock River Basin. The approximate location of Outfall 001 is shown in *Figure A1*.

1.3 Current Permit

The Riverside Energy Center currently operates under WPDES Permit No. WI-0061921-02-0. The only outfall for the combined discharge from both the existing and future plants is Outfall 001, to the Rock River. The current permit dictates that the TP load from the outfall cannot exceed 0.65 lb TP/day, on a monthly average. The total annual limit of P that may be discharged from the plant is 237.25 lb.

1.4 Phosphorus Discharge

Existing Riverside Plant

The future P discharge from the existing Riverside Plant was projected based on past plant monitoring data and scaled up to account for changes in plant operations. Plant operations (and therefore P discharge) varies throughout the year with fluctuating electrical demand. Therefore, weekly monitoring data from January 2015 through August 2016 was used to project the daily future P discharge by month. Data after August 2016 was not available because the plant was offline for several months for repairs and maintenance. A summary of the assumptions used in the discharge analysis are provided below. Monitoring data and loading calculations are provided in *Appendix B*.

- It is assumed that the plant will be operating at 70-80% capacity factor (CF). The actual average CF was 62% during period of available monitoring data.
- P based antiscalent will be utilized at the plant, after previously discontinuing use. Antiscalent use is proportional to flow and increases P discharge by approximately 60%.

- Plant operating 5 days per week on average, or about 70% of the month (currently operating about 50-60% of the month)
- Outfall P concentrations conservatively estimated to increase by 50% from monitoring data.

The projected daily average P discharge is 0.35-1.10 lb/day, varying by month and plant capacity factor. The projected annual discharge from the existing plant, based on the available data, is 195.5-223.4 lb P/year. Additional, details are provided in *Appendix B*.

New West Riverside Expansion

The projected discharge from the new plant was calculated based on the plant and wastewater treatment system designs. Alliant Energy is constructing a recirculating sand filter system to treat wastewater from the new West Riverside Plant. The system is designed to remove phosphorus, zinc, chlorine, and TSS from the waste stream via settlement and sand filtration. Phosphorus removal will be enhanced with a Ferric chemical dosing system prior to the settling tanks. The system has been designed to provide total maximum TP concentrations of 0.05 mg/L, based on the systems design flows. This information was used to project the P discharge from the new West Riverside Plant. A summary of the calculation assumptions is below. Additional information is provided in *Appendix B*.

- West Riverside outfall flow is 65% of that of the existing Riverside plant for the same CF.
- Treatment of wastewater stream from West Riverside will achieve P concentrations of 0.05mg/L.
- Plant will operate 5 days per week on average, or about 70% of the month.

The projected daily average P discharge is 0.07-0.24 lb/day, varying by month and plant capacity factor. The projected annual discharge from the new plant is 39.2-44.8 lb P/year. Additional, details are provided in *Appendix B*.

Total Discharge

The projected total discharge from the combined plants was calculated to be 234.7-268.2 lb P/yr. The plant may discharge less P on an annual basis than the maximum allowable annual P discharge of 237.25 lb/yr. However, the plant is likely to exceed the monthly P limits most months of the year as is shown in the calculations in *Appendix B*.

1.5 Credit Need

Alliant Energy and MARS evaluated the existing and projected P discharges from the Riverside Facility to determine the total credit need from the trading program. Based on historic plant use and operations data the average daily discharge (by month) from the existing Riverside plant and new West Riverside expansion was estimated to be 0.49-1.23 lb/day (*Table 1* and *Appendix B*). Given the assumptions of the projections the plant is expected to exceed the monthly P discharge limit of 0.65 lb/day during most months of the year. Due to the uncertainties in plant operations due to varying electrical demand and plant operations the actual number of credits used on an annual basis is likely to vary from the projection. The anticipated credit need for the combined Riverside/West Riverside plant to meet the current WPDES permit limits is 0-105 lb P. Alliant intends to generate more credits than this estimate to provide a factor of safety and ensure sufficient credit availability in the future.

Table 1. Anticipated Credit Need for both Plants at 80% Capacity Factor

Month	Existing Riverside (lb/day)	West Riverside (lb/day)	Total (lb/day)	Permitted discharge (lb/day)	Credit need (lb/day)	Total Credits Needed*
Jan	0.91	0.17	1.08	0.65	0.43	9.42
Feb	0.91	0.18	1.09	0.65	0.44	8.84
Mar	0.93	0.20	1.13	0.65	0.48	10.50
April	0.40	0.08	0.49	0.65	-	-
May	1.10	0.19	1.28	0.65	0.63	13.94
Jun	1.02	0.19	1.20	0.65	0.55	11.61
Jul	0.90	0.24	1.14	0.65	0.49	10.70
Aug	0.99	0.22	1.21	0.65	0.56	12.23
Sep	1.03	0.20	1.23	0.65	0.58	12.24
Oct	0.70	0.10	0.80	0.65	0.15	3.25
Nov	0.57	0.12	0.69	0.65	0.04	0.79
Dec	0.93	0.19	1.12	0.65	0.47	10.44
				Total Credit Need: 103.95 lb **P**		

*- Assumes both plants operating 70% of the month

2 EXISTING LAND USE ANALYSIS

2.1 Existing Land Use

Two agricultural parcels, totaling approximately 112 acres located near the Riverside Energy Center have been identified for inclusion in the P trading program. The trading locations are shown in *Figure A2*. The largest parcel is 84 acres on the east side of S Walters Rd, South of WBR Townline Rd, adjacent to the existing Riverside Energy Center. The remaining 28 acres is located on the west side of S Walters Rd. Each parcel has been managed for row crop production continuously for at least the last decade.

The fields on the east side of S Walters Rd., adjacent to the Riverside Energy Center, have been owned by Alliant Energy and were leased to an agricultural operator between 2008 and 2017. The operator alternated no-till soybeans and winter wheat production in these field. Fertilizer application typically averaged 125 lb/ac of diammonium phosphate in the spring. No soil testing was conducted by the operator prior to the initiation of this project, and the fields were not part of an approved nutrient management plan.

The fields on the west side of S Walters Rd. were purchased by Alliant Energy from the Town of Beloit in 2016. Previously these fields were leased to an agricultural operator by the Town. Alliant Energy continued this lease through the 2017 growing season. The fields were under a variable corn grain – soybeans – wheat rotation. Additionally, the Town utilized these areas for municipal sludge disposal from the Town's wastewater treatment plant. Cropping records, sludge disposal records, and sludge analysis results for these fields were provided by the Town to MARS. A selection of these records is included in *Appendix B*. Fields received sludge applications in spring and/or fall, with application times and rates varying every year. The cropping and sludge application records were aggregated, and representative cropping rotation and nutrient application schedule was determined. The typical crop rotation over the period of record was determined to be 3-years corn -2 years soybeans - 2 years wheat. The average sludge application was 7,200 gal/ac/yr, which based on the sludge analysis results, amounted to 50 lb/ac/yr of P. Additionally, according to the town, 125 lb/ac of potassium sulfate and 50 lb/ac of ammonium phosphate were incorporated annually, with 100 lb/ac of ammonium nitrate added when wheat was planted.

2.2 Analysis Areas

The phosphorus trading areas were subdivided by the planned land use and restoration schedule. The planned land analysis areas are identified in *Figure A2*. Areas are either considered to be "operational" or "restorations". Operational areas include 18.2 acres of land owned by Alliant Energy being set aside for construction of an electrical substation to be owned by American Transmission Company (ATC), 33.3 acres of land for construction of the West Riverside Addition, 24.0 acres reserved to be a future solar array mixed with perennial vegetation, and a total of 32.7 acres of native prairie restoration. Areas were further subdivided by the intended construction schedule and intermediate land use. Field ID's, areas, a brief description of the final land use, intermediate land use (during plant construction), and final restoration date is provided in *Table 2*. Additionally, some areas adjacent to the Riverside Expansion construction will be utilized for construction laydown and/or parking.

Table 2. Analysis Areas and Proposed Land Use

Field ID	Area (ac)	Proposed Land Use	Intermediate Construction Use	Projected Final Restoration
*O1	6.0	Substation Expansion – removed from Trading analysis , 2023	Transmission Line Construction Laydown	2020
O2	12.2	ATC Kittyhawk Substation – removed from trading analysis, 2023	-	2019
O3-A	20.20	Plant Operational Area (plant buildings and parking)	-	2020
O3-B	3.82	Plant Operational Area (temporary parking and plant green space)	Trailer parking	2020
O3-C	4.79	Plant Operational Area (permanent stormwater facilities)	-	2018
O4	7.42	Greenspace (disturbed by plant construction but not developed)	-	2020
O5	21.9*	Future Solar Array with Perennial Vegetation	Parking and Laydown	2021
O6	1.7	Future Alliant Energy Substation	-	2019
R1	9.0	Native Prairie Restoration, "Southeast Green Space"	Laydown and Stockpiling	2018
R2	9.3	Native Prairie Restoration, "Southwest Green Space"	-	2020
R3	13.8*	Transmission Corridor, Native Prairie Restoration	Laydown and Parking	2021

Field O1 is planned to be seeded to perennial vegetation after its use as the transmission line construction laydown. This area is reserved for future substation expansion by ATC, though the exact schedule is unknown at this time. When that expansion occurs, this plan will be amended, and revised credit calculations will be provided to WDNR.

2.3 Soil Sampling

Soil sampling was conducted by MARS staff covering the entire area of planned development. Soil sampling was completed in three phases. Soil sampling was completed on 4/5/2016, 1/20/2017, and 5/11/18. Additionally, three soil samples were collected by Eco Resource Consulting (ERC) on 11/01/2017, as part of the restoration planning for field R2. These soil samples were included in the SnapPlus analysis as well. *Figure B1,* in *Appendix B* shows the approximate locations of all soil samples collected. All soil samples collected were analyzed at the UW Soil and Plant Analysis Lab (SPAL), except the samples collected by ERC, which were analyzed at Rock River Laboratories, Inc. Additional description of the soil sampling and analysis is provided below:

- A composite sample was collected on 04/05/2016 covering the fields adjacent to the West Riverside Expansion. A total of 17 sub-samples were collected and composited. This composite sample was applied to fields O3, O4, O5, O6, R1, and R3 in the SnapPlus analysis.

- On 1/20/2017 a second composite sample was collected on the land purchased by Alliant Energy from the Town of Beloit. A total of 12 sub-samples were collected and composited for analysis. The composite soil sample was applied to fields O1, O2, and R2 in Snap Plus analysis.

- As part of the restoration planning for the first phase of prairie planting ERC collected 3 soil samples in field R2.

- Much more extensive soil sampling conforming to UW Extension guidance (Document A2100) for soil sampling was completed on 5/11/2018. Composite soil samples consisting of 10 sub-samples were collected for every 5 acres of land to be evaluated. However, due to ongoing construction activities some areas were not accessible, or were heavily disturbed, and therefore were not sampled. A total of 9 samples were collected and analyzed covering fields O1, O2, R1, R2, and R3.

A summary of the soil samples collected and applied to each field in the SnapPlus analysis are provided below in *Table 3*, refer to *Figure B1* for locations and additional information.

Table 3. Soil Sample Summary by Field

Field ID	Soil Samples applied to Analysis	Notes
O1	1/20/17 Composite, 5/11/18: O1-1, O1-2	
O2	1/20/17 Composite, 5/11/18: O2-1, O2-2	May 2018 soil sampling access limited by substation construction, area analyzed in WinSLAMM so soil samples not used in P Trade Analysis
O3-A	4/5/16 Composite	May 2018 soil sampling access limited by plant construction, area analyzed in WinSLAMM so soil samples not used in P Trade Analysis
O3-B	4/5/16 Composite	
O3-C	4/5/16 Composite	
O4	4/5/16 Composite	May 2018 soil sampling access limited by plant construction
O5	4/5/16 Composite	May 2018 soil sampling access limited by plant construction
O6	4/5/16 Composite	May 2018 soil sampling access limited by plant construction, area analyzed in WinSLAMM so soil samples not used in P Trade Analysis
R1	4/5/16 Composite, 5/11/18: R1-1	May 2018 soil sampling access partially limited by plant construction
R2	1/20/17 Composite, 5/11/18: R2-1, R2-2, ERC Soil Samples 1, 2, and 3	
R3	4/5/16 Composite, 5/11/18: R3-1, R3-2	May 2018 soil sampling access partially limited by plant construction

Soil test P levels varied significantly across the site. The soils on the east side of Walters Rd with a relatively modest P application history, had relatively lower soil test P levels than the fields on the west side of S Walters Rd. Soil test analysis results are included in *Appendix B*.

2.4 Phosphorus Runoff Modeling Approach

Two modeling tools were used to evaluate P runoff and determine potentially tradeable phosphorus (PTP), SnapPlus V2 17.1 (build 18234.1413) and WinSLAMM v10.3.3. SnapPlus was designed for agricultural use while WinSLAMM is intended for urban land use analysis. WinSLAMM cannot account for differences in soil P content or ground slope, among other potential P export factors. However, SnapPlus cannot model runoff from urban landscapes or stormwater treatment facilities.

Credits were also calculated for areas converted from agricultural land use to developed areas, subject to NR216.Credit cannot be taken for reductions in P export required under other permits, therefore, only limited credits will be taken for the developed areas covered by a stormwater permit. Construction of the West Riverside Plant Expansion, the Alliant Energy Substation, and

Kittyhawk Substation are subject to stormwater management performance criteria described in NR151. There are no P reduction performance criteria explicitly described in NR151. However, newly developed sites are required to reduce total suspended solids (TSS) leaving the site by 80% on an annual average basis. WinSLAMM can be used to model TSS as well as total P and therefore a correlation between TSS and TP can be established. P credits were only generated for reductions greater than the required amount. Additional details of this calculation are provided in *Sections 3.3 and 3.4*.

2.5 Potentially Tradeable Phosphorus

SnapPlus 17.1 was utilized for determining the PTP (in lb. P exported from each field) from existing fields that are to be converted to future perennial vegetation. These areas can be seen in *Figure A3*, along with the identified critical slope. Alliant Energy elected not to include the sludge applications in the existing land use analysis in SnapPlus, as the sludge application is likely to be relocated within the watershed. Therefore, when analyzing the existing PTP, only chemical fertilizers were included in the crop rotation. Areas subject to NR 151 post construction stormwater management criteria were modeled in SnapPlus under existing conditions, however, these results were not used in the credit calculations. PTP available for trading credits is limited to 3.6 lbs/acre per the Rock River TMDL; see section 4.1 for details.

A summary of the modeling results is provided in *Table 4*. Values for years prior to 2023 have not been updated in the July 2023 revision but are included for historical reference. Two permit cycles were considered for the analysis, yielding an analysis period of 10 years. Detailed model input and output are provided in *Appendix C*.

Table 4. Existing Land Use Potentially Tradeable Phosphorus

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
O1	Area removed from trading plan, July 2023									
O2	Area removed from trading plan, July 2023									
O3-A	Area subject to NR 151 stormwater management performance criteria									
O3-B	Area subject to NR 151 stormwater management performance criteria									
O3-C	Area subject to NR 151 stormwater management performance criteria									
O4	13	12	13	13	13	13	14	14	14	14
O5	105.0	97.0	108.0	100.0	110.0	93	102	94	104	96
O6	Area subject to NR 151 stormwater management performance criteria									
R1	68	62	69	63	70	64	71	65	71	66
R2	61	64	73	184	127	82	90	60	64	29
R3	111.0	102.0	112.0	103.0	113.0	100	110	102	111	103

3 PROPOSED LAND USE ANALYSIS

3.1 Proposed Land Uses

Proposed land use on site includes land developed for both electric generating and distribution, as well as areas of native prairie restoration, as described in *Table 2* above and shown in *Figure A3*. These areas have been subdivided into "fields" based on the proposed land use and construction schedule. Each field was individually evaluated for P loss under the final proposed condition.

3.2 Design

Areas of Perennial Vegetation (Restoration Areas)

These areas will be restored and maintained in accordance with NRCS Conservation Practice Standard (327): Conservation Cover. All areas of perennial vegetative cover (O1, O4, O5, R1, R2, and R3) have been evaluated and restoration activities planned, based on the proposed construction schedule (*Section 4.4*). Some design details such as precise seed mixes, seed bed preparation, and seeding rates have not been evaluated at the time of the issuance of this report. Additional details will be developed as construction activities are completed on site. The areas of native restoration (R1, R2, and R3) will be evaluated by a trained ecologist for restoration methodology and seed mix selection.

Southeast, Southwest, and Transmission Corridor Green Spaces (R1, R2, R3):

Detailed seed bed preparation plans, and seed mixes has not been determined because these areas are expected to be heavily impacted by construction activities. A detailed investigation will be completed closer to the date of final restoration of each field. Field R2 will be the first area restored to native prairie and has been evaluated by Eco-Resource Consulting (ERC). Seed bed preparation and planting occurred in November 2017. The restoration methodology described by ERC is provided in *Appendix D*. Similar methodology will be used for the remaining areas of restoration as construction activities are completed. Final restoration plans for each area can be submitted to WDNR as an addendum to this report prior to restoration activities occurring and credits are generated from these areas. Area R1 may be partially utilized for solar arrays as well. See the description of the solar array restoration below. Since perennial vegetation will be established throughout the credit calculations are not affected.

Solar Array (O5):

The solar array has been included in the proposed areas of perennial vegetation evaluated in SnapPlus. Detailed designs have not been finalized on the array the final design of the solar array is being bid through and EPC (engineering, procurement, construction) contract. The contractor has not been selected at the time of this report. The intended design is to intermix perennial vegetation cover and potentially native species. At a minimum the area will be seeded with a perennial grass cover, such as WisDOT seed mix 40, that provides good cover and is somewhat drought and wet tolerant. The solar panels will provide sufficient ground cover in conjunction with the intermixed vegetation that risk of erosion is low. Additionally, traffic around the solar panels will be relatively low compared to plant operational areas and no P will be applied in these areas.

ATC Transmission Line Laydown/Future Expansion (O1):

Note: area O1 has been removed from the analysis as of this revision. The following text is retained for context

The ATC Laydown area will be used for material and equipment storage during transmission line construction and restored to perennial vegetation after. The transmission line construction will take place in 2019 with restoration of the laydown area occurring by the beginning of 2020. The area will be seeded with a perennial grass seed mix developed by ATC for long term restorations, referred to as ATC pasture mix. No P application will occur as part of the long-term

management of the area, only potential intermittent mowing to control annual weed growth. The seed mix is described below.

ATC Pasture Mix:

Seeding Rate: 40 lbs/acre
Orchard Grass - 14 lbs/acre
Tall Fescue - 14 lbs/acre
Festulolium - 4 lbs/acre
Tetraploid Perennial Ryegrass - 4 lbs/acre
Intermediate Ryegrass - 4 lbs/acre

The laydown area has been set aside for potential future expansion of the Kittyhawk Substation. There is no planned schedule for expansion currently. This area will be withdrawn from the P trading program, or the credit calculations modified if the substation expansion occurs.

Riverside Plant Green Space (O4):

The green space associated with the Riverside expansion will be landscaped and planted with a perennial grass type seed, WisDOT seed mix 40, or similar approved equivalent. No P fertilizers will be applied as part of the ongoing maintenance of the area, with regular mowing to control growth and maintain aesthetics.

Areas Draining to Stormwater Facilities (Operational Areas)

Runoff from areas of developed impervious surfaces (O2, O3, and O6) will be treated by stormwater facilities designed to meet regulatory requirements for water quality (Total Suspended Solids) treatment. WinSLAMM was used to evaluate the corresponding P removal in these stormwater facilities and total P export from each site. Additional information on the site and stormwater design of these areas is provided in *Appendix E.*

West Riverside Plant (O3):

Rain gardens adjacent to the parking areas provide potential for infiltration and sediment/P removal. Remaining runoff from the plant buildings, parking lots, driveways, and overflow from the rain gardens is captured by two vegetated swales on the east and west side of the plant. The

swales both drain to a wet pond on the south side of the plant, which provides additional settling time for sediment and P removal. The wet pond discharges to the south toward an intermittent stream leading toward the Rock River.

Kittyhawk Substation (O2):

Runoff from the proposed Kittyhawk Substation will be collected in vegetated swales on the east and west side of the substation. All water is then diverted to a wet pond at the southeast corner of the pad. The wet pond provides water quality treatment (P removal) via settling. Outflow from the pond is split between being directed toward an infiltration facility or directed toward the S Walters Rd right of way. The infiltration facility provides additional particulate and dissolved P removal via infiltration and plant uptake.

Alliant Energy Substation (O6):

The new proposed Alliant Energy substation has not yet been designed, and therefore stormwater facilities have not been sized. Additionally, due to the relatively small size of the area relative to the other portions of the property and the low potential for credit generation this area was not modeled and is not generating any P credits as part of this trading plan.

3.3 Proposed Conditions P Export – SnapPlus

As described in *Section 2.4*, two modeling methodologies were utilized for determination of the P export from each trading area under the proposed development conditions. Areas of proposed perennial vegetation cover were evaluated with SnapPlus to determine PTP. The same areas and critical slopes identified in the existing conditions analysis were used (*Figure A2*). The crop rotations were set to permanent grassland with no nutrient applications. The total calculated PTP under developed conditions for each field is provided in *Table 5*. Values for years prior to 2023 have not been updated in the July 2023 revision but are included for historical reference. Additional modeling details are provided in *Appendix B*.

Table 5. Proposed Land Use Potentially Tradeable Phosphorus

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
O1	Area removed from trading plan, July 2023									
O2	Area removed from trading plan, July 2023									
O3-A	Area subject to NR 151 stormwater management performance criteria									
O3-B	Area subject to NR 151 stormwater management performance criteria									
O3-C	Area subject to NR 151 stormwater management performance criteria									
O4	1	1	1	1	1	1	1	1	1	1
O5	4	4	3	3	3	3	3	3	3	3
O6	Area does not generate P trading credits, but is included in table for completeness									
R1	14	8	8	7	7	7	7	7	7	7
R2	25	23	21	20	20	20	20	20	20	20
R3	23	14	13	13	12	12	12	12	12	12

3.4 Proposed Conditions P Export – WinSLAMM

Developed areas with impervious land use and subject to NR151 stormwater management performance criteria were modeled using WinSLAMM to determine the potentially available P credits. The industrial land use was selected for the substations, and plant area within WinSLAMM. Stormwater facilities (detention ponds and infiltration facilities) were modeled as nodes receiving runoff from each contributing area. Additional input/output from the WinSLAMM analysis is provided in *Appendix C*. Results for the three sub areas of the plant (O3-A, O3-B, and O3-C) were combined as there were all analyzed within a single model.

P credits are only generated if P removal in the stormwater management facilities exceeds the permit requirements. Permit required P reductions were determined for each area using the WinSLAMM model output to calculate a correlation between total suspended solids (TSS) and Total Phosphorus (TP). A TP:TSS ratio was calculated for each area based on the modeled site outfall (i.e. treated runoff). The ratio varies because, different practices remove the P forms (i.e. particulate vs. dissolved) with varying levels of efficiency. Using the TP:TSS ratio, the permittable TP discharge from the site was calculated based on the NR151 required 80% TSS removal. The permittable P discharge was subtracted from the modeled P discharge to calculate the excess removal, and therefore the amount potentially available for credit. Additional information on

these calculations is provided in *Table 6* with a model input/output summary provided in *Appendix C*.

Table 6. Proposed Land Use Potentially Tradeable Phosphorus

Field ID	Discharge w/No Control Practices[1] (lb)		Discharge with Controls[1] (lb)		TP:TSS Ratio2	Permittable Discharge (lb)		**P** Removal beyond NR151 Requirements (lb)
	TSS	TP	TSS	**P**		TSS[3]	TP[4]	
O2	Area removed from trading plan, July 2023							
O3-A	8,567	31.7	131.1	0.39	1:336	1,713	5.1	4.7
O3-B								
O3-C								

1. From WinSLAMM Modeling
2. Calculated from pollutant runoff WinSLAMM results with runoff controls.
3. Based on 80% TSS reduction required by NR151 compared to no controls.
4. Calculated from TP:TSS ratio

4 CREDIT ANALYSIS

4.1 Rock River TMDL

The Riverside Energy Center Outfall and water quality trading fields lie within the Rock River Watershed, thereby subject to the approved Rock River TMDL (approved by USEPA in 2012). These fields fall within Sub-basin 79 as delineated within the TMDL. According to Appendix H of the Rock River TMDL, non-point sources contributing to Reach 79 are required to reduce TP loads by 40% from baseline. The assumed baseline loading for agricultural fields is equivalent to a Phosphorus Index (PI) of 6. Given the required reduction of 40%, the credit threshold for these fields is 3.6 lb P/ac/yr. Only reduction of P losses from fields below 3.6 lb/ac/yr will generate long term credits. The reduction in P losses above 3.6 will generate interim credits (only available in the first 5 years of the practice).

This trading plan quantifies the generation of both long term and interim credits from conversion of land out of agricultural use.

4.2 Trade Ratios

Individual trade ratios were calculated for each field based on the guidance documents. Each of the five factors was considered in calculation of the final trade ratio for each field. For several fields that are to be restored to native prairie or other perennial vegetation, the WDNR mandated minimum trade ratio of 1.2:1 was determined to be appropriate. A brief discussion of the evaluation for each of the factors is provided below, while the final trade ratio calculated for each field is provided in *Table 7*.

Delivery - All fields and the discharge outfall are located within the same HUC 12, so the factor does not apply.

Downstream – All fields on the east side of S Walters Rd. discharge to effectively the same location on the Rock River near the Riverside outfall. The fields to the west side of Walter's road drain to culverts under the roadway, directing runoff to the roadside ditch and across the trading areas on the east side of the road. Therefore, the downstream factor does not apply to any of the trading areas.

Equivalency – The proposed traded nutrients are the same form (TP to TP); the factor does not apply.

Uncertainty – Runoff from the plant operations areas and the substations will be treated with structural stormwater facilities (factor of 2), while the prairie restoration and greenspace areas are considered conservation easements (factor of 1).

Habitat – No proposed habitat adjustments, so the factor does not apply.

Table 7. Trade Ratios

Field ID	Delivery	Downstream	Equivalency	Uncertainty	Habitat	*Final Trade Ratio
O1: ATC Laydown	-	-	-	1	-	1.2:1
O2: ATC Substation	-	-	-	2	-	2.0:1
O3-A: Plant Operational Area	-	-	-	2	-	2:1
O3-B: Plant Stormwater Facilities	-	-	-	2	-	2:1
O3-C: Plant Green Space	-	-	-	2	-	2:1
O4: Offsite Plant Greenspace	-	-	-	1	-	1.2:1
O5: Solar and Green Space	-	-	-	1	-	1.2:1
O6: Substation	-	-	-	2	-	2:1
R1: SE Green Space	-	-	-	1	-	1.2:1
R2: SW Green Space	-	-	-	1	-	1.2:1
R3: Transmission Green Space	-	-	-	1	-	1.2:1

*WDNR minimum allowable trade ratio is 1.2:1

4.3 Construction and Implementation Timeline

Credits only become available after the practices have been installed, fully established, and reported to WDNR. To maximize credit availability as soon as possible, each parcel will be brought into the trading program when development on each is completed and ground cover established, rather than waiting until the whole area is fully developed. The intended construction schedule is described below.

2017: Construction activities begin on West Riverside Addition and ATC Kittyhawk Substation (O1, O2, O3, and O4). Areas south of the pad are used for construction time parking, laydown, and stockpiling (R1, R3, and O5).

December 2017: Prepare soil and seed of southwest greenspace native prairie restoration; schedule to be dependent on soil and weather conditions and contractor availability (R2).

Summer 2018: Restore stormwater facilities treating runoff from the West Riverside Plant (O3-B), and complete grading activities and seeding of pervious areas and stormwater facilities adjacent to Kittyhawk Substation (O2). Construction of Alliant Energy Substation (O6).

Fall 2018: Complete construction of Alliant Energy Substation (O6).

Spring 2019: Complete construction on Kittyhawk Substation (O2). Use of ATC Laydown area for transmission line construction begins (R2).

Spring 2020: Complete construction of West Riverside (O3-A, O3-B) and restore offsite greenspace areas immediately east of West Riverside Expansion (O4).

Fall 2020- Spring 2021: Restore native prairie of transmission line corridor (R3), construction of solar array area (O5), and the restoration of the southeast green space area (R1).

January 2022: All areas of trading plan generating credits.

4.4 Timeline of Total Credit Availability

The total credits available for each field were calculated as the difference between the existing PTP and the proposed PTP, divided by the trade ratio. The available credit for each year was then determined based on the projected project timeline. The existing PTP was determined as the lower of the calculated PTP (Table 4) or a rate of 3.6lbs/ac as required by the Rock River TMDL (see section 4.1).

A timeline of total credit availability was created based on the projected construction schedule described in *Section 4.3*. It was generally assumed that credits will become available the beginning of the year following vegetation establishment. As described in *Section 4.1*, interim credits are generated as part of this plan. Long term credits and interim credits available are shown in *Tables 8 and 9* respectively. Values for years prior to 2023 have not been updated in the July 2023 revision but are included for historical reference. When the entire area is fully developed and the plant fully operational in 2021, 160-163 credits will available for trading (*Table 10*). The variability in the total credits generated is due to the comparison of the continuous vegetative cover under the proposed condition (consistent P loss) compared to continuation of the existing cropping rotations which have variable P loss across the analysis period. Areas modeled within

WinSLAMM generate the same number of credits every year. Additional details of the credit calculations are provided in *Appendix F*.

Table 8. Long Term Credits

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
O1	Area removed from trading plan, July 2023									
O2	Area removed from trading plan, July 2023									
O3-A			1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
O3-B			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
O3-C		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
O4				10.0	10.0	10.0	10.9	10.9	10.9	10.9
O5					69.3	63.2	63.2	63.2	63.2	63.2
O6	Area does not generate P trading credits, but is included in table for completeness									
R1					20.9	20.9	20.9	20.9	20.9	20.9
R2	6.8	8.8	10.1	10.7	11.1	11.3	11.4	11.5	11.5	7.7
R3					32.9	31.6	31.6	31.6	31.6	31.6
Total	6.8	10.3	26.8	37.9	161.5	139.4	140.4	140.5	140.5	136.7

Table 9. Interim Credits

Field ID	2018	2019	2020	2021	2022
O1			15.3	20.3	7.8
O5					11.8
R1					31.4
R2	23.1	25.8	32.9	125.4	77.9
Total	23.1	25.8	48.2	145.7	128.9

Table 10. Total Projected Credits Generated By Year

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Interim	23.1	25.8	48.2	145.7	128.9					
Long Term	6.8	10.3	26.8	37.9	161.5	139.4	140.4	140.5	140.5	136.7
Total	29.9	36.1	75.0	183.6	290.4	139.4	140.4	140.5	140.5	136.7

5 PROPOSED COMPLIANCE APPROACH

5.1 Inspections

To generate water quality trading credits, the proposed management practices need to be installed and maintained per WDNR or Natural Resource Conservation Service (NRCS) Conservation Practice Standards (CPS). Relevant CPS to this site are identified in *Table 10*.

Table 10 –Conservation Practice Standards

NRCS Conservation Practice Standard	Number
Conservation Cover	327
WDNR Post Construction Technical Standard	Number
Bioretention for Infiltration	1004
Infiltration Basin	1003
Wet Detention Pond	1001

Areas of native prairie restoration will be inspected via meander survey a minimum of twice per year the first two years of growth. After the initial period of establishment, the fields will be inspected via meander survey annually in August by a qualified expert. Mowing, herbicide treatments, burning, or other maintenance will be performed based on recommendations provided to Alliant Energy. Additional details are provided in the Installation and Maintenance plan in *Appendix D*.

A registered engineer will annually inspect all stormwater facilities and drainage features for the West Riverside Expansion, Kittyhawk Substation, and any other stormwater management facilities installed on the areas included in this trading plan. Inspections will include identification of sediment accumulation in stormwater facilities, proper vegetation establishment in ponds and infiltration facilities, verification of good vegetative cover and proper function of drainage swales, inspection of drainage culverts to ensure good function, and identification of any areas of significant erosion.

Practices will need to be registered with DNR after installation and records of inspection maintained. Annual submittals shall be provided to DNR certifying the practice is in place, including the previous year's inspection reports.

5.2 Reporting

Practice Registration

Management practices will not produce credits until fully established and registered with WDNR. As construction of areas of the proposed development are completed and restoration areas established, Alliant Energy will file completed Registration Form 3400-207 separately from this plan. A blank form is provided in *Appendix F*.

Approved stormwater management plans for the developed areas will be provided upon practice registration. The WinSLAMM modeling described in this report is based on the designed stormwater facilities which meet NR 151 performance criteria. However, at the time of issuing this report the final stormwater management plan for the West Riverside Expansion Plant area are being revised and has not been finalized.

Certification

Each month when the discharge report is filed with WDNR, Alliant Energy staff will certify that the management practices identified in this plan, and registered as described above, are installed and functioning as intended.

Inspection Reporting

Inspection reports for all practices will be created by Alliant Energy, or a contractor authorized by Alliant Energy, on an annual basis and for their own records. At a minimum, inspection reports shall include documentation of the condition of all practices, any issues identified, as well as a description of any recommended repairs or maintenance to be conducted. Inspection reports will be included in the annual Water Quality Trading Report submitted to WDNR. Final stormwater reports covering the stormwater facilities generating credits as part of this plan as part of the annual water quality trading report provided to DNR. A copy of the current approved stormwater plans for areas generating P from stormwater facilities (O2 and O3) are provided in *Appendix H*.

Notification of Practice Failure

In the event any practices described in this plan fail in such a manner that the intended P credits are not being generated, Alliant Energy staff or a contracted representative shall notify WDNR staff of the failure by telephone within 24 hours or learning of the failure. Within 5 working days of learning of the failure, written notice shall be provided to WDNR. The notice shall include a description of the failure and why the intended P credits are not being generated. Additionally, any planned maintenance or repairs required to reestablish the generation of credits from the practice will be provided with 5-day written notice.

In Event Insufficient Credits are Generated

In the event that insufficient credits are generated to meet permit needs due to practice failure or other unanticipated events, Alliant may modify or curtail plant operations to meet stated permit limits. This may include reduced operation, reduced discharge, increased treatment system cycling, or changes in conditioning additives.

Water Quality Trading Report

A water quality trading report shall be prepared and submitted to WDNR by January 31. The report shall include a description of the credits used each month, inspection reports for all practices generating credits in the previous year, and a description of any occurrences of non-compliance or practice failures in the previous year.

Right to Inspect

Any duly authorized officer, employee, or representative of WDNR shall have the right to access and inspect the credit generating areas included in the trading plan pursuant to Wis. Stat. § 283.55(2), so long as the Alliant Energy trade agreement with WDNR and this plan are in effect. A minimum of 48-hours' notice shall be provided to Alliant Energy to ensure that proper safety training can be scheduled and provided to any persons visiting the site.

Trade Agreement

Pursuant s. 283.84(1), Wis. Stats, a trade agreement is required to be in place prior to using trading to help demonstrate compliance with the final phosphorus limits. Alliant Energy will be

generating the credits themselves and therefore a trade agreement is being developed that will be entered by Alliant Energy and WDNR. This agreement is being developed concurrently at the time of the development of this plan. The agreement will be finalized prior to conditional approval of this plan.

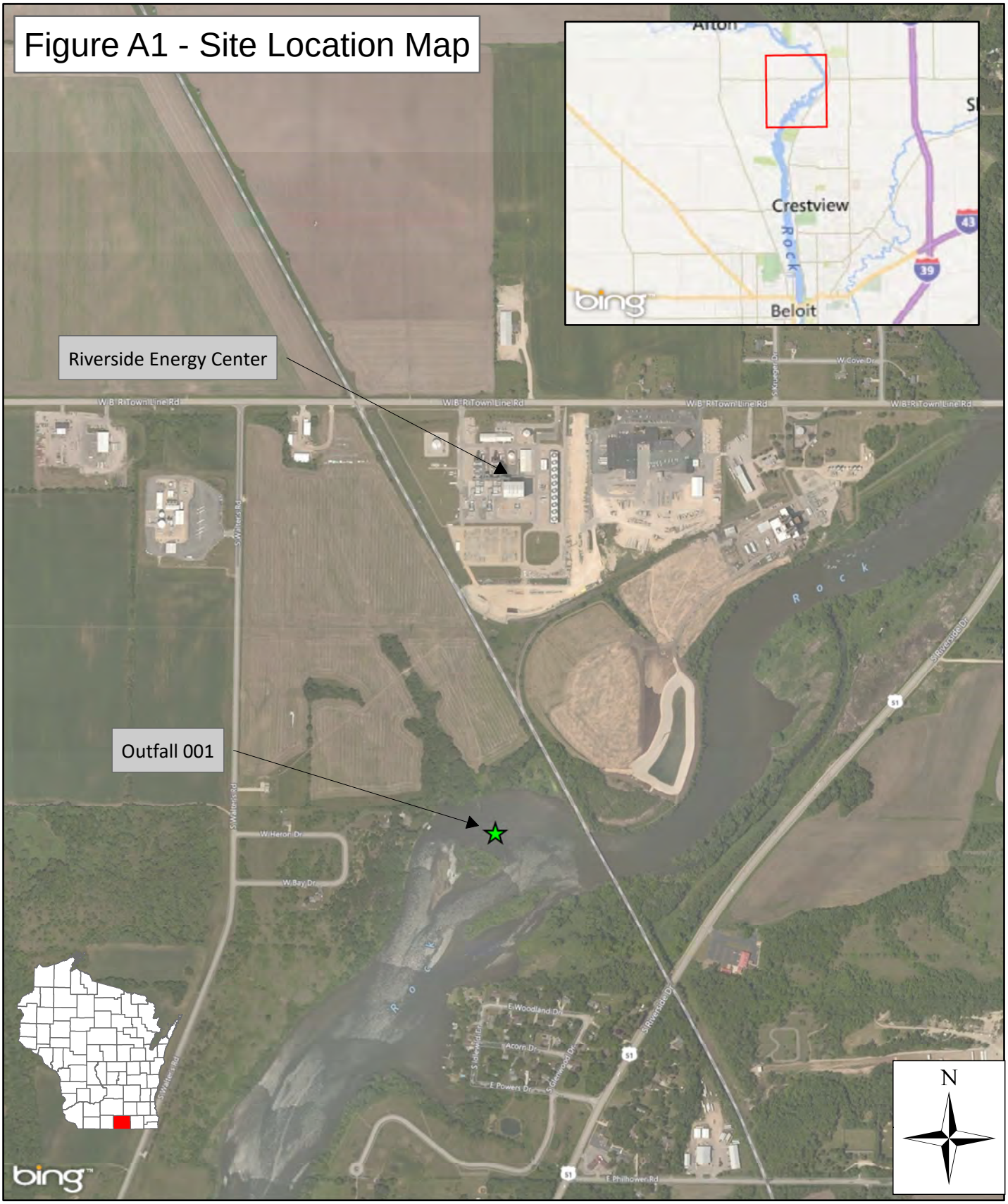
APPENDIX A

FIGURES

Riverside Energy Center P Trading Plan
Town of Beloit, Rock County, WI
Alliant Energy WP&L

Montgomery Associates:
Resource Solutions, LLC
119 South Main St.
Cottage Grove, WI 53527

Figure A1 - Site Location Map

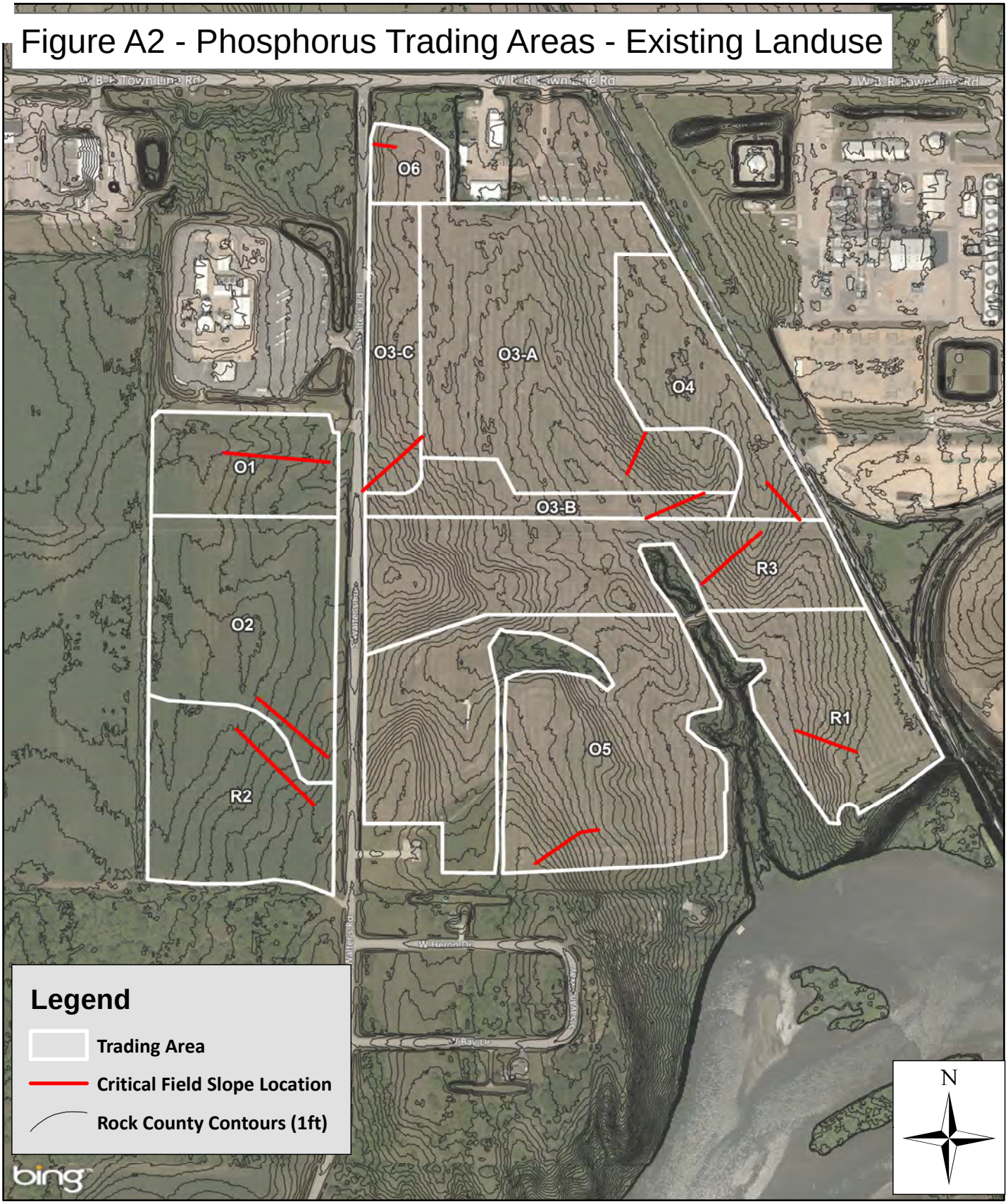


November 2017

Riverside Energy Center P Trading Plan
Town of Beloit, Rock County, WI
Alliant Energy WP&L

Montgomery Associates:
Resource Solutions, LLC
119 South Main St., Suite A
Cottage Grove, WI 53527

Figure A2 - Phosphorus Trading Areas - Existing Landuse



November 2017

0 250 500 1,000 Feet

Riverside Energy Center P Trading Plan
Town of Beloit, Rock County, WI
Alliant Energy WP&L

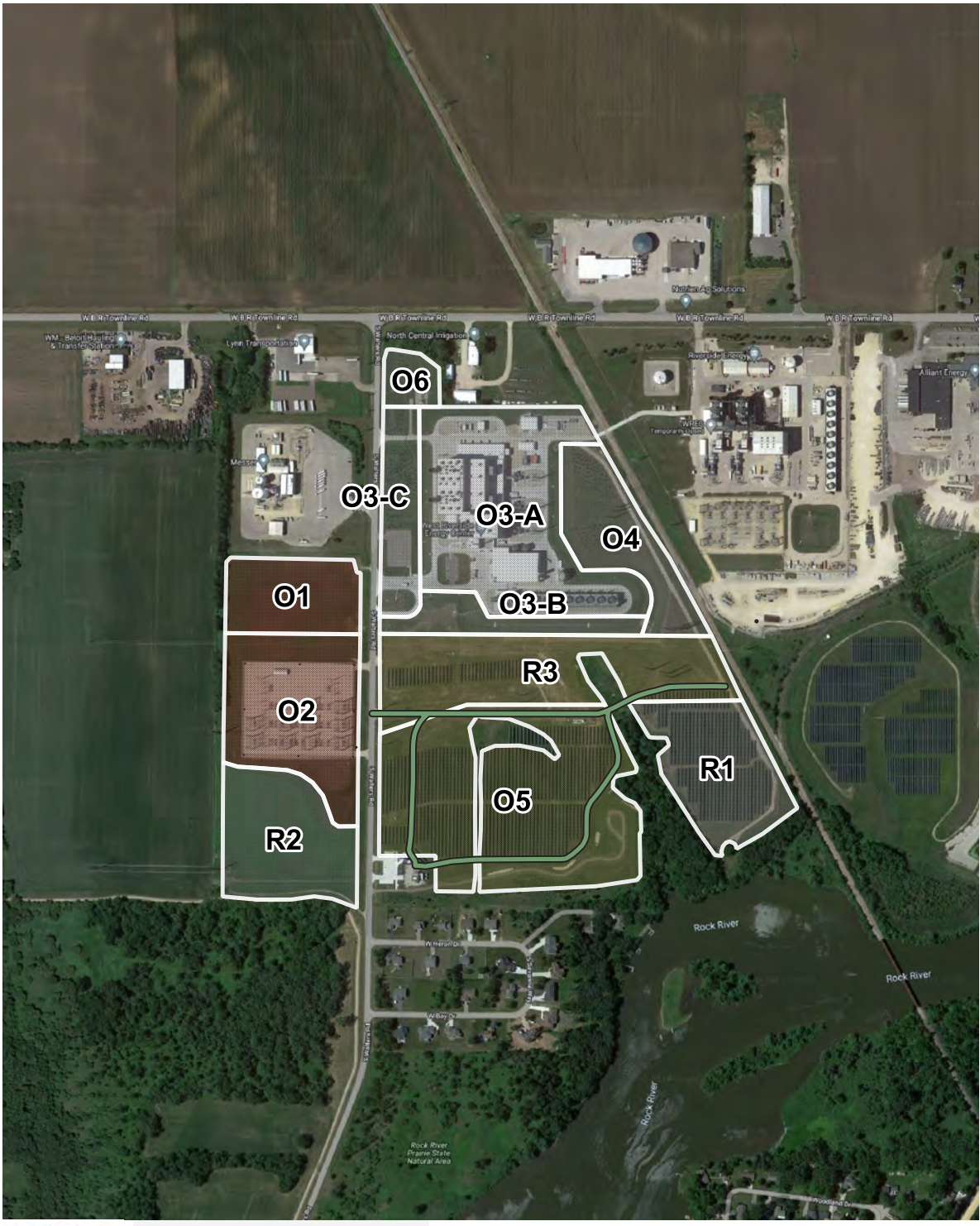
Montgomery Associates:
Resource Solutions, LLC
119 South Main St., Suite A
Cottage Grove, WI 53527

Figure A3 - Phosphorus Trading Areas - Proposed Land Use



November 2017

0 250 500 1,000 Feet



Areas
Trading
Updated
Layout: Murdock
Author: Evan
2023-07-21T13:51:30.161
Document Path: P:\1530-6000 Alliant Energy Miscellaneous Projects\6013 Riverside WQT 2023 Update\GIS\Mapping.qgz
Date:

EOR water ecology community

Trading_areas

- Removed from trading plan
- Reduced in area
- Unchanged from previous plan
- Proposed new paved area

Riverside Water Quality Trading Plan

Updated Trading Areas

July 2023

N

0 250 500 ft

APPENDIX B

DATA

Soil Testing Results

Samples Analyzed By:
Soil & Forage Analysis Lab
2611 Yellowstone Dr
Marshfield, WI 54449
phone: (715) 387-2523

SOIL TEST REPORT

COOPERATIVE EXTENSION
University of Wisconsin-Extension
University of Wisconsin-Madison
Department of Soil Science

Results also available on-line at http://uwlab.soils.wisc.edu/reports
lab number: 2112 access code: zvy6x

LAB #: 2112

This Report is for:
Ryan Stenjem

Montgomery Associates-Resource Solutions - Ryan Stenjem
119 S Main St
Cottage Grove, WI 53527

County	Account No.
Rock	558424

Date Received	Date Processed
4/12/2016	4/13/2016

Slope	Acres	Plow Depth	Irrigated
4%	81	12"	No

Soil Name: Lorenzo — loamy soil/medium yield potential
Tiled: No
Field Name: 101
Previous Crop: Soybean, grain

NUTRIENT RECOMMENDATIONS

Cropping Sequence	Yield Goal	Crop Nutrient Need N (lbs/a)	Crop Nutrient Need P2O5 (lbs/a)	Crop Nutrient Need K2O (lbs/a)	Fertilzer Credit Legume N (lbs/a)	Fertilzer Credit Manure N (lbs/a)	Fertilzer Credit P2O5 (lbs/a)	Fertilzer Credit K2O (lbs/a)	Nutrients to Apply N (lbs/a)	Nutrients to Apply P2O5 (lbs/a)	Nutrients to Apply K2O (lbs/a)
	per acre										
Soybean, grain	36-45 bu	0	60	85	0	0	0	0	0	60	85
Wheat, grain + straw	61-80 bu	see below	75	120	0	0	0	0	see below	75	120
Soybean, grain	36-45 bu	0	60	85	0	0	0	0	0	60	85
Wheat, grain + straw	61-80 bu	see below	75	120	0	0	0	0	see below	75	120

The lime required for this rotation to reach pH 6.3 is 2 T/a of 60-69 lime or 1.5 T/a of 80-89 lime.

SUGGESTED N APPLICATION RATES FOR WHEAT AT DIFFERENT N:WHEAT PRICE RATIOS

Loamy Soils

Previous Crop	PPNT	N:Wheat Price Ratio ($/lb N:$/bu) 0.05 Rate	0.05 Range	0.075 Rate	0.075 Range	0.1 Rate	0.1 Range	0.125 Rate	0.125 Range
		lb N/a (Total to Apply)[1]							
Corn	< 50[2] or none	75	65-85	70	55-80	60	50-70	55	40-65
Corn	51 to 100	45	35-55	40	30-50	35	25-40	30	20-35
Corn	> 100	0	0-0	0	0-0	0	0-0	0	0-0
Soybean, Small grain	All[3]	55	45-65	50	40-60	45	35-50	40	35-45

[1] On loamy soils with < 2% organic matter, add 30 lb N/a to all rates. On soils with more than 10% organic matter, reduce rates by 30 lb N/a. Reduce N rates by 10 lb N/a for spring wheat on all soils. No N is required on organic soils. Manure N credits must be subtracted from these values.
[2] If wheat follows a forage legume or leguminous vegetable, use the MRTN rate for wheat following corn with PPNT < 50 and take the legume credit.
[3] Previous crop soybean or small grain: If a PPNT is taken and the PPNT is < 50 lb N/a, use the top end of the profitable range; if the PPNT is 51 to 100 lb N/a, use the bottom end of the profitable range; if the PPNT is > 100 lb N/a, no additional N is needed. Do not take a soybean legume credit.

For more information on the new N application rate guidelines for wheat see http://uwlab.soils.wisc.edu/pubs/MRTN/

ADDITIONAL INFORMATION

Parts of this field may not benefit from liming. Please see the unadjusted lime requirements in the Laboratory Analysis section below.

If lime has been applied in the last two years, more lime may not be needed due to incomplete reaction.

Recommended rates are the total amount of nutrients to apply (N-P-K), including starter fertilizer.

SOIL TEST INTERPRETATION FOR CROPPING SEQUENCE

	Very Low	Low	Optimum	High	Very High	Excessive
Phosphorus	PPPPPPPPPPPPPPPPPPPPPPPPPPPPP					
Potassium	KKKKKKKKKKKKKKKKKKKKKKKKK					
Rotation pH	XXXXXXXXXXXXXXXXXXXXXXXX					

LABORATORY ANALYSIS

Sample Identification	Soil pH	O.M %	Phosphorus ppm	Potassium ppm	60-69 Lime Req (T/a)	Calcium ppm	Magnesium ppm	Est. CEC (cmol/kg)	Boron ppm	Manganese ppm	Zinc ppm	Sulfate-Sulfur ppm		Texture Code	Sample Density	Buffer pH
1	5.5	2.5	27	136	3.4									2	1.19	6.6
2	6.3	2.1	7	68	0									2	1.22	6.9
Adjusted Averages	5.9	2.3	17	102												

Notes:
Composite Samples For Fields O3, O4, O5, O6, R1, and R3
Sample 1 - Top 8" of soil profile
Sample 2 - 8-12" depth of soil profile

Samples Analyzed By:
Soil & Forage Analysis Lab
2611 Yellowstone Dr
Marshfield, WI 54449
phone: (715) 387-2523

SOIL TEST REPORT

COOPERATIVE EXTENSION
University of Wisconsin-Extension
University of Wisconsin-Madison
Department of Soil Science

Results also available on-line at http://not available
lab number: 1110 access code: 653pk

LAB #: 1110

County	Account No.
Rock	558424

Date Received	Date Processed
1/20/2017	1/23/2017

Montgomery Associates-Resource Solutions - Ryan Stenjem
119 S Main St
Cottage Grove, WI 53527

This Report is for:
Ryan Stenjem

Slope	Acres	Plow Depth	Irrigated
3%	30	12"	No

Soil Name: Lorenzo — Tiled: No
loamy soil/medium yield potential
Field Name: 101
Previous Crop: Soybean, grain

NUTRIENT RECOMMENDATIONS

Cropping Sequence	Yield Goal	Crop Nutrient Need N	Crop Nutrient Need P2O5	Crop Nutrient Need K2O	Legume N	Fertilzer Credit Manure N	Fertilzer Credit P2O5	Fertilzer Credit K2O	Nutrients to Apply N	Nutrients to Apply P2O5	Nutrients to Apply K2O
	per acre	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a
Corn, grain	151-170 bu	see below	0	75	0	0	0	0	see below	0	75
Soybean, grain	46-55 bu	0	0	100	0	0	0	0	0	0	100
Corn, grain	151-170 bu	see below	0	75	0	0	0	0	see below	0	75
Soybean, grain	46-55 bu	0	0	100	0	0	0	0	0	0	100

There is no lime recommendation.

SUGGESTED N APPLICATION RATES FOR CORN (GRAIN) AT DIFFERENT N:CORN PRICE RATIOS

Previous Crop — Medium Yield Potential Soils	0.05 Rate[1]	0.05 Range	0.10 Rate[1]	0.10 Range	0.15 Rate[1]	0.15 Range	0.20 Rate[1]	0.20 Range
	N:Corn Price Ratio ($/lb N:$/bu) — lb N/a (Total to Apply)[2]							
Corn, Forage legumes, Leguminous vegetables, Green manures[3]	145	130-160	125	115-140	115	105-125	105	95-110
Soybean, Small grains[4]	130	110-150	100	85-120	85	70-95	70	60-80

[1] Rate is the N rate that provides the maximum return to N (MRTN). Range is the range of profitable N rates that provide an economic return to N within $1/a of the MRTN.
[2] These rates are for total N applied including N in starter fertilizer and N used in herbicide applications.
[3] Subtract N credits for forage legumes, leguminous vegetables, green manures and animal manures. This includes 1st, 2nd and 3rd year credits where applicable. Do not subtract N credits for leguminous vegetables on sand and loamy sand soils.
[4] Subtract N credits for animal manures and 2nd year forage legumes.

Guidelines for choosing an appropriate N application rate for corn (grain)

1) If there is more than 50% residue cover at planting, use the upper end of the range.
2) If 100% of the N will come from organic sources, use the top end of the range. In addition, up to 20 lb N/a in starter fertilizer may be applied in this situation.
3) For medium and fine textured soils with 10% or more organic matter, use the low end of the range; for medium and fine textured soils with less than 2% organic matter, use the high end of the range.
4) If there is a likelihood of residual N, then use the low end of the range or use the high end of the range and subtract preplant nitrate test (PPNT) credits.
5) For corn following small grains on medium and fine textured soils, the middle to low end of the range is most appropriate.

For more information on the new N application rate guidelines for corn see http://uwlab.soils.wisc.edu/pubs/MRTN/

ADDITIONAL INFORMATION

Recommended rates are the total amount of nutrients to apply (N-P-K), including starter fertilizer.

Starter fertilizer (e.g. 10+20+20 lbs N+P_2O_5+K_2O/a) is advisable for row crops on soils slow to warm in the spring.

Because of excessively high P levels, no P_2O_5 fertilizer or manure is recommended on this field.

Year 1,3: If corn is harvested for silage instead of grain apply extra 90 lbs K_2O per acre to next crop.

SOIL TEST INTERPRETATION FOR CROPPING SEQUENCE

Very Low | Low | Optimum | High | Very High | Excessive

Phosphorus PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
Potassium KKKKKKKKKKKKKKKKKKKK
Rotation pH XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

LABORATORY ANALYSIS

Sample Identification	Soil pH	O.M %	Phosphorus ppm	Potassium ppm	60-69 Lime Req (T/a)	Calcium ppm	Magnesium ppm	Est. CEC (cmol/kg)	Boron ppm	Manganese ppm	Zinc ppm	Sulfate-Sulfur ppm		Texture Code	Sample Density	Buffer pH
1	6.1	1.9	280	80	0									2	1.18	6.7
Adjusted Averages	6.1	1.9	280	80												

Notes:
Composite Samples For Fields O1, O2, and R2
Sample 1 - Top 12" of soil profile

Soil Test Report - Field: Alliant SW Green Spa

ROCK RIVER LABORATORY, INC.
AGRICULTURAL ANALYSIS

Account: 1913
Eco-Resource Consulting, Inc.
2554 County Road N
Stoughton, WI 53589

Report For:
PN 17165 MARS Beloit/Alliant Restoration

Town Line Road
Beloit, WI 53511

Lab #204803
County ROCK

Received 11/1/2017
Slope 0%
Field
Alliant SW Green Spa
Acres
Plow Depth 7.0
Soil Name
unknown
Previous Crop
Soybean, grain

Nutrient Recommendations

Cropping Sequence	Yield Goal (per acre)	Crop Nutrient Need (lbs/acre)			Fertilizer Credit (lbs/acre)				Nutrients to Apply(lbs/acre)		
		N	P2O5	K2O	Legume N	Manure N	P2O5	K2O	N	P2O5	K2O
CRP, grass	n/a	0	0	45	20	0	0	0	0	0	45

There is no lime recommendation. Please see Additional Information below.

Laboratory Analysis for Field Alliant SW Green Spa, Lab No 204803

Sample Num	Soil pH	Om %	P ppm	K ppm	60-69 Lime Req(T/a)	Ca ppm	Mg ppm	Est Cec	B ppm	Mn ppm	Zn ppm	Sulfate-S ppm	Texture Code	Sample Density	Buffer Code
1	7.0	1.7	99	83		1220	373	10					2	1.13	N.R.
2	5.1	1.8	368	37	2.8	751	125	5					2	1.21	6.4
3	5.7	0.9	111	44		540	126	5					1	0.96	6.7
Adj Avg	**5.9**	**1.5**	**193**	**41**		**837**	**208**								

Additional Information, Secondary & Micronutrient Recommendations

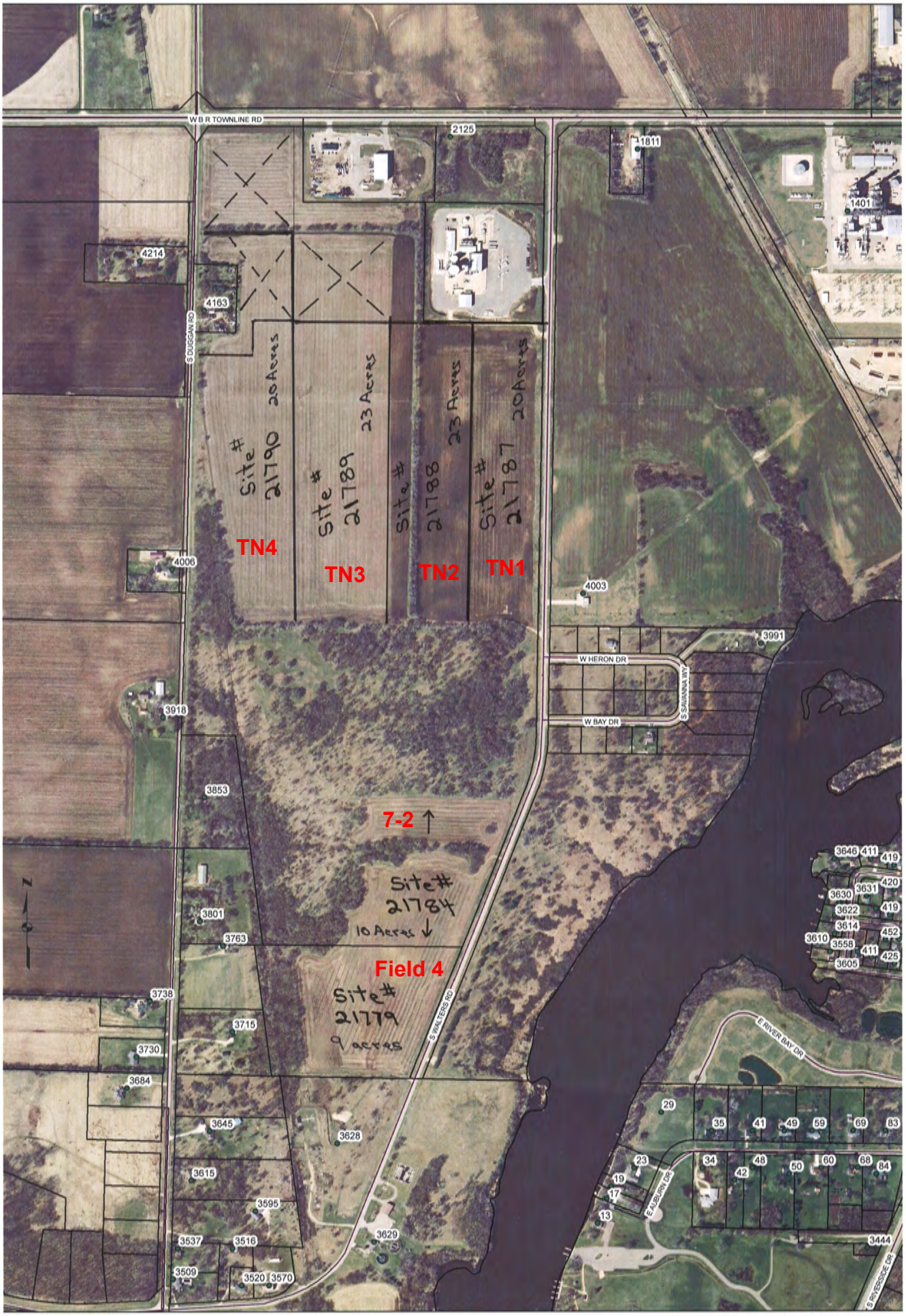
First year legume N credit is based on a previous poor stand of soybean, grain with less than 8" of regrowth, as specified on sample submission form.
N.R.=Not required for calculation of lime requirement when soil pH is 6.6 or higher.
Because of excessively high P levels, no P2O5 fertilizer or manure is recommended on this field.
Parts of this field may benefit from liming. Please see the unadjusted lime requirements in the Laboratory Analysis section below.
Recommended rates are the total amount of nutrients to apply (N-P-K), including starter fertilizer.
For CRP crops in the seeding year only, apply some nitrogen (15–30 lb N/a). See table 6.3 in publication A2809 for specific rates.
Nitrogen rate guidelines for corn can not be provided without knowledge of the soil series or county/soil map unit. Please consult Chapters 4 and 6 in UWEX Publication A2809 for more detail.
Ca - Opt Mg-Opt
%Base Saturation: Ca 69.8% Mg 28.4% K 1.7%
1: NO3=3.02ppm
2: NO3=10.92ppm
3: NO3=2.61ppm
Response to added Ca is unlikely.
Soil Mg is optimum. Maintain level with dolomitic lime.

Test Interpretation for Field Alliant SW Green Spa, Lab No 204803

Crop Name	Very Low	Low	Optimum	High	Very High	Excessive	Very Low	Low	Optimum	High	Very High	Excessive
CRP, grass	P						K					
Rotation pH	pH											

Notes:
Samples For Field R2

Sludge Hauling Records



Batterman
engineers surveyors planners

1 inch = 500 feet

SLUDGE HAULING RECORDS FOR 2004

Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/27/04	23,000	TN-1	corn	16,341
05/28/04	18,400	TN-1	corn	13,073
06/29/04	10,200	TN-1	corn	9,253
06/30/04	23,000	TN-1	corn	20,864
07/07/04	27,600	TN-1	corn	17,373
07/08/04	11,500	TN-1	corn	7,239
07/12/04	18,400	TN-1	corn	9,553
07/13/04	16,100	TN-1	corn	8,359
07/14/04	23,000	TN-1	corn	11,941
08/18/04	23,000	TN-1	corn	11,061
08/19/04	18,400	TN-1	corn	8,849
08/20/04	16,100	TN-1	corn	7,743
08/23/04	23,000	TN-1	corn	14,068
08/24/04	23,000	TN-1	corn	14,068
09/13/04	20,700	TN-1	corn	11,444
09/14/04	20,700	TN-1	corn	11,444
09/15/04	16,100	TN-1	corn	8,901
09/21/04	23,000	TN-1	corn	25,036
11/02/04	11,500	TN-1	corn	26,384
11/08/04	20,700	TN-1	corn	14,180
11/09/04	16,100	TN-1	corn	11,029
11/10/04	23,000	TN-1	corn	15,205
11/11/04	13,800	TN-1	corn	9,123

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-1	440,300	20	22,015	15,126
Total Gallons	440,300			

SLUDGE HAULING RECORDS FOR 2005

Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/09/05	10,000	TN-3	Corn	17,773
05/10/05	5,000	TN-3	Corn	8,887
05/24/05	20,700	TN-3	Corn	11,374
05/25/05	25,300	TN-3	Corn	13,902
05/26/05	29,900	TN-3	Corn	10,200
05/27/05	29,900	TN-3	Corn	10,200
05/31/05	27,600	TN-3	Corn	12,262
06/01/05	23,000	TN-3	Corn	10,218
06/02/05	23,000	TN-3	Corn	14,620
06/03/05	23,000	TN-3	Corn	14,620
06/06/05	16,100	TN-3	Corn	11,088
06/13/05	29,900	TN-3	Corn	20,592
06/14/05	23,000	TN-3	Corn	21,928
06/15/05	9,000	TN-3	Corn	8,580
06/16/05	23,000	TN-3	Corn	20,134
06/17/05	23,000	TN-3	Corn	20,134
10/03/05	34,500	TN-3	Corn	9,857
10/04/05	34,500	TN-3	Corn	9,857
10/05/05	23,000	TN-3	Corn	6,571
10/06/05	32,000	TN-3	Corn	11,401
10/07/05	36,400	TN-3	Corn	12,968
10/10/05	39,100	TN-3	Corn	15,836
10/11/05	29,300	TN-3	Corn	11,867
10/12/05	45,000	TN-3	Corn	8,130
10/13/05	29,900	TN-3	Corn	5,402
10/19/05	4,600	TN-3	Corn	27,292
10/20/05	36,800	TN-3	Corn	20,994
10/21/05	25,000	TN-3	Corn	14,262

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-3	711,500	23	30,935	16,563
Total Gallons	711,500			

SLUDGE HAULING RECORDS FOR 2006

Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/24/06	34,500	TN-4	Corn	31,692
05/25/06	20,700	TN-4	Corn	31,692
06/08/06	28,000	TN-4	Corn	27,416
06/09/06	28,000	TN-4	Corn	27,416
06/16/06	54,000	TN-4	Corn	25,648
06/29/06	46,000	TN-4	Corn	29,220
07/10/06	38,000	TN-4	Corn	23,148
07/11/06	28,000	TN-4	Corn	23,148
07/13/06	30,000	TN-4	Corn	25,368
07/14/06	28,000	TN-4	Corn	25,368
07/17/06	20,000	TN-4	Corn	28,284
07/18/06	20,000	TN-4	Corn	28,284
10/29/06	20,000	Field 4	Beans	26,040
10/30/06	20,000	Field 4	Beans	26,040
10/31/06	30,000	Field 4	Beans	26,040
11/01/06	30,000	Field 4	Beans	26,040
11/02/06	20,000	Field 4	Beans	33,450
11/06/06	34,000	Field 4	Beans	33,450
11/07/06	34,000	Field 4	Beans	33,450
11/08/06	34,000	Field 4	Beans	33,450
11/09/06	20,000	Field 4	Beans	33,450
11/10/06	22,000	Field 4	Beans	33,450

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-4	375,200	20	18,760	16,334
Field 4	264,000	9	29,333	33,873
Total Gallons	639,200			

SLUDGE HAULING RECORDS FOR 2007				
Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/24/07	16,800	TN-2	Corn	29,960
05/25/07	20,000	TN-2	Corn	29,960
07/30/07	23,000	TN-2	Corn	29,960
07/31/07	23,700	TN-2	Corn	29,960
08/01/07	23,000	TN-2	Corn	30,216
08/02/07	27,400	TN-2	Corn	30,216
08/06/07	33,700	TN-2	Corn	25,152
08/07/07	33,000	TN-2	Corn	25,152
09/14/07	27,600	TN-2	Corn	27,569
10/23/07	33,000	TN-2	Corn	29,728
10/24/07	25000	TN-3	Beans	29,728
10/26/07	18400	TN-3	Beans	29,736
10/29/07	32,500	TN-2	Corn	29,736
10/30/07	46,000	TN-2	Corn	29,736
10/31/07	32,000	Field 4	Beans	30,248
11/01/07	32,000	Field 4	Beans	30,248
11/02/07	32,000	Field 4	Beans	30,248

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-2	339,700	23	14,770	15,102
TN-3	43,400	23	1,887	2,585
Field 4	96,000	9	10,667	10,083
Total Gallons	479,100			

SLUDGE HAULING RECORDS FOR 2008

Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/21/08	27,600	TN-1	Corn	30,152
06/18/08	36,800	TN-1	Corn	41,648
06/19/08	34,500	TN-1	Corn	41,648
06/20/08	29,900	TN-1	Corn	41,648
07/02/08	30,000	TN-1	Corn	27,492
07/15/08	55,200	TN-1	Corn	23,774
07/16/08	36,800	TN-1	Corn	23,774
07/30/08	20,000	TN-1	Corn	31,212
07/31/08	30,000	TN-1	Corn	31,212
08/11/08	32,000	TN-1	Corn	14,080
08/12/08	30,000	TN-1	Corn	14,080
08/13/08	40,000	TN-1	Corn	23,072
08/14/08	21,600	TN-1	Corn	23,072
08/15/08	18,400	TN-1	Corn	23,072
09/23/08	41,400	TN-1	Corn	26,916
09/24/08	46,000	TN-1	Corn	26,916
10/13/08	48,300	TN-2	Corn	30,604
11/04/08	34,500	TN-2	Corn	27,420

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-1	530,200	20	26,510	22,188
TN-2	82,800	23	3,600	2,523
Total Gallons	613,000			

SLUDGE HAULING RECORDS FOR 2009				
Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/11/09	35,900	TN-3	Corn	26,240
05/18/09	35,000	TN-3	Corn	28,840
05/20/09	37,500	TN-2	Corn	28,620
05/21/09	62,100	TN-2	Corn	28,620
05/22/09	42,500	TN-2	Corn	28,620
05/26/09	29,900	TN-2	Corn	28,620
05/27/09	29,900	TN-2	Corn	28,696
05/28/09	25,300	TN-2	Corn	28,696
06/11/09	23,000	TN-2	Corn	28,576
06/12/09	18,400	TN-2	Corn	28,576
06/15/09	35,000	TN-2	Corn	28,408
06/16/09	48,300	TN-2	Corn	28,408
07/07/09	31,200	TN-2	Corn	26,448
07/14/09	39,100	TN-2	Corn	26,448
07/15/09	42,500	TN-2	Corn	26,448
07/21/09	32,000	TN-2	Corn	27,792
07/27/09	23,000	TN-2	Corn	24,780
07/28/09	25,300	TN-2	Corn	24,780
07/29/09	62,100	TN-2	Corn	24,780
08/19/09	32,200	TN-2	Corn	17,636
08/20/09	45,000	TN-2	Corn	17,636
08/25/09	37,500	TN-2	Corn	20,552
08/26/09	41,400	TN-2	Corn	20,552
10/20/09	40,000	TN-4	Beans	29,300
10/21/09	40,000	TN-4	Beans	29,300

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-2	763,200	23	33,183	23,639
TN-3	70,900	23	3,083	2,395
TN-4	80,000	20	4,000	2,930
Total Gallons	914,100			

SLUDGE HAULING RECORDS FOR 2010				
Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
06/28/10	25,000	T-3	Corn	30,048
06/29/10	30,600	T-3	Corn	30,048
06/30/10	20,000	T-3	Corn	30,048
07/01/10	32,500	T-3	Corn	29,548
07/02/10	30,000	T-3	Corn	29,548
07/06/10	25,300	T-3	Corn	28,188
07/07/10	30,000	T-3	Corn	28,188
07/08/10	23,000	T-3	Corn	27,922
07/09/10	16,100	T-3	Corn	27,922
07/12/10	62,600	T-3	Corn	30,712
07/13/10	27,600	T-3	Corn	30,712
07/14/10	51,200	T-3	Corn	30,712
07/15/10	25,600	T-3	Corn	19,000
07/20/10	24,400	T-3	Corn	28,780
07/21/10	24,400	T-3	Corn	28,780
11/05/10	30,000	T-3	Corn	19,388
11/06/10	30,000	T-3	Corn	19,388
11/08/10	41,400	T-3	Corn	34,488
11/09/10	45,000	T-3	Corn	34,488
11/16/11	28,750	T-3	Corn	29,184
11/17/10	28,750	T-3	Corn	29,184
11/18/10	23,000	T-3	Corn	22,932
11/19/10	23,000	T-3	Corn	22,868
11/24/10	36,800	T-3	Corn	33,232
11/25/10	40,000	T-3	Corn	33,232

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-3	775,000	23	33,696	30,806
Total Gallons	775,000			

SLUDGE HAULING RECORDS FOR 2011				
Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
06/26/11	30000	TN-4	Corn	24,348
06/27/11	30000	TN-4	Corn	24,348
06/28/11	40000	TN-4	Corn	22,508
06/29/11	27600	TN-4	Corn	22,508
06/30/11	37500	TN-4	Corn	22,508
07/01/11	27600	TN-4	Corn	22,508
07/19/11	55200	TN-4	Corn	25,664
07/20/11	25300	TN-4	Corn	25,664
08/02/11	24500	TN-4	Corn	25,956
08/03/11	26100	TN-4	Corn	25,956
08/04/11	37500	TN-4	Corn	25,956
08/06/11	20000	TN-4	Corn	25,956
08/16/11	39100	TN-4	Corn	19,312
08/30/11	52900	TN-4	Corn	9,628
08/31/11	32500	TN-4	Corn	9,628
09/13/11	46,000	TN-1	Wheat	17,344
09/14/11	25,000	TN-1	Wheat	17,344
09/15/11	46,000	TN-1	Wheat	15,892
09/16/11	27,500	TN-1	Wheat	15,892
10/31/11	25,000	TN-1	Wheat	16,512
11/01/11	45,000	TN-1	Wheat	16,512
11/02/11	35,000	TN-1	Wheat	29,184
11/07/11	41,400	TN-1	Wheat	19,972

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-1	290,900	20	14,545	7,433
TN-4	505,800	20	25,290	16,622
Total Gallons	505,800			

SLUDGE HAULING RECORDS FOR 2012

Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/14/12	39100	TN-1	Wheat	30,268
05/15/12	46000	TN-1	Wheat	30,268
05/16/12	34500	TN-1	Wheat	29,476
05/17/12	37500	TN-1	Wheat	29,476
05/18/12	23000	TN-1	Wheat	29,476
05/21/12	36800	TN-1	Wheat	29,476
06/05/12	46000	TN-1	Wheat	25,372
06/06/12	25000	TN-1	Wheat	24,818
06/18/12	35000	TN-1	Wheat	26,704
06/19/12	57500	TN-1	Wheat	26,704
06/25/12	25000	TN-1	Wheat	21,272
06/26/12	23000	TN-1	Wheat	21,272
06/27/12	23000	TN-1	Wheat	27,688
06/28/12	34500	TN-1	Wheat	27,688
10/15/12	36800	Field 4	Beans	32660
10/16/12	39100	Field 4	Beans	32660
10/17/12	35000	Field 4	Beans	21340
10/18/12	34000	Field 4	Beans	21340
10/31/12	27600	Field 4	Beans	25564
11/01/12	27600	Field 4	Beans	25564
11/02/12	27600	7-2	Beans	22396
11/05/12	27600	7-2	Beans	22396
11/06/12	36800	7-2	Beans	23936
11/07/12	36800	7-2	Beans	23936
11/08/12	23000	7-2	Beans	18196
11/09/12	28750	7-2	Beans	25900
11/13/12	28750	7-2	Beans	25900

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-1	485900	20	24295	18998
Field 4	200100	9	22233	17681
7-2	209300	10	20930	16266
Total Gallons	895,300			

SLUDGE HAULING RECORDS FOR 2013

Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
06/03/13	32,100	Field 4	Wheat/Soy Beans	7351
06/03/13	30,000	7-2	Wheat/Soy Beans	6870
06/04/13	40,000	7-2	Wheat/Soy Beans	9160
06/05/13	25,600	7-2	Wheat/Soy Beans	6090
06/05/13	20,000	Field 4	Wheat/Soy Beans	4758
06/06/13	62,900	Field 4	Wheat/Soy Beans	14964
06/10/13	36,800	7-2	Wheat/Soy Beans	29,012
06/11/13	34,500	Field 4	Wheat/Soy Beans	7620
06/12/13	38,400	7-2	Wheat/Soy Beans	8481
06/13/13	16,800	7-2	Wheat/Soy Beans	3711
10/21/13	40,000	TN-2	Beans	19,476
10/22/13	54,000	TN-2	Beans	25,932
10/23/13	34000	TN-3	Beans	25,972
10/23/13	24,000	TN-2	Beans	25,972
10/24/13	70,000	TN-2	Beans	11,004
10/25/13	62,000	TN-1	Beans	10,088
11/04/13	26,000	TN-1	Beans	26,592
11/04/13	18000	TN-4	Beans	26,592
11/05/13	30000	TN-4	Beans	3,304
11/05/13	30000	TN-3	Beans	3,304
11/11/13	36,000	TN-1	Beans	7,816
11/20/13	28000	TN-3	Beans	18,692
11/20/13	30000	TN-4	Beans	18,692

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-1	124,000	20	6,200	2,225
TN-2	188,000	23	8,174	3,582
TN-3	92,000	23	23	2,086
TN-4	78,000	20	3,900	2,429
Field 4	149,500	9	16611	3,855
7-2	187,600	10	18760	6,332
Total Gallons	819,100			

SLUDGE HAULING RECORDS FOR 2014				
Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
05/05/14	38000	TN-1	Beans	7,307
05/05/14	40000	TN-2	Beans	7,691
05/05/14	22000	TN-3	Beans	4,230
05/06/14	60000	TN-1	Beans	11,537
05/06/14	22000	TN-2	Beans	4,230
05/06/14	40000	TN-3	Beans	7,691
05/07/14	50000	TN-2	Beans	9,614
05/07/14	42000	TN-3	Beans	8,076
05/08/14	12000	TN-2	Beans	2,307
05/08/14	28000	TN-3	Beans	5,384
10/23/14	54600	TN-3	Beans	10,498
10/27/14	94000	TN-3	Beans	18,074
10/28/14	16000	TN-4	Beans	3,076
10/29/14	78000	TN-4	Beans	14,998
10/30/14	58000	TN-4	Beans	11,152

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-1	98,000	20	4,900	942
TN-2	124,000	23	124,000	1,037
TN-3	280,600	23	280,600	2,346
TN-4	152,000	23	152,000	1,271
Total Gallons	654,600			

SLUDGE HAULING RECORDS FOR 2015				
Date	Gallons Applied	Field Location	Crop	Suspended Solids Applied (lb)
04/15/15	50,000	TN-4	Corn	30,372
04/16/15	40,000	TN-4	Corn	35,050
04/23/15	44,000	TN-4	Corn	29,332
04/24/15	76,000	TN-4	Corn	28,432
04/27/15	40,000	TN-4	Corn	34,420
04/28/15	50,000	TN-4	Corn	33,404
04/29/15	54,000	TN-4	Corn	14,032
09/22/15	3,200	TN-2	Wheat	28,140
09/23/15	78,000	TN-2	Wheat	27,372
09/24/15	26,000	TN-2	Wheat	24,604
10/19/15	66,000	TN-1	Wheat	20,156
10/20/15	82,000	TN-1	Wheat	11,596
10/21/15	84,000	TN-2	Wheat	11,596
10/22/15	68,000	TN-2	Wheat	19,624
10/26/15	60,000	TN-1	Wheat	16,544

Field	Total Gallons Applied	Acres in field	Gallons / Acre	TSS (lb/ac)
TN-1	208,000	20	10,400	2,415
TN-2	259,200	23	11,270	4,841
TN-4	354,000	23	15,391	8,915
Total Gallons	821,200			

Gallons of Sludge Applied

Year	TN-1	TN-2	TN-3	TN-4	Field 4	7-2	Total
2004	440,300						440,300
2005			711,500				711,500
2006				375,200	264,000		639,200
2007		339,700	43,400		96,000		479,100
2008	530,200	82,800					613,000
2009		763,200	70,900	80,000			914,100
2010			746,250				746,250
2011	290,900		28,750	505,800			825,450
2012	485,900				200,100	209,300	895,300
2013	124,000	188,000	92,000	78,000	149,500	187,600	819,100
2014	98,000	124,000	280,600	152,000			654,600
2015	208,000	259,200		354,000			821,200
Total	2,177,300	1,756,900	1,973,400	1,545,000	709,600	396,900	8,559,100

Suspended Solids Applied

	TN-1	TN-2	TN-3	TN-4	Field 4	7-2	Total
2004	302,528						302,528
2005			380,947				380,947
2006				326,684	304,860		631,544
2007		347,345	59,464		90,744		497,553
2008	443,768	58,024					501,792
2009		543,692	55,080	58,600			657,372
2010			679,356				679,356
2011	148,652		29,184	332,448			510,284
2012	379,958				159,128	162,660	701,746
2013	44,496	82,384	47,968	48,588	34,692	63,324	321,452
2014	18,843	23,843	53,954	29,227			125,866
2015	48,296	111,336		205,042			364,674
Total	1,386,541	1,166,624	1,305,953	1,000,589	589,424	225,984	5,675,114

Sludge Analysis Results

Year	% Solids	TP
2011	2.6%	3.3%
2012	-	-
2013	2.7%	3.0%
2014	2.3%	2.8%
2015	1.9%	2.5%
2016	2.7%	3.8%

Sludge Analysis Results

CHARACTERISTIC REPORT: s 283.55(1), Wis.Stats. Form 3400-49 Rev. 12-98 Permit No.: WI- 0026930

(Municipal Sludge, Industrial Sludge, Liquid Industrial Waste and By-Product Solids)

Facility: BELOIT TOWN WASTEWATER TREATMENT FACILITY
2871 South Afton Road
Beloit, WI 53511

Reporting Period: 01/01/2011 to 12/31/2011 Frequency: Annual
Form Due Date: 01/31/2012

Did you land apply this period? ____Yes_____ (Y/N)
If yes & Municipal Sludge:
A) Were Class ___B___ (A/B) Pathogen Requirements Satisified? ____Yes_____ (Y/N)
B) Were Vector Control Requirements Satisified? ___Yes___ (Y/N)

If Municipal Sludge then complete section B and C on the reverse side of this form.
Include copy of lab sheets, unless instructed otherwise

FIN: 6162
FID: 396022138

Region: South Central DOC: 223300
Office: FITCHBURG Date Received:

Return Form To: Bureau of Watershed Management/3
PO Box 7921
101 South Webster Street
Madison, WI 53707-7921

A) Parameters to be Sampled DNR Contact: Doris Thiele

Parameter Number	Parameter	Sample Point Number	Date Sample Taken	Sample Type	Analytical Results	Units	Limit	Municipal Sludge Only		Lab Certification Number
								High Quality Limit	Date Smpl Analyzed for Organics	
461	Solids, Total	002	7/12/2011	comp	2.6	Percent	*****	*****	*****	617013980
33	Arsenic Dry Wt	002	7/11/2011	comp	2.9	mg/kg	75	41	*****	617013980
86	Cadmium Dry Wt	002	7/11/2011	comp	< 2.2	mg/kg	85	39	*****	617013980
145	Copper Dry Wt	002	7/11/2011	comp	458	mg/kg	4300	1500	*****	617013980
262	Lead Dry Wt	002	7/11/2011	comp	19	mg/kg	840	300	*****	617013980
278	Mercury Dry Wt	002	7/12/2011	comp	1.2	mg/kg	57	17	*****	617013980
295	Molybdenum Dry Wt	002	7/11/2011	comp	9.7	mg/kg	75	*****	*****	617013980
313	Nickel Dry Wt	002	7/11/2011	comp	24.6	mg/kg	420	420	*****	617013980
421	Selenium Dry Wt	002	7/11/2011	comp	6.5	mg/kg	100	100	*****	617013980
551	Zinc Dry Wt	002	7/11/2011	comp	665	mg/kg	7500	2800	*****	617013980
335	Nitrogen, Total Kjeldahl	002	7/13/2011	comp	46.9	Percent	*****	*****	*****	617013980
324	Nitrogen, Ammonium (NH4-N) Total	002	7/22/2011	comp	1.6	Percent	*****	*****	*****	617013980
388	Phosphorus, Total	002	7/11/2011	comp	3.3	Percent	*****	*****	*****	617013980
686	Phosphorus, Water Extractable	002	7/11/2011	comp	3.9	% of Tot P	*****	*****	*****	617013980
395	Potassium, Total Recoverable	002	7/11/2011	comp	0.3	Percent	*****	*****	*****	617013980

Description of Facility Sampling Point: Sample faucet on Stand Pipe that fills sludge hauling trucks at sludge storage facility.

Comments:

I certify, under penalty of law that metal testing, pathogen monitoring and testing, and the vector control requirements; if reported on this form have been prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated this information. I am aware that there are signifcant penalities for false certification including the possibilty of fine and imprisonment.

Completion of this form is required. Failure to complete this form, as required by s. 283.55(1), Wis. Stats., may result in penalties pursuant to s. 283.91(4), Wis. Stats. Personally identifiable information on this form is not intented to be used for any other purpose.

Municipal Sludge Only

B) PATHOGEN CONTROL (EITHER CLASS A or B)

☐ Class A

FECAL COLIFORM [2] _____ MPN/g TS SAMPLE DATES [1,3] _____ to _____	OR	SALMONELLA _____ MPN/4g TS SAMPLE DATE [1] _____

AND one of the following

☐ Alkaline Treatment ☐ Composting ☐ Thermophilic Aerobic Digestion ☐ Prior test for Enteric Virus/Viable Helminth Ova

☐ Heat Drying ☐ Beta Ray Irradiation ☐ Temp/Time based on % Solids

☐ Heat Treatment ☐ Gama Ray Irradiation ☐ Pasteurization ☐ Post test for Enteric Virus/Viable Helminth Ova

☐ PFRP Equivalent

Description of which process is used & operating parameters

☒ Class B

FECAL COLIFORM [2] _____ CFU/g or 145,571 MPN/g TS

SAMPLE DATES [1,3] 7/6/2011 to 7/6/2011

OR one of the following, as specified in Ch. NR 204

☒ Aerobic Digestion ☐ Air Drying ☐ Alkaline Stabilization

☐ Anaerobic Digestion ☐ Composting ☐ PSRP Equivalent

Description of which process used & operating parameters:

1 - Each sample to be analyzed 2 - Geometric mean of 7 discrete samples 3 - Range should not be more than 3 weeks

C) VECTOR ATTRACTION REDUCTION

Check which option below is used and enter analytical result if appropriate

				ANALYTICAL DATE
☐	Volatile Solids Reduction	≥ 38 %	_____ % VSR	
☐	Aerobic SOUR Test	≤ 1.5 @ 20° C	_____ mg O_2 /hr/g TS	
☐	Aerobic Bench Scale	< 15 % VSR	_____ % VSR	
☐	Anaerobic Bench Scale	< 17 % VSR	_____ % VSR	

☐	Drying With Unstabilized Solids	> 90 % TS	_____ % ts
☐	Drying With Stabilized Solids	> 75 % TS	_____ % ts
☐	Aerobic Composting Process	> 40° C	
☐	pH Adjustment of Sludge		
☐	Injection when land apply		
☒	Incorporation when land apply		
☐	Approved Equivalent Process		

Municipal Sludge Only

B) PATHOGEN CONTROL (EITHER CLASS A or B)

☐ Class A

FECAL COLIFORM [2] _____ MPN/g TS SAMPLE DATES [1,3] _____ to _____	OR	SALMONELLA _____ MPN/4g TS SAMPLE DATE [1] _____

AND one of the following

☐ Alkaline Treatment ☐ Composting ☐ Thermophilic Aerobic Digestion ☐ Prior test for Enteric Virus/Viable Helminth Ova

☐ Heat Drying ☐ Beta Ray Irradiation ☐ Temp/Time based on % Solids

☐ Heat Treatment ☐ Gama Ray Irradiation ☐ Pasteurization ☐ Post test for Enteric Virus/Viable Helminth Ova

☐ PFRP Equivalent

Description of which process is used & operating parameters

_____

_____

☒ Class B

FECAL COLIFORM [2] _____ CFU/g or _____ MPN/g TS

SAMPLE DATES [1,3] _____ to _____

OR one of the following, as specified in Ch. NR 204

☒ Aerobic Digestion ☐ Air Drying ☐ Alkaline Stabilization

☐ Anaerobic Digestion ☐ Composting ☐ PSRP Equivalent

Description of which process used & operating parameters:

_____

_____

_____

1 - Each sample to be analyzed 2 - Geometric mean of 7 discrete samples 3 - Range should not be more than 3 weeks

C) VECTOR ATTRACTION REDUCTION

Check which option below is used and enter analytical result if appropriate

			ANALYTICAL DATE
☐ Volatile Solids Reduction	≥ 38 %	_____ % VSR	_____
☐ Aerobic SOUR Test	≤ 1.5 @ 20° C	_____ mg O_2 /hr/g TS	_____
☐ Aerobic Bench Scale	< 15 % VSR	_____ % VSR	_____
☐ Anaerobic Bench Scale	< 17 % VSR	_____ % VSR	_____

☐ Drying With Unstabilized Solids	> 90 % TS	_____ % ts
☐ Drying With Stabilized Solids	> 75 % TS	_____ % ts
☐ Aerobic Composting Process	> 40° C	
☐ pH Adjustment of Sludge		
☐ Injection when land apply		
☒ Incorporation when land apply		
☐ Approved Equivalent Process		

CHARACTERISTIC REPORT: s.283.55(1), Wis. Stats. Form 3400-49 Rev. 1-98

(Municipal Sludge, Industrial Sludge, Liquid Industrial Waste and By-Product Solids)

Permit No: **0026930**

Facility: BELOIT TOWN WASTEWATER TREATMENT FACILITY
2871 S. Afton Rd.
Beloit, WI 53511

FIN: 6162 Region: South Central Region DOC: 304346

FID: 154001760 Date Received:

Forms require electronic submittal.

Submit form electronically and keep a version of the form for your records.

Reporting Period: 01/01/2013 - 12/31/2013

Form Due Date: 01/31/2014

Did you land apply this period? Yes

If yes and Municipal Sludge:

A) Were Class B Pathogen Requirements Satisfied? Yes

B) Were Vector Control Requirements Satisfied? Yes

Submit a copy of your lab reports, to your facility's DNR sludge representative or basin engineer unless instructed otherwise. Email submittal is preferred.

A) Parameters to be Sampled

DNR Contact: Phillip A. Spranger

Sample Point Number	Parameter Number	Parameter	Date Sample Taken	Sample Type	Analytical Results	Units	Limit	Municipal Sludge Only		Lab Certification Number
								High Quality Limit	Date Analyzed for Organics	
002	461	Solids, Total	06/03/2013	COMP	2.7	Percent			06/06/2013	617013980
002	33	Arsenic Dry Wt	06/03/2013	COMP	2.4	mg/kg	75	41	06/10/2013	617013980
002	86	Cadmium Dry Wt	06/03/2013	COMP	<2.0	mg/kg	85	39	06/10/2013	617013980
002	145	Copper Dry Wt	06/03/2013	COMP	744	mg/kg	4300	1500	06/10/2013	617013980
002	262	Lead Dry Wt	06/03/2013	COMP	18.3	mg/kg	840	300	06/10/2013	617013980
002	278	Mercury Dry Wt	06/03/2013	COMP	1.7	mg/kg	57	17	06/11/2013	617013980
002	295	Molybdenum Dry Wt	06/03/2013	COMP	6.9	mg/kg	75		06/10/2013	617013980
002	313	Nickel Dry Wt	06/03/2013	COMP	19.6	mg/kg	420	420	06/10/2013	617013980
002	421	Selenium Dry Wt	06/03/2013	COMP	4.9	mg/kg	100	100	06/10/2013	617013980
002	551	Zinc Dry Wt	06/03/2013	COMP	900	mg/kg	7500	2800	06/10/2013	617013980
002	335	Nitrogen, Total Kjeldahl	06/03/2013	COMP	7.1	Percent			06/12/2013	617013980
002	324	Nitrogen, Ammonium (NH4-N) Total	06/03/2013	COMP	1.1	Percent			06/07/2013	617013980
002	388	Phosphorus, Total	06/03/2013	COMP	3.0	Percent			06/10/2013	617013980
002	686	Phosphorus, Water Extractable	06/03/2013	COMP	3.3	%ofTotP			06/10/2013	617013980
002	395	Potassium, Total Recoverable	06/03/2013	COMP	0.3	Percent			06/10/2013	617013980

OUTFALLS

002 - SLUDGE

CHARACTERISTIC REPORT: s.283.55(1), Wis. Stats. Form 3400-49 Rev. 1-98
(Municipal Sludge, Industrial Sludge, Liquid Industrial Waste and By-Product Solids)

Reporting Period: 01/01/2013 - 12/31/2013
Form Due Date: 01/31/2014

Permit No: **0026930**
Facility: BELOIT TOWN WASTEWATER TREATMENT FACILITY
2871 S. Afton Rd.
Beloit, WI 53511
FIN: 6162 Region: South Central Region DOC: 304346

Municipal Sludge Only

Pathogens

Sample Point Number	Requirement Met	Class	Process Code / Process Description	Bacteria	Amount	Unit	Start Date	End Date
002	Yes	B	Aerobic Digestion	Fecal Coliform	222143	MPN/g TS	06/03/2013	06/10/2013
			222,143 MPN/g TS average					

Vectors

Sample Point Number	Requirement Met	Vector Reduction	Amount	Date
002	Yes	Incorporation when land apply	Yes	

Description of Facility Sample Point:

Faucet on stand pipe that fills sludge hauling trucks.

Comments:

CHARACTERISTIC REPORT: s.283.55(1), Wis. Stats. Form 3400-49 Rev. 1-98

(Municipal Sludge, Industrial Sludge, Liquid Industrial Waste and By-Product Solids)

Permit No: **0026930**

Facility: BELOIT TOWN WASTEWATER TREATMENT FACILITY
2871 S. Afton Rd.
Beloit, WI 53511

FIN: 6162 Region: South Central Region DOC: 322912

FID: 154001760 Date Received:

Forms require electronic submittal.

Submit form electronically and keep a version of the form for your records.

Reporting Period: 01/01/2014 - 12/31/2014

Form Due Date: 01/31/2015

Did you land apply this period? Yes

If yes and Municipal Sludge:

A) Were Class B Pathogen Requirements Satisfied? Yes

B) Were Vector Control Requirements Satisfied? Yes

Submit a copy of your lab reports, to your facility's DNR sludge representative or basin engineer unless instructed otherwise. Email submittal is preferred.

A) Parameters to be Sampled

DNR Contact: Phillip A. Spranger

Sample Point Number	Parameter Number	Parameter	Date Sample Taken	Sample Type	Analytical Results	Units	Limit	Municipal Sludge Only		Lab Certification Number
								High Quality Limit	Date Analyzed for Organics	
002	461	Solids, Total	06/03/2014	COMP	2.3	Percent			06/04/2014	617013980
002	33	Arsenic Dry Wt	06/03/2014	COMP	2.0	mg/kg	75	41	06/06/2014	617013980
002	86	Cadmium Dry Wt	06/03/2014	COMP	<1.9	mg/kg	85	39	06/09/2014	617013980
002	145	Copper Dry Wt	06/03/2014	COMP	280	mg/kg	4300	1500	06/09/2014	617013980
002	262	Lead Dry Wt	06/03/2014	COMP	23.3	mg/kg	840	300	06/09/2014	617013980
002	278	Mercury Dry Wt	06/03/2014	COMP	1.8	mg/kg	57	17	06/16/2014	617013980
002	295	Molybdenum Dry Wt	06/03/2014	COMP	4.9	mg/kg	75		06/09/2014	617013980
002	313	Nickel Dry Wt	06/03/2014	COMP	8.8	mg/kg	420	420	06/09/2014	617013980
002	421	Selenium Dry Wt	06/03/2014	COMP	4.3	mg/kg	100	100	06/06/2014	617013980
002	551	Zinc Dry Wt	06/03/2014	COMP	552	mg/kg	7500	2800	06/09/2014	617013980
002	335	Nitrogen, Total Kjeldahl	06/03/2014	COMP	6.7	Percent			06/11/2014	617013980
002	324	Nitrogen, Ammonium (NH4-N) Total	06/03/2014	COMP	0.9	Percent			06/13/2014	617013980
002	388	Phosphorus, Total	06/03/2014	COMP	2.8	Percent			06/09/2014	617013980
002	686	Phosphorus, Water Extractable	06/03/2014	COMP	2.6	%ofTotP			06/09/2014	617013980
002	395	Potassium, Total Recoverable	06/03/2014	COMP	0.2	Percent			06/09/2014	617013980

OUTFALLS

002 - SLUDGE

CHARACTERISTIC REPORT: s.283.55(1), Wis. Stats. Form 3400-49 Rev. 1-98
(Municipal Sludge, Industrial Sludge, Liquid Industrial Waste and By-Product Solids)

Reporting Period: 01/01/2014 - 12/31/2014
Form Due Date: 01/31/2015

Permit No: **0026930**
Facility: BELOIT TOWN WASTEWATER TREATMENT FACILITY
2871 S. Afton Rd.
Beloit, WI 53511
FIN: 6162 Region: South Central Region DOC: 322912

Municipal Sludge Only

Pathogens

Sample Point Number	Requirement Met	Class	Process Code / Process Description	Bacteria	Amount	Unit	Start Date	End Date
002	Yes	B	Anaerobic Digestion	Fecal Coliform	1700000	MPN/g TS	06/03/2014	06/03/2014
			7 samples were taken from separate truck loads during a day of land spreading.					

Vectors

Sample Point Number	Requirement Met	Vector Reduction	Amount	Date
002	Yes	Incorporation when land apply	Yes	

Description of Facility Sample Point:

Comments:

Commercial Testing Laboratory, Inc.

514 Main Street • P.O. Box 526 • Colfax, Wisconsin 54730
Phone: 715-962-3121 • WWW.CTLCOLFAX.COM • Fax: 715-962-4030

ANALYTICAL REPORT

Howard Hemmer
Town of Beloit
2871 Afton Road
Beloit WI 53511

Report Number: 16032225 Page: 1
Report Date: 11/30/16
Date Received: 11/15/16

SLUDGE CHARACTERISTICS

Sample Number: 16-S683
Sample ID: Sludge-List 1,2
WEP
11/10/16

D.N.R. #	Parameter	Wet Weight (As Is)	Dry Weight (Dry Basis)	Date of Analysis	Method Used
789	Ammonia-Nitrogen, %	0.031	1.1	11/18/16	SM4500NH3C
33	Arsenic, mg/kg	0.070	2.6	11/22/16	7010
86	Cadmium, mg/kg	< 0.067	< 2.5	11/22/16	6010A
145	Copper, mg/kg	13.0	481	11/22/16	6010A
335	Kjeldahl-Nitrogen, %	0.151	5.6	11/29/16	SM4500NH3C
262	Lead, mg/kg	< 0.673	< 24.9	11/22/16	6010A
278	Mercury, mg/kg	0.032	1.2	11/28/16	245.5
295	Molybdenum, mg/kg	< 0.161	< 6.0	11/22/16	6010A
313	Nickel, mg/kg	0.534	19.8	11/22/16	6010A
388	Phosphorous,%	0.102	3.8	11/22/16	200.7 R4.4
395	Potassium, %	0.005	0.2	11/22/16	6010A
421	Selenium, mg/kg	0.152	5.6	11/22/16	7010
461	Total Solids, %	2.7		11/15/16	SM2540G
551	Zinc, mg/kg	19.8	733	11/22/16	6010A

WDNR Laboratory ID Number: 617013980

< Means "LESS THAN" Detectable Level

Authorized by:
Pamela Gane,Lab Manager

Reviewed by: T Kellar

Assumed % days discharging per month: 70%

Existing Riverside - Projected P Discharge (lb/day)

Average daily discharge by month estimated from outfall monitoring data

Month	70% CF	75% CF	80% CF
1	0.796	0.853	0.910
2	0.799	0.856	0.914
3	0.811	0.869	0.926
4	0.352	0.377	0.403
5	0.960	1.029	1.097
6	0.890	0.954	1.018
7	0.787	0.843	0.899
8	0.864	0.925	0.987
9	0.901	0.966	1.030
10	0.609	0.653	0.696
11	0.495	0.531	0.566
12	0.814	0.872	0.930
Average	**0.769**	**0.824**	**0.879**
Min	0.352	0.377	0.403
Max	0.960	1.029	1.097

Existing Riverside - Projected P Discharge (lb/month)

Days/Mo	Days Running	70% NCF	75% NCF	80% NCF
31	22	17.51	18.76	20.01
28	20	15.99	17.13	18.27
31	22	17.83	19.11	20.38
30	21	7.40	7.93	8.46
31	22	21.12	22.63	24.14
30	21	18.70	20.04	21.37
31	22	17.31	18.55	19.78
31	22	19.00	20.36	21.71
30	21	18.93	20.28	21.63
31	22	13.40	14.36	15.32
30	21	10.40	11.14	11.89
31	22	17.90	19.18	20.46
lbs discharged		***195.49***	***209.45***	***223.41***

West Riverside - Projected P Discharge (lb/day)

Average daily discharge by month estimated from plant design

Month	70% CF	75% CF	80% CF
1	0.148	0.158	0.169
2	0.156	0.167	0.178
3	0.176	0.188	0.201
4	0.073	0.079	0.084
5	0.163	0.175	0.186
6	0.162	0.174	0.185
7	0.207	0.222	0.237
8	0.192	0.205	0.219
9	0.177	0.190	0.203
10	0.089	0.095	0.101
11	0.106	0.114	0.122
12	0.170	0.183	0.195
Average	**0.156**	**0.167**	**0.179**
Min	0.073	0.079	0.084
Max	0.207	0.222	0.237

West Riverside - Projected P Discharge (lb/month)

Days/Mo	Days Running	70% NCF	75% NCF	80% NCF
31	22	3.25	3.48	3.71
28	20	3.12	3.34	3.57
31	22	3.87	4.14	4.42
30	21	1.54	1.65	1.76
31	22	3.59	3.84	4.10
30	21	3.41	3.65	3.89
31	22	4.56	4.89	5.21
31	22	4.22	4.52	4.82
30	21	3.73	3.99	4.26
31	22	1.95	2.09	2.23
30	21	2.23	2.39	2.55
31	22	3.75	4.02	4.28
lbs discharged		***39.21***	***42.01***	***44.81***

Combined Projected P Discharge (lb/day)

Month	70% CF	75% CF	80% CF
1	0.943	1.011	1.078
2	0.955	1.024	1.092
3	0.986	1.057	1.127
4	0.426	0.456	0.487
5	1.123	1.203	1.283
6	1.053	1.128	1.203
7	0.994	1.065	1.136
8	1.055	1.131	1.206
9	1.079	1.156	1.233
10	0.698	0.748	0.798
11	0.602	0.645	0.688
12	0.984	1.054	1.124
Average	**0.908**	**0.973**	**1.038**

Total Projected P Discharge (lb/month)

Days/Mo	Days Running	70% NCF	75% NCF	80% NCF	Compliance
31	22	20.76	22.24	23.72	**20.15**
28	20	19.11	20.47	21.84	**18.20**
31	22	21.70	23.25	24.80	**20.15**
30	21	8.94	9.58	10.22	**19.50**
31	22	24.71	26.47	28.24	**20.15**
30	21	22.11	23.69	25.26	**19.50**
31	22	21.87	23.43	25.00	**20.15**
31	22	23.21	24.87	26.53	**20.15**
30	21	22.65	24.27	25.89	**19.50**
31	22	15.36	16.45	17.55	**20.15**
30	21	12.63	13.54	14.44	**19.50**
31	22	21.65	23.19	24.74	**20.15**
lbs discharged		***234.69***	***251.46***	***268.22***	***237.25***

* - red boxes indicate discharge higher than permitted limits (compliance column)

Total Credit Need (lb/day)

Month	70% CF	75% CF	80% CF
1	0.293	0.361	0.428
2	0.305	0.374	0.442
3	0.336	0.407	0.477
4	-	-	-
5	0.473	0.553	0.633
6	0.403	0.478	0.553
7	0.344	0.415	0.486
8	0.405	0.481	0.556
9	0.429	0.506	0.583
10	0.048	0.098	0.148
11	-	-	0.038
12	0.334	0.404	0.474
Average	**0.281**	**0.340**	**0.402**

* - calculations are lb/day discharged minus 0.65 lb (assumes plant would be discharging every day at the projected level)

Total Projected P Discharge (lb/month)

Days/Mo	Days Running	70% NCF	75% NCF	80% NCF
31	22	6.46	7.94	9.42
28	20	6.11	7.47	8.84
31	22	7.40	8.95	10.50
30	21	-	-	-
31	22	10.41	12.17	13.94
30	21	8.46	10.04	11.61
31	22	7.57	9.13	10.70
31	22	8.91	10.57	12.23
30	21	9.00	10.62	12.24
31	22	1.06	2.15	3.25
30	21	-	-	0.79
31	22	7.35	8.89	10.44
Total Credit Need		***72.72***	***87.94***	***103.95***

Total Credit Need (lb/day, lb discharged - 0.65)

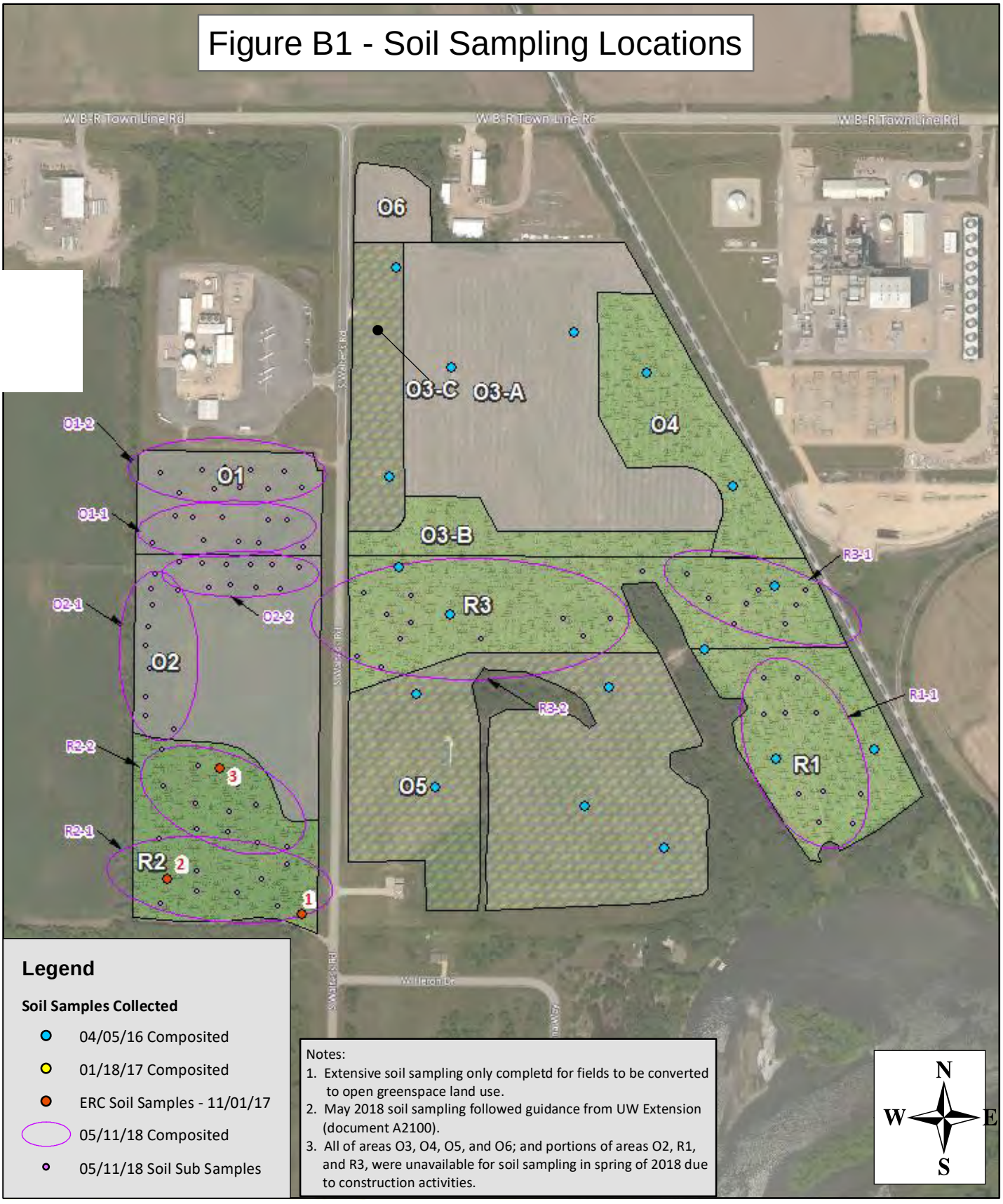
Month	Existing 80% CF	West Riverside 80% CF	Total (lb/day) 80% CF	Permitted (lb/day)	Credit need (lb/day)	Total Credits (lb)
1	0.91	0.17	1.08	0.65	0.43	9.42
2	0.91	0.18	1.09	0.65	0.44	8.84
3	0.93	0.20	1.13	0.65	0.48	10.50
4	0.40	0.08	0.49	0.65	-	-
5	1.10	0.19	1.28	0.65	0.63	13.94
6	1.02	0.19	1.20	0.65	0.55	11.61
7	0.90	0.24	1.14	0.65	0.49	10.70
8	0.99	0.22	1.21	0.65	0.56	12.23
9	1.03	0.20	1.23	0.65	0.58	12.24
10	0.70	0.10	0.80	0.65	0.15	3.25
11	0.57	0.12	0.69	0.65	0.04	0.79
12	0.93	0.19	1.12	0.65	0.47	10.44
Average	**0.88**	**0.18**	**1.04**	**0.65**	**Total**	**103.95**

* - Total credit calculations assuming plant is operation 70% of the month

Riverside Energy Center P Trading Plan
Town of Beloit, Rock County, WI
Alliant Energy WP&L

Montgomery Associates:
Resource Solutions, LLC
119 South Main St., Suite A
Cottage Grove, WI 53527

Figure B1 - Soil Sampling Locations



Legend

Soil Samples Collected

- 04/05/16 Composited
- 01/18/17 Composited
- ERC Soil Samples - 11/01/17
- 05/11/18 Composited
- 05/11/18 Soil Sub Samples

Notes:
1. Extensive soil sampling only completd for fields to be converted to open greenspace land use.
2. May 2018 soil sampling followed guidance from UW Extension (document A2100).
3. All of areas O3, O4, O5, and O6; and portions of areas O2, R1, and R3, were unavailable for soil sampling in spring of 2018 due to construction activities.

May 2018

0 250 500 1,000 Feet

Weekly P data Max [P] 0.14 mg/L

P concentration scaled up to account for uncertainty in intake P concentration. Capped at 0.14 mg/L based on past data.

West Riverside flows projected to be 65% of existing Riverside plant flows.

Assuming P based antiscalents added to RV process water. Monitoring data indicates that antiscalents add 60% to the P discharge load.

West Riverside P discharge assuming wastewater at 0.05 mg P/L, based on treatement system design.

Credit need, total projected P discharge minus 0.65 lb P/day

RV Actual Data (average CF of 0.62)						RV Flow (MGD) scaled Up for Cap Factor			West Riverside Flow (MGD) - 0.65 of RV			RV lbs P/Day no AntiScalent			RV lbs P/Day with AntiScalent			WRV lbs P/day at .05mg/L			Total lb P/day			Credits Needed		
Week of:	Well [P]	Outfall [P]	P scaled up	Flow (MGD)	P lb/day	70%	75%	80%	70%	75%	80%	70%	75%	80%	70%	75%	80%	70%	75%	80%	70%	75%	80%	70% NCF	75% NCF	80% NCF
1/4/2015		0.12	0.14	0.39	0.39	0.44	0.47	0.50	0.29	0.31	0.33	0.51	0.55	0.59	0.82	0.88	0.94	0.12	0.13	0.14	0.94	1.01	1.08	0.29	0.36	0.43
1/11/2015	<0.025	0.11	0.14	0.55	0.5	0.62	0.67	0.71	0.40	0.43	0.46	0.73	0.78	0.83	1.16	1.24	1.33	0.17	0.18	0.19	1.33	1.42	1.52	0.68	0.77	0.87
1/18/2015		0.11	0.14	0.59	0.54	0.67	0.71	0.76	0.43	0.46	0.49	0.78	0.83	0.89	1.24	1.33	1.42	0.18	0.19	0.21	1.42	1.53	1.63	0.77	0.88	0.98
1/25/2015		0.09	0.13	0.42	0.31	0.47	0.51	0.54	0.31	0.33	0.35	0.52	0.56	0.60	0.84	0.89	0.95	0.13	0.14	0.15	0.96	1.03	1.10	0.31	0.38	0.45
2/1/2015		0.08	0.12	0.5	0.33	0.56	0.60	0.65	0.37	0.39	0.42	0.56	0.60	0.64	0.89	0.96	1.02	0.15	0.16	0.17	1.05	1.12	1.20	0.40	0.47	0.55
2/8/2015		0.06	0.09	0.46	0.22	0.52	0.56	0.59	0.34	0.36	0.39	0.38	0.40	0.43	0.60	0.65	0.69	0.14	0.15	0.16	0.74	0.80	0.85	0.09	0.15	0.20
2/15/2015		0.09	0.13	0.56	0.39	0.63	0.68	0.72	0.41	0.44	0.47	0.67	0.72	0.77	1.08	1.15	1.23	0.17	0.18	0.20	1.25	1.34	1.43	0.60	0.69	0.78
3/1/2015		0.05	0.08	0.55	0.24	0.62	0.67	0.71	0.40	0.43	0.46	0.41	0.44	0.47	0.66	0.71	0.75	0.17	0.18	0.19	0.83	0.89	0.95	0.18	0.24	0.30
3/8/2015		0.06	0.09	0.58	0.28	0.65	0.70	0.75	0.43	0.46	0.49	0.48	0.51	0.54	0.76	0.81	0.87	0.18	0.19	0.20	0.94	1.00	1.07	0.29	0.35	0.42
3/15/2015		0.06	0.10	0.53	0.28	0.60	0.64	0.68	0.39	0.42	0.44	0.48	0.51	0.55	0.77	0.82	0.88	0.16	0.17	0.19	0.93	1.00	1.06	0.28	0.35	0.41
3/22/2015		0.09	0.13	0.44	0.33	0.50	0.53	0.57	0.32	0.35	0.37	0.55	0.59	0.63	0.88	0.95	1.01	0.13	0.14	0.15	1.02	1.09	1.17	0.37	0.44	0.52
3/29/2015		0.07	0.11	0.53	0.31	0.60	0.64	0.68	0.39	0.42	0.44	0.52	0.56	0.60	0.84	0.90	0.96	0.16	0.17	0.19	1.00	1.07	1.14	0.35	0.42	0.49
4/5/2015		0.07	0.11	0.17	0.1	0.19	0.21	0.22	0.12	0.13	0.14	0.17	0.18	0.19	0.27	0.29	0.31	0.05	0.06	0.06	0.32	0.34	0.37	-	-	-
4/12/2015		0.09	0.13	0.17	0.13	0.19	0.21	0.22	0.12	0.13	0.14	0.21	0.22	0.24	0.33	0.36	0.38	0.05	0.06	0.06	0.39	0.41	0.44	-	-	-
4/19/2015		0.11	0.14	0.34	0.31	0.38	0.41	0.44	0.25	0.27	0.29	0.45	0.48	0.51	0.72	0.77	0.82	0.10	0.11	0.12	0.82	0.88	0.94	0.17	0.23	0.29
5/3/2015		0.10	0.14	0.22	0.18	0.25	0.27	0.28	0.16	0.17	0.18	0.29	0.31	0.33	0.46	0.50	0.53	0.07	0.07	0.08	0.53	0.57	0.61	-	-	-
5/10/2015		0.13	0.14	0.38	0.41	0.43	0.46	0.49	0.28	0.30	0.32	0.50	0.54	0.57	0.80	0.86	0.92	0.12	0.12	0.13	0.92	0.98	1.05	0.27	0.33	0.40
5/17/2015		0.10	0.14	0.53	0.45	0.60	0.64	0.68	0.39	0.42	0.44	0.70	0.75	0.80	1.12	1.20	1.28	0.16	0.17	0.19	1.28	1.37	1.46	0.63	0.72	0.81
5/24/2015		0.11	0.14	0.55	0.51	0.62	0.67	0.71	0.40	0.43	0.46	0.73	0.78	0.83	1.16	1.24	1.33	0.17	0.18	0.19	1.33	1.42	1.52	0.68	0.77	0.87
5/31/2015		0.12	0.14	0.57	0.57	0.64	0.69	0.74	0.42	0.45	0.48	0.75	0.81	0.86	1.20	1.29	1.37	0.17	0.19	0.20	1.38	1.48	1.57	0.73	0.83	0.92
6/7/2015		0.14	0.14	0.56	0.65	0.63	0.68	0.72	0.41	0.44	0.47	0.74	0.79	0.84	1.18	1.27	1.35	0.17	0.18	0.20	1.35	1.45	1.55	0.70	0.80	0.90
6/14/2015		0.12	0.14	0.46	0.46	0.52	0.56	0.59	0.34	0.36	0.39	0.61	0.65	0.69	0.97	1.04	1.11	0.14	0.15	0.16	1.11	1.19	1.27	0.46	0.54	0.62
6/21/2015	0.019	0.09	0.14	0.38	0.3	0.43	0.46	0.49	0.28	0.30	0.32	0.50	0.54	0.57	0.80	0.86	0.92	0.12	0.12	0.13	0.92	0.98	1.05	0.27	0.33	0.40
7/5/2015	0.016	0.09	0.13	0.6	0.44	0.68	0.73	0.77	0.44	0.47	0.50	0.75	0.81	0.86	1.21	1.29	1.38	0.18	0.20	0.21	1.39	1.49	1.59	0.74	0.84	0.94
7/12/2015	0.016	0.06	0.09	0.7	0.35	0.79	0.85	0.90	0.51	0.55	0.59	0.59	0.64	0.68	0.95	1.02	1.08	0.21	0.23	0.24	1.16	1.25	1.33	0.51	0.60	0.68
7/19/2015	<0.0074	0.01	0.02	0.68	0.07	0.77	0.82	0.88	0.50	0.53	0.57	0.12	0.12	0.13	0.18	0.20	0.21	0.21	0.22	0.24	0.39	0.42	0.45	-	-	-
7/26/2015	<0.0074	0.05	0.07	0.74	0.3	0.84	0.90	0.95	0.54	0.58	0.62	0.50	0.54	0.57	0.80	0.86	0.92	0.23	0.24	0.26	1.03	1.10	1.18	0.38	0.45	0.53
8/2/2015	<0.0074	0.04	0.06	0.56	0.18	0.63	0.68	0.72	0.41	0.44	0.47	0.31	0.33	0.35	0.49	0.53	0.56	0.17	0.18	0.20	0.66	0.71	0.76	0.01	0.06	0.11
8/9/2015	<0.0074	0.04	0.06	0.64	0.23	0.72	0.77	0.83	0.47	0.50	0.54	0.39	0.42	0.44	0.62	0.67	0.71	0.20	0.21	0.22	0.82	0.88	0.93	0.17	0.23	0.28
8/16/2015	<0.0074	0.10	0.14	0.56	0.08	0.63	0.68	0.72	0.41	0.44	0.47	0.74	0.79	0.84	1.18	1.27	1.35	0.17	0.18	0.20	1.35	1.45	1.55	0.70	0.80	0.90
8/23/2015	<0.0074	0.05	0.08	0.48	0.2	0.54	0.58	0.62	0.35	0.38	0.40	0.34	0.36	0.39	0.54	0.58	0.62	0.15	0.16	0.17	0.69	0.74	0.79	0.04	0.09	0.14
9/6/2015	<0.0074	0.06	0.08	0.51	0.23	0.58	0.62	0.66	0.37	0.40	0.43	0.40	0.42	0.45	0.63	0.68	0.72	0.16	0.17	0.18	0.79	0.85	0.90	0.14	0.20	0.25
9/13/2015		0.05	0.08	0.59	0.27	0.67	0.71	0.76	0.43	0.46	0.49	0.45	0.48	0.51	0.72	0.77	0.82	0.18	0.19	0.21	0.90	0.96	1.03	0.25	0.31	0.38
9/20/2015	0.02	0.10	0.14	0.64	0.55	0.72	0.77	0.83	0.47	0.50	0.54	0.84	0.90	0.96	1.35	1.45	1.54	0.20	0.21	0.22	1.55	1.66	1.77	0.90	1.01	1.12
10/4/2015	0.018	0.10	0.14	0.61	0.51	0.69	0.74	0.79	0.45	0.48	0.51	0.80	0.86	0.92	1.29	1.38	1.47	0.19	0.20	0.21	1.47	1.58	1.68	0.82	0.93	1.03
10/11/2015	0.066	0.11	0.14	0.24	0.22	0.27	0.29	0.31	0.18	0.19	0.20	0.32	0.34	0.36	0.51	0.54	0.58	0.07	0.08	0.08	0.58	0.62	0.66	-	-	0.01
10/25/2015		0.08	0.12	0.02	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.01	0.01	0.01	0.04	0.04	0.05	-	-	-
11/8/2015	0.025	0.07	0.10	0.19	0.11	0.21	0.23	0.25	0.14	0.15	0.16	0.18	0.19	0.20	0.28	0.30	0.32	0.06	0.06	0.07	0.34	0.37	0.39	-	-	-
11/15/2015		0.05	0.08	0.32	0.14	0.36	0.39	0.41	0.23	0.25	0.27	0.23	0.25	0.26	0.37	0.40	0.42	0.10	0.10	0.11	0.47	0.50	0.53	-	-	-
11/22/2015	0.025	0.06	0.09	0.35	0.17	0.40	0.42	0.45	0.26	0.28	0.29	0.29	0.31	0.33	0.47	0.50	0.53	0.11	0.11	0.12	0.57	0.61	0.66	-	-	0.01
11/29/2015	0.013	0.07	0.11	0.53	0.32	0.60	0.64	0.68	0.39	0.42	0.44	0.54	0.58	0.62	0.86	0.92	0.99	0.16	0.17	0.19	1.02	1.10	1.17	0.37	0.45	0.52
12/13/2015		0.07	0.10	0.55	0.31	0.62	0.67	0.71	0.40	0.43	0.46	0.53	0.57	0.60	0.85	0.91	0.97	0.17	0.18	0.19	1.01	1.09	1.16	0.36	0.44	0.51
12/20/2015	0.011	0.06	0.10	0.58	0.31	0.65	0.70	0.75	0.43	0.46	0.49	0.52	0.56	0.60	0.84	0.90	0.96	0.18	0.19	0.20	1.02	1.09	1.16	0.37	0.44	0.51
12/27/2015	0.015	0.06	0.09	0.54	0.28	0.61	0.65	0.70	0.40	0.42	0.45	0.47	0.51	0.54	0.76	0.81	0.86	0.17	0.18	0.19	0.92	0.99	1.05	0.27	0.34	0.40
1/3/2016	0.015	0.07	0.10	0.45	0.24	0.51	0.54	0.58	0.33	0.35	0.38	0.41	0.44	0.47	0.66	0.71	0.76	0.14	0.15	0.16	0.80	0.86	0.91	0.15	0.21	0.26
1/10/2016	0.013	0.06	0.09	0.37	0.18	0.42	0.45	0.48	0.27	0.29	0.31	0.30	0.32	0.34	0.48	0.51	0.54	0.11	0.12	0.13	0.59	0.63	0.67	-	-	0.02
1/17/2016	<0.0074	0.05	0.08	0.52	0.23	0.59	0.63	0.67	0.38	0.41	0.44	0.40	0.42	0.45	0.63	0.68	0.73	0.16	0.17	0.18	0.79	0.85	0.91	0.14	0.20	0.26
1/24/2016	0.016	0.06	0.09	0.51	0.24	0.58	0.62	0.66	0.37	0.40	0.43	0.41	0.44	0.47	0.66	0.70	0.75	0.16	0.17	0.18	0.81	0.87	0.93	0.16	0.22	0.28
1/31/2016	0.026	0.06	0.08	0.54	0.25	0.61	0.65	0.70	0.40	0.42	0.45	0.42	0.45	0.48	0.67	0.72	0.77	0.17	0.18	0.19	0.84	0.90	0.96	0.19	0.25	0.31
2/7/2016	0.0077	0.05	0.08	0.44	0.18	0.50	0.53	0.57	0.32	0.35	0.37	0.31	0.33	0.36	0.50	0.53	0.57	0.13	0.14	0.15	0.63	0.68	0.72	-	0.03	0.07
2/14/2016	0.012	0.07	0.10	0.55	0.31	0.62	0.67	0.71	0.40	0.43	0.46	0.53	0.57	0.60	0.85	0.91	0.97	0.17	0.18	0.19	1.01	1.09	1.16	0.36	0.44	0.51
2/28/2016	0.049	0.07	0.11	0.55	0.32	0.62	0.67	0.71	0.40	0.43	0.46	0.55	0.59	0.63	0.88	0.95	1.01	0.17	0.18	0.19	1.05	1.13	1.20	0.40	0.48	0.55
3/6/2016	0.05	0.07	0.10	0.63	0.36	0.71	0.76	0.81	0.46	0.50	0.53	0.61	0.66	0.70	0.98	1.05	1.12	0.19	0.21	0.22	1.18	1.26	1.34	0.53	0.61	0.69
3/13/2016	0.03	0.06	0.09	0.65	0.31	0.73	0.79	0.84	0.48	0.51	0.55	0.52	0.56	0.60	0.84	0.90	0.96	0.20	0.21	0.23	1.04	1.11	1.18	0.39	0.46	0.53
3/20/2016	0.013	0.05	0.08	0.61	0.27	0.69	0.74	0.79	0.45	0.48	0.51	0.47	0.50	0.53	0.74	0.80	0.85	0.19	0.20	0.21	0.93	1.00	1.06	0.28	0.35	0.41
3/27/2016	0.0077	0.06	0.08	0.65	0.3	0.73	0.79	0.84	0.48	0.51	0.55	0.51	0.55	0.59	0.82	0.88	0.94	0.20	0.21	0.23	1.02	1.09	1.17	0.37	0.44	0.52
4/3/2016	0.022	0.07	0.10	0.53	0.3	0.60	0.64	0.68	0.39	0.42	0.44	0.51	0.55	0.58	0.81	0.87	0.93	0.16	0.17	0.19	0.98	1.05	1.12	0.33	0.40	0.47
4/10/2016	0.0084	0.02	0.04	0.2	0.04	0.23	0.24	0.26	0.15	0.16	0.17	0.07	0.07	0.08	0.11	0.12	0.12	0.06	0.07	0.07	0.17	0.18	0.19	-	-	-
4/17/2016		0.06	0.09	0.03	0.02	0.03	0.04	0.04	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.04	0.04	0.01	0.01	0.01	0.05	0.05	0.05	-	-	-
4/24/2016	0.028	0.03	0.05	0.24	0.07	0.27	0.29	0.31	0.18	0.19	0.20	0.12	0.12	0.13	0.18	0.20	0.21	0.07	0.08	0.08	0.26	0.28	0.29	-	-	-
5/1/2016	0.017	0.06	0.09	0.55	0.27	0.62	0.67	0.71	0.40	0.43	0.46	0.47	0.50	0.53	0.75	0.80	0.85	0.17	0.18	0.19	0.91	0.98	1.04	0.26	0.33	0.39
5/15/2016	<0.0074	0.06	0.09	0.74	0.36	0.84	0.90	0.95	0.54	0.58	0.62	0.61	0.65	0.69	0.97	1.04	1.11	0.23	0.24	0.26	1.20	1.28	1.37	0.55	0.63	0.72
5/22/2016	<0.0074	0.07	0.11	0.72	0.45	0.81	0.87	0.93	0.53	0.57	0.60	0.76	0.82	0.87	1.22	1.31	1.39	0.22	0.24	0.25	1.44	1.54	1.65	0.79	0.89	1.00
6/5/2016	0.019	0.06	0.09	0.6	0.3	0.68	0.73	0.77	0.44	0.47	0.50	0.52	0.55	0.59	0.83	0.89	0.95	0.18	0.20	0.21	1.01	1.08	1.16	0.36	0.43	0.51
6/19/2016	0.016	0.08	0.11	0.61	0.39	0.69	0.74	0.79	0.45	0.48	0.51	0.65	0.70	0.75	1.05	1.12	1.20	0.19	0.20	0.21	1.23	1.32	1.41	0.58	0.67	0.76
6/26/2016	<0.015	0.04	0.06	0.57	0.19	0.64	0.69	0.74	0.42	0.45	0.48	0.32	0.35	0.37	0.52	0.55	0.59	0.17	0.19	0.20	0.69	0.74	0.79	0.04	0.09	0.14
7/3/2016	0.017	0.06	0.09	0.6	0.29	0.68	0.73	0.77	0.44	0.47	0.50	0.49	0.53	0.56	0.79	0.84	0.90	0.18	0.20	0.21	0.97	1.04	1.11	0.32	0.39	0.46
7/10/2016		0.05	0.07	0.61	0.24	0.69	0.74	0.79	0.45	0.48	0.51	0.40	0.43	0.46	0.65	0.69	0.74	0.19	0.20	0.21	0.83	0.89	0.95	0.18	0.24	0.30
7/17/2016	0.017	0.05	0.08	0.75	0.31	0.85	0.91	0.97	0.55	0.59	0.63	0.53	0.57	0.61	0.85	0.91	0.97	0.23	0.25	0.26	1.08	1.15	1.23	0.43	0.50	0.58
7/24/2016		0.05	0.08	0.74	0.32	0.84	0.90	0.95	0.54	0.58	0.62	0.54	0.58	0.62	0.87	0.93	0.99	0.23	0.24	0.26	1.10	1.17	1.25	0.45	0.52	0.60
8/7/2016	<0.015	0.07	0.11	0.77	0.47	0.87	0.93	0.99	0.57	0.61	0.65	0.80	0.86	0.92	1.29	1.38	1.47	0.24	0.25	0.27	1.52	1.63	1.74	0.87	0.98	1.09
8/14/2016	<0.015	0.05	0.08	0.75	0.34	0.85	0.91	0.97	0.55	0.59	0.63	0.57	0.61	0.65	0.92	0.98	1.05	0.23	0.25	0.26	1.14	1.23	1.31	0.49	0.58	0.66
8/21/2016	<0.015	0.09	0.14	0.6	0.45	0.68	0.73	0.77	0.44	0.47	0.50	0.76	0.82	0.87	1.22	1.31	1.39	0.18	0.20	0.21	1.40	1.50	1.60	0.75	0.85	0.95
8/28/2016	<0.015	0.04	0.07	0.65	0.24	0.73	0.79	0.84	0.48	0.51	0.55	0.40	0.43	0.46	0.65	0.69	0.74	0.20	0.21	0.23	0.85	0.91	0.97	0.20	0.26	0.32

Abbreviations

RV- Riverside Plant (existing)
WRV - West Riverside Plant (new)
CF- Capacity Factor
P - Phosphorus
[P] - Phosphorus Concentration

APPENDIX C

MODELING RESULTS

WQ1: P Trade Report

Reported For	Alliant Riverside Full Trading Analysis
Printed	2023-07-21
Plan Completion/Update Date	2018-05-09
SnapPlus Version 17.1 built on 2018-08-22	
P:\1530-6000 Alliant Energy Miscellaneous Projects\6010 - Riverside WQT Update\Analysis\Revised models\SnapPlus\Alliant Riverside Full Trading Analysis - Prairie - revised.snapDb	

Prepared for:
Alliant Riverside Full Trading Analysis
attn:Alliant Riverside Full Trading Analysis
Town of Beloit,

The P Trade Report estimates the annual pounds of phosphorus (P) in surface runoff from cropland entering surface waters. These P loss calculations are based on a field's soil test P concentration, crops, tillage, nutrient management practices and estimates of average runoff and sheet and rill erosion for the predominant soil type. Losses from concentrated flow channel or gully erosion with a field are not included in these calculations. Field runoff losses are calculated for each year as **PTP** (lb P/field/yr). Fields are only included if there are at least 2 years of crops before the selected start year. Before using this report as part of a Water Quality Trade activity, phosphorus losses (PTP) must be converted into 'P credits' according to DNR guidance.

For more information go to **http://dnr.wi.gov/** and type keyword: **Water Quality Trading**

Questions? Please contact DNRphosphorus@wisconsin.gov

This report was developed for Wisconsin DNR Water Quality Trading and Adaptive Management purposes and cannot be used to demonstrate compliance with NR 151 or NRCS 590 NM plan requirements.

P Trade Report				PTP											
Field Name	Soil Series	Soil Symbol	Acres	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
O1: ATC Laydown	LORENZO	LoC2	6	9	7	6	5	5	5	5	5	5	5	5
O2: ATC Substation	LORENZO	LoB	12	47	31	27	24	23	23	22	22	22	22	22
O3-A: Plant Operating Area	WARSAW	WaB	20	3	3	3	3	3	3	3	3	3	3	3
O3-B: Plant Green Space	WARSAW	WaB	4	1	1	1	1	1	0	0	0	0	0	0
O3-C: Plant Operating Area	LORENZO	LoB	5	1	1	1	1	1	1	1	1	1	1	1
O4: Offsite Plant Green Space	WARSAW	WaA	7	1	1	1	1	1	1	1	1	1	1	1
O5: Solar and Green Space	WARSAW	WaB	22	4	3	3	3	3	3	3	3	3	3	3

P Trade Report				PTP										
Field Name	Soil Series	Soil Symbol	Acres	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
O6: Substation	WARSAW	WaA	2	0	0	0	0	0	0	0	0	0	0	0
R1: SE Green Space	LORENZO	LoB	9	14	8	8	7	7	7	7	7	7	7	7
R2: SW Green Space	LORENZO	LoB	9	25	23	21	20	20	20	20	20	20	20	19
R3: Transmission Green Space	LORENZO	LoB	14	22	13	12	12	12	12	12	12	12	12	12
Total			**110**	**127**	**91**	**82**	**77**	**75**	**74**	**74**	**73**	**73**	**73**	**73**

WQ1: P Trade Report

Reported For	Alliant Riverside Full Trading Analysis
Printed	2023-07-21
Plan Completion/Update Date	2017-11-17
SnapPlus Version 17.1 built on 2018-08-22	
P:\1530-6000 Alliant Energy Miscellaneous Projects\6010 - Riverside WQT Update\Analysis\Revised models\SnapPlus\Alliant Riverside Full Trading Analysis.snapDb	

Prepared for:
Alliant Riverside Full Trading Analysis
attn:Alliant Riverside Full Trading Analysis
Town of Beloit,

The P Trade Report estimates the annual pounds of phosphorus (P) in surface runoff from cropland entering surface waters. These P loss calculations are based on a field's soil test P concentration, crops, tillage, nutrient management practices and estimates of average runoff and sheet and rill erosion for the predominant soil type. Losses from concentrated flow channel or gully erosion with a field are not included in these calculations. Field runoff losses are calculated for each year as **PTP** (lb P/field/yr). Fields are only included if there are at least 2 years of crops before the selected start year. Before using this report as part of a Water Quality Trade activity, phosphorus losses (PTP) must be converted into 'P credits' according to DNR guidance.

For more information go to **http://dnr.wi.gov/** and type keyword: **Water Quality Trading**

Questions? Please contact DNRphosphorus@wisconsin.gov

This report was developed for Wisconsin DNR Water Quality Trading and Adaptive Management purposes and cannot be used to demonstrate compliance with NR 151 or NRCS 590 NM plan requirements.

P Trade Report				PTP										
Field Name	Soil Series	Soil Symbol	Acres	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
O1: ATC Laydown	LORENZO	LoC2	6	100	64	40	46	31	32	37	98	63	39	45
O2: ATC Substation	LORENZO	LoB	12	94	103	69	73	83	209	144	93	102	69	72
O3-A: Plant Operating Area	WARSAW	WaB	20	85	78	87	80	89	82	90	83	92	85	94
O3-B: Plant Green Space	WARSAW	WaB	4	16	15	16	15	17	16	17	16	17	16	18
O3-C: Plant Operating Area	LORENZO	LoB	5	16	15	16	15	17	15	17	16	17	16	18
O4: Offsite Plant Green Space	WARSAW	WaA	7	13	12	13	13	13	13	14	13	14	14	14
O5: Solar and Green Space	WARSAW	WaB	22	96	88	98	91	100	93	102	94	104	96	106

P Trade Report				PTP											
Field Name	Soil Series	Soil Symbol	Acres	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
O6: Substation	WARSAW	WaA	2	3	3	3	3	3	3	3	3	3	3	3
R1: SE Green Space	LORENZO	LoB	9	68	62	69	63	70	64	71	65	71	66	72
R2: SW Green Space	LORENZO	LoB	9	61	64	73	184	127	82	90	60	64	29	185
R3: Transmission Green Space	LORENZO	LoB	14	106	97	107	99	109	100	110	102	111	103	113
Total			**110**	**658**	**602**	**591**	**682**	**657**	**709**	**694**	**643**	**658**	**533**	**740**

APPENDIX D

O&M PLANS

ECO-RESOURCE CONSULTING, INC

MEMORANDUM

TO: ROBERT MONTGOMERY, RYAN STENJEM – MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS (MARS)

FROM: ECO-RESOURCE CONSULTING, INC.

SUBJECT: ALLIANT ENERGY RIVERSIDE ENERGY PARK – SW GREEN SPACE RESTORATION PLAN

DATE: 11/8/2017

CC: **STEVE HJORT, CLAY FRAZER**

RE: SW Green Space Preliminary Findings and Recommendations

Summary:
On October 31, 2017 ERC senior ecological staff members Clayton Frazer and Daniel Fuhs conducted a precursory field investigation of the 8 +/- acre "SW Green Space" unit at Alliant Energy's Riverside Energy Park. Observations were made on current vegetation, land use, and soil conditions with the intent of developing a Native Prairie Restoration Plan for this field/unit.

Three soil test pits were advanced to classify soil structure, type, horizons, and to collect soil for lab testing. The location of the test pits can be viewed on ERC Figure 4 (enclosed).

Vegetation:
The eastern 2/3 of the unit was planted (drilled) into a temporary cover crop of soybeans, winter wheat, and rye. This was likely a late season planting as the soybeans are underdeveloped (approx. 8"). Annual weeds are sparse and include pigweed, lambsquarters, and curly dock.

The western 1/3 of the unit was planted into corn in spring of 2017. This was presumably Roundup-Ready corn as weed control was excellent. The corn was harvested and heavy/dense residue persists (stalks, leaves, cobs).

Soil Type/Structure:
Mapped soils include loams and silt loams. The largest portion of the unit is mapped as a Lorenzo Loam with 2-5% slopes. Mapped soils on the balance of the field include; Warsaw Silt Loam 0-2% slope Warsaw Silt loam 2-6% slope, and Lorenzo Loam 6-12% slope – eroded. These mapped soils were consistent with ERC's on-site findings (see ERC Figure 2).

Soil Compaction:
Soils across the unit are generally lacking porosity and are heavily compacted down to a 20" depth. This is likely a hard pan layer that has developed following years of agricultural use.
Topography:
Topography on this unit is lightly rolling and trends from the northwest to the southeast. Drainage is more pronounced in the eastern third of the unit through a shallow swale.

Soil Test Results:
Soil pH was low on two samples. Organic Matter (OM) percentage is low (<2% on two samples) and very low (<1%) on sample 3. Phosphorus levels are high to excessive on each sample.

Additional Considerations:

- Silt fence currently extends into the unit near the northeast corner (see ERC Figure 4).
- The tree lines along the west and south edges of the unit contain high densities of mature common buckthorn and Asian bush honeysuckle. These woody invasive species will propagate seedlings into the restoration unit and should be eradicated.

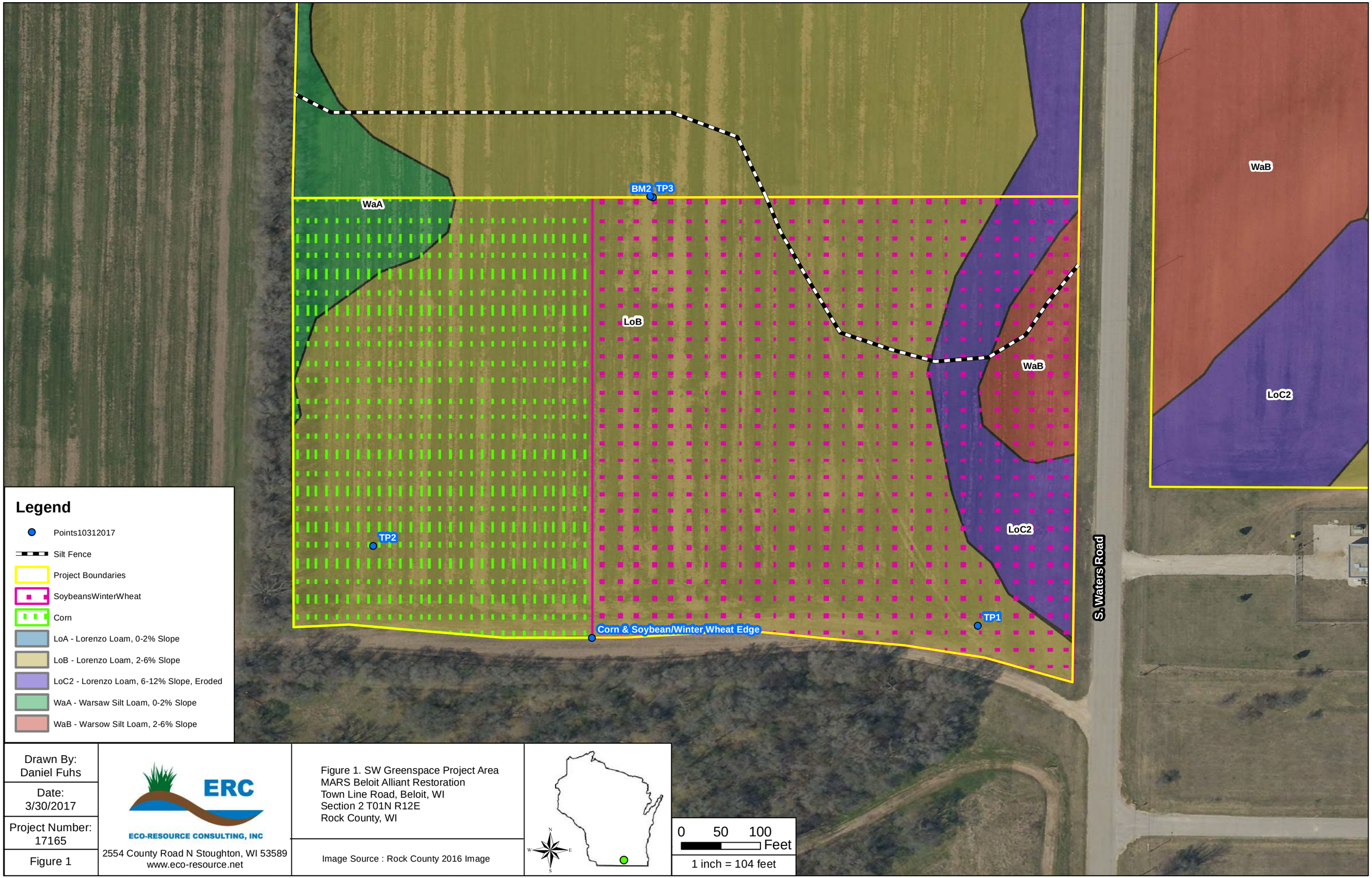
Preliminary Recommendations:
Based on the amount of surface vegetation, crop residue, compaction, and low pH levels, ERC recommends that seedbed preparation be conducted prior to installation of native seed. A heavy disk-ripper should be used to turn over surface residue and breakup the plow-pan layer. This action may also serve to increase soil pH slightly. During this seedbed preparation, Dolomitic limestone should be applied at 2.5- 3 tons per acre. Surface soils should be finished with a harrow-finisher. This will smooth clods and root balls, and will prepare an ideal soil surface for either broadcast seeding or no-till drill installation of a native seed mix.

If this seedbed preparation can be conducted in November or December, native seed can be broadcasted in the winter months up to the time 3-5 inches of snow exists on the site. A dormant winter seeding will increase seed germination rates of forbs and will result in a longer 2018 growing season. If site preparation cannot be conducted until the spring of 2018, the native seed mix can be drilled in May or June with a specialized no-till native seed drill.

Native Seed Mix:
ERC Ecologists will design a native seed mix ideal for soil and hydrology conditions which meets the client's objectives. Based on current conditions, ERC recommends a mix with a base of tall-stature C4 (warm season) grasses. Representative C4 grass species would be big bluestem, Indiangrass, and switchgrass along with a modest array of native forbs and legumes to help prevent broad-leaved weed incursion and to maximize nutrient uptake.

Attachments:
ERC Figure 2 – NRCS Web Soil Viewer
ERC Figure 4 – 10/31 Site Visit
Site Assessment Photos Available for Review

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Drawn By: Daniel Fuhs

Date: 3/30/2017

Project Number: 17165

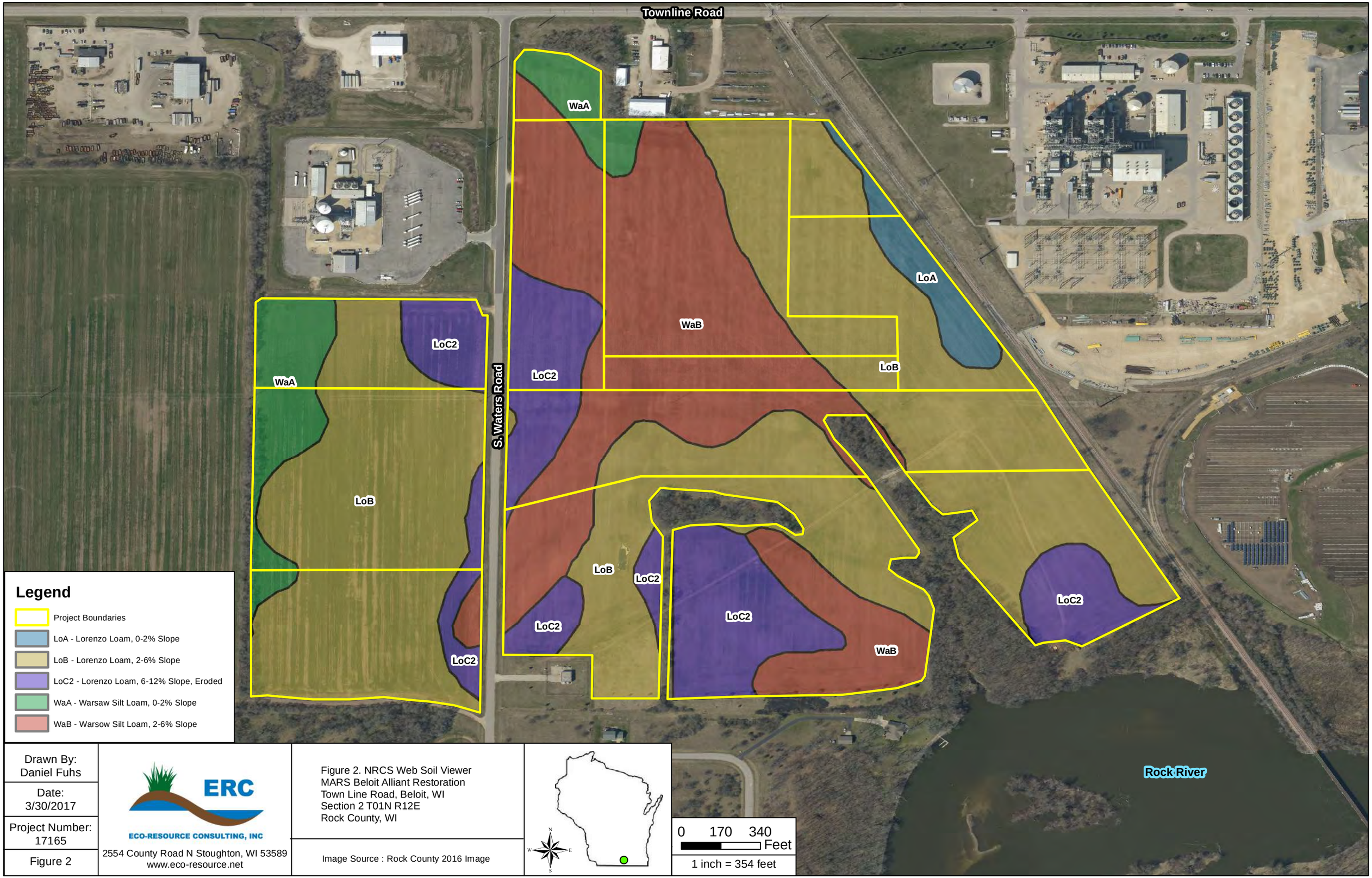
Figure 1

ERC
ECO-RESOURCE CONSULTING, INC

2554 County Road N Stoughton, WI 53589
www.eco-resource.net

Figure 1. SW Greenspace Project Area
MARS Beloit Alliant Restoration
Town Line Road, Beloit, WI
Section 2 T01N R12E
Rock County, WI

Image Source : Rock County 2016 Image



Drawn By: Daniel Fuhs

Date: 3/30/2017

Project Number: 17165

Figure 2

ERC
ECO-RESOURCE CONSULTING, INC

2554 County Road N Stoughton, WI 53589
www.eco-resource.net

Figure 2. NRCS Web Soil Viewer
MARS Beloit Alliant Restoration
Town Line Road, Beloit, WI
Section 2 T01N R12E
Rock County, WI

Image Source : Rock County 2016 Image

Riverside Energy Center
Water Quality Trading
Operation and Maintenance Plan

Town of Beloit
Rock County, WI

Prepared for:
Alliant Energy, Wisconsin Power & Light Co.



November 30, 2017

Montgomery Associates
Resource Solutions, LLC • ma-rs.org

MARS Project #1723

119 South Main Street, Cottage Grove, WI 53527 | 608-839-4422

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List of Attachments

Figures
Approved Maintenance Agreements
Prairie Restoration Maintenance Plans
Stormwater Facility Inspection Report Templates

1 Background

This plan has been prepared to describe the operation and maintenance of the areas described in the Riverside Energy Center Water Quality Trading Plan. These areas will be managed to reduce the export of sediment and phosphorus from the site to meet the conditions of the trading plan. These management practices will control phosphorus export by reducing sediment export from erosion as well as reducing runoff volume. The management practices and contributing areas shall be inspected annually by Alliant Energy, or an authorized representative, with reports prepared and submitted to the Wisconsin DNR.

1.1 Areas Described

All areas described in this plan are part of the Riverside Energy Center Water Quality Trading Plan and identified on the attached *Figure 1*. The total site is approximately 112 acres south of WBR Townline Rd, on the east and west side of S Walters Rd in the Town of Beloit, Rock County, WI. The land is primarily divided into two land use types, perennial vegetation (primarily prairie restoration) areas and developed areas draining to stormwater facilities. Additional descriptions of the areas are provided in *Section 2*.

1.2 Access

All areas described within this plan shall be accessed by foot during inspections. Several parking areas are available at existing field access drives and driveways. The two fenced areas (West Riverside Energy Center and Kittyhawk Substation) will have more specific access conditions.

The areas and stormwater facilities within the fence at the Riverside Energy Center shall be inspected within the fence. Access to these areas shall be coordinated by contacting the Plant Manager (contact information below).

Observations of stormwater facilities and site conditions at Kittyhawk Substation shall be made by walking the site. Parking is available at one of the driveways on the west side of S Walters Rd. The general site conditions and stormwater facility inspections shall be performed on foot outside of the substation fence, additionally, conditions of the gravel pad shall be made from outside of the fence. Access within the fence is not anticipated unless significant erosion or runoff issues develop.

If it is determined that maintenance is required on any of the land management areas or stormwater practices, a specific access plan should be developed. The access plan will consider the scope of work and equipment needs. Ground disturbance shall be minimized to the extent possible, and environmentally sensitive areas avoided.

1.3 Contact information

The following people shall be contacted prior to performing any inspections on the areas described in this plan and if any maintenance is required. This section shall be updated if other individuals fill these rolls in the future.

Riverside Energy Center Plant Manager
Paul Gregor
401 W B-R Townline Road, Beloit WI 53511
Office: (608) 361-5116
paulgregor@alliantenery.com

Manager – Environmental Services, Compliance
Bill Skalitzky
4902 N. Biltmore Lane, Madison, WI 53718
Office: (608) 458-3108 | Cell: (608) 575-5831
williamskalitzky@alliantenergy.com

2 Operation, Inspection, and Maintenance

2.1 Restoration Areas

Areas covered

The areas converted to native prairie restoration, or perennial vegetative "green space" are as follows; the South West Green Space, the Transmission Green Space, the South East Green Space and, the Plant Green Space, the Solar and Green Space area, and the ATC laydown area. These areas are being evaluated and established over several years due to construction activities on the site, as described in the Water Quality Trading Plan. As each area is evaluated and restored, a unique maintenance plan will be developed amended to this plan.

The ATC laydown area shall be included as part of the restoration area operation and maintenance procedures when the area is restored after transmission line construction (2019). The area is set aside for future expansion of the Kittyhawk Substation. A planned schedule for this expansion has not been established at this time. Prior to this expansion, and after use for laydown, this area will be restored to perennial vegetation. When the substation expansion is planned and designed this location will be revaluated and this plan updated.

Inspections

The inspections will evaluate the overall vegetative cover as well as identify areas of rill or gulley erosion. Meander surveys will be conducted annually on all areas of native prairie restoration annually

in August. More frequent inspections are recommended in the first two years of vegetation establishment. These surveys will report the vegetation density and richness as well as note the presence of invasive species. Any areas of erosion will be noted and recommendations for maintenance provided (if necessary).

Maintenance

Maintenance of the perennial vegetation areas will be performed at the recommendation of an ecologist or trained engineer. In the first year of establishment it is recommended that the native restoration areas are mowed when the vegetation reaches a height of 12-14". Vegetation should be cut to a height of 6-8" to allow sunlight to reach slower growing vegetation and compete with weeds or invasive species. In the second growing season vegetation should be mowed after reaching a height of 24-26" and cut to a height of 12-14".

After the second growing season spot mowing or herbicide treatment may be needed to control invasive species. Areas of poor vegetation establishment shall be re-seeded as necessary. If areas of erosion are identified appropriate vegetation and/or structural practices shall be recommended.

Reporting

Detailed inspection and maintenance reports shall be created after each inspection and meander survey. These reports shall include descriptions of the vegetative cover and condition. Photo logs shall be included as an attachment to the report. These reports shall be provided to the DNR as described in the Riverside Energy Center Water Quality Trading Plan.

2.2 Stormwater Facilities

Areas Covered

The areas to be covered by these inspections include the stormwater facilities, as well as, the areas draining to the facilities. These areas include the Kittyhawk Substation, the Plant Parking and Green Space, the Plant Operating Area, the Plant Stormwater Facilities, and the Alliant Substation.

Inspections and Maintenance

Inspections on all stormwater facilities shall be completed a minimum of once per year. Permitted storm water facilities shall be inspected and maintained according to any recorded maintenance agreements. Both the West Riverside Energy Center and Kittyhawk Substation stormwater facilities have maintenance agreements with the Town of Beloit (see attached).

Contributing Areas

Contributing areas to stormwater facilities should be maintained to limit erosion and sediment losses. Areas of excessive erosion or poor ground cover shall be noted. The export of soil or other sediment from contributing areas can result in failure of stormwater facilities or increased maintenance frequency.

Areas of minor erosion or with poor vegetative cover may be maintained by seeding and mulching to re-establish good cover. Areas of significant erosion, such as large rills or gullies, may require minor regrading to convey channelized flow. Any areas of significant sediment generation, such as grave, or dirt roads, should be managed to prevent the transport of sediment to stormwater facilities. Recommendations may be made by a qualified engineer upon identification of an issue

Wet Ponds

Wet ponds maintenance shall conform to the recommendations of WDNR Conservation practice standard 1001 and any approved maintenance agreement. All inflow points to the pond shall be inspected for stability and areas of erosion noted. Embankments shall be inspected for erosion, seepage, or growth of woody vegetation. The permanent pool shall be evaluated to ensure an average depth of at least 3.5 ft. The outlet structure shall be inspected to ensure it is in good condition and functioning as designed.

Wet ponds shall be dredged to remove accumulated sediment when the permanent pool depth is less than 3.5 ft., to achieve a pool depth of at least 5 ft. Spoils shall be appropriately handled and disposed of according to NR 500, Wis Adm. Code. Woody vegetation shall be removed from the embankments or within the pond. Any additional issues that may impact the functionality of the pond shall be addressed as recommended by a qualified engineer.

Rain Garden and Infiltration Areas

Rain gardens and infiltration areas shall be inspected and maintained in conformance with WDNR Conservation Practice Standard 1003 and any approved maintenance agreement. All embankments and side slopes shall be inspected for areas of erosion, seepage or extensive woody vegetation growth. Infiltration areas shall be inspected for signs of extended ponding such as dead vegetations or sediment rings, a sign of a clogged infiltration surface. Standing water should not be present in the infiltration area more than 3 days after rainfall. Vegetation should be maintained so that there are no areas bare of vegetation or have excessive vegetative growth that would limit the facility storage.

If surface infiltration has been impacted by accumulated sediment the top 3-4 inches of engineered soil media shall be removed and tilled to promote infiltration. Appropriate vegetation management will also help to promote infiltration by breaking up the sediment layer. Any additional issues that may impact the functionality of the facilities shall be addressed as recommended by a qualified engineer.

Swales

Vegetated swales shall be inspected and maintained in conformance with WDNR Conservation Practice Standard 1005 and any approved maintenance agreement. Swales should have good vegetative

cover in all areas, especially the channel flow line. Areas of erosion, dead vegetation, or sediment accumulation shall be noted as these factors may indicate insufficient swale conveyance capacity. Areas of excessive vegetation shall also be noted as it may reduce the swale conveyance capacity.

If persistent ponding is occurring within swales with grades less than 1%, an underdrain may be added to reduce ponding and improve drainage. Minor areas of dead vegetation shall be restored with seed and mulch, or erosion mat if located on the channel flow line. Grassed swales shall be mowed regularly to maintain channel capacity. With vegetation being cut to approximately 4" or shorter if vegetative growth exceeds 8". Any additional issues that may impact the functionality of the facilities shall be addressed as recommended by a qualified engineer.

Storm Sewers and Culverts

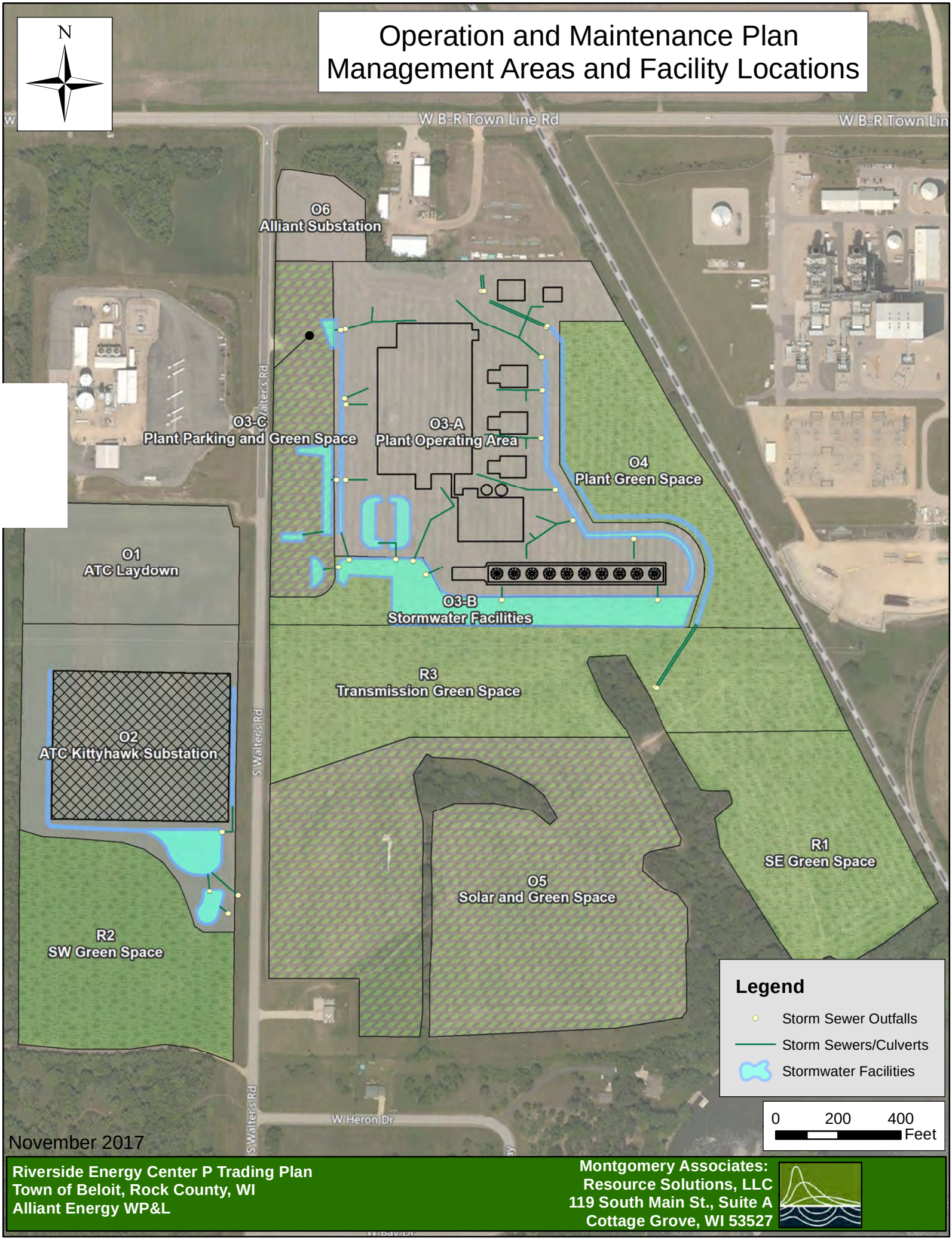
Storm sewers and culverts shall be inspected to ensure they are in good working condition. Pipes should not have accumulation of sediment or debris. Inlets and outlets shall be inspected for the presence of significant erosion or blockage. Driveway culverts should not be crushed or deformed.

Any accumulated debris and sediment shall be removed if the depth exceeds 2". Upstream sources of sediment shall be identified and remedied if possible. Areas of erosion around outlets shall be stabilized with a properly sized rip-rap pad. Any deformed or damaged culverts and storm sewers shall be replaced in a timely manner. Any additional issues that may impact the functionality of the facilities shall be addressed as recommended by a qualified engineer.

Reporting

Detailed inspection and maintenance reports shall be prepared after each inspection. These reports shall include descriptions of the vegetative cover and condition as well as the conditions of impervious areas. Stormwater facility conditions and recommended maintenance provisions (if needed) shall also be described. Photo logs shall be included as an attachment to the report. The attached inspection logs shall be completed during each inspection and attached to the report. These reports shall be provided to the DNR as described in the Riverside Energy Center Water Quality Trading Plan.

Figures


N
Operation and Maintenance Plan
Management Areas and Facility Locations
W B-R Town Line Rd
W B-R Town Lin
O6
Alliant Substation
S Walters Rd
O3-C
Plant Parking and Green Space
O3-A
Plant Operating Area
O4
Plant Green Space
O1
ATC Laydown
O3-B
Stormwater Facilities
R3
Transmission Green Space
O2
ATC Kittyhawk Substation
R1
SE Green Space
O5
Solar and Green Space
R2
SW Green Space
W Heron Dr
Legend
Storm Sewer Outfalls
Storm Sewers/Culverts
Stormwater Facilities
0
200
400
Feet
November 2017
Riverside Energy Center P Trading Plan
Town of Beloit, Rock County, WI
Alliant Energy WP&L
Montgomery Associates:
Resource Solutions, LLC
119 South Main St., Suite A
Cottage Grove, WI 53527

Approved Maintenance Agreements

STORM WATER MANAGEMENT PRACTICES
MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this_____ day of _____, 2017, by and between Alliant Energy/Wisconsin Power and Light Company hereinafter called the "Owner", and the Township of Beloit, hereinafter called the "Town".

WITNESSETH:

WHEREAS, the Owner is the owner of the following described lands situated in the Town of Beloit, County of Rock County, State of Wisconsin, to-wit:

ASSESSORS PLAT
PT OUTLOTS 4 & 5 COM 50.01'
S OF N1/4 COR E 276.19',
SE ALG RR R/W 2798.43'
SW 25', SE 569.36',
W 2416.85' TO E LN
RD, N 2885.59', NE 92.53',
E 245.51', S 399.99', E 200'
N 399.99' TO POB
(EXC CSM 36-78)

hereinafter called the "Property".

WHEREAS, the Owner is developing the property; and

WHEREAS, the development provides for on-site storm water management practices within the confines of the Property; and

WHEREAS, the Town and the Owner, its successors and assigns, require that on-site storm water management practices as defined in Chapter 8 of the Town of Beloit Ordinance be constructed and maintained on the Property; and

WHEREAS, the Town requires that on-site storm water management practices as shown on the Plan be constructed and adequately maintained by the Owner, its successors and assigns.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site storm water management practices shall be constructed by the Owner, its successors and assigns, in accordance with the development plans and specifications and applicable statutes, ordinances and rules.

2. The Owner, its successors and assigns, shall regularly inspect the storm water management practices and specifically the function of the approved storm water

management system as often as conditions require, but in any event at least once each year.

3. The Owner, its successors and assigns, shall adequately maintain the storm water management practices, including but not limited to pipes, channels, structures, improvements, and vegetation provided to control the quantity and quality of the storm water. Adequate maintenance is herein defined as keeping the storm water management devices in good working condition.

4. The Owner, its successors and assigns, hereby grant permission to the Community Development Department as the authorized agent and employees of the Town, to enter upon the Property and to inspect the storm water management practices as necessary to ascertain that the practices are being maintained and operated in accordance with the agreement.

5. The Town shall maintain public records of the results of the site inspections, inform the Owner of the inspection results, and to specifically indicate any corrective actions required to bring the storm water management practice into proper working condition.

6. The Owner, as the responsible for long term maintenance of the storm water management practices, shall be notified by the Town, Community Development Department or Public Works Department(s) of maintenance problems which require corrections. The specified corrective actions shall be undertaken within a reasonable time frame as set by the Community Development Department.

7. If the Owner does not make the required corrections in the specified time period, the Community Development Department has authorization to perform the corrected actions identified in the inspection report. The Town Finance Director/Treasurer shall enter the amount due on the tax rolls and collect the money as a special charge against the property pursuant to Subch. VII of Chapter 66, Wis. Stats.

Signatures

The undersigned agrees to the provisions set forth in this agreement.

_____

Signature or Authorized Agent for Owner

_____

Name and Title

_____

Date

Exhibit A
Minimum Storm Water Practice Maintenance Requirements

This exhibit explains the basic function of each of the storm water practices and the maintenance requirements beyond the minimum requirements to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this particular site.

WET DETENTION POND
OPERATION AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Mowing

1. Side slopes, embankments, and emergency spillways that are not rock lined which have been planted with turf grasses should be mowed at least twice a year to prevent woody growth and control noxious weeds.

2. More frequent mowing, typically once a week during a normal growing season, is recommended for aesthetic and allergy control purposes.

3. Native grasses should be mowed to a height of 6" in mid to late summer or after they have achieved a height of 1-1/2 feet during the first growing season. Further mowing in subsequent growing seasons will not be required

B. Inspections

1. Inspections of the ponds shall he completed on a quarterly basis or after significant rainfall events.

2. The inspections should be completed during wet weather conditions to determine if the ponds are functioning properly.

3. Inspection priorities shall be as follows:

a. Inspect the embankments for subsidence, erosion, cracking and tree growth.

b. Inspect the condition of the emergency spillway and overland flow path.

c. Inspect the pond for accumulation of sediment.

d. Inspect the outlet control structure for clogs, debris and material failures.

e. Inspect upstream and downstream channels from an erosion perspective.

f. Inspect any modifications that may have been done to the ponds following their initial construction.

g. Inspect the side slopes of the pond for erosion, slumping, cracking or woody plant materials.

4. As-built plans shall accompany the person responsible for the pond inspections.

5. Documentation of the inspections should be completed and filed. Documentation should include at a minimum:

a. Inspectors name, affiliation and professional credentials if applicable.

b. Date, time and weather conditions.

c. Approximate rainfall total over a 24 hour period if applicable.

d. Existing embankment, outlet and inlet conveyance systems and vegetation condition.

e. Sediment depth at the outlet control structure and at a minimum one other location.

f. Identification of potential structural failures and repair needs

g. Other pond conditions such as vegetation growth, algae growth and emergency spillway conditions.

h. Repair recommendations.

C. Debris and Litter Removal.

1. Debris and litter removal from the pond surface shall be completed at least once a month.
2. Particular attention should be paid to debris accumulating around the riser pipe to prevent potential clogging.

D. Erosion Control.

1. The pond side slopes, embankments and emergency spillways may suffer from periodic slumpage and erosion.

2. Corrective measures shall include re-grading, filling and re-vegetation of the eroded or slumping areas.

3. Rip rap at the pond outlet and emergency spillways should be inspected for displacement or undermining. Repairs shall be made upon discovery.

E. Nuisance Control.

1. Biological control of algae and mosquitoes is preferred over chemical control. Consultation with local WDNR officials is recommended prior to the introduction of any biological control.

2. Maintaining the native grass perimeter will aide in the control of geese.

3. Mechanical controls should be used when feasible.

II. NON-ROUTINE MAINTENANCE

A. Structural Repairs and Replacement.

1. Annual inspection of the outlet structures will disclose any potential structural problems. If structural problems appear, repair or replace the outlet.

2. Excessive or chronic drawdown of the ponds may cause leaks or seepage through the embankments. Excessive drawdown should be avoided and thus corrective measures for leakage and seepage can be avoided.

B. Sediment Removal

1. A sediment clean out cycle of 10 to 15 years is recommended. Sediment removal may be necessary prior to 10 years if there is a substantial amount of land disturbance occurring within the contributory watershed. Annual inspections shall be made to insure that the design depth of the permanent water pool is maintained.

2. Sediment removed from the ponds shall be hauled to an upland area, spread and stabilized with vegetative material or disposed of in accordance with Chapter NR 528 of the Wisconsin Administrative Code.

3. Surveyed depths of the sediment storage area and permanent pool elevations shall be made immediately following the construction of the ponds and recorded on the as-built plans. Annual inspections shall include measure downs to determine sediment elevations in relation to the permanent pool elevation.

III. ADDITIONAL CONSIDERATIONS TO IMPROVE POND WATER QUALITY AND REDUCE MAINTENANCE COSTS.

A. General.

1. Improper disposal of yard wastes will affect the water quality of the wet ponds and may cause clogging of the outlet structure.

2. Improper fertilizer and pesticide application will affect the water quality of the wet ponds and add to algae growth.

3. Excess lawn watering will affect the water quality of the ponds due to increased water runoff that may contain fertilizers and pesticides.

B. Yard Care

1. It is recommended to consider routine yard care maintenance that is practical and environmentally sound.

2. Refer to the U.W. Extension's "Rethinking Yard Care" for additional information.

C. Leaves and Yard Trimmings.

1. It is recommended that leaves and yard trimmings be properly disposed of.

2. Refer to the U.W. Extension's "Managing Leaves and Yard Trimmings" for further information.

D. Lawn and Garden Fertilizers.

1. It is recommended to control fertilizer applications on lawn and gardens so as not to be detrimental to the water quality of the ponds.

2. Refer to the U.W. Extension's "Lawn and Garden Fertilizers" for further information.

E. Lawn and Garden Pesticides.

1. Lawn and garden pesticides may pollute surface and ground water.

2. Refer to the U.W. Extension's "Lawn and Garden Pesticides" for further information.

F. Lawn Watering.

1. Excess lawn watering will wash pollutants into the wet ponds.

2. Refer to the U.W. Extension's "Lawn Watering" for further information.

G. Lawn Weed Control.

1. Proper turf management will lower the amount of the chemicals that may runoff into the wet ponds during rain events.

2. Refer to the U.W. Extension's "Lawn Weed Control" for further information.

VEGETATED FILTER STRIPS
OPERATION AND MAINTENANCE

I. INSPECTION

A. Inspect quarterly and after every major storm event.

B. Inspect for erosion, accumulation of sediment, diversions and short circuiting, standing water and the accumulation of litter.

II. MAINTENANCE

A. Do not mow vegetation to a height lower than the design flow depth.

B. Minimize the use of fertilizers and pesticides.

C. Do not use heavy equipment to mow. Mowing should occur during dry periods to avoid compaction.

D. Repair and reseed eroded areas immediately upon discovery.

GRASSED SWALES
OPERATION AND MAINTENANCE

I. INSPECTION

A. Inspection should occur seasonally and after major rainfall events.

B. Inspect for sediment deposition, check dam bypassing, erosion and litter.

C. Nuisance conditions such as woody plant growth and mosquito breeding areas should also be identified and removed.

II. MAINTENANCE

A. Mow only to maintain the vegetation at a height greater than the design flow depth.

B. Maintain the vegetated liner in a vigorous condition.

C. Depending on the vegetative material, mowing may be infrequent or unnecessary.

D. Remove woody plants that may invade the swale.

E. If the swale is damaged by road salts, remove the damaged area and replant with salt tolerant grasses.

F. Discourage deposition of leaf litter and grass clippings by informing, typically by signage, local residents of the swales purpose.

CULVERTS
OPERATION AND MAINTENANCE

I. INSPECTION

A. Culverts should be inspected twice a year and after heavy rainfall.

B. Inspect for sediment deposition, scour at the ends of pipe, accumulations of trash and obstructions.

II. MAINTENANCE

A. Scour areas should be repaired with clean fill and replacement of end treatment (rip rap, TRM, etc.). Scour areas with no end treatment should be stabilized with topsoil, seed and erosion control mat at a minimum.

B. Sediment deposits, trash and obstructions should be removed from the pipe ends.

C. Material deposited within the pipe should be promptly removed to maintain the conveyance capacity of the pipe.

EXHIBIT A

Description of Property:

Owner:
Alliant Energy Wisconsin Power and Light Company

Property Address:
(To be provided upon receipt of driveway permit)

Property is located in the SE ¼ - NW ¼ of Section 2, T1N, R12E town of Beloit, Rock County.

Maintenance provisions:

Stormwater Management Maintenance Measures

- Facilities showing signs of soil erosion should be repaired with emphasis put on grassed waterways being maintained for proper stormwater conveyance.
- Facilities or parts of facilities with no vegetation shall be restored to good vegetated catch.
- To maximize filtration, mowing in buffer areas around stormwater ponds should be minimized. If occasional mowing is necessary, the mowing height is recommended to be no shorter than 6 inches.

Wet Detention Basins:

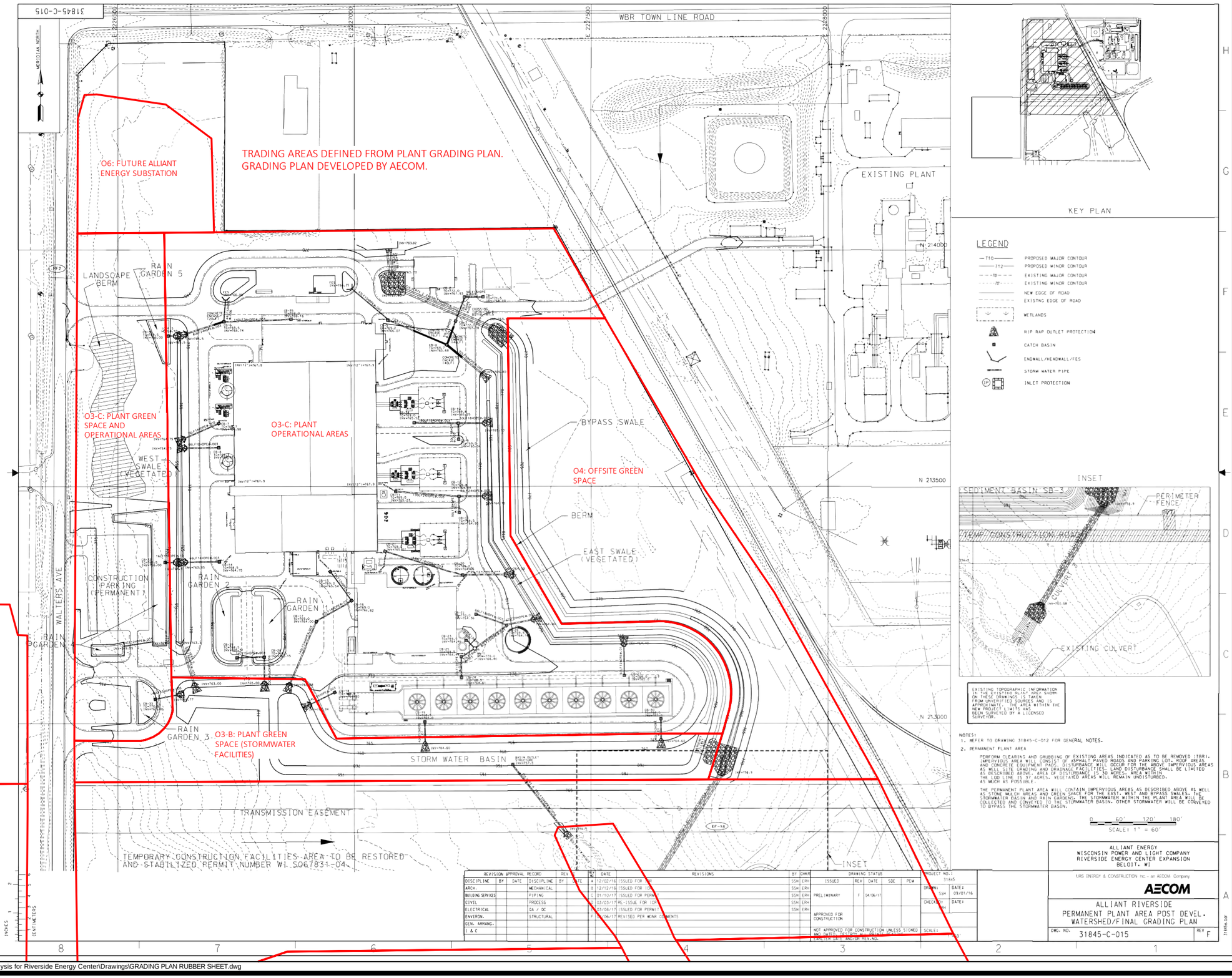
- The landowner shall visually inspect the wet detention basin outfalls and outlet structures annually. The inspections shall include checking for potential problems such as: subsidence erosion, tree growth in and around the embankment and outfall areas, sediment accumulation, clogging of the outfall structure, and damage to emergency spillway. Problems identified by the inspections shall be repaired as soon as is practical.
- All undesirable vegetation and volunteer tree growth shall be removed, including close proximity to any outfall and the outlet structures.
- Sediment accumulations shall be removed by dredging when sediment accumulation results in a permanent pool depth less than 3 feet. The dredged material shall be removed and disposed of in accordance with NR 347.
- The owner shall at a minimum maintain records of installation, inspections, mowing, clearing, and other maintenance of the system.

Infiltration Basins

- Inspections of the infiltration basins shall be done at least semi-annually in early spring and early fall, until permanent vegetation is established. Infiltration area inspections shall include inlet pipe and condition of vegetation as part of inspection. If standing water is observed over 50% of the pond floor 3 days after rainfall, the pond is clogged and measures should be undertaken to unclog it. Acceptable measures include removing the top 2 to 3 inches, chisel plowing and replacing engineered soil material. If deep tilling is used, the pond shall be drained and the soils dried to a depth of 8 inches. After procedures, the owner /operator shall replant with State-approved native plugs.

APPENDIX E

GRADING PLANS



DRAWN BY RSS | CHECKED BY RSS

NO.	REVISION / ISSUE	DATE

MONTGOMERY ASSOCIATES: RESOURCE SOLUTIONS, LLC
119 SOUTH MAIN ST
COTTAGE GROVE, WI 53527
www.ma-rs.org

PROPOSED TRADING AREAS WEST RIVERSIDE EXPANSION

ALLIANT ENERGY PHOSPHORUS TRADING

Town of Beloit
Rock County, WI

Alliant Energy WP&L

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE
0 ½ 1

SCALE
1" = 200'

PROJECT NO.	DATE
1732	11/17/17

SHEET NO.
1/1

P:\1723 - Alliant - P Trade analysis for Riverside Energy Center\Drawings\GRADING PLAN RUBBER SHEET.dwg

31845-C-015

E 2226500 E 2227000 E 2227500 E 2228000

N 214000 N 213500 N 213000

WBR TOWN LINE ROAD

EXISTING PLANT

MERIDIAN NORTH

RAIN GARDEN 5

LANDSCAPE BERM

RIP RAP OUTLET PROTECTION

BYPASS SWALE

WEST SWALE (VEGETATED)

BERM

EAST SWALE (VEGETATED)

CONSTRUCTION PARKING (PERMANENT)

RAIN GARDEN 2

RAIN GARDEN 1

RAIN GARDEN 4

WALTERS AVE

RAIN GARDEN 3

STORM WATER BASIN

BASIN OUTLET INV=757.5

TRANSMISSION EASEMENT

TEMPORARY CONSTRUCTION FACILITIES AREA TO BE RESTORED AND STABILIZED PERMIT NUMBER WI-S067831-04

INSET

SEDIMENT BASIN SB-3

PERIMETER FENCE

TEMP. CONSTRUCTION FLOW ROUTE

CULVERT 3

EXISTING CULVERT

KEY PLAN

EXISTING TOPOGRAPHIC INFORMATION IN THE EXISTING PLANT AREA SHOWN ON THESE DRAWINGS IS TAKEN FROM UNVERIFIED SOURCES AND IS APPROXIMATE. THE AREA WITHIN THE NEW PROJECT LIMITS HAS BEEN SURVEYED BY A LICENSED SURVEYOR.

LEGEND

- 710 — PROPOSED MAJOR CONTOUR
- 712 — PROPOSED MINOR CONTOUR
- --70-- EXISTING MAJOR CONTOUR
- --72-- EXISTING MINOR CONTOUR
- NEW EDGE OF ROAD
- EXISTNG EDGE OF ROAD
- WETLANDS
- RIP RAP OUTLET PROTECTION
- CATCH BASIN
- ENDWALL/HEADWALL/FES
- STORM WATER PIPE
- IP INLET PROTECTION

NOTES:
1. REFER TO DRAWING 31845-C-012 FOR GENERAL NOTES.
2. PERMANENT PLANT AREA

PERFORM CLEARING AND GRUBBING OF EXISTING AREAS INDICATED AS TO BE REMOVED (TBR). IMPERVIOUS AREA WILL CONSIST OF ASPHALT PAVED ROADS AND PARKING LOT, ROOF AREAS AND CONCRETE EQUIPMENT PADS. DISTURBANCE WILL OCCUR FOR THE ABOVE IMPERVIOUS AREAS AS WELL SITE GRADING AND DRAINAGE FACILITIES. LAND DISTURBANCE SHALL BE LIMITED AS DESCRIBED ABOVE. AREA OF DISTURBANCE IS 30 ACRES. AREA WITHIN THE LOD LINE IS 37 ACRES. VEGETATED AREAS WILL REMAIN UNDISTURBED AS MUCH AS POSSIBLE.

THE PERMANENT PLANT AREA WILL CONTAIN IMPERVIOUS AREAS AS DESCRIBED ABOVE AS WELL AS STONE MULCH AREAS AND GREEN SPACE FOR THE EAST, WEST AND BYPASS SWALES, THE STORMWATER BASIN AND RAIN GARDENS. THE STORMWATER WITHIN THE PLANT AREA WILL BE COLLECTED AND CONVEYED TO THE STORMWATER BASIN. OTHER STORMWATER WILL BE CONVEYED TO BYPASS THE STORMWATER BASIN.

0 60' 120' 180'
SCALE: 1" = 60'

REVISION APPROVAL RECORD				REV E			REV NO.	DATE	REVISIONS	BY	CHKR
DISCIPLINE	BY	DATE	DISCIPLINE	BY	DATE		A	12/02/16	ISSUED FOR IDR	SSH	ERH
ARCH.			MECHANICAL				B	12/12/16	ISSUED FOR ICR	SSH	ERH
BUILDING SERVICES			PIPING				C	01/10/17	ISSUED FOR PERMIT	SSH	ERH
CIVIL			PROCESS				D	03/03/17	RE-ISSUE FOR ICR	SSH	ERH
ELECTRICAL			QA / QC				E	03/08/17	ISSUED FOR PERMIT	SSH	ERH
ENVIRON.			STRUCTURAL				F	04/06/17	REVISED PER WDNR COMMENTS		
GEN. ARRANG.											
I & C											

DRAWING STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY	F	04/06/17		
APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED AND DATED. DESTROY ALL PRINTS BEARING EARLIER DATE AND/OR REV.NO.

PROJECT NO.: 31845
DRAWN: SSH DATE: 03/01/16
CHECKED: ERH DATE:
SCALE: 1"=60'

ALLIANT ENERGY
WISCONSIN POWER AND LIGHT COMPANY
RIVERSIDE ENERGY CENTER EXPANSION
BELOIT, WI

URS ENERGY & CONSTRUCTION Inc. – an AECOM Company
AECOM

ALLIANT RIVERSIDE
PERMANENT PLANT AREA POST DEVEL.
WATERSHED/FINAL GRADING PLAN

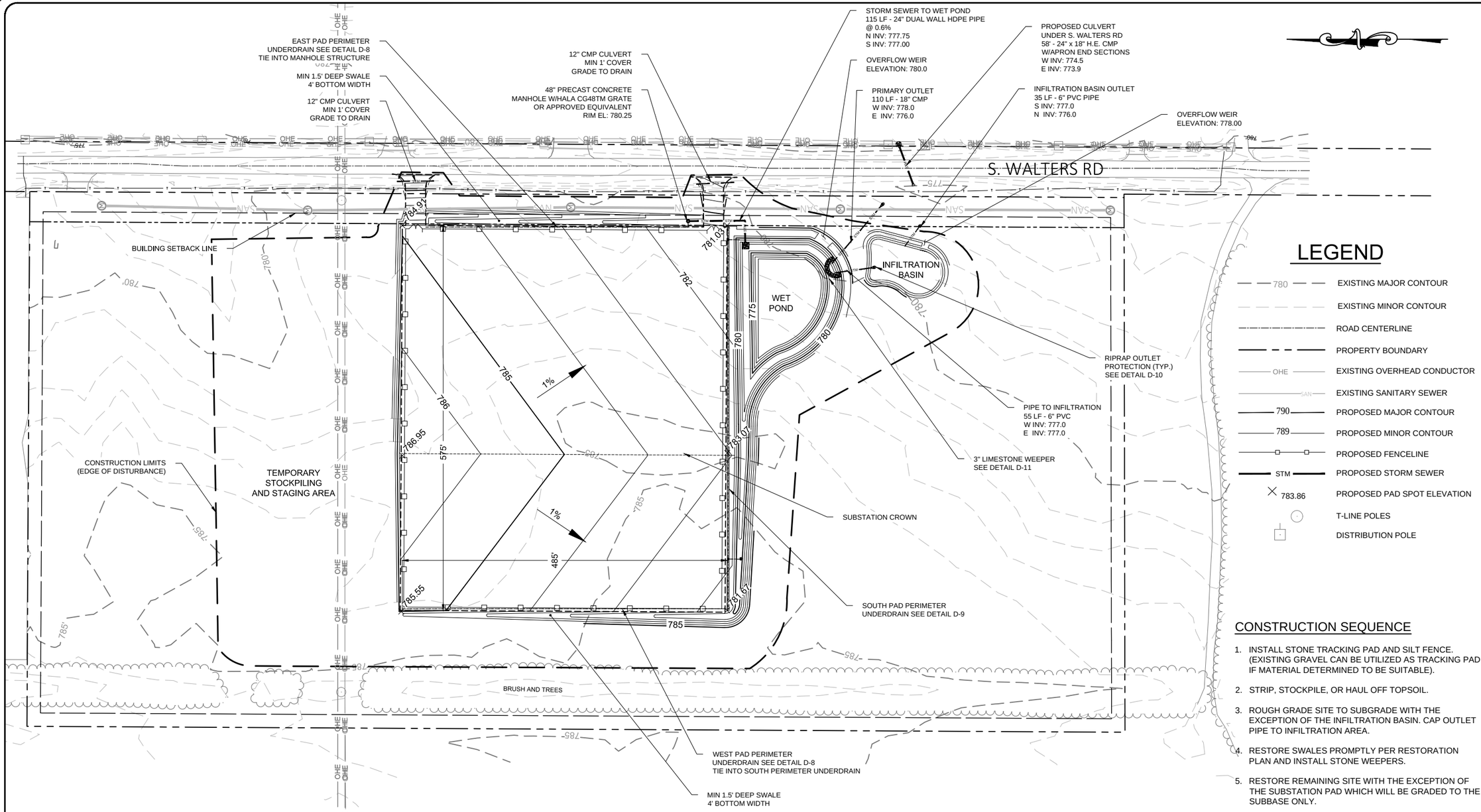
DWG. NO. 31845-C-015 REV F

31845.dgn

INCHES 1 2 3 4 5 6
CENTIMETERS 1 2 3 4 5 6

8 7 6 5 4 3 2 1

H G F E D C B A



LEGEND

- EXISTING MAJOR CONTOUR (780)
- EXISTING MINOR CONTOUR
- ROAD CENTERLINE
- PROPERTY BOUNDARY
- EXISTING OVERHEAD CONDUCTOR (OHE)
- EXISTING SANITARY SEWER (SAN)
- PROPOSED MAJOR CONTOUR (790)
- PROPOSED MINOR CONTOUR (789)
- PROPOSED FENCELINE
- PROPOSED STORM SEWER (STM)
- PROPOSED PAD SPOT ELEVATION (783.86)
- T-LINE POLES
- DISTRIBUTION POLE

CONSTRUCTION SEQUENCE

1. INSTALL STONE TRACKING PAD AND SILT FENCE. (EXISTING GRAVEL CAN BE UTILIZED AS TRACKING PAD IF MATERIAL DETERMINED TO BE SUITABLE).
2. STRIP, STOCKPILE, OR HAUL OFF TOPSOIL.
3. ROUGH GRADE SITE TO SUBGRADE WITH THE EXCEPTION OF THE INFILTRATION BASIN. CAP OUTLET PIPE TO INFILTRATION AREA.
4. RESTORE SWALES PROMPTLY PER RESTORATION PLAN AND INSTALL STONE WEEPERS.
5. RESTORE REMAINING SITE WITH THE EXCEPTION OF THE SUBSTATION PAD WHICH WILL BE GRADED TO THE SUBBASE ONLY.
6. GRADE THE INFILTRATION BASIN. PLACE ENGINEERED SOIL MIX AND SAND STORAGE LAYER PER DETAILS AND RESTORE PER THE RESTORATION PLAN.
7. COMPLETE BELOW GRADE WORK INTERIOR TO THE SUBSTATION FENCE AND PLACE SUBSTATION PAD AGGREGATE.
8. REMOVE TEMPORARY EROSION CONTROL MEASURES WHEN SITE IS FULLY STABILIZED.
9. CONSTRUCTION SHALL BE IN CONFORMANCE WITH ALLIANT ENERGY CONSTRUCTION SPECIFICATIONS.
10. BEFORE GRADING, CONTRACTOR SHALL CONFIRM THE EXISTING GROUNDING WELL LOCATION.

GRADING NOTES:

1. ALL GRADES SHOWN ARE TO BE CONSIDERED TO BE FINAL GRADES.
2. DRIVEWAY AND SUBSTATION PAD SUBGRADE CONSIDERED TO BE 12" BELOW FINISHED GRADE. AREAS TO BE VEGETATED TO BE BROUGHT TO FINAL GRADE WITH 6" OF PLACED TOPSOIL.
3. SUBGRADE PREPARATION, FILL PLACEMENT, AND COMPACTION SHALL BE COMPLETED PER ALLIANT ENERGY EARTHWORK SPECIFICATIONS.
4. LENGTHS, MATERIAL, AND INVERTS OF CULVERTS AND DRAIN PIPES SPECIFIED IN PLAN AND DETAILS.
5. PROTECT INFILTRATION BASIN FROM COMPACTION AND SEDIMENT DURING CONSTRUCTION. AVOID TRAFFIC IN THESE AREAS DURING CONSTRUCTION.
6. PERFORM COMPACTION MITIGATION IN INFILTRATION BASIN AFTER CONSTRUCTION IS COMPLETED, PER WDNR TECHNICAL STANDARD 1004.

DRAWN BY	CHECKED BY
RSS	DJH

NO.	REVISION / ISSUE	DATE

MONTGOMERY ASSOCIATES:
RESOURCE SOLUTIONS, LLC
119 SOUTH MAIN ST
COTTAGE GROVE, WI 53527
www.ma-rs.org

GRADING PLAN

ALT-152 Kittyhawk Substation
Town of Beloit
Rock County, WI
Alliant Energy

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE
0 ½ 1

SCALE
1"=150'

PROJECT NO.	DATE
1312-075	9/13/17

SHEET NO.
2/7

APPENDIX F

CREDIT CALCULATIONS

Existing PTP From SnapPlus (total lb)

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027	PTP 2028
O1: ATC Laydown	100.0	64.0	40.0	46.0	31.0	32.0	37.0	98.0	63.0	39.0	45.0
O2: ATC Substation	94.0	103.0	69.0	73.0	83.0	209.0	144.0	93.0	102.0	69.0	72.0
O3-A: Plant Operating Area	85.0	78.0	86.0	80.0	88.0	82.0	90.0	83.0	91.0	84.0	93.0
O3-B: Plant Green Space	16.0	15.0	16.0	15.0	17.0	16.0	17.0	16.0	17.0	16.0	18.0
O3-C: Plant Operating Area	16.0	15.0	16.0	15.0	17.0	15.0	17.0	16.0	17.0	16.0	17.0
O4: Offsite Plant Green Space	13.0	12.0	13.0	13.0	13.0	13.0	14.0	14.0	14.0	14.0	14.0
O5: Solar and Green Space	105.0	97.0	108.0	100.0	110.0	102.0	112.0	103.0	114.0	105.0	116.0
O6: Substation	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
R1: SE Green Space	68.0	62.0	69.0	63.0	70.0	64.0	71.0	65.0	71.0	66.0	72.0
R2: SW Green Space	61.1	64.3	72.9	183.9	126.9	81.9	89.6	60.5	63.6	28.7	185.2
R3: Transmission Green Space	111.0	102.0	112.0	103.0	113.0	105.0	115.0	106.0	116.0	107.0	117.0
	672	**615**	**605**	**695**	**672**	**723**	**710**	**657**	**672**	**548**	**752**

Existing PTP SnapPlus and WinSLAMM combined results

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	100.0	64.0	40.0	46.0	31.0	32.0	37.0	98.0	63.0	39.0
O2: ATC Substation	Areas modeled in WinSLAMM not modeled under existing conditions									
O3-A: Plant Operating Area	Areas modeled in WinSLAMM not modeled under existing conditions									
O3-B: Plant Green Space	Areas modeled in WinSLAMM not modeled under existing conditions									
O3-C: Plant Operating Area	Areas modeled in WinSLAMM not modeled under existing conditions									
O4: Offsite Plant Green Space	13.0	12.0	13.0	13.0	13.0	13.0	14.0	14.0	14.0	14.0
O5: Solar and Green Space	105.0	97.0	108.0	100.0	110.0	102.0	112.0	103.0	114.0	105.0
O6: Substation	Areas modeled in WinSLAMM not modeled under existing conditions									
R1: SE Green Space	68.0	62.0	69.0	63.0	70.0	64.0	71.0	65.0	71.0	66.0
R2: SW Green Space	61.1	64.3	72.9	183.9	126.9	81.9	89.6	60.5	63.6	28.7
R3: Transmission Green Space	111.0	102.0	112.0	103.0	113.0	105.0	115.0	106.0	116.0	107.0
	458.1	**401.3**	**414.9**	**508.9**	**463.9**	**397.9**	**438.6**	**446.5**	**441.6**	**359.7**

Existing Loss (lb/ac) from SnapPlus

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027	PTP 2028
O1: ATC Laydown	16.6	10.6	6.7	7.7	5.2	5.3	6.2	16.3	10.5	6.5	7.5
O2: ATC Substation	7.7	8.4	5.7	6.0	6.8	17.1	11.8	7.6	8.4	5.7	5.9
O3-A: Plant Operating Area	4.2	3.9	4.3	4.0	4.4	4.1	4.5	4.1	4.5	4.2	4.6
O3-B: Plant Green Space	4.2	3.9	4.2	3.9	4.5	4.2	4.5	4.2	4.5	4.2	4.7
O3-C: Plant Operating Area	3.3	3.1	3.3	3.1	3.5	3.1	3.5	3.3	3.5	3.3	3.5
O4: Offsite Plant Green Space	1.7	1.6	1.7	1.7	1.7	1.7	1.9	1.9	1.9	1.9	1.9
O5: Solar and Green Space	4.4	4.0	4.5	4.2	4.6	4.2	4.7	4.3	4.7	4.4	4.8
O6: Substation	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
R1: SE Green Space	7.6	6.9	7.7	7.0	7.8	7.1	7.9	7.2	7.9	7.3	8.0
R2: SW Green Space	6.6	6.9	7.9	19.8	13.7	8.8	9.7	6.5	6.9	3.1	20.0
R3: Transmission Green Space	7.7	7.1	7.8	7.2	7.9	7.3	8.0	7.4	8.1	7.4	8.1

Existing Loss (lb/ac) SnapPlus and WinSLAMM combined results

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	16.6	10.6	6.7	7.7	5.2	5.3	6.2	16.3	10.5	6.5
O2: ATC Substation	Areas modeled in WinSLAMM not modeled under existing conditions									
O3-A: Plant Operating Area	Areas modeled in WinSLAMM not modeled under existing conditions									
O3-B: Plant Green Space	Areas modeled in WinSLAMM not modeled under existing conditions									
O3-C: Plant Operating Area	Areas modeled in WinSLAMM not modeled under existing conditions									
O4: Offsite Plant Green Space	1.7	1.6	1.7	1.7	1.7	1.7	1.9	1.9	1.9	1.9
O5: Solar and Green Space	4.4	4.0	4.5	4.2	4.6	4.2	4.7	4.3	4.7	4.4
O6: Substation	Areas modeled in WinSLAMM not modeled under existing conditions									
R1: SE Green Space	7.6	6.9	7.7	7.0	7.8	7.1	7.9	7.2	7.9	7.3
R2: SW Green Space	6.6	6.9	7.9	19.8	13.7	8.8	9.7	6.5	6.9	3.1
R3: Transmission Green Space	7.7	7.1	7.8	7.2	7.9	7.3	8.0	7.4	8.1	7.4

Proposed PTP from Snap Plus

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027	PTP 2028
O1: ATC Laydown	9.4	6.7	5.8	5.2	5.0	4.9	4.8	4.8	4.8	4.7	4.7
O2: ATC Substation	47.4	30.8	26.7	24.2	23.1	22.6	22.3	22.1	22.0	21.9	21.9
O3-A: Plant Operating Area	3.2	2.8	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6
O3-B: Plant Green Space	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
O3-C: Plant Operating Area	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
O4: Offsite Plant Green Space	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
O5: Solar and Green Space	4.0	3.5	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
O6: Substation	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
R1: SE Green Space	13.6	8.3	7.5	7.4	7.3	7.3	7.2	7.2	7.2	7.2	7.2
R2: SW Green Space	25.2	22.8	21.2	20.5	20.1	19.8	19.7	19.6	19.5	19.5	19.5
R3: Transmission Green Space	22.7	14.0	12.8	12.5	12.3	12.3	12.2	12.2	12.2	12.2	12.2
	128	**91**	**82**	**78**	**76**	**75**	**74**	**74**	**74**	**74**	**74**

Proposed PTP SnapPlus and WinSLAMM combined results

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	9.4	6.7	5.8	5.2	5.0	4.9	4.8	4.8	4.8	4.7
O2: ATC Substation	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
O3-A: Plant Operating Area	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
O3-B: Plant Green Space	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
O3-C: Plant Operating Area	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
O4: Offsite Plant Green Space	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
O5: Solar and Green Space	4.0	3.5	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.3
O6: Substation										
R1: SE Green Space	13.6	8.3	7.5	7.4	7.3	7.3	7.2	7.2	7.2	7.2
R2: SW Green Space	25.2	22.8	21.2	20.5	20.1	19.8	19.7	19.6	19.5	19.5
R3: Transmission Green Space	22.7	14.0	12.8	12.5	12.3	12.3	12.2	12.2	12.2	12.2
	83.0	**63.3**	**58.7**	**56.8**	**56.0**	**55.5**	**55.2**	**55.0**	**54.9**	**54.9**

Proposed PTP (lb/ac) from SnapPlus

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027	PTP 2028
O1: ATC Laydown	1.6	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8
O2: ATC Substation	3.9	2.5	2.2	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8
O3-A: Plant Operating Area	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
O3-B: Plant Green Space	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
O3-C: Plant Operating Area	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
O4: Offsite Plant Green Space	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
O5: Solar and Green Space	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
O6: Substation	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
R1: SE Green Space	1.5	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
R2: SW Green Space	2.7	2.5	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1
R3: Transmission Green Space	1.6	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8

Proposed PTP (lb/ac) SnapPlus and WinSLAMM combined results

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	1.6	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.8
O2: ATC Substation	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
O3-A: Plant Operating Area	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
O3-B: Plant Green Space	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
O3-C: Plant Operating Area	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
O4: Offsite Plant Green Space	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
O5: Solar and Green Space	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
O6: Substation										
R1: SE Green Space	1.5	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
R2: SW Green Space	2.7	2.5	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1
R3: Transmission Green Space	1.6	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8

Reduction in P Export Predicted by SnapPlus

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027	PTP 2028
O1: ATC Laydown	90.6	57.3	34.2	40.8	26.0	27.1	32.2	93.2	58.2	34.3	40.3
O2: ATC Substation	46.6	72.2	42.3	48.8	59.9	186.4	121.7	70.9	80.0	47.1	50.1
O3-A: Plant Operating Area	81.8	75.2	83.3	77.3	85.4	79.4	87.4	80.4	88.4	81.4	90.4
O3-B: Plant Green Space	15.4	14.5	15.5	14.5	16.5	15.5	16.5	15.5	16.5	15.5	17.5
O3-C: Plant Operating Area	15.2	14.3	15.4	14.4	16.4	14.4	16.4	15.4	16.4	15.4	16.4
O4: Offsite Plant Green Space	11.9	11.0	12.0	12.0	12.0	12.0	13.0	13.0	13.0	13.0	13.0
O5: Solar and Green Space	101.0	93.5	104.6	96.7	106.7	98.7	108.7	99.7	110.7	101.7	112.7
O6: Substation	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
R1: SE Green Space	54.4	53.7	61.5	55.6	62.7	56.7	63.8	57.8	63.8	58.8	64.8
R2: SW Green Space	35.9	41.5	51.6	163.4	106.8	62.1	70.0	40.9	44.1	9.2	165.7
R3: Transmission Green Space	88.3	88.0	99.2	90.5	100.7	92.7	102.8	93.8	103.8	94.8	104.8
	544	**524**	**522**	**617**	**596**	**648**	**635**	**583**	**598**	**474**	**678**

Reduction in P Export Predicted SnapPlus and WinSLAMM combined results

Field	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	90.6	57.3	34.2	40.8	26.0	27.1	32.2	93.2	58.2	34.3
O2: ATC Substation										
O3-A: Plant Operating Area										
O3-B: Plant Green Space										
O3-C: Plant Operating Area										
O4: Offsite Plant Green Space	11.9	11.0	12.0	12.0	12.0	12.0	13.0	13.0	13.0	13.0
O5: Solar and Green Space	101.0	93.5	104.6	96.7	106.7	98.7	108.7	99.7	110.7	101.7
O6: Substation										
R1: SE Green Space	54.4	53.7	61.5	55.6	62.7	56.7	63.8	57.8	63.8	58.8
R2: SW Green Space	35.9	41.5	51.6	163.4	106.8	62.1	70.0	40.9	44.1	9.2
R3: Transmission Green Space	88.3	88.0	99.2	90.5	100.7	92.7	102.8	93.8	103.8	94.8
	382.1	**345.0**	**363.2**	**459.1**	**414.9**	**349.5**	**390.5**	**398.5**	**393.7**	**311.9**

Credit Calculations June 2018

Long Term Credits

Field	Trade Ratio	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	1.2			13.2	13.7	13.9	14.0	14.0	14.0	14.1	14.1
O2: ATC Substation	2.1		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
O3-A: Plant Operating Area	2			1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
O3-B: Plant Green Space	2			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
O3-C: Plant Operating Area	2		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
O4: Offsite Plant Green Space	1.2			10.0	10.0	10.0	10.0	10.9	10.9	10.9	10.9
O5: Solar and Green Space	1.2				69.3	69.3	69.3	69.3	69.3	69.3	69.4
O6: Substation	2.1										
R1: SE Green Space	1.2			20.7	20.8	20.9	20.9	20.9	20.9	20.9	20.9
R2: SW Green Space	1.2	6.8	8.8	10.1	10.7	11.1	11.3	11.4	11.5	11.5	7.7
R3: Transmission Green Space	1.2				32.7	32.9	32.9	32.9	33.0	33.0	33.0
		6.8	**10.3**	**57.5**	**160.8**	**161.5**	**161.9**	**163.0**	**163.1**	**163.2**	**159.4**

Intermediate Credits

Field	Trade Ratio	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	1.2			15.3	20.3	7.8					
O2: ATC Substation	2.1										
O3-A: Plant Operating Area	2										
O3-B: Plant Green Space	2										
O3-C: Plant Operating Area	2										
O4: Offsite Plant Green Space	1.2			0.0	0.0	0.0					
O5: Solar and Green Space	2				6.8	11.8					
O6: Substation	2.1										
R1: SE Green Space	1.2			30.6	25.6	31.4					
R2: SW Green Space	1.2	23.1	25.8	32.9	125.4	77.9					
R3: Transmission Green Space	1.2				42.7	51.0					
		23.1	**25.8**	**78.8**	**220.8**	**179.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Total Credits

Field	Trade Ratio	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	1.2	0.0	0.0	28.5	34.0	21.7	14.0	14.0	14.0	14.1	14.1
O2: ATC Substation	2.1	0.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
O3-A: Plant Operating Area	2	0.0	0.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
O3-B: Plant Green Space	2	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
O3-C: Plant Operating Area	2	0.0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
O4: Offsite Plant Green Space	1.2	0.0	0.0	10.0	10.0	10.0	10.0	10.9	10.9	10.9	10.9
O5: Solar and Green Space	2	0.0	0.0	0.0	76.1	81.1	69.3	69.3	69.3	69.3	69.4
O6: Substation	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R1: SE Green Space	1.2	0.0	0.0	51.2	46.4	52.3	20.9	20.9	20.9	20.9	20.9
R2: SW Green Space	1.2	29.9	34.6	43.0	136.2	89.0	11.3	11.4	11.5	11.5	7.7
R3: Transmission Green Space	1.2	0.0	0.0	0.0	75.4	83.9	32.9	32.9	33.0	33.0	33.0
		29.9	**36.1**	**136.3**	**381.5**	**341.4**	**161.9**	**163.0**	**163.1**	**163.2**	**159.4**

Total Credits accounting for Timeline

Field	Trade Ratio	PTP 2018	PTP 2019	PTP 2020	PTP 2021	PTP 2022	PTP 2023	PTP 2024	PTP 2025	PTP 2026	PTP 2027
O1: ATC Laydown	1.2			28.5	34.0	21.7	14.0	14.0	14.0	14.1	14.1
O2: ATC Substation	2.1		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
O3-A: Plant Operating Area	2			1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
O3-B: Plant Green Space	2			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
O3-C: Plant Operating Area	2		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
O4: Offsite Plant Green Space	1.2			10.0	10.0	10.0	10.0	10.9	10.9	10.9	10.9
O5: Solar and Green Space	2				76.1	81.1	69.3	69.3	69.3	69.3	69.4
O6: Substation	2.1		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R1: SE Green Space	1.2			51.2	46.4	52.3	20.9	20.9	20.9	20.9	20.9
R2: SW Green Space	1.2	29.9	34.6	43.0	136.2	89.0	11.3	11.4	11.5	11.5	7.7
R3: Transmission Green Space	1.2				75.4	83.9	32.9	32.9	33.0	33.0	33.0
		29.9	**36.1**	**136.3**	**381.5**	**341.4**	**161.9**	**163.0**	**163.1**	**163.2**	**159.4**

Gray cells indicate areas analyzed with WinSLAMM

Green cells indicate areas analyzed with SnapPlus

APPENDIX G

FORMS

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 WI-	Facility Site Number

Facility Address	City	State	ZIP Code

Project Contact Name (if applicable)	Address	City	State	ZIP Code

Project Name

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					

County	Closest Receiving Water Name	Land Parcel ID(s)	Parameter(s) being traded

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

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

Notification of Water Trade Agreement Termination

Form 3400-209 (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 WI-	Facility Site Number

Facility Address	City	State	ZIP Code

Project Contact Name (if applicable)	Address	City	State	ZIP Code

Project Name

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:

Trade Agreement number(s) to be terminated including affected land parcel ID(s):

Amount of trading credit being terminated	Effective date of termination

Reason for termination

Is this agreement being updated or replaced?

- ◯ Yes
- ◯ No
- ◯ Unsure

Will this termination result in non-compliance with the effective limit or other permit requirements?

- ◯ Yes; Name:
- ◯ No
- ◯ Unsure

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

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

Appendix H – DNR Reviewer Comments

Comments Issued by Amy Garbe on 4/20/2018, MARS responses to comments in red

WPL – Riverside Water Quality Trading Plan

Plan Comments and Suggested Revisions

Draft: 4/20/2018, Amy Garbe

Section 1.4 – Credit Needed

Pleas provide more explanation of current operations and anticipated expansion as it relates to the 0.65 lbs/day existing phosphorus limits. Based on the values provided in the narrative, it would appear that 0-150 lbs/yr is the needed offset. More detailed calculations should be provided.

Additionally, through discussions with Riverside, there are plans to provide wastewater treatment to reduce the effluent from the expansion. Please provide more detail if available and how that would affect the needed credits.

Section 1.4 has been added to better described the proposed P discharge from the existing plant as well as the new plant. A very brief description of the wastewater treatment system and the contracted design parameters are provided.

Section 1.5 (previously 1.4) has been updated to describe the range of credits Alliant will require to be in compliance with the WPDES permit.

Section 2.3 – Soil Sampling

The UW Extension Soil Sampling Guidance (A2100) recommends taking a composite sample for every 5 acres of a field at plow depth or at least 6". According to the narrative, only 2 soil samples were taken. From the results provided in appendix B, samples were split by depth and not enough samples were taken for the acreage amount. There should have been at least 19 samples split-up by field.

Due to construction already in progress, some fields might not be available for additional sampling; however, for those fields not under construction soil sampling should be performed following the UW Extension guidance. Specifically focus on those fields using SnapPlus for modelling. Please include a map of the location of all samples taken by field.

Additional soil samples were collected in May 2018 following UW Extension guidance. Soil sampling was concentrated in areas analyzed with SnapPlus and areas to be restored to prairie. Due to construction activities on site new soil samples were not able to be collected for fields O4 and O5. Additionally, portions of fields O2, R2, and R1 were unable to be sampled due to construction activities. A soil sampling map has been provided in figure B1, all soil analysis results are provided in Appendix B, additional discussion is also provided in Section 2.3 of the trading plan.

Section 2.4 – Phosphorus Runoff Modeling Approach

Please rerun SnapPlus using the newest version (version 16) and update all applicable tables.

In reviewing the SnapPlus files, the incorrect soil type was used for fields O1 and O4. Both fields use LoB soil type, while the correct soil types are LoC2 and WaA, respectively. Please rerun SnapPlus to account for these changes and update the tables accordingly.

At the time of updating this analysis the latest version of SnapPlus available is SnapPlus version 17.0, build 18127.1502. Version 17.0 was downloaded and used for the revised analysis/, including the recommended changes to the soil types (described above) and the new addition of the new soil samples.

Section 2.5 – Potentially Tradeable Phosphorus

WPL-Riverside cannot take credit for reductions needed under another WPDES permit. Stormwater new construction permits require an 80% TSS reduction which does correlate to a phosphorus percent reduction as well. Therefore, credits are not generated at 100% as calculated, but rather a certain percent less is generated on the stormwater practices. This Is not considered a new threshold and no interim credits are generated in this process.

The 80% TSS reduction is approximately 60% for urban stormwater out of SLAMM but it depends on the practices being employed and the source areas. SLAMM can simulate both TSS and TP by switching the TP reports for the models and this is the best way to get a correlation between TSS and TP. For those fields using stormwater practices (O2, O3 and O6) please rerun SLAMM using the TP report to calculate the correlation and required TP percent reduction. Then apply that reduction to the potentially tradeable phosphorus and update the applicable tables. Please include a section in the WQT plan describing this.

Additional discussion of the credit generation from areas covered under other WPDES Permits has been added to section 2.5. A TP:TSS ratio has been calculated for each developed area allowing for a calculation of the TP load associated with a TSS reduction of 80%. The excess TP removed by the stormwater facilities was calculated and used to calculate P credits by applying the trade ratios. The description of this analysis has been added to Section 3.4.

Section 3.2 – Design

It is unclear what fields O1, O4 and O5 will be planted in; prairie or some other perennial vegetation. Please clarify.

Fields O4, and O5 will be planted with WisDOT standard seed mixes or similar mixes. Field O1 will be seeded with ATC pasture mix or a similar seed mix. Additional discussion has been added to section 3.2. Detailed designs have not been fully developed for these areas. In the event that the restoration plans for this area are changed these changes will be reflected in the annual water quality trading report to DNR.

Please state what NRCS standards will be followed for all best management practices.

All vegetative restoration management practices shall follow NRCS Conservation practice standard 327. This has been added in Section 3.2.

Section 4.2 – Trade Ratios

For the downstream trade factor, please show the calculation that lead to the factor used.
Upon more detailed investigation of the drainage patterns and available LiDAR data, it was determined that the fields on the west of Walters Rd (O1, O2, R2) drain to culverts under the roadway. Therefore, the eventual discharge location for all fields in the trading plan is effectively the same location as the Riverside outfall, and the downstream trade ratio does not apply.

Please rephrase the uncertainty factor. The practice is incorrectly listed as "whole field" management, but rather a conservation easement (land in perennial vegetation) is being used. It results in the same 1 uncertainty factor.
The text description under the uncertainty factor description has been updated.

Section 5.2 – Reporting

The stormwater reports should be included as part of inspection reports and annual WQT report. Please state this in the WQT plan in the inspection reporting section.

The notification of practice failure should be rephrased to make sure that maintenance activities and repairs will be included within the 5-day written notice. Additionally, any information should be included as to what Riverside's back-up plan is should a practice fail.

The requested change has been made to the plan. Proposed practice restorative measures shall be provided in writing within 5-days of noticing practice failure. Some proposed discharge mitigation measures have been provided in section 5.2.

Trade Agreement

Pursuant s. 283.84(1), Wis. Stats, a trade agreement is required to be in place prior to using trading to help demonstrate compliance with the final phosphorus limits. In this case, WPL-Riverside is generating the credits themselves and s. 283.84(1)(e), Wis. Stats applies, meaning that Riverside must enter into an agreement with WDNR. This agreement should be in place prior to conditional approval of the WQT plan.

Alliant Energy's legal department is currently working to develop the trade agreement with the DNR. The trade agreement will be provided as soon as it is approved by Alliant and the DNR. Language from this comment was added to Section 5.2 of the report to acknowledge this.

Appendix I – 2022 Inspection



Alliant Energy – Riverside Energy Center Vegetation Survey
Town of Beloit
Rock County, WI

Report Developed by Eco-Resource Consulting, Inc. for
Alliant Energy

September 2022

Eco-Resource Consulting, Inc. 2554 County Road N Stoughton, WI 53589 www.eco-resource.net

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Location

The legal description for the Alliant Energy – Riverside Energy center parcels are as follows (see Figure 1):

Parcel Number: 004 0020050101 – NW quarter of section 02, Township 01 N, Range 12E

Parcel Number: 004 0020060202 – NW quarter of section 02, Township 01 N, Range 12E

Parcel Number: 004 00200602 – NW quarter of section 02, Township 01 N, Range 12E & NE quarter of section 02, Township 01 N, Range 12E

Parcel Number: 004 0020060201 – NW quarter of section 02, Township 01 N, Range 12E & NE quarter of section 02, Township 01 N, Range 12E

Land History

Alliant Energy owns and operates the Riverside Energy Center located in Beloit, Wisconsin. This facility discharges water into the Rock River, which requires a WPDES permit issued by the Wisconsin Department of Natural Resources (WDNR). This permit specifies the discharge limits for various constituents that enter the river, such as phosphorous. Alliant Energy enrolled in a phosphorus trading program in 2017 with the WDNR which reduces the amount of phosphorous entering the Rock River. The plan which serves as the guideline for this program was revised and re-submitted in June of 2018 in order to address comments from the WDNR. With new construction planned, Alliant Energy was required to enroll into this trading plan to meet existing phosphorous discharge limits spelt out in the previously established WPDES permit. This plan was designed to cost effectively and sustainably reduce phosphorous discharge into the Rock River. The trading plan was first implemented in 2019.

As part of this plan, native perennial vegetation was installed by Eco-Resource Consulting, Inc. (ERC) in R2 (Figure 1) in 2017 in order to enhance nutrient uptake and stabilize a portion of the Riverside Energy Center (Site). Additional improvements to the Site conducted by other companies include the addition of a solar array, an electrical substation, and the installation of native perennial vegetation in additional locations. The purpose of this report is to characterize the current species composition, type(s), and density of the vegetation on the Site.

Alliant Energy provided several snapshots of the design plan-set. These documents were part of AECOM's 2017 Alliant Riverside Landscaping Plan (AECOM 2017), which outlines some (but not all) of the designed planting specifications. Alliant Energy also provided the Riverside Energy Center Water Quality Trading Plan, which was written by Montgomery Associates Resource Solutions, LLC (MARS) Trading Plan in November of 2017 (Montgomery 2017). ERC conducted a vegetation survey in August of 2021 and produced a report (Alliant Energy – Riverside Energy Center Vegetation Survey).

ERC met with Alliant Energy in the spring of 2022 to discuss management activities outlined in the 2021 report. Alliant Energy elected to pursue management on portions of the property along with an additional vegetation survey as part of their phosphorous trading program. The 2022 survey was conducted on August 2, 2022 by ERC Ecologists Kyle Duquaine and Daniel Fuhs.

Survey Areas

The Survey Area (SA) consisted of approximately 99.6 acres spanning sixteen (16) different units. These units were derived from the MARS Trading Plan from November of 2017 (Montgomery 2017). Following the 2021 survey, several areas were broken down further based on topography, vegetation, and hydrology. A combination of solar arrays, native perennial vegetation, stormwater basins, and perennial cool season vegetation were designed to be installed in the SA. All the work was scheduled to be completed prior to the survey conducted by ERC in August of 2021.

O1 – 6.4 Acres

O1 was designed as a pasture unit that was previously utilized as an equipment and product laydown area. Following construction completion, this unit was designed to be planted into a cool season pasture seed mix (Montgomery 2017). The final seed mix was planned to be installed in 2020 (Montgomery 2017).

O2 – 13.9 Acres

The design plans outline the construction of the Kittyhawk Substation within unit O2. The vegetation surrounding the facility was designed to be cool season grass species and installed in 2020 (Montgomery 2017).

O2B – 2.8 Acres

A stormwater basin was designed to help mitigate and attenuate surface water within Area O2 and to provide phosphorus bioremediation via settling. The design of this infiltration facility should provide particulate and phosphorous removal through infiltration and plant uptake (Montgomery 2017). Native vegetation was planned to be installed in the stormwater basin (Montgomery 2017).

O3ANS – 1.9 Acres

The dominant feature of O3A in the designed plans was a stormwater swale. This swale was designed to collect surface stormwater runoff from the plant buildings, parking lots, driveways, and overflow from the rain gardens (Montgomery 2017). Perennial native vegetation was designed to be installed in this swale as a way to increase infiltration, attenuate sediment, stabilize soil, and sequester phosphorous (Montgomery 2017 and AECOM 2017).

O3A Rain Gardens (two rain gardens) – 0.3 Acres

The main employee parking lot located in O3A contains two rain gardens in the design plans. The rain gardens were designed to collect surface stormwater runoff, mainly from the parking lot (Montgomery 2017). Perennial native vegetation was designed to be installed in the form of native plant plugs (AECOM 2017).

O3B – 4.0 Acres

The plans show that O3B connects to the O3A north-south swale. The western extent of this unit was designed as a wet pond in order to collect water from the O3A and O3C while allowing for additional settling time for sediment and phosphorous removal (Montgomery 2017). Perennial native vegetation was also specified to be installed in this location (AECOM 2017). Pockets of shrub species were also designed to be installed in this area (AECOM 2017).

O3C – 5.6 Acres

The O3C SA has a designed 0.8-acre North-South Swale which feeds into the aforementioned O3B wet pond. This swale was specifically designed to collect water from the O3C roadside berm and deliver it to the stormwater basin in O3B. Perennial native vegetation was also designed to be installed in this location (AECOM 2017). A berm and rain garden were designed to make up the

rest of the O3C SA (Montgomery 2017). Several pockets of deciduous tree and shrub species were also designed to be installed in this area (AECOM 2017).

O4 – 7.3 Acres

The green space associated with the Riverside expansion was designed to be landscaped with a perennial grass mix. A low-profile native seed mix was designed to be installed in this SA (AECOM 2017). Several deciduous tree species were also designed to be installed in this area (AECOM 2017). The purpose of this greenspace was to increase infiltration and sequester phosphorous (Montgomery 2017).

O5 – 21.4 Acres

A ground-based variable-axis solar array was designed as the dominant structural feature of O5. Following the construction of the solar array, perennial native vegetation was planned to be installed. The height of proposed vegetation was taken into consideration when designing the seed mix in order to provide sufficient ground cover, minimize the blocking of sunlight, and reduce erosion (Montgomery 2017).

Peace Trail Extension – 6.6 Acres

Just south of O5 the plans specify the Peace Trail Extension. This 6.6-acre area was designed as a trail extension to the Peace Trail that connects Janesville to Beloit. Perennial native vegetation was designed to be planted on both sides of the Peace Trail Extension (Montgomery 2017).

R1 – 8.9 Acres

R1 was also designed for a ground-based variable-axis solar array. Following the construction of the solar array, perennial native vegetation was designed to be installed. The height of proposed vegetation was taken into consideration when designing the seed mix in order to provide sufficient ground cover, minimize the blocking of sunlight, and reduce erosion (Montgomery 2017).

R2 – 8.7 Acres

Greenspace R2 was the first area restored with native perennial vegetation, which was installed by ERC in 2017 and maintained through the end of the 2019 growing season. The purpose of the

2017 project was to establish a functional native planting on the Riverside Energy Center property to enhance nutrient uptake and stabilize the site with perennial native vegetation (Montgomery 2017).

R3 – 14.6 Acres

Similar to R1, R3 was also designed to support a solar array and transmission corridor. Following the construction of the solar array, perennial native vegetation was designed to be installed. The height of proposed vegetation was taken into consideration when designing the seed mix in order to provide sufficient ground cover, minimize the blocking of sunlight, and reduce erosion (Montgomery 2017).

NB1 – 1.3 Acres

A stormwater facility was observed during the 2022 survey. This survey area is defined as North Basin 1 (NB1). ERC did not have any information on this facility, but it appeared that the facility was designed to take water from impervious surfaces from the south of the facility.

Survey Methodology

ERC Ecologists conducted a meander vegetation survey on August 2, 2022. Meander surveys are commonly used and are an accepted survey methodology in the ecological and botanical community. The purpose of the meander survey is to rapidly determine plant community conditions in a given area. This methodology is often used in conjunction with the Floristic Quality Assessment Methodology for Wisconsin (Bernthal 2003). ERC's survey methodology is based on and modified from procedures developed and employed by the Wisconsin Department of Natural Resources (WDNR) (2017). ERC selected this survey methodology since restoration site monitoring and vegetation assessments are described as primary uses for this type of survey (Montgomery 2017).

Survey Description

ERC conducted 2022 vegetation surveys within the same Survey Areas (SAs) that were established for the 2021 vegetation survey. These SA's were created by grouping similar plant communities or by pre-established boundaries based on construction or site characteristics. ERC chose to delineate the SAs by the pre-established boundaries which were established in the Riverside Energy Center Water Quality Trading Plan produced by MARS in November of 2017

(Montgomery 2017) and delineated them further based on topography, vegetation, and hydrology.

The start of the survey begins within a given SA, typically at the entrance of a SA. Once the starting point has been determined, the surveyor(s) proceed walking throughout the entire SA. The surveyor(s) meander throughout the SA and cover large areas that are representative of the entire area. The survey consists of identifying all vegetative species observed, both weed species and native species, within a given SA. A survey form documenting every vegetative species observed during the survey is maintained throughout the survey. Estimations for abundance and percent cover for each species is determined after the meander has been completed for that SA. The estimations are broken down into five distinct abundance codes based on the estimated cover. The description for each of the codes and their associated percent cover are described in Table 1 and Table 2.

Table 1. Abundance Codes and Descriptions

Symbol	Abundance Code	Description
A	Abundant	The dominant plants throughout the site
C	Common	Locally abundant or frequently observed
O	Occasional	occasionally encountered, or locally common but absent or infrequent across much of the site
U	Uncommon	Infrequently observed
R	Rare	Very few plants observed

Abundance codes are based on absolute percent cover. Absolute percent cover refers to the percent of the ground surface that is covered by above ground portions (leaves and stems) of a given plant species when viewed from above (McIntosh, United States Army Corp of Engineers 2011). Due to individual plants overlapping and sharing space, the sum of absolute cover of all the species may, and commonly does, exceed 100 percent. To determine an abundance code for a given species, ERC Ecologists conducted visual estimates of percent cover for each plant species throughout the meander survey. The percent cover then correlates to a given abundance code as indicated in Table 2.

Table 2. Abundance Codes

Abundance Code				
A	**C**	**O**	**U**	**R**
30%>	11-29%	5-10%	2-4%	<1%

General notes on each SA are also included in the survey form to describe notable site characteristics including but not limited to disturbance, erosion, and infrastructure.

Meander Survey

On August 2, 2022, two ERC senior ecologists conducted meander surveys throughout each of the Survey Areas (SAs). Daniel Fuhs and Kyle Duquaine conducted a survey on the entire property owned by Alliant Energy.

For the purposes of this survey, plant species will be grouped into two categories. The first group designation is native species. Native plant species are defined as native to the area by the United States Department of Agriculture (USDA) and WDNR. The second group designation is weed species. Weed species are defined as undesirable species that are capable of displacing desirable plant species are to be labeled as weed species.

R2 Meander Survey

A total of 66 species were observed throughout the 8.7-acre SA. The co-dominant species observed were *Elymus canadensis* (Canada wild rye), *Monarda fistulosa* (bergamot), and *Ratibida pinata* (yellow coneflower). Native vegetation was the dominant cover in this SA, with a total of 40 native plant species were observed. A total of 26 weed species were observed within the SA. R2 was previously restored in 2017 and maintained throughout the 2019 growing season as part of ERC's previous work on this SA. Well-planned and well-executed vegetation maintenance during the 2018 and 2019 growing seasons resulted in native plant dominance and high number of established native plants.



Photo 1. Native Vegetation is the dominant cover type in the R2 Survey Area. This photo represents the typical cover within the R2 Survey Area.

Survey Form 1 – R2 SA

Observed Vegetation						
Scientific Name	**Common Name**	**Weed Species**	**Absolute % Cover Estimate**	**AC**	**C of C**	**SA**
Acer negundo	box elder		0.50%	R	0	R2
Ambrosia artemisiifolia L.	common ragweed	x	5.00%	O	0	R2
Ambrosia trifida	giant ragweed	x	3.00%	U	0	R2
Andropogon gerardi	big bluestem		30.00%	A	4	R2
Asclepias syriaca	common milkweed		19.00%	O	1	R2
Asclepias verticillata	whorled milkweed		2.00%	U	2	R2
Baptisia lactea	white wild indigo		2.00%	U	8	R2
Bouteloua curtipendula	side oats grama		26.00%	C	6	R2
Bromus ciliatus	fringed brome		25.00%	C	7	R2
Calystegia sepium	hedge bindweed		5.00%	O	2	R2
Carduus nutans	musk thistle	x	1.00%	R	0	R2
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	2.00%	U	0	R2
Chamaecrista fasciculata	partridge pea		11.00%	C	3	R2
Chenopodium album	lamb's quarters	x	6.00%	O	0	R2
Cichorium intybus	chickory	x	3.00%	U	0	R2
Cirsium arvense	Canada thistle	x	3.00%	U	0	R2
Cirsium vulgare	bull thistle	x	1.00%	R	0	R2
Conyza canadensis	mares tail	x	2.00%	U	0	R2
Dactylis glomerata	orchard grass	x	3.00%	U	0	R2
Dalea purpurea	purple prairie clover		15.00%	C	7	R2
Daucus carota	Queen Ann's lace	x	4.00%	U	0	R2
Desmodium canadense	showy tick trefoil		25.00%	C	4	R2
Echinacea pallida	pale purple coneflower		15.00%	C	7	R2
Echinacea purpurea	purple cone flower		22.00%	C	0	R2
Elymus canadensis	Canada wild rye		33.00%	A	4	R2
Erigeron annuus	annual fleabane	x	5.00%	O	0	R2
Euthamia graminifolia	grass-leaved goldrenrod		5.00%	O	3	R2
Heliopsis helianthoides	false sunflower		23.00%	C	5	R2
Lactuca serriola	prickly lettuce	x	8.00%	O	0	R2
Leucanthemum vulgare	ox-eye daisy	x	1.00%	R	0	R2
Lotus corniculatus	bird's foot trefoil	x	1.00%	R	0	R2
Medicago sativa	alfalfa	x	3.00%	U	0	R2
Melilotus alba	white sweet clover	x	1.00%	R	0	R2
Melilotus officinalis	yellow sweet clover	x	1.00%	R	0	R2
Monarda fistulosa	bergamot		30.00%	A	3	R2
Oxalis corniculata	creeping yellow wood-sorrel		1.00%	R	0	R2
Panicum virgatum L.	switch grass		25.00%	C	4	R2
Pastinaca sativa L.	wild parsnip	x	4.00%	U	0	R2
Penstemon digitalis	foxglove beard-tongue		17.00%	C	0	R2
Phalaris aurundinacea	reed canary grass	x	2.00%	R	0	R2
Plantago major	common plantain		5.00%	O	0	R2
Poa pratensis	Kentucky bluegrass	x	17.00%	C	0	R2
Populus deltoides	eastern cottonwood		1.00%	R	2	R2
Potentilla reptans	creeping cinquefoil		2.00%	U	0	R2
Prunella vulgaris	heal all		2.00%	U	0	R2
Pycnanthemum virginianum	mountain mint		5.00%	O	6	R2
Ratibida pinnata	yellow cone flower		50.00%	A	4	R2
Rubus occidentalis	black raspberry		1.00%	R	2	R2
Rudbeckia hirta	black-eyed Susan		20.00%	C	4	R2
Rudbeckia laciniata	cut-leaved coneflower		3.00%	U	6	R2
Setaria pumila	yellow foxtail	x	8.00%	O	0	R2
Setaria viridis	giant green foxtail	x	7.00%	O	0	R2
Silphium integrifolium	prairie rosinweed		10.00%	O	6	R2
Silphium laciniatum	compass plant		6.00%	O	8	R2
Solidago canadensis	Canada goldenrod		12.00%	C	1	R2
Solidago gigantea	giant goldenrod		4.00%	U	3	R2
Solidago rigida	stiff goldenrod		26.00%	C	5	R2
Sorghastrum nutans	Indian grass		10.00%	O	5	R2
Symphyotrichum ericoides	heath aster		10.00%	C	4	R2
Symphyotrichum novae-angliae	New England aster		10.00%	O	3	R2
Trifolium pratense	red clover		9.00%	O	0	R2
Turritis glabra	tower mustard	x	5.00%	O	0	R2
Ulmus pumila	siberian elm	x	1.00%	R	0	R2
Verbascum thapsus	common mullein	x	4.00%	U	0	R2
Verbena stricta	hoary vervain		6.00%	O	3	R2
Verbena hastata	blue vervain		2.00%	U	3	R2

Sum of C	135
Mean C	2.04545455
FQI	16.6173513

Total Species	66
Weed Species Count	26
Native Species Count	40

O2 Meander Survey

A total of 51 species were observed throughout the 11.2-acre SA. Due to topographic and hydrological differences, the stormwater basin was removed from this unit. The co-dominant species observed were *Centaurea stoebe subsp. micranthos L.* (spotted knapweed), *Poa pratensis* (Kentucky bluegrass), *Setaria pumila* (yellow foxtail), and *Setaria viridis* (giant green foxtail). Weed vegetation was the dominant cover in this SA, with a total of 30 weed plant species were observed. A total of 21 native species were observed within the SA. Common weed species, such as spotted knapweed, foxtail, and velvet leaf, are quickly establishing within this SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 2. ERC Ecologist Daniel Fuhs observing weed species which dominate the O2 survey area. Spotted knapweed was observed in higher densities when compared to 2021.

Survey Form 2 – O2 SA

Observed Vegetation						
Scientific Name	**Common Name**	**Weed Species**	**Absolute % Cover Estimate**	**AC**	**C of C**	**SA**
Abutilon theophrasti	velvet leaf	x	4.00%	U	0	O2
Acer negundo	box elder		3.00%	U	0	O2
Achillea millefolium	common yarrow		2.00%	U	1	O2
Amaranthus retroflexus	common amaranth	x	7.00%	O	0	O2
Ambrosia artemisiifolia L.	common ragweed	x	12.00%	C	0	O2
Ambrosia trifida	giant ragweed	x	6.00%	O	0	O2
Asclepias syriaca	common milkweed		13.00%	C	1	O2
Berteroa incana	hoary alyssum		2.00%	U	0	O2
Calystegia sepium	hedge bindweed		7.00%	O	2	O2
Carduus nutans	musk thistle	x	3.00%	U	0	O2
Celtis occidentalis	hackberry		1.00%	R	4	O2
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	40.00%	A	0	O2
Chenopodium album	lamb's quarters	x	8.00%	O	0	O2
Cirsium arvense	Canada thistle	x	6.00%	O	0	O2
Cirsium vulgare	bull thistle	x	2.00%	U	0	O2
Daucus carota	Queen Ann's lace	x	7.00%	O	0	O2
Eleusine indica	goose grass	x	15.00%	C	0	O2
Elymus canadensis	Canada wild rye		2.00%	U	4	O2
Euphorbia nutans	nodding spurge	x	3.00%	U	0	O2
Euphorbia virgata	leafy spurge	x	3.00%	U	0	O2
Ipomoea purpurea	common morning glory	x	5.00%	O	0	O2
Lactuca serriola	prickly lettuce	x	18.00%	C	0	O2
Leucanthemum vulgare	ox-eye daisy	x	1.00%	R	0	O2
Lotus corniculatus	bird's foot trefoil	x	4.00%	U	0	O2
Melilotus alba	white sweet clover	x	3.00%	U	0	O2
Melilotus officinalis	yellow sweet clover	x	3.00%	U	0	O2
Morus alba	Russian mulberry	x	3.00%	U	0	O2
Oenothera parviflora	northern evening-primrose		2.00%	U	4	O2
Parthenocissus quinquefolia	Virginina creeper		3.00%	U	5	O2
Pastinaca sativa L.	wild parsnip	x	1.00%	R	0	O2
Picea pungens	blue spruce		1.00%	R	0	O2
Pinus sylvestris	scotch pine		1.00%	R	0	O2
Plantago major	common plantain		9.00%	O	0	O2
Poa pratensis	kentucky bluegrass	x	30.00%	A	0	O2
Populus deltoides	eastern cottonwood		2.00%	U	2	O2
Potentilla reptans	creeping cinquefoil		2.00%	U	0	O2
Pseudognaphalium obtusifolium	sweet everlasting		1.00%	R	3	O2
Robinia pseudoacacia	black locust	x	2.00%	U	0	O2
Rubus occidentalis	black raspberry		2.00%	U	2	O2
Setaria pumila	yellow foxtail	x	35.00%	A	0	O2
Setaria viridis	giant green foxtail	x	35.00%	A	0	O2
Silene latifolia	white campion	x	3.00%	U	0	O2
Solidago canadensis	Canada goldenrod		4.00%	U	1	O2
Sonchus arvensis	sow thistle	x	8.00%	O	0	O2
Sorghum halepense	Johnson grass	x	3.00%	U	0	O2
Symphyotrichum pilosum	frost aster		1.00%	R	1	O2
Taraxacum officinale	common dandelion	x	5.00%	O	0	O2
Trifolium pratense	red clover		7.00%	O	0	O2
Ulmus pumila	siberian elm	x	18.00%	C	0	O2
Vitis riparia	wild grape		1.00%	R	2	O2
Quercus spp.	unknown oak		1.00%	R	0	O2

Sum of C	32
Mean C	0.62745098
FQI	4.480896269

Total Species	51
Weed Species Count	30
Native Species Count	21

O2B Meander Survey

A total of 48 species were observed throughout the 2.8-acre SA. This unit was removed from O2 as there was different species intended for this specific area along with topographic and hydrological differences when compared to the remainder of the O2 unit. The co-dominant species observed were *Centaurea stoebe subsp. micranthos L.* (spotted knapweed), *Poa pratensis* (Kentucky bluegrass), *Setaria pumila* (yellow foxtail), and *Setaria viridis* (giant green foxtail). Weed vegetation was the dominant cover in this SA, with a total of 29 weed plant species were observed. A total of 19 native species were observed within the SA. The native vegetation was locally observed in the stormwater basins. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as spotted knapweed, ragweed, foxtail, and velvet leaf, are quickly establishing within this SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 3. Spotted knapweed was prolific throughout the majority of the O2B SA.

Survey Form 3 - O2B

Observed Vegetation						
Scientific Name	Common Name	Weed Species	Absolute % Cover Estimate	AC	C of C	SA
Abutilon theophrasti	velvet leaf	x	4.00%	U	0	O2
Achillea millefolium	common yarrow		2.00%	U	1	O2
Amaranthus retroflexus	common amaranth	x	7.00%	O	0	O2
Ambrosia artemisiifolia L.	common ragweed	x	11.00%	C	0	O2
Ambrosia trifida	giant ragweed	x	6.00%	O	0	O2
Asclepias syriaca	common milkweed		3.00%	O	1	O2
Calystegia sepium	hedge bindweed		7.00%	O	2	O2
Carduus nutans	musk thistle	x	3.00%	U	0	O2
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	40.00%	A	0	O2
Chenopodium album	lamb's quarters	x	8.00%	O	0	O2
Cirsium arvense	Canada thistle	x	6.00%	O	0	O2
Cirsium vulgare	bull thistle	x	2.00%	U	0	O2
Daucus carota	Queen Ann's lace	x	7.00%	O	0	O2
Eleusine indica	goose grass	x	15.00%	C	0	O2
Elymus canadensis	Canada wild rye		2.00%	U	4	O2
Elymus virginicus	Virgina wild rye		2.00%	U	6	O2
Euphorbia corollata	flowering spurge		3.00%	U	4	O2
Euphorbia nutans	nodding spurge	x	3.00%	U	0	O2
Euphorbia virgata	leafy spurge	x	3.00%	U	0	O2
Ipomoea purpurea	common morning glory	x	5.00%	O	0	O2
Lactuca serriola	prickly lettuce	x	18.00%	C	0	O2
Leucanthemum vulgare	ox-eye daisy	x	1.00%	R	0	O2
Lotus corniculatus	bird's foot trefoil	x	4.00%	U	0	O2
Melilotus alba	white sweet clover	x	3.00%	U	0	O2
Melilotus officinalis	yellow sweet clover	x	3.00%	U	0	O2
Monarda fistulosa	bergamot		2.00%	U	3	O2
Morus alba	Russian mulberry	x	3.00%	U	0	O2
Oenothera parviflora	northern evening-primrose		2.00%	U	4	O2
Parthenocissus quinquefolia	Virgina creeper		3.00%	U	5	O2
Pastinaca sativa L.	wild parsnip	x	1.00%	R	0	O2
Plantago major	common plantain		9.00%	O	0	O2
Poa pratensis	kentucky bluegrass	x	30.00%	A	0	O2
Populus deltoides	eastern cottonwood		2.00%	U	2	O2
Potentilla recta	sulfur cinquefoil		15.00%	C	0	O2
Potentilla reptans	creeping cinquefoil		2.00%	U	0	O2
Pseudognaphalium obtusifolium	sweet everlasting		1.00%	R	3	O2
Ratibida pinnata	yellow cone flower		3.00%	U	4	O2
Rubus occidentalis	black raspberry		2.00%	U	2	O2
Rudbeckia hirta	black-eyed Susan		3.00%	U	4	O2
Setaria pumila	yellow foxtail	x	35.00%	A	0	O2
Setaria viridis	giant green foxtail	x	35.00%	A	0	O2
Silene latifolia	white campion	x	3.00%	U	0	O2
Solidago canadensis	Canada goldenrod		4.00%	U	1	O2
Sonchus arvensis	sow thistle	x	8.00%	O	0	O2
Sorghum halepense	Johnson grass	x	3.00%	U	0	O2
Taraxacum officinale	common dandelion	x	5.00%	O	0	O2
Trifolium pratense	red clover		7.00%	O	0	O2
Ulmus pumila	siberian elm	x	18.00%	C	0	O2
Verbena stricta	hoary vervain		6.00%	O	3	O2

Sum of C	49
Mean C	1
FQI	7

Total Species	49
Weed Species Count	29
Native Species Count	20

O1 Meander Survey

A total of 35 species were observed throughout the 6.4-acre SA. The dominant species observed was *Ulmus pumila* (Siberian elm). Weed vegetation was the dominant cover in this SA, and a total of 24 weed plant species were observed. A total of 11 native species were observed within the SA. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as Siberian elm, spotted knapweed, ragweed, foxtail, and velvet leaf, are quickly establishing within this SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 4. ERC Ecologist Daniel Fuhs observing weed species which dominate the O2 survey area. Spotted knapweed was observed in higher densities when compared to 2021.

Survey Form 4 – O1

Observed Vegetation						
Scientific Name	Common Name	Weed Species	Absolute % Cover Estimate	AC	C of C	MA
Ambrosia artemisiifolia L.	common ragweed	x	12.00%	C	0	O1
Asclepias syriaca	common milkweed		2.00%	U	1	O1
Bromus ciliatus	fringed brome		2.00%	U	7	O1
Calystegia sepium	hedge bindweed		10.00%	O	2	O1
Carduus nutans	musk thistle	x	3.00%	U	0	O1
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	15.00%	C	0	O1
Chenopodium album	lamb's quarters	x	6.00%	O	0	O1
Cirsium arvense	Canada thistle	x	6.00%	O	0	O1
Cirsium vulgare	bull thistle	x	4.00%	U	0	O1
Daucus carota	Queen Ann's lace	x	5.00%	O	0	O1
Eleusine indica	goose grass	x	9.00%	O	0	O1
Euphorbia nutans	nodding spurge	x	5.00%	O	0	O1
Ipomoea purpurea	common morning glory	x	2.00%	U	0	O1
Lactuca serriola	prickly lettuce	x	16.00%	C	0	O1
Melilotus alba	white sweet clover	x	3.00%	U	0	O1
Morus alba	Russian mulberry	x	5.00%	O	0	O1
Oxalis corniculata	creeping yellow wood-sorrel		8.00%	O	0	O1
Plantago major	common plantain		6.00%	O	0	O1
Potentilla reptans	creeping cinquefoil		3.00%	U	0	O1
Rhamnus cathartica	common buckthorn	x	4.00%	U	0	O1
Rubus occidentalis	black raspberry		5.00%	O	2	O1
Securigera varia	crown vetch	x	4.00%	U	0	O1
Setaria viridis	giant green foxtail	x	25.00%	C	0	O1
Silene latifolia	white campion	x	5.00%	O	0	O1
Solidago canadensis	Canada goldenrod		4.00%	U	1	O1
Sonchus arvensis	sow thistle	x	14.00%	C	0	O1
Sorghastrum nutans	indian grass		2.00%	U	5	O1
Sorghum halepense	Johnson grass	x	7.00%	O	0	O1
Taraxacum officinale	common dandelion	x	2.00%	U	0	O1
Tragopogon dubius	yellow salsify	x	1.00%	R	0	O1
Trifolium pratense	red clover		5.00%	O	0	O1
Turritis glabra L.	tower mustard		6.00%	O	5	O1
Ulmus pumila	siberian elm	x	50.00%	A	0	O1
Erigeron annuus	annual fleabane	x	11.00%	C	0	O1
Verbascum thapsus	common mullein	x	3.00%	U	0	O1

Sum of C	23
Mean C	0.65714286
FQI	3.88770957

Total Species	35
Weed Species Count	24
Native Species Count	11

O3C Meander Survey

A total of 66 species were observed throughout the 5.6-acre SA. The co-dominant species observed were *Bouteloua curtipendula* (side oats gramma), yellow foxtail and giant green foxtail. Native species were slightly more dominant throughout the SA, with a total of 41 native species and 25 weed species observed. As a result of several mowing events in 2022, the native vegetation was observed at higher densities throughout the 2022 growing season. Continuation of native vegetation management will increase the native vegetation densities in future years.



Photo 5. Purple coneflower, switchgrass, big bluestem, and side oats gramma were in higher densities in OC3 as compared to 2021.

Survey Form 5 – O3C

Observed Vegetation						
Scientific Name	**Common Name**	**Weed Species**	**Absolute % Cover Estimate**	**AC**	**C of C**	**MA**
Andropogon gerardi	big bluestem		16.00%	C	4	O3-C
Abutilon theophrasti	velvet-leaf	x	5.00%	O	0	O3-C
Acer rubrum	red maple		3.00%	U	3	O3-C
Ambrosia artemisiifolia L.	common ragweed	x	5.00%	O	0	O3-C
Asclepias incarnata	swamp milkweed		5.00%	O	5	O3-C
Asclepias tuberosa	buttferfly weed		5.00%	O	6	O3-C
Bidens vulgata	tall beggar-ticks		4.00%	U	1	O3-C
Bouteloua curtipendula	side oats grama		20.00%	C	6	O3-C
Carduus nutans	musk thistle	x	2.00%	U	0	O3-C
Carex comosa	bristly sedge		5.00%	O	5	O3-C
Carex vulpinoidea	brown fox sedge		5.00%	O	5	O3-C
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	4.00%	U	0	O3-C
Cirsium arvense	Cananda thistle	x	2.00%	U	0	O3-C
Conyza canadensis	mares tail	x	5.00%	O	0	O3-C
Coreopsis grandiflora	prairie coreopsis		5.00%	O	0	O3-C
Coreopsis lanceolata	lanceleaf coreopsis		5.00%	O	8	O3-C
Dalea purpurea	purple prairie clover		5.00%	O	7	O3-C
Desmanthus illinoensis	illinois bundleflower		5.00%	O	6	O3-C
Echinacea pallida	pale purple coneflower		5.00%	O	7	O3-C
Echinacea purpurea	purple cone flower		17.00%	C	0	O3-C
Echinochloa crus-galli	barnyard grass	x	10.00%	O	0	O3-C
Eleusine indica	goosegrass	x	10.00%	O	0	O3-C
Erigeron annuus	annual fleabane	x	6.00%	O	0	O3-C
Eryngium yuccifolium	rattlesnake master		4.00%	U	8	O3-C
Euphorbia nutans	nodding spurge	x	3.00%	U	0	O3-C
Heliopsis helianthoides	false sunflower		10.00%	O	5	O3-C
Ilex verticillata	winterberry		3.00%	U	7	O3-C
Iris versicolor	blue flag iris		2.00%	U	5	O3-C
Juncus effusus	common rush		3.00%	U	4	O3-C
Lactuca serriola	prickly lettuce	x	11.00%	C	0	O3-C
Lespedeza capitata	round headed bush clover		1.00%	R	5	O3-C
Leucanthemum vulgare	ox-eye daisy	x	2.00%	U	0	O3-C
Lobelia cardinalis	cardinal flower		2.00%	U	7	O3-C
Lolium perenne	perennial rye	x	4.00%	U	0	O3-C
Melilotus alba	white sweet clover	x	3.00%	U	0	O3-C
Melilotus officinalis	yellow sweet clover	x	3.00%	U	0	O3-C
Mimulus ringens	monkey-flower		1.00%	R	6	O3-C
Monarda fistulosa	bergamot		10.00%	O	3	O3-C
Oenothera parviflora	northern evening primrose		3.00%	U	4	O3-C
Panicum capillare	witchgrass		11.00%	C	1	O3-C
Panicum virgatum L.	switch grass		12.00%	C	4	O3-C
Persicaria hydropiperoides	swamp smartweed		2.00%	U	6	O3-C
Plantago major	common plantain		4.00%	U	0	O3-C
Poa pratensis	Kentucky bluegrass	x	7.00%	O	0	O3-C
Ratibida pinnata	yellow cone flower		15.00%	C	4	O3-C
Rhus aromatica	fragrant sumac		3.00%	U	10	O3-C
Rudbeckia hirta	black-eyed Susan		14.00%	O	4	O3-C
Rudbeckia subtomentosa	sweet black-eyed Susan		4.00%	U	4	O3-C
Rudbeckia triloba	brown-eyed Susan		4.00%	U	4	O3-C
Salix discolor	pussy willow		3.00%	U	2	O3-C
Senna hebecarpa	wild senna		3.00%	U	7	O3-C
Setaria pumila	yellow foxtail	x	12.00%	C	0	O3-C
Setaria viridis	giant green foxtail	x	12.00%	C	0	O3-C
Silene latifolia	white campion	x	2.00%	U	0	O3-C
Solidago flexicaulis	zig zag goldenrod		5.00%	O	6	O3-C
Sonchus arvensis	sow thistle	x	4.00%	U	0	O3-C
Symphyotrichum novae-angliae	New England aster		5.00%	O	3	O3-C
Symphyotrichum pilosum	frost aster		4.00%	U	1	O3-C
Taraxacum officinale	common dandelion	x	6.00%	O	0	O3-C
Tragopogon dubius	yellow salsify	x	5.00%	O	0	O3-C
Trifolium pratense	red clover		7.00%	O	0	O3-C
Trifolium repens	white clover		7.00%	O	0	O3-C
Ulmus pumila	siberian elm	x	3.00%	U	0	O3-C
Vernonia fasciculata	ironweed		2.00%	U	5	O3-C
Amaranthus retroflexus	common amaranth	x	2.00%	U	0	O3-C
Lolium multiflorum	annual rye	x	2.00%	U	0	O3-C

Sum of C	178
Mean C	2.696969697
FQI	21.91028539

Total Species	66
Weed Species Count	25
Native Species Count	41

O3B Meander Survey

A total of 32 species were observed throughout the 4.0-acre SA. The co-dominant species observed were yellow foxtail and giant green foxtail. Weed vegetation was the dominant cover in this SA, with a total of 24 weed plant species were observed. A total of 8 native species were observed within the SA. As part of management in 2022, the entire unit was sprayed in order to control the invasive species present within the SA. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation was currently not establishing well in this SA. Common weed species, such as ragweed, foxtail, and velvet leaf, are quickly establishing within this SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species. As a result, ERC conducted a foliar herbicide application which prepared the site for future management practices.



Photo 6. Recently sprayed (herbicide) invasive vegetation within the O3B SA, specifically the basin bottom.

Survey Form 6 – O3B

Observed Vegetation						
Scientific Name	**Common Name**	**Weed Species**	**Absolute % Cover Estimate**	**AC**	**C of C**	**MA**
Abutilon theophrasti	velvet-leaf	x	7.00%	O	0	O3-B
Ambrosia artemisiifolia L.	common ragweed	x	25.00%	C	0	O3-B
Bouteloua curtipendula	side oats grama		5.00%	O	6	O3-B
Bromus inermis	smooth brome	x	9.00%	O	0	O3-B
Calystegia sepium	hedge bindweed		2.00%	U	2	O3-B
Carduus nutans	musk thistle	x	3.00%	U	0	O3-B
Chenopodium album	lamb's quarters	x	4.00%	U	0	O3-B
Cichorium intybus	chickory	x	3.00%	U	0	O3-B
Cirsium arvense	Cananda thistle	x	2.00%	U	0	O3-B
Cirsium vulgare	bull thistle	x	2.00%	U	0	O3-B
Daucus carota	Queen Ann's lace	x	3.00%	U	0	O3-B
Echinochloa crus-galli	barnyard grass	x	22.00%	C	0	O3-B
Eleusine indica	goose grass	x	20.00%	C	0	O3-B
Elymus repens	quackgrass	x	17.00%	C	0	O3-B
Euphorbia nutans	nodding spurge	x	3.00%	U	0	O3-B
Ilex verticillata	winterberry		4.00%	U	7	O3-B
Lactuca serriola	prickly lettuce	x	14.00%	C	0	O3-B
Linaria vulgaris	common toadflax	x	3.00%	U	0	O3-B
Lolium perenne	perennial rye	x	6.00%	O	0	O3-B
Melilotus officinalis	yellow sweet clover	x	7.00%	O	0	O3-B
Poa pratensis	Kentucky bluegrass	x	15.00%	C	0	O3-C
Panicum virgatum L.	switch grass		2.00%	U	4	O3-B
Rhus aromatica	fragrant sumac		3.00%	U	10	O3-B
Rudbeckia hirta	black-eyed Susan		2.00%	U	4	O3-B
Rumex crispus	curly dock	x	15.00%	C	0	O3-B
Setaria pumila	yellow foxtail	x	35.00%	A	0	O3-B
Setaria viridis	giant green foxtail	x	35.00%	A	0	O3-B
Silene latifolia	white campion	x	10.00%	O	0	O3-B
Sonchus arvensis	sow thistle	x	8.00%	O	0	O3-B
Trifolium pratense	red clover		12.00%	C	0	O3-B
Verbascum thapsus	common mullein	x	3.00%	U	0	O3-B
Viburnum trilobum	American Cranberry		3.00%	U	5	O3-B

Sum of C	38
Mean C	1.1875
FQI	6.717514421

Total Species	32
Weed Species Count	24
Native Species Count	8

O3A North-South Swale Meander Survey

A total of 43 species were observed throughout the 1.9-acre SA. The co-dominant species observed were yellow foxtail and giant green foxtail. Weedy vegetation was the dominant cover in this SA, with a total of 24 weed plant species observed. A total of 20 native species were observed within the SA. Maintenance mowing was conducted throughout the 2022 growing season. As a result, the native vegetation increased in density. Native vegetation is in higher densities when compared to 2021, but weed species are still prevalent throughout the swale. Common weed species, such as ragweed, foxtail, and velvet leaf, are fast-establishing annual weed species. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 7. ERC Ecologist Kyle Duquaine observing the higher densities of native vegetation within the SA. The co-dominant species are side oats gramma and yellow coneflower. There is still a strong presence of cool season invasive grass species that must be properly managed.

Survey Form 7 – O3C North-South Swale

Observed Vegetation						
Scientific Name	Common Name	Weed Species	Absolute % Cover Estimate	AC	C of C	MA
Abutilon theophrasti	velvet-leaf	x	2.00%	U	0	O3A-NS Swale
Ambrosia artemisiifolia L.	common ragweed	x	11.00%	C	0	O3A-NS Swale
Andropogon gerardi	big bluestem		4.00%	U	4	O3A-NS Swale
Asclepias syriaca	common milkweed		5.00%	O	1	O3A-NS Swale
Asclepias tuberosa	buttferfly weed		5.00%	O	6	O3A-NS Swale
Bouteloua curtipendula	side oats grama		45.00%	A	6	O3A-NS Swale
Bromus ciliatus	fringed brome		5.00%	O	7	O3A-NS Swale
Bromus inermis	smooth brome	x	5.00%	O	0	O3A-NS Swale
Calystegia sepium	hedge bindweed		2.00%	U	2	O3A-NS Swale
Carduus nutans	musk thistle	x	3.00%	U	0	O3A-NS Swale
Centaurea stoebe subsp. mi	spotted knapweed	x	4.00%	U	0	O3A-NS Swale
Chamaecrista fasciculata	partriage pea		2.00%	U	3	O3A-NS Swale
Chenopodium album	lamb's quarters	x	2.00%	U	0	O3A-NS Swale
Cichorium intybus	chickory	x	2.00%	U	0	O3A-NS Swale
Cirsium arvense	Cananda thistle	x	2.00%	U	0	O3A-NS Swale
Cirsium vulgare	bull thistle	x	2.00%	U	0	O3A-NS Swale
Coreopsis grandiflora	prairie coreopsis		4.00%	U	0	O3A-NS Swale
Daucus carota	Queen Ann's lace	x	3.00%	U	0	O3A-NS Swale
Dalea purpurea	purple prairie clover		1.00%	R	7	O3A-NS Swale
Desmodium canadense	showy tick trefoil		2.00%	U	4	O3A-NS Swale
Echinochloa crus-galli	barnyard grass	x	9.00%	O	0	O3A-NS Swale
Echinacea purpurea	purple cone flower		11.00%	C	0	O3A-NS Swale
Eleusine indica	goose grass	x	8.00%	O	0	O3A-NS Swale
Elymus repens	quackgrass	x	2.00%	U	0	O3A-NS Swale
Elymus canadensis	Canada wild rye		10.00%	O	4	O3A-NS Swale
Euphorbia nutans	nodding spurge	x	3.00%	U	0	O3A-NS Swale
Heliopsis helianthoides	false sunflower		5.00%	O	5	O3A-NS Swale
Lactuca serriola	prickly lettuce	x	8.00%	O	0	O3A-NS Swale
Lolium perenne	perennial rye	x	5.00%	O	0	O3A-NS Swale
Melilotus officinalis	yellow sweet clover	x	5.00%	O	0	O3A-NS Swale
Monarda fistulosa	bergamot		11.00%	C	3	O3A-NS Swale
Panicum virgatum L.	switch grass		10.00%	O	4	O3A-NS Swale
Persicaria pensylvanica	smartweed		5.00%	O	2	O3A-NS Swale
Poa pratensis	Kentucky bluegrass	x	15.00%	C	0	O3A-NS Swale
Ratibida pinnata	yellow cone flower		30.00%	A	4	O3A-NS Swale
Rudbeckia hirta	black-eyed Susan		5.00%	O	4	O3A-NS Swale
Rumex crispus	curly dock	x	7.00%	O	0	O3A-NS Swale
Senna hebecarpa	wild senna		1.00%	R	7	O3A-NS Swale
Setaria pumila	yellow foxtail	x	12.00%	C	0	O3A-NS Swale
Setaria viridis	giant green foxtail	x	12.00%	C	0	O3A-NS Swale
Silene latifolia	white campion	x	5.00%	O	0	O3A-NS Swale
Sonchus arvensis	sow thistle	x	5.00%	O	0	O3A-NS Swale
Trifolium pratense	red clover		5.00%	O	0	O3A-NS Swale
Verbascum thapsus	common mullein	x	2.00%	U	0	O3A-NS Swale

Sum of C	73
Mean C	1.65909091
FQI	11.0051641

Total Species	44
Weed Species Count	24
Native Species Count	20

O3A Rain Gardens (two rain gardens) Meander Survey

The O3A Rain Gardens are located in the center of the employee parking lot. The west rain garden is 0.1-acres while the east rain garden is 0.2-acres. The co-dominant species observed were yellow foxtail and giant green foxtail. A total of 27 species were observed throughout the meander survey. Native vegetation was the dominant cover in this SA, and a total of 18 native plant species were observed. A total of 9 weed species were observed within the SA. Native vegetation such as switchgrass and yellow coneflower were common. Weed species are still present within the rain gardens. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 8. Switchgrass (native) was the dominant species in 2022. The two rain gardens were planted with native plugs. The large voids filled in with foxtail and switchgrass. Continued maintenance is required to prevent invasive establishment.

Survey Form 8 – O3A Rain Gardens (two rain gardens)

Observed Vegetation						
Scientific Name	Common Name	Weed Species	Absolute % Cover Estimate	AC	C of C	MA
Ambrosia artemisiifolia L.	common ragweed	x	8.00%	O	0	O3-A Rain Gardens
Asclepias incarnata	swamp milkweed		6.00%	O	5	O3-A Rain Gardens
Brickellia eupatorioides	false boneset		3.00%	U	8	O3-A Rain Gardens
Carex comosa	bristly sedge		9.00%	O	5	O3-A Rain Gardens
Carex vulpinoidea	brown fox sedge		8.00%	O	5	O3-A Rain Gardens
Chamaecrista fasciculata	partriage pea		7.00%	O	3	O3-A Rain Gardens
Echinacea pallida	pale purple coneflower		5.00%	O	7	O3-A Rain Gardens
Echinochloa crus-galli	barnyard grass		10.00%	O	0	O3-A Rain Gardens
Erigeron annuus	annual fleabane	x	9.00%	O	0	O3-A Rain Gardens
Eryngium yuccifolium	rattlesnake master		7.00%	O	8	O3-A Rain Gardens
Eupatorium maculatum L. var. maculatum	Spotted Joe pye-weed		8.00%	O	4	O3-A Rain Gardens
Eupatorium perfoliatum	boneset		8.00%	O	6	O3-A Rain Gardens
Heliopsis helianthoides	false sunflower		5.00%	O	5	O3-A Rain Gardens
Lactuca serriola	prickly lettuce	x	16.0%	C	0	O3-A Rain Gardens
Melilotus alba	white sweet clover	x	6.00%	O	0	O3-A Rain Gardens
Melilotus officinalis	yellow sweet clover	x	6.00%	O	0	O3-A Rain Gardens
Oenothera parviflora	evening primerose		5.00%	O	4	O3-A Rain Gardens
Panicum virgatum L.	switch grass		25.00%	C	4	O3-A Rain Gardens
Rudbeckia triloba	brown-eyed Susan		9.00%	O	4	O3-A Rain Gardens
Scirpus atrovirens	dakr green bulrush		12.00%	C	3	O3-A Rain Gardens
Scirpus cyperinus	woolgrass		12.00%	C	7	O3-A Rain Gardens
Senna hebecarpa	wild senna		10.00%	C	7	O3-A Rain Gardens
Setaria pumila	yellow foxtail	x	15.00%	C	0	O3-A Rain Gardens
Setaria viridis	giant green foxtail	x	15.00%	C	0	O3-A Rain Gardens
Sonchus arvensis	sow thistle	x	5.00%	O	0	O3-A Rain Gardens
Verbascum thapsus	common mullein	x	5.00%	O	0	O3-A Rain Gardens
Vernonia fasciculata	ironweed		10.00%	O	5	O3-A Rain Gardens

Sum of C	90
Mean C	3.33333333
FQI	17.3205081

Total Species	27
Weed Species Count	9
Native Species Count	18

Peace Trail Extension Meander Survey

A total of 40 species were observed throughout the 6.6-acre SA. Yellow foxtail and *Ambrosia artemisiifolia L.* (common ragweed) were the co-dominant species in most of this area, with mare's tail, *Chenopodium album* (lamb's quarters), and *Daucus carota* (Queen-Anne's lace) also present in significant density. Weedy vegetation was the dominant cover in this SA with a total of 21 weed plant species observed. A total of 19 native species were observed within the SA. ERC conducted maintenance mowing throughout the 2022 growing season. The maintenance mowing allowed native vegetation to increase in density within these areas. The berm was still dominated by non-native vegetation. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as ragweed, foxtail, and velvet leaf, are quickly establishing throughout this SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 9. Commonly used (in native plantings) native grass and forb species were observed in very low density. Native plants were most common on the eastern portion of The Peace Trail Extension area, in the lower elevation area below (and east) of the turnaround loop. Yellow coneflower and Canada wild rye were the most commonly observed native plants in this area.



Photo 10. Common ragweed and foxtail were the dominant vegetation cover throughout the remaining portion of the Peace Trail Extension (PTE) SA.

Survey Form 9 – Peace Trail Extension

Observed Vegetation						
Scientific Name	Common Name	Weed Species	Absolute % Cover Estimate	AC	C of C	MA
Abutilon theophrasti	velvetleaf	x	7.00%	O	0	PTE
Ambrosia artemisiifolia L.	common ragweed	x	25.00%	C	0	PTE
Andropogon gerardii	big bluestem		1.00%	R	4	PTE
Asclepias syriaca	common milkweed		3.00%	U	1	PTE
Bouteloua curtipendula	side oats grama		7.00%	O	6	PTE
Bromus ciliatus	fringed brome		1.00%	R	7	PTE
Calystegia sepium	hedge bindweed		7.00%	O	2	PTE
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	2.00%	U	0	PTE
Chamaecrista fasciculata	partridge pea		8.00%	O	3	PTE
Chenopodium album	lamb's quarters	x	15.00%	C	0	PTE
Cirsium arvense	Canada thistle	x	9.00%	O	0	PTE
Conyza canadensis	mare's tail	x	12.00%	C	0	PTE
Coreopsis lanceolata	lanceleaf coreopsis		5.00%	O	8	PTE
Daucus carota	Queen Anne's lace	x	11.00%	C	0	PTE
Desmanthus illinoensis	bundleflower		4.00%	U	0	PTE
Echinacea purpurea	purple cone flower		15.00%	C	0	PTE
Echinochloa crus-galli	barnyard grass	x	5.00%	O	0	PTE
Eleusine indica	goosegrass	x	4.00%	U	0	PTE
Elymus canadensis	Canada wild rye		15.00%	C	4	PTE
Erigeron annuus	annual fleabane	x	10.00%	O	0	PTE
Heliopsis helianthoides	false sunflower		5.00%	O	5	PTE
Lactuca serriola	prickly lettuce	x	2.00%	U	0	PTE
Lolium multiflorum	annual rye	x	28.00%	C	0	PTE
Medicago sativa	alfalfa	x	3.00%	U	0	PTE
Melilotus alba	white sweet clover	x	2.00%	U	0	PTE
Melilotus officinalis	yellow sweet clover	x	13.00%	C	0	PTE
Monarda fistulosa	bergamot		5.00%	O	3	PTE
Plantago lanceolata	lanceleaf plantain	x	9.00%	O	0	PTE
Ratibida pinnata	yellow cone flower		11.00%	C	4	PTE
Rudbeckia hirta	black-eyed Susan		10.00%	O	4	PTE
Rumex crispus	curly dock	x	2.00%	U	0	PTE
Setaria pumila	yellow foxtail	x	35.00%	A	0	PTE
Silene latifolia	white campion	x	5.0%	O	0	PTE
Solidago rigida	stiff goldenrod		7.00%	O	5	PTE
Symphyotrichum ericoides	heath aster		1.00%	R	4	PTE
Trifolium pratense	red clover		18.00%	C	0	PTE
Turritis glabra L.	tower mustard		6.0%	O	5	PTE
Ulmus pumila	siberian elm	x	1.00%	R	0	PTE
Verbena stricta	hoary vervain		6.00%	O	3	PTE
Verbascum thapsus	common mullein	x	4.00%	U	0	PTE

Sum of C	68
Mean C	1.7
FQI	10.751744

Total Species	40
Weed Species Count	21
Native Species Count	19

R1 Meander Survey

R1 is the approximately 8.9-acre southeast lobe of the solar array. A total of 54 species were observed throughout the SA. Weedy vegetation was the dominant cover in this SA, with a total of 28 weed plant species observed. A total of 26 native species were observed in R1 SA. Maintenance mowing was conducted throughout the 2022 growing season. As a result, the native vegetation increased in density. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as ragweed, foxtail, and velvet leaf, are quickly establishing throughout the SA. These annual weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 11. Due to mowing events throughout the 2022 growing season, native grass species were able to increase in density. Native vegetation can be seen here coming up in rows. Non-native vegetation is still present, thus continued maintenance is required for several more years to allow native vegetation to fully-establish.

Survey Form 10 – R1

Observed Vegetation						
Scientific Name	**Common Name**	**Weed Species**	**Absolute % Cover Estimate**	**AC**	**C of C**	**MA**
Abutilon theophrasti	velvetleaf	x	2.00%	U	0	R1
Amaranthus sp.	amaranth	x	6.00%	O	0	R1
Ambrosia artemisiifolia L.	common ragweed	x	25.00%	C	0	R1
Articum minus	burdock	x	11.00%	C	0	R1
Asclepias syriaca	common milkweed		2.00%	U	1	R1
Asclepias tuberosa	butterfly milkweed		1.00%	R	6	R1
Asclepias verticillata	whorled milkweed		1.00%	R	3	R1
Bidens frondosa	devil's beggertick		5.00%	O	1	R1
Bouteloua curtipendula	side oats gramma		35.00%	A	6	R1
Bromus ciliatus	fringed brome		2.00%	U	7	R1
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	5.00%	O	0	R1
Chamaecrista fasciculata	partridge pea		12.00%	C	3	R1
Chenopodium album	lamb's quarters	x	15.00%	C	0	R1
Cichorium intybus	chickory	x	6.00%	O	0	R1
Cirsium vulgare	bull thistle	x	4.00%	U	0	R1
Convolvulus arvensis	field bindweed	x	12.00%	C	0	R1
Conyza canadensis	mare's tail	x	15.00%	C	0	R1
Coreopsis lanceolata	lanceleaf coreopsis		5.00%	O	8	R1
Dalea purpurea	purple prairie clover		2.00%	U	7	R1
Daucus carota	Queen Anne's lace	x	14.00%	C	0	R1
Echinacea purpurea	purple cone flower		5.00%	O	0	R1
Echinochloa crus-galli	barnyard grass	x	20.00%	C	0	R1
Eleusine indica	goosegrass	x	12.00%	C	0	R1
Elymus canadensis	Canada wild rye		25.00%	C	4	R1
Eragrostis cilianensis	stink grass	x	11.00%	C	0	R1
Erigeron annuus	annual fleabane	x	20.00%	C	0	R1
Euphorbia nutans	nodding spurge	x	6.00%	O	0	R1
Helianthus pauciflorus	stiff sunflower		1.00%	R	7	R1
Heliopsis helianthoides	false sunflower		1.00%	R	5	R1
Hibiscus trionum	flower of an hour	x	6.00%	O	0	R1
Lactuca serriola	prickly lettuce	x	12.00%	C	0	R1
Lolium multiflorum	annual rye	x	20.00%	C	0	R1
Medicago sativa	alfalfa	x	5.00%	O	0	R1
Melilotus alba	white sweet clover	x	15.00%	C	0	R1
Melilotus officinalis	yellow sweet clover	x	11.00%	C	0	R1
Nepeta cataria	catnip	x	2.00%	U	0	R1
Panicum capillare	witch grasss		4.00%	O	1	R1
Panicum virgatum L.	switch grass		8.00%	O	4	R1
Parthenocissus quinquefolia	Virginia creeper		3.00%	U	5	R1
Persicaria pensylvanica	smartweed		10.00%	O	2	R1
Ratibida pinnata	yellow cone flower		12.00%	C	4	R1
Rudbeckia hirta	black-eyed Susan		15.00%	C	4	R1
Rumex crispus	curly dock	x	10.00%	O	0	R1
Setaria pumila	yellow foxtail	x	35.00%	A	0	R1
Solidago canadensis	Canada goldenrod		20.00%	C	1	R1
Solidago rigida	stiff goldenrod		4.00%	U	5	R1
Symphyotrichum ericoides	heath aster		5.00%	O	4	R1
Taraxacum officinale	common dandelion	x	12.00%	C	0	R1
Trifolium pratense	red clover		25.00%	C	0	R1
Ulmus pumila	siberian elm	x	2.00%	U	0	R1
Verbena hastata	blue vervain		2.00%	U	3	R1
Verbena stricta	hoary vervain		6.00%	O	3	R1
Verbascum thapsus	common mullein	x	6.00%	O	0	R1
Vitis riparia	wild grape		2.00%	U	2	R1

Sum of C	96
Mean C	1.77777778
FQI	13.0639453

Total Species	54
Weed Species Count	28
Native Species Count	26

R3 Meander Survey

A total of 53 species were observed throughout the 14.6-acre SA. Weedy vegetation was the dominant cover in this SA, with a total of 28 weed plant species observed. A total of 25 native species were observed within the SA. The solar array in this SA is located only in the southwest portion of the SA. Maintenance mowing was conducted throughout the 2022 growing season. As a result, the native vegetation increased in density. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as ragweed, foxtail, and velvet leaf, are quickly establishing throughout the SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 12. Due to mowing events throughout the 2022 growing season, native grass species were able to increase in density. With dry soils present, the native vegetation was growing at a slower rate than if the soil was mesic. This means that the native vegetation will likely take longer to establish. Continued maintenance is required for several more years to allow native vegetation to fully establish.



Photo 13. R3 has dry soils present within the SA. As a result, more bare soil areas are present than in other SAs throughout the project area. Continued maintenance and overseeding will be required to allow natives to establish in this SA.

Survey Form 11 – R3

Observed Vegetation						
Scientific Name	**Common Name**	**Weed Species**	**Absolute % Cover Estimate**	**AC**	**C of C**	**MA**
Abutilon theophrasti	velvetleaf	x	5.00%	O	0	R3
Amaranthus sp.	amaranth	x	11.00%	C	0	R3
Ambrosia artemisiifolia L.	common ragweed	x	25.00%	C	0	R3
Articum minus	burdock	x	6.00%	O	0	R3
Asclepias syriaca	common milkweed		5.00%	O	1	R3
Asclepias tuberosa	butterfly milkweed		1.00%	R	6	R3
Bidens frondosa	devil's beggertick		6.00%	O	1	R3
Bouteloua curtipendula	side oats gramma		35.00%	O	6	R3
Bromus ciliatus	fringed brome		5.00%	O	7	R3
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	8.00%	O	0	R3
Chamaecrista fasciculata	partridge pea		12.00%	C	3	R3
Chenopodium album	lamb's quarters	x	15.00%	C	0	R3
Cichorium intybus	chickory	x	5.00%	0	0	R3
Cirsium vulgare	bull thistle	x	5.00%	o	0	R3
Convolvulus arvensis	field bindweed	x	11.00%	C	0	R3
Conyza canadensis	mare's tail	x	18.00%	C	0	R3
Coreopsis lanceolata	lanceleaf coreopsis		6.00%	O	8	R3
Dalea purpurea	purple prairie clover		2.00%	U	7	R3
Daucus carota	Queen Anne's lace	x	12.00%	C	0	R3
Echinacea purpurea	purple cone flower		4.00%	U	0	R3
Echinochloa crus-galli	barnyard grass	x	7.00%	O	0	R3
Eleusine indica	goosegrass	x	14.00%	C	0	R3
Elymus canadensis	Canada wild rye		11.00%	C	4	R3
Eragrostis cilianensis	stink grass	x	14.00%	C	0	R3
Erigeron annuus	annual fleabane	x	20.00%	C	0	R3
Euphorbia nutans	nodding spurge	x	5.00%	O	0	R3
Helianthus pauciflorus	stiff sunflower		1.00%	R	7	R3
Heliopsis helianthoides	false sunflower		2.00%	U	5	R3
Hibiscus trionum	flower of an hour	x	3.00%	U	0	R3
Lactuca serriola	prickly lettuce	x	5.00%	O	0	R3
Lolium multiflorum	annual rye	x	20.00%	C	0	R3
Medicago sativa	alfalfa	x	5.00%	O	0	R3
Melilotus alba	white sweet clover	x	6.00%	O	0	R3
Melilotus officinalis	yellow sweet clover	x	5.00%	O	0	R3
Nepeta cataria	catnip	x	1.00%	R	0	R3
Panicum capillare	witch grasss		4.00%	U	1	R3
Panicum virgatum L.	switch grass		8.00%	O	4	R3
Parthenocissus quinquefolia	Virginia creeper		2.00%	U	5	R3
Persicaria pensylvanica	smartweed		3.00%	U	2	R3
Ratibida pinnata	yellow cone flower		6.00%	O	4	R3
Rudbeckia hirta	black-eyed Susan		8.00%	O	4	R3
Rumex crispus	curly dock	x	2.00%	U	0	R3
Setaria pumila	yellow foxtail	x	30.00%	A	0	R3
Solidago canadensis	Canada goldenrod		7.00%	O	1	R3
Solidago rigida	stiff goldenrod		5.00%	O	5	R3
Symphyotrichum ericoides	heath aster		2.00%	U	4	R3
Taraxacum officinale	common dandelion	x	2.00%	U	0	R3
Trifolium pratense	red clover		1.00%	R	0	R3
Ulmus pumila	siberian elm	x	1.00%	R	0	R3
Verbena hastata	blue vervain		2.00%	U	3	R3
Verbena stricta	hoary vervain		6.00%	O	3	R3
Verbascum thapsus	common mullein	x	6.00%	O	0	R3
Vitis riparia	wild grape		1.00%	R	2	R3

Sum of C	93
Mean C	1.75471698
FQI	12.7745324

Total Species	53
Weed Species Count	28
Native Species Count	25

O5 Meander Survey

The O5 SA contains the largest portion of the solar array at over 20 acres. A total of 52 species were observed throughout the SA. Weed vegetation was the dominant cover in this SA, with a total of 27 weed plant species observed. A total of 25 native species were observed within the SA. Maintenance mowing was conducted throughout the 2022 growing season. As a result, the native vegetation increased in density. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as ragweed, foxtail, and velvet leaf, are quickly establishing throughout the SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 14. The co-dominant species were common ragweed and green foxtail. Lamb's quarters and annual rye (likely nurse crop used with the original seeding) also occupied significant density. Partridge pea was the most common native plant. In many locations, weedy species exceeded the height of the lower edge of the solar panels.

Survey Form 12 – O5

Observed Vegetation						
Scientific Name	**Common Name**	**Weed Species**	**Absolute % Cover Estimate**	**AC**	**C of C**	**MA**
Abutilon theophrasti	velvetleaf	x	12.00%	C	0	O5
Amaranthus sp.	amaranth	x	10.00%	O	0	O5
Ambrosia artemisiifolia L.	common ragweed	x	30.00%	A	0	O5
Articum minus	burdock	x	8.00%	O	0	O5
Asclepias syriaca	common milkweed		11.00%	C	1	O5
Asclepias tuberosa	butterfly milkweed		1.00%	R	6	O5
Bidens frondosa	devil's beggertick		6.00%	O	1	O5
Bouteloua curtipendula	side oats gramma		29.00%	C	6	O5
Bromus ciliatus	fringed brome		10.00%	O	7	O5
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	1.00%	R	0	O5
Chamaecrista fasciculata	partridge pea		12.00%	C	3	O5
Chenopodium album	lamb's quarters	x	28.00%	C	0	O5
Cichorium intybus	chickory	x	2.00%	U	0	O5
Cirsium vulgare	bull thistle	x	2.00%	U	0	O5
Convolvulus arvensis	field bindweed	x	12.00%	C	0	O5
Conyza canadensis	mare's tail	x	15.00%	C	0	O5
Coreopsis lanceolata	lanceleaf coreopsis		6.00%	O	8	O5
Dalea purpurea	purple prairie clover		2.00%	U	7	O5
Daucus carota	Queen Anne's lace	x	12.00%	C	0	O5
Echinacea purpurea	purple cone flower		5.00%	O	0	O5
Echinochloa crus-galli	barnyard grass	x	10.00%	O	0	O5
Eleusine indica	goosegrass	x	4.00%	U	0	O5
Elymus canadensis	Canada wild rye		11.00%	C	4	O5
Eragrostis cilianensis	stink grass	x	15.00%	C	0	O5
Erigeron annuus	annual fleabane	x	15.00%	C	0	O5
Euphorbia nutans	nodding spurge	x	3.00%	U	0	O5
Heliopsis helianthoides	false sunflower		1.00%	R	5	O5
Hibiscus trionum	flower of an hour	x	5.00%	O	0	O5
Lactuca serriola	prickly lettuce	x	4.00%	U	0	O5
Lolium multiflorum	annual rye	x	28.00%	C	0	O5
Medicago sativa	alfalfa	x	2.00%	U	0	O5
Melilotus alba	white sweet clover	x	8.00%	O	0	O5
Melilotus officinalis	yellow sweet clover	x	11.00%	C	0	O5
Nepeta cataria	catnip	x	1.00%	R	0	O5
Panicum capillare	witch grasss		4.00%	U	1	O5
Panicum virgatum L.	switch grass		8.00%	O	4	O5
Parthenocissus quinquefolia	Virginia creeper		2.00%	U	5	O5
Persicaria pensylvanica	smartweed		6.00%	O	2	O5
Ratibida pinnata	yellow cone flower		17.00%	C	4	O5
Rudbeckia hirta	black-eyed Susan		15.00%	C	4	O5
Rumex crispus	curly dock	x	15.00%	C	0	O5
Setaria pumila	yellow foxtail	x	35.00%	A	0	O5
Solidago canadensis	Canada goldenrod		18.00%	C	1	O5
Solidago rigida	stiff goldenrod		4.00%	U	5	O5
Symphyotrichum ericoides	heath aster		1.00%	R	4	O5
Taraxacum officinale	common dandelion	x	5.00%	O	0	O5
Trifolium pratense	red clover		7.00%	O	0	O5
Ulmus pumila	siberian elm	x	1.00%	R	0	O5
Verbena hastata	blue vervain		2.00%	U	3	O5
Verbena stricta	hoary vervain		6.00%	O	3	O5
Verbascum thapsus	common mullein	x	4.00%	U	0	O5
Vitis riparia	wild grape		2.00%	U	2	O5
			Sum of C		86	
			Mean C		1.65384615	
			FQI		11.9260542	

Total Species	52
Weed Species Count	27
Native Species Count	25

O4 Meander Survey

The O4 SA comprises the northeast corner of the surveyed area and is just over seven acres. A total of 44 species were observed throughout the SA. Weedy vegetation was the dominant cover in this SA, with a total of 22 weed plant species observed. A total of 22 native species were observed within the SA. Maintenance mowing was conducted throughout the 2022 growing season. As a result, the native vegetation increased in density. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as ragweed, foxtail, and velvet leaf, are quickly establishing throughout the SA. These weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 15. Common ragweed, yellow foxtail, and Kentucky bluegrass were the three co-dominant species. Black-eyed Susan and *Bouteloua curtipendula* (side oats grama) were the two most common native plants observed.

Survey Form 13 – O4

Observed Vegetation						
Scientific Name	Common Name	Weed Species	Absolute % Cover Estimate	AC	C of C	MA
Abutilon theophrasti	velvetleaf	x	6.00%	O	0	O4
Acer rubrum	red maple		2.00%	U	3	O4
Acer saccharum	sugar maple		2.00%	U	5	O4
Ambrosia artemisiifolia L.	common ragweed	x	25.00%	C	0	O4
Andropogon gerardi	big bluestem		11.00%	C	4	O4
Asclepias syriaca	common milkweed		5.00%	O	1	O4
Asclepias tuberosa	buttferfly weed		5.00%	O	6	O4
Bouteloua curtipendula	side oats grama		15.00%	C	6	O4
Bromus inermis	smooth brome	x	10.00%	O	0	O4
Celtis occidentalis	northern hackberry		2.00%	U	4	O4
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	2.00%	U	0	O4
Chamaecrista fasciculata	partriage pea		2.00%	U	3	O4
Chenopodium album	lamb's quarters	x	11.00%	C	0	O4
Cichorium intybus	common chicory	x	20.00%	C	0	O4
Coreopsis grandiflora	prairie coreopsis		4.00%	U	0	O4
Cirsium vulgare	bull thistle	x	4.00%	U	0	O4
Dalea purpurea	purple prairie clover		1.00%	R	7	O4
Daucus carota	Queen Anne's lace	x	10.00%	O	0	O4
Echinacea purpurea	purple cone flower		11.00%	C	0	O4
Echinochloa crus-galli	barnyard grass	x	12.00%	C	0	O4
Eleusine indica	goosegrass	x	15.00%	C	0	O4
Elymus canadensis	Canada wild rye		10.00%	O	4	O4
Erigeron annuus	annual fleabane	x	8.00%	O	0	O4
Galium sp.	bedstraw	x	2.00%	U	0	O4
Heliopsis helianthoides	false sunflower		8.00%	O	5	O4
Hibiscus trionum	flower of an hour	x	1.00%	R	0	O4
Hieracium aurantiacum	orange hawkweed	x	3.00%	U	0	O4
Linaria vulgaris	yellow toadflax	x	2.00%	U	0	O4
Lolium multiflorum	annual rye	x	20.00%	C	0	O4
Lotus corniculatus	bird's foot trefoil	x	2.00%	U	0	O4
Medicago sativa	alfalfa	x	15.00%	C	0	O4
Monarda fistulosa	bergamot		11.00%	C	3	O4
Panicum virgatum L.	switch grass		14.00%	C	4	O4
Persicaria pensylvanica	smartweed		5.00%	O	2	O4
Poa pratensis	kentucky bluegrass	x	30.00%	A	0	O4
Prunus virginiana	chokecherry		2.00%	U	3	O4
Quercus ellipsoidalis	northern pink oak		2.00%	U	5	O4
Ratibida pinnata	yellow cone flower		6.00%	O	4	O4
Rudbeckia hirta	black-eyed Susan		12.00%	X	4	O4
Rumex crispus	curly dock	x	5.00%	O	0	O4
Setaria pumila	yellow foxtail	x	40.00%	A	0	O4
Solidago rigida	stiff goldenrod		26.00%	C	5	O4
Vicia cracca	tufted vetch	x	4.00%	U	0	O4
Trifolium pratense	red clover		15.00%	C	0	O4

Sum of C	78
Mean C	1.7727273
FQI	11.758942

Total Species	44
Weed Species Count	22
Native Species Count	22

NB1 Meander Survey

The NB1 SA comprises a stormwater basin on the north end of the project area, roughly 1.3 acres in total area. A total of 43 species were observed throughout the SA. Weedy vegetation was the dominant cover in this SA, with a total of 26 weed plant species observed. A total of 17 native species were observed within the SA. Based on the designed species lists established by AECOM and MARS, the intended/native vegetation is currently not establishing well in this SA. Common weed species, such as ragweed, foxtail, and velvet leaf, are quickly establishing throughout the SA. These annual weed species directly outcompete intended species and are not as suitable for the restoration area. Weed species do not attenuate phosphorous as well as the designed species, nor do they provide adequate erosion control when compared to the intended species.



Photo 16. Non-native vegetation dominates the NB1 SA. Continued maintenance is required to allow native vegetation to fully establish.

Survey Form 14 – NB1

Observed Vegetation						
Scientific Name	Common Name	Weed Species	Absolute % Cover Estimate	AC	C of C	MA
Abutilon theophrasti	velvet-leaf	x	5.00%	O	0	NB1
Acer rubrum	red maple		3.00%	U	3	NB1
Ambrosia artemisiifolia L.	common ragweed	x	30.00%	A	0	NB1
Bouteloua curtipendula	side oats grama		1.00%	R	6	NB1
Bromus ciliatus	fringed brome		5.00%	O	7	NB1
Bromus inermis	smooth brome	x	10.00%	O	0	NB1
Carduus nutans	musk thistle	x	3.0%	U	0	NB1
Carduus nutans	musk thistle	x	2.00%	U	0	NB1
Centaurea stoebe subsp. micranthos L.	spotted knapweed	x	4.00%	U	0	NB1
Chamaecrista fasciculata	partriage pea		2.00%	U	3	NB1
Cichorium intybus	common chicory	x	20.00%	C	0	NB1
Cirsium arvense	Cananda thistle	x	2.00%	U	0	NB1
Conyza canadensis	mares tail	x	2.00%	U	0	NB1
Coreopsis grandiflora	prairie coreopsis		4.00%	U	0	NB1
Cornus spp.	dogwood		5.00%	O	3	NB1
Dalea purpurea	purple prairie clover		1.00%	R	7	NB1
Daucus carota	Queen Ann's lace	x	20.00%	C	0	NB1
Dactylis glomerata	orchard grass	x	25.00%	C	0	NB1
Echinacea purpurea	purple cone flower		3.00%	U	0	NB1
Echinochloa crus-galli	barnyard grass	x	14.00%	C	0	NB1
Erigeron annuus	annual fleabane	x	30.00%	A	0	NB1
Heliopsis helianthoides	false sunflower		1.00%	R	5	NB1
Lactuca serriola	prickly lettuce	x	14.00%	C	0	NB1
Melilotus alba	white sweet clover	x	2.00%	U	0	NB1
Melilotus officinalis	yellow sweet clover	x	2.00%	U	0	NB1
Panicum virgatum L.	switch grass		1.00%	R	4	NB1
Plantago major	common plantain		6.00%	O	0	NB1
Poa pratensis	Kentucky bluegrass	x	30.00%	A	0	NB1
Prunus virginiana	common chokecherry		5.00%	O	3	NB1
Ratibida pinnata	yellow cone flower		3.00%	U	4	NB1
Rudbeckia hirta	black-eyed Susan		3.00%	U	4	NB1
Rumex crispus	curly dock		7.00%	O	0	NB1
Setaria pumila	yellow foxtail	x	11.00%	C	0	NB1
Setaria viridis	giant green foxtail	x	11.00%	C	0	NB1
Silene latifolia	white campion	x	2.00%	U	0	NB1
Sonchus arvensis	sow thistle	x	15.00%	C	0	NB1
Taraxacum officinale	common dandelion	x	7.00%	O	0	NB1
Tragopogon dubius	yellow salsify	x	5.00%	O	0	NB1
Trifolium pratense	red clover		9.00%	O	0	NB1
Trifolium repens	white clover		9.00%	O	0	NB1
Ulmus pumila	siberian elm	x	1.00%	R	0	NB1
Amaranthus retroflexus	common amaranth	x	3.00%	U	0	NB1
Lolium multiflorum	annual rye	x	4.00%	U	0	NB1

Sum of C	49
Mean C	1.139534884
FQI	7.472429946

Total Species	43
Weed Species Count	26
Native Species Count	17

Summary of Results

ERC conducted meander surveys in each Survey Area in order to determine vegetative composition, the dominant or co-dominant plant species, the percent cover for each species observed, and to complete a Floristic Quality Assessment (FQA) of each survey area. This was accomplished by surveying each SA and identifying all vegetative species observed.

The FQA is generated by assigning a value to each vegetative species. This value is called the Coefficient of Conservatism (C). C represents an estimated probability that a species is likely to occur in a landscape relatively unaltered by what is believed to be a pre-settlement condition (Bernthal 2003). Coefficients for native species range from 0 (highly tolerant of disturbance, low fidelity to native plant communities) up to 10 (highly intolerant of disturbance, high fidelity to native plant communities). Most weed plant species are assigned a C of 0 as they have a low fidelity to native plant communities.

ERC calculated the Floristic Quality Index (FQI) for each of the survey areas on the Alliant property. An FQI is generated using the C for each observed species within a SA. Calculating the FQI is accomplished by multiplying the Mean C ($\bar{C}$) by the square root of the total number of species observed. FQI is a measure of the overall vegetative quality on a given site. This measurement allows for comparative evaluations between sites or over time on a given site. Generally, FQI values of 0-19 indicate low vegetative quality. Values ranging from 20-35 indicate high vegetative quality. Values over 35 indicate very high quality and a relatively undisturbed natural vegetation setting. A high vegetation quality value indicates increased presence of more conservative native species and typically means that the area surveyed is less ecologically degraded.

The FQI values for each of the Survey Areas are indicated in each of their survey forms as well as in Table 3.

Table 3. 2021 Survey Areas FQI's

Survey Area	FQI
R2	16.50
O2	9.22
O1	4.53
O3-C	21.75
O3-B	12.65
O3-1 NS Swale	8.75
O3-1 Rain Gardens	14.71
Peace Trail Extension	9.40
R1	10.75
R3	10.47
O5	10.64
O4	9.70

Table 4. 2022 Survey Areas FQI's

Survey Area	FQI
R2	16.62
O2	4.48
O2B	7.00
O1	3.89
O3-C	21.91
O3-B	6.72
O3-A NS Swale	11.01
O3-A Rain Gardens	17.32
Peace Trail Extension	10.75
R1	13.06
R3	12.77
O5	11.93
O4	11.76
NB1	7.47

Survey Areas FQI Ratings

R2 FQI

R2 was on the high end of the low vegetative quality ranking with a score of 16.62. This SA was maintained for the first two growing seasons after the initial seed installation. A native installation such as this will typically see a slow but steady increase in the overall FQI score over the first several years of the restoration. As a native planting matures, more conservative species with a higher C-value typically appear in the restoration area. This increase in conservative species raises the FQI score over time. ERC estimates that with continued management, the FQI score will increase. Management practices such as prescribed fire, spot mowing, spot herbicide treatments, and supplemental seeding should all be utilized to increase native species richness and the subsequent FQI score. Eventually the FQI will peak, typically between years 5-10 of the restoration. Certain species will start to dominate the restoration, resulting in a lower number of species in the restoration. The lower number of species will decrease the FQI score, but it should remain steady with a high vegetative quality ranking as long as appropriate maintenance activities are continued.

While the FQI is a good indicator of quality, it isn't the only metric to be considered. The overall native density increased from 2021 to 2022. This is this is a qualitative measurement which relies on the expertise of the individual conducting the survey. ERC conducted a qualitative survey along with the FQI survey while meandering through each unit. The overall density of native vegetation in R2 is between 95-99%. Even though this SA scores on the relatively low-quality ranking based on FQI, when you couple that score with the high density of native vegetation observed during the survey, it is ERC's opinoin that this restoration is in excellent condition. There are non-native species present within the SA, however, they do *not* pose a significant threat to native plant establishment within the area as long as minor maintenance is conducted periodically throughout the growing season.

O2 FQI

Due to differences in seed mixes, topography, and hydrology, O2 was broken down int two separate units. The first consists of the upland portion and the second the stormwater facility. The upland portion of O2 received an FQI of 4.48. This score is lower than the overall O2 score from 2021. While it is to be expected as the stormwater facility had native vegetation planted in it and was subsequently removed from this SA, the qualitative analysis of this SA indicates that the non-native vegetation within O2 has increased since 2021. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation did not establish well in

this SA. These areas require weed species management through the use of mechanical removal and herbicide applications. Once the weed species are properly managed and sufficiently suppressed, native species plants can be reintroduced.

O2B – Stormwater Facility FQI

While the stormwater basins were restored with native plant plugs, the FQI in this facility also dropped from 2021 to a score of 7.00. The basins in this SA are no longer salvageable, as non-native vegetation has established within the SA. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation did not establish well in this SA. These areas require weed species management through the use of mechanical removal and herbicide applications. Once the weed species are properly managed and sufficiently suppressed, native species plants can be reintroduced.

O1 FQI

O1 received a lower FQI score (3.89) since 2021 (4.53) as well. The SA was low-mowed in November of 2021, but no other management practices were conducted. This allowed non-native seed to germinate and establish during the 2022 growing season, lowering the FQI score. While non-native cool season grass species were present at higher densities than 2021 within the SA, Siberian elm was the dominant plant within the area. Based on the designed species lists established by AECOM and MARS, the designed vegetation did not establish well in this SA. Siberian elm will outcompete the designed cool season grasses if left unmanaged. This invasive woody species should be mechanically removed and treated with herbicide as soon as possible. If no action is taken, these invasive trees will create a Siberian elm forest with little to no herbaceous vegetation on the forest floor.

O3-C

O3-C is still the only SA to score over 20 with a score of 21.91, up from 21.75 in 2021. This is directly attributable to the native plants and seed which were installed as part of the original restoration. Many of the native plant plugs from the AECOM design were visible and healthy at the time of the survey. While species in the design were observed, weed species are present in throughout the SA. Additional maintenance is required in order to retain the high FQI. If no maintenance is conducted, ERC predicts that the FQI will fall below 20 within several years.

O3-B

The large swale and "wet pond" (Montgomery 2017) that comprises most of O3-B received a score of 6.72, down from 12.65 in 2021. The original design indicated that native vegetation was to be installed in these units. The "wet pond" was dry at the time of the survey. While native vegetation was observed during the survey, weed species dominated the area. As indicated in Photo 5, the non-native vegetation was sprayed with herbicide during the 2022 growing season. This herbicide application was conducted as preparation for the reintroduction of native vegetation. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation did not establish well in this SA, thus warranting an herbicide application. These areas require weed species management through the use of mechanical removal and herbicide applications. Once the weed species are properly managed and sufficiently suppressed, native species plants can be reintroduced.

O3-A NS Swale

O3-A NS Swale is a recently restored SA based on the timeline established by MARS and the apparent native plant plugs within the restoration area. Albeit a recent restoration based on MARS timeline, this SA received a low score of 11.01, up from 8.75 in 2021. Based on the designed species lists established by AECOM and MARS, most of the species in the design are present within the SA. However, the area is still dominated by non-native species and requires additional management to be conducted. These areas require weed species management through the use of mechanical removal and herbicide applications. Once the weed species are properly managed and sufficiently suppressed, native species plants can be reintroduced.

O3-A Rain Gardens

Two rain gardens had native plant plugs installed in the center of the parking lot. These two rain gardens scored a 17.32, up from 14.71. Many of large voids of vegetation from 2021 were vegetated in 2022. This could be a result of native seed germinating within the SA as native vegetation densities increased in 2022. ERC did conduct several maintenance events throughout the growing season, which assisted in the development of native vegetation. Continued maintenance is required to maintain native plant dominance in these rain gardens.

Peace Trail Extension

The native restoration on either side of the 6.6-acre Peace Trail Extension is still in poor condition, receiving a FQI score of 10.75, up from 9.4. There are several areas near the loop that have higher

densities of native vegetation than the bulk of the SA. The remainder of the SA, near the southern property boundary, have low densities of native vegetation. The majority of the SA should be overseeded and continually maintained for the foreseeable future. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation did not establish well in this SA. A combination of mowing, herbicide, and supplemental seed installation should occur in order to achieve the designed plan specifications outlined by MARS and AECOM.

R1

A solar array with native vegetation was designed for this 8.9-acre SA. The native plant species that were in the designed seed mix along with maintenance mowing in 2022 raised the FQI score up to 13.06 from 10.75 in 2021. Native vegetation, primarily side oats gramma, could easily be observed in rows in this SA. Qualitatively, native densities also increased throughout the SA. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation did not establish well in this SA. A combination of mowing, herbicide applications, and supplemental seed installation should occur in order to achieve the designed plan specifications outlined by MARS and AECOM.

R3

A solar array and transmission line corridor with native vegetation was designed for this 8.7-acre SA. The natives that were in the designed seed mix along with maintenance mowing in 2022 raised the FQI score up to 12.77 from 10.45 in 2021. Native vegetation, primarily side oats gramma, was observed in planting rows in this SA in 2022. Qualitatively, native densities also increased throughout the SA from 2021 to 2022. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation did not establish well in this SA. A combination of mowing, herbicide applications, and supplemental seed installation should occur in order to achieve the designed plan specifications outlined by MARS and AECOM.

O5

A solar array with native vegetation was designed for this 21.4-acre SA. The natives that were in the designed seed mix along with maintenance mowing in 2022 raised the FQI score up to 11.93 from 10.64 in 2021. Native vegetation, primarily side oats gramma, could be observed in planting rows in this SA in 2022. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation did not establish well in this SA. Qualitatively, native densities also increased throughout the SA in 2022. A combination of mowing, herbicide applications, and

supplemental seed installation should occur in order to achieve the designed plan specifications outlined by MARS and AECOM.

O4

The Montgomery Plans outlined native perennial grass as the designed seed specification. It appears that the majority of the 7.3-acre SA was planted with a native species. A swale on the western side of the SA was planted with non-native cool season grasses and the upper portion of the SA was planted with native seed. The cool season grass swale appears to be in relatively stable condition. Qualitatively, native densities also increased throughout the SA. Based on the designed species lists established by AECOM and MARS, the designed/native vegetation in the native vegetation portion of this SA did not establish well in this SA. The combination of the invasive species and low establishment of native vegetation led to a FQI score of 11.89, up from 9.7 in 2021.

Overall, the quantitative FQI scores indicate an ecologically degraded site. Several factors likely contributed to the overall low FQI scores. First, several areas were designed with non-native cool season grasses to be installed. In certain locations, like the steep swale on the western side of O4, cool season grasses are required for rapid establishment. However, in areas such as O1, a native seed mix alongside a cool season grass cover crop would have been a more sustainable design. Native species are better suited for this site and the nutrient program the site is enrolled in. Native plant species are capable of producing vast and complex root systems, whereas non-native cool season species have shallow, simple root systems. The extensive root systems of many native species are better suited for stormwater and nutrient attenuation. Photo 16 (obtained from Natural Resource Conservation Services website) shows the differences in the root systems of a non-native cool season grass (far left) when compared to native vegetation.

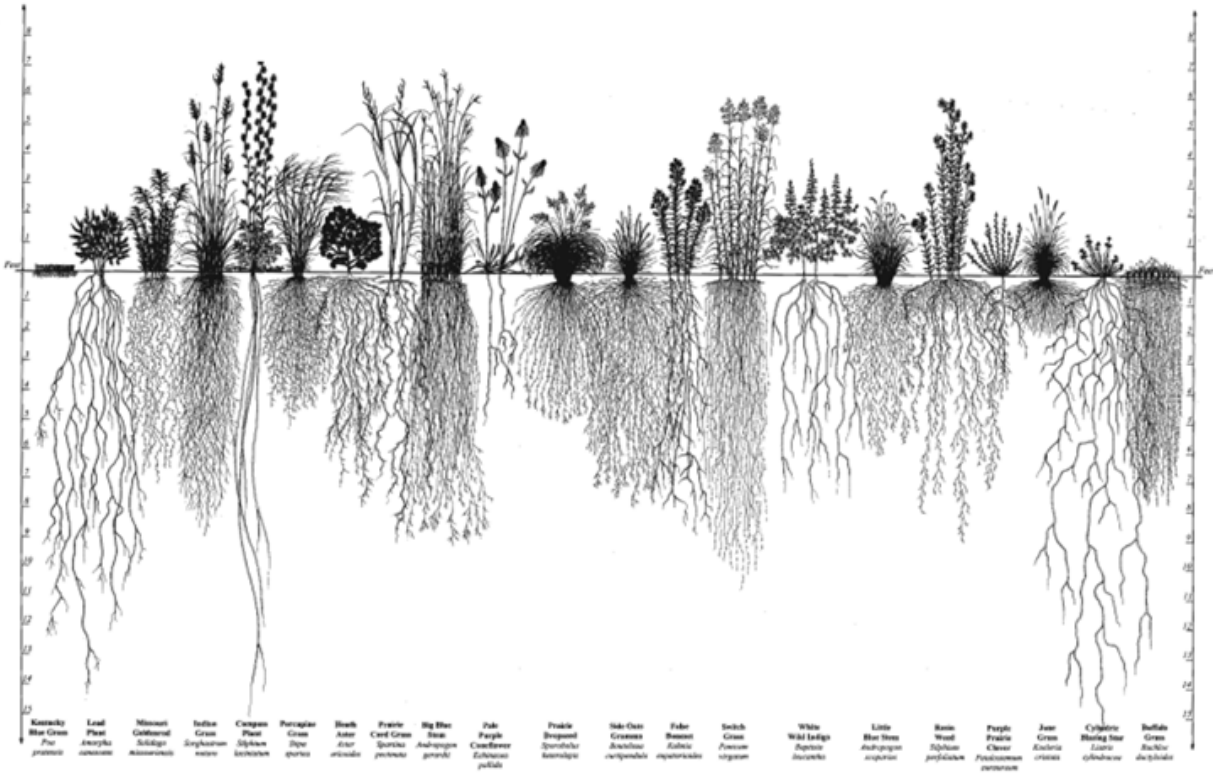


Photo 17. Vegetation Root Systems

The plant on the far left of Photo 17 (above) is the non-native cool season *Poa pratensis* (Kentucky bluegrass). The root system of this species is only a few inches deep and is of very low complexity from a structural standpoint. The native plant species to the right are capable of producing root systems that are significantly deeper, up to 10+ feet deep and far more complex. This is

significant as this the overarching goals of the planting projects on site are dependent on maximizing nutrient uptake by vegetation. Because of the deep and complex root systems of native vegetation, phosphorus uptake is substantially increased when compared to non-native cool season grasses. Numerous studies (i.e., Lowrance et al. 1984, Peterjohn and Correll 1984, Cooper et al. 1986, Ducnuigeen et al. 1997) have shown that native vegetation is capable of retaining 80% of phosphorus from adjacent agricultural land that has phosphorous in the form of fertilizer. Using native plant species instead of non-native cool season grasses will significantly decrease the amount of phosphorous discharging into the river.

Qualitative analysis from the survey indicated that several of the SA's are recovering as a result of prescribed maintenance. The areas within the solar array (R1, R3, O4, O5, and PTE) have all observed native vegetation density increases on some level. These areas were the focus for 2022 management activities, and the native vegetation benefited as a result. Continued maintenance should be scheduled for these units in order to increase the native vegetation densities. Management practices should include maintenance mowing, spot herbicide applications, and native seed overseeding. All of these management practices will in turn increase the FQI scores as the non-native vegetation will begin to decrease in density and overall vigor.

O3B was sprayed as part of the management recommendations established by ERC. Several more herbicide applications are required in order to fully exhaust the seedbank of non-native vegetation. Eventually, the erosion control mat will be removed, native seed will be reinstalled, and new erosion control mat will be re-installed to prevent erosion within the basin. The practice of chemically managing non-native vegetation in order to prepare an SA for reintroduction of native seed should be conducted in O1, O2, O2B, and NB1.

Spot mowing, spot herbicide applications, and supplemental seeding should be conducted in R2, O3C, O3A Rain Gardens, and O3A North South Swale. These areas should be part of the focus for 2023 management activities, which will greatly benefit the native vegetation as a result. Continued maintenance should be scheduled for these units in order to increase the native vegetation densities. Management practices should include maintenance mowing, spot herbicide applications, and native seed overseeding. All of these management practices will increase the FQI scores as the non-native vegetation will begin to decrease in density and vigor.

Drone Images

ERC conducted a drone flight on September 29, 2022. Due to interference from the substation and plant, a comprehensive drone flight was unable to be completed. ERC was able to capture several oblique angle images from the drone flight. The images show areas that are densely vegetated as well as areas that have lower densities of vegetation. Photo 17 (below) shows the Peace Trail Extension, O5, R3, and O3B.



Photo 18. R3 has a lower density of vegetation when compared to O5. O3 is the swale that was dominated by invasive species and was sprayed during the 2022 growing season. It is important to note the erosion visible within the stormwater basin just south of the substation. This erosion at the inlet will require repair in order for the stormwater basin to functioning properly.

The second drone photo (Photo 19 below) indicates invasive species dominating O1. A clear difference in vegetation composition is seen in R1 when you compare it to Photo 20 showing R2.



Photo 19. This drone image shows R1, which is dominated by invasive species.



Photo 20. This drone image shows R2, which is dominated by native species.



Photo 21. This lower elevation drone image in R2 shows the native species. Canada wild rye and goldenrod are evident in this photo.



Photo 22. A drone image showing the majority of the Alliant Energy facility.

Conclusions and Recommendations

ERC was contracted by Alliant Energy to conduct maintenance activities in high priority areas. The high priority areas are SA's that are within the phosphorus trading plan (PTE, R1, R3, O3A Rain Gardens, O3A North South Swale, O3B, O4, and O5). Maintenance activities consisted of maintenance mowing throughout the growing season. As mowing had only occurred in November of 2021, the mowing was conducted in a manner similar to a first-year planting. Continued maintenance is required in these units (as well as the remaining units) for several years. The soils within the solar array are dry soils, primarily consisting of sand. This soil type has low organic matter and low macronutrients. Native vegetation planted into soils such as this tend to require more time to fully establish. In a normal mesic, loamy soil, the expected establishment period is 2-4 years. With a dry, sandy soil, establishment may take 4-6 years. This is simply due to the lack of moisture, nutrients, and organic matter within the soil.

The results of the maintenance that occurred during the 2022 growing season indicate that native vegetation is increasing in density. The FQI scores increased in every unit that was managed in 2022, except O3B which was sprayed as a site preparation measure for the installation of native seed. Continuing management activities in the units that received maintenance in 2022 is required for 2023. ERC also recommends that the remaining units be included in 2023 management activities. Management activities include comprehensive foliar herbicide in specific management areas, spot mowing, spot herbicide applications, native seed installation, minor excavation and grading, and erosion control installation.

A more robust Vegetation m=Management Plan (VMP) should be developed in order to outline management activities in every management area and timelines in order to meet the designed specifications outlined in the Montgomery and AECOM. A concise VMP outlining the tasks required to maintain and meet expectations outlined by WDNR WPDES permit should be written by a restoration ecologist specializing in native plant botany and biology. A qualified native restoration ecologist will have intimate knowledge on the growth cycles of native vegetation. Knowing what management practice to apply and when to apply them are critical to the development and maintenance of native vegetation and should be outlined in a specific VMP. Each management area has unique characteristics that require different management practice applications. A VMP would detail work required to establish native vegetation on each management area. The VMP will not only give Alliant Energy an outline of management activities, but also serve as a guideline for managers to follow as well.

Ongoing and routine vegetation maintenance is highly recommended to prevent the continued establishment of the weed plant species and to ensure the reestablishment of native plant

species. Many of the plant species that were observed during the survey were annual weed species. Annual weed species such as foxtail produce a significant amount of highly viable seed annually and can persist in the seed bank for several years. This life history characteristic allows annual species to remain established for many years. However, if properly managed, these annual weeds can be suppressed over time. Proper management includes maintenance mowing (with thatch removal), line trimming, hand pulling, and the judicious and well-timed use of herbicides where necessary. An integral component to these management practices is conducting the maintenance prior to the production of highly viable annual seed. If the maintenance is conducted prior to the development of a seed head, the annual weed species will not be able to reproduce. This allows for planted native vegetation to fill in the voids, become more robust, and dominate the restoration area. In the survey areas that are dominated by weed plant species, best management practices should be implemented immediately.

Legend

Management Areas

- O1 - 6.4 Acres
- O2 - 11.2 Acres
- O2 Basin (O2B) - 2.8 Acres
- R2 - 8.7 Acres
- O3C - 5.6 Acres
- O3A West Parking Lot Rain Garden (O3AWP) - 0.1 Acres
- O3A East Parking Lot Rain Garden (O3AEP) - 0.2 Acres
- O3A North-South Swale (O3ANS) - 1.9 Acres
- O3B - 4.0 Acres
- O4 - 7.3 Acres
- R3 - 14.6 Acres
- O5 - 21.4 Acres
- R1 - 8.9 Acres
- Peace Trail Extension (PTE) - 6.6 Acres
- North Basin 1 (NB1) - 1.3 Acres
- 2022 Meander Survey Lines

W B-R Town Line Rd
S Walters Rd
CP Rail Systems
NB1
O3C
O4
O3AEP
O3AWP
O3ANS
O1
O3B
R3
O2
O2B
O5
R1
R2
PTE
W Heron Dr
W Bay Dr
Rock River
Sand Bar

1 inch equals 310 feet

0 75150 300 450 600 Feet

Drawn By: Daniel Fuhs	ERC ECO-RESOURCE CONSULTING, INC 2554 County Road N Stoughton, WI 53589 www.eco-resource.net	Figure 1. Management Areas Alliant Energy Beloit Substation Town Line Road, Beloit, WI Section 2 T01N R12E Rock County, WI
Date: 8/24/2022		
Project Number: 22010B		
Figure 1		Image Source : Pictometry 2020

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Legend

Management Areas

- O1 - 6.4 Acres
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W B-R Town Line Rd

S Walters Rd

CP Rail Systems

NB1

O3C

O4

O3AEP

O3AWP

O3ANS

O1

O3B

R3

O2

O2B

O5

R1

R2

PTE

W Heron Dr

W Bay Dr

Rock River

Sand Bar

1 inch equals 310 feet

0 75150 300 450 600 Feet

ntributors, Rock County WI Land Information, © OpenStreetMap, Microsoft, aph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Maxar

Drawn By: Daniel Fuhs

Date: 8/24/2022

Project Number: 22010B

Figure 2

ERC

ECO-RESOURCE CONSULTING, INC

2554 County Road N Stoughton, WI 53589
www.eco-resource.net

Figure 2. Meander Surveys
EOR Beloit Alliant Restoration
Town Line Road, Beloit, WI
Section 2 T01N R12E
Rock County, WI

Image Source : Pictometry 2020

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November 15, 2023

Submitted Electronically

Matt Claucherty
Water Resources Specialist
DNR Central Office
PO Box 7921
Madison, WI 53707-7921

Re: Water Quality Trading Plan Amendment
Wisconsin Power and Light Company – Riverside Energy Center
WPDES Permit No. 0061921-03-2

Dear Matt Claucherty:

On behalf of the Wisconsin Power and Light Company (WPL) Riverside Energy Center (REC) in Beloit, Wisconsin, Alliant Energy is submitting this Water Quality Trading Plan (Plan) Amendment (Amendment). This Amendment is intended to supplement the version of the Plan that was submitted on July 31, 2023, and conditionally approved by WDNR on September 5, 2023. The Amendment describes work anticipated for Spring 2024 that is not captured in the most recent version of the Plan. The work will impact area R3 Transmission Green Space (R3) to install three transmission poles. Soil disturbance in area R3 will occur during installation of the transmission poles. To address this temporary disturbance, the Amendment pauses phosphorus credit generation of area R3 for 2024. Credit generation in area R3 will resume in 2025 after vegetation is established. The Amendment describes the project work, timeline, area impacted, and updated credit quantities.

If you have any questions regarding this amendment, please contact me at (608) 458-3821 or seanspears@alliantenergy.com.

Sincerely,

Sean Spears
Environmental Specialist II
Alliant Energy Corporate Services, Inc,
On Behalf of WPL

cc: A. Blank (WPL)
A. Ford (WPL)
A. Brechlin (DNR)
S. Hanson (DNR)
J. Maxted (Alliant)

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Riverside Energy Center
Water Quality Trading Plan Amendment

November 15, 2023

Introduction

Wisconsin Power and Light Company (WPL) Riverside Energy Center (REC) in Beloit, Wisconsin operates under a Water Quality Trading Plan (Plan) as required by its Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Number 0061921-03-2. The current Permit for REC will expire December 31, 2023, and a renewal application was submitted to the Wisconsin Department of Natural Resources (WDNR) on April 5, 2023.

WPL submitted a revised Plan to WDNR on July 31, 2023, for REC. The revised Plan was submitted to remove O1 – ATC Laydown Yard and O2 – ATC Substation from the Plan as well as to modify O5 Solar and Green Space for project developments at REC. Additional project work is planned to take place in R3 Transmission Green Space (R3) during 2024 that is not captured in the Plan submitted July 31, 2023. This Water Quality Trading Plan Amendment (Amendment) serves only to revise 2024 R3 phosphorus credit generation and 2024 total phosphorus credit generation that were stated in the Plan submitted July 31, 2023. The project description, timeline, and updated credit tables are included in this Amendment. WPL understands that this modified Plan will be incorporated into its renewed WPDES permit upon issuance from WDNR in the near future.

Project Description

In Spring 2024, three transmission line poles are planned to be installed in area R3. One pole will have a 5-foot-wide hole. Two poles will have a 10-foot-wide hole for the foundation. Discussions between WDNR and Alliant Energy concluded the approximately 225 square feet of removed area will have minimal impact on phosphorous credit generation in area R3 and would not require recalculating credits. However, the pole installation will disturb the soil and vegetation due to heavy equipment used. The area will be reseeded following pole installation. The seed mixture to be used is included in Attachment 1.

Timeline

Pole installation in area R3 is anticipated to begin May 2024. Following pole installation, disturbed areas in area R3 will be reseeded. Area R3 phosphorus credit generation will resume in 2025 following vegetation establishment. Table 1 outlines the anticipated timeline.

Table 1 Activity Timeline

Activity	Timeline
Pole installation	May 2024
Seeding disturbed areas	1 month after installation
R3 credit generation resumes	January 1, 2025

Credit Quantities

During 2024, area R3 will pause phosphorus credit generation due to soil disturbance resulting from the pole installation work during the project. Due to the small footprint of the poles, normal phosphorus credit generation is anticipated to resume in 2025 after any disturbed soil is reseeded and stabilized. Tables 2 and 3 below show the projected credits resulting from pausing phosphorus credit generation of R3 during 2024. With this Amendment, 2024 R3 phosphorus credit generation changes from 31.6 credits to 0 credits. 2024 total phosphorus credits available to REC changes from 140.4 credits to 108.8 credits. It is assumed phosphorus credits will be available for R3 at the beginning of 2025 following vegetation establishment of the disturbed soil, so no other future credit quantities require revision.

Table 2 Long Term Phosphorus Credits

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
O1	Area removed from trading plan, July 2023									
O2	Area removed from trading plan, July 2023									
O3-A			1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
O3-B			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
O3-C		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
O4				10.0	10.0	10.0	10.9	10.9	10.9	10.9
O5					69.3	63.2	63.2	63.2	63.2	63.2
O6	Area does not generate P trading credits, but is included in table for completeness									
R1					20.9	20.9	20.9	20.9	20.9	20.9
R2	6.8	8.8	10.1	10.7	11.1	11.3	11.4	11.5	11.5	7.7
R3					32.9	31.6	0	31.6	31.6	31.6
Total	6.8	10.3	26.8	37.9	161.5	139.4	108.8	140.5	140.5	136.7

Note: Table 2 generated by revising Table 8 from the Plan. Changes in red.

Table 3 Total Projected Phosphorus Credits Generated By Year

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Interim	23.1	25.8	48.2	145.7	128.9					
Long Term	6.8	10.3	26.8	37.9	161.5	139.4	108.8	140.5	140.5	136.7
Total	29.9	36.1	75.0	183.6	290.4	139.4	108.8	140.5	140.5	136.7

Note: Table 3 generated by revising Table 10 from the Plan. Changes in red.

Attachment 1

Seed Mix

GRASSES, SEDGES & RUSHES	COMMON NAME	OZ/ACRE	COLOR	HT	BLOOM	MOISTURE	SUN	SEEDS/OZ	SEEDS/SF	% OF MIX
Andropogon gerardii	Big Bluestem	12.88	Green	4-7'	Aug-Sep	WM-Dry	FP	12000	3.55	7.1%
Bouteloua curtipendula	Side Oats Grama	8.59	Green	1-3'	July-Aug	Mesic-Dry	FP	12500	2.46	4.9%
Carex bicknellii	Copper-Shouldered Oval Sedge	0.81	Green	1-3'	June-July	WM-DM	F	27000	0.50	1.0%
Elymus canadensis	Canada Wild Rye	17.18	Green	3-5'	June-Oct	WM-Dry	FP	6000	2.37	4.7%
Elymus virginicus	Virginia Wild Rye	17.18	Green	3-5'	July-Aug	Wet-Mesic	FPS	4200	1.66	3.3%
Juncus tenuis	Path Rush	0.11	Green	1'	May-Aug	Mesic-Dry	FP	1500000	3.70	7.4%
Panicum virgatum	Switchgrass	4.29	Green	4-6'	May-Sep	WM-Dry	FP	25000	2.46	4.9%
Schizachyrium scoparium	Little Bluestem	6.44	Green	2-3'	June-Aug	Mesic-Dry	FP	20000	2.96	5.9%
Sorghastrum nutans	Indian Grass	12.88	Green	4-6'	Aug-Sep	Mesic-Dry	FP	12500	3.70	7.4%
	GRASSES, SEDGES & RUSHES TOTAL	**80.36**							**23.35**	**46.7%**

WILDFLOWERS	COMMON NAME	OZ/ACRE	COLOR	HT	BLOOM	MOISTURE	SUN	SEEDS/OZ	SEEDS/SF	% OF MIX
Allium cernuum	Nodding Onion	2.15	Pink	1-2'	July-Aug	WM-DM	FP	8500	0.42	0.8%
Amorpha canescens	Leadplant	1.07	Purple	1-3'	June-Aug	Mesic-Dry	FP	24000	0.59	1.2%
Aster azureus	Sky Blue Aster	0.54	Blue	1-3'	Aug-Oct	Mesic-Dry	FP	82000	1.01	2.0%
Aster novae-angliae	New England Aster	0.54	Purple	4-5'	Sep-Oct	Wet-DM	FP	100000	1.23	2.5%
Baptisia leucantha (alba)	White Wild Indigo	1.07	White	3-5'	May-June	WM-Dry	FP	2200	0.05	0.1%
Coreopsis palmata	Prairie Coreopsis	0.81	Yellow	1-2'	June-Aug	Mesic-Dry	FP	14000	0.26	0.5%
Coreopsis tripteris	Tall Coreopsis	0.54	Yellow	4-7'	July-Oct	WM-DM	FP	16000	0.20	0.4%
Dalea candida	White Prairie Clover	1.61	White	1-2'	June-Oct	Mesic-Dry	F	26000	0.96	1.9%
Dalea purpurea	Purple Prairie Clover	1.34	Purple	1-2'	June-Aug	Mesic-Dry	F	23000	0.71	1.4%
Desmodium canadense	Canada Tick Trefoil	1.07	Purple	2-5'	July-Aug	WM-DM	F	5500	0.14	0.3%
Echinacea pallida	Pale Purple Coneflower	2.15	Purple	3-5'	June-July	Mesic-Dry	FP	5500	0.27	0.5%
Echinacea purpurea	Purple Coneflower	3.22	Purple	3-4'	July-Aug	WM-DM	FP	7000	0.52	1.0%
Eryngium yuccifolium	Rattlesnake Master	1.34	White	3-4'	July-Aug	WM-DM	F	12000	0.37	0.7%
Helianthus grosseserratus	Sawtooth Sunflower	0.27	Yellow	4-8'	July-Oct	WM-DM	FP	15000	0.09	0.2%
Heliopsis helianthoides	Early Sunflower	4.29	Yellow	3-5'	June-Oct	WM-DM	FP	6500	0.64	1.3%
Liatris pycnostachya	Prairie Blazing Star	1.61	Purple	2-4'	July-Sep	Mesic-DM	FP	15000	0.55	1.1%
Monarda fistulosa	Wild Bergamot	1.07	Lavender	2-4'	June-Aug	WM-Dry	FP	100000	2.46	4.9%
Penstemon digitalis	Foxglove Beard Tongue	0.27	White	1-3'	May-July	Mesic-DM	FPS	120000	0.74	1.5%
Potentilla arguta	Prairie Cinquefoil	0.11	White	1-2'	June-July	DM-Dry	F	230000	0.57	1.1%
Pycnanthemum virginianum	Mountain Mint	0.11	White	1-3'	July-Sep	Wet-Mesic	FP	220000	0.54	1.1%
Ratibida pinnata	Yellow Coneflower	1.21	Yellow	4-5'	July-Aug	Mesic-DM	FP	30000	0.83	1.7%
Rudbeckia hirta	Black-Eyed Susan	1.88	Yellow	1-3'	June-Sep	WM-Dry	FP	130000	5.61	11.2%
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	1.07	Yellow	4-5'	July-Sep	WM-DM	FP	65000	1.60	3.2%
Silphium laciniatum	Compass Plant	1.07	Yellow	4-9'	June-Sep	WM-Dry	FP	1000	0.02	0.0%
Silphium perfoliatum	Cup Plant	1.34	Yellow	4-9'	July-Sep	WM-Mesic	FP	1900	0.06	0.1%
Solidago graminifolia	Grass-Leaved Goldenrod	0.11	Yellow	1-3'	July-Aug	Wet-DM	FP	650000	1.60	3.2%
Solidago rigida	Stiff Goldenrod	0.67	Yellow	3-5'	July-Sep	WM-Dry	F	50000	0.77	1.5%
Verbena hastata	Blue Vervain	0.81	Blue	3-5'	July-Sep	Wet-Mesic	FP	100000	1.85	3.7%
Veronicastrum virginicum	Culver's Root	0.11	White	3-5'	July-Aug	WM-DM	FP	800000	1.97	3.9%
	WILDFLOWERS TOTAL	**33.44**							**26.65**	**53.3%**

	OZ/ACRE	SEEDS/SF	% OF MIX
SEED MIX TOTALS	**113.81**	**50.00**	**100.0%**

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August 15, 2024

Submitted Electronically

Matt Claucherty
Water Resources Specialist
DNR Central Office
PO Box 7921
Madison, WI 53707-7921

Re: Water Quality Trading Plan Amendment
Wisconsin Power and Light Company – Riverside Energy Center
WPDES Permit No. 0061921-03-2

Dear Matt Claucherty:

On behalf of the Wisconsin Power and Light Company (WPL) Riverside Energy Center (REC) in Beloit, Wisconsin, Alliant Energy is submitting this Water Quality Trading Plan (Plan) Amendment (Amendment). This Amendment intends to update phosphorus credits in Tables 2 and 3 of WQT-2024-0002 that was approved on January 12, 2024. The credit updates reflect delays in transmission pole installation construction schedule that impacts R3 Transmission Green Space (R3) credit generation. The Amendment pauses R3 credit generation in 2025 and 2026 while vegetation of the approved seed mix is established in accordance with the approved Plan. Credit generation in R3 will resume in 2027 after vegetation is established. This Amendment also removes credit generation from O3-A, O3-B, and O3-C beginning in 2025 as these areas are locations where future projects may occur.

If you have any questions regarding this Amendment, please contact me at (608) 458-3821 or seanspears@alliantenergy.com.

Sincerely,

Sean Spears
Environmental Specialist II
Alliant Energy Corporate Services, Inc,
On Behalf of WPL

cc: A. Abdi (WPL)
A. Ford (WPL)
J. Zumstein (WPL)
A. Brechlin (DNR)
S. Hanson (DNR)
J. Maxted (Alliant)

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Riverside Energy Center
Water Quality Trading Plan Amendment

August 15, 2024

Introduction

Wisconsin Power and Light Company (WPL) Riverside Energy Center (REC) in Beloit, Wisconsin operates under a Water Quality Trading Plan (Plan) as required by its Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Number 0061921-03-2. The current Permit for REC expired December 31, 2023, and a renewal application was submitted to the Wisconsin Department of Natural Resources (WDNR) on April 5, 2023.

WPL submitted a revised Plan to WDNR on July 31, 2023, for REC. The revised Plan was submitted to remove O1 – ATC Laydown Yard and O2 – ATC Substation from the Plan as well as to modify O5 Solar and Green Space for project developments at REC. WPL received conditional approval for WQT-2024-0002 on January 12, 2024, that paused 2024 R3 Transmission Green Space (R3) credit generation for transmission pole installation work taking place in R3. Due to delays in the construction schedule, vegetation will not be established in time to generate 2025 credits in R3.

WPL is submitting this amendment to update phosphorus credits in Tables 2 and 3 of WQT-2024-0002. Due to construction delays, R3 credit generation will be paused for 2025 and 2026 to ensure vegetation will be established. In addition, WPL is removing from credit generation the areas of West Riverside Plant O3-A, O3-B, and O3-C. These Plant areas only generate a total 2.3 phosphorus credits and are in areas where future construction activities are likely to occur.

Credit Quantities

Due to delays in construction schedule for the transmission pole installation in R3 that was described in WQT-2024-0002, the seed mix in Attachment 1 will not be able to be planted in 2024 as it would not survive the winter. Instead, a winter cover crop will be planted in Fall 2024 to stabilize the soil with the seed mix being planted in Spring 2025. In order to ensure the seed mix is fully established and generating phosphorus credits, WPL is pausing credit generation for R3 in 2025 and 2026. R3 credit generation resumes in 2027 once the planned seed mix is established.

With this Amendment, areas O3-A, O3-B, and O3-C are removed from phosphorus credit generation at the beginning of 2025. These areas are locations where future projects are likely to occur at the facility which would require plan modifications at a future date. Removing them with this Plan amendment reduces the likelihood of future permit modification requests because of project work in these areas. Since these

areas only generate a total of 2.3 credits per year, removal of these areas from the Plan will not affect WPL compliance with WPDES permit limits.

Tables 1 and 2 show the projected phosphorus credits from pausing R3 for 2025 and 2026 and resuming in 2027 as well as removing O3-A, O3-B, and O3-C from credit generation beginning 2025. Table 3 is from the WQT-2024-0002 approval letter and has been updated with credits removed and paused as described above.

Table 1 Long Term Phosphorus Credits

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
O1	Area removed from trading plan, July 2023									
O2	Area removed from trading plan, July 2023									
O3-A			1.6	1.6	1.6	1.6	1.6	Area removed from plan		
O3-B			0.3	0.3	0.3	0.3	0.3	Area removed from plan		
O3-C		0.4	0.4	0.4	0.4	0.4	0.4	Area removed from plan		
O4				10.0	10.0	10.0	10.9	10.9	10.9	10.9
O5					69.3	63.2	63.2	63.2	63.2	63.2
O6	Area does not generate P trading credits, but is included in table for completeness									
R1					20.9	20.9	20.9	20.9	20.9	20.9
R2	6.8	8.8	10.1	10.7	11.1	11.3	11.4	11.5	11.5	7.7
R3					32.9	31.6	0	0	0	31.6
Total	6.8	10.3	26.8	37.9	161.5	139.4	108.8	106.6	106.6	134.4

Note: Table 1 generated by revising Table 2 from WQT-2024-0002. Changes in red.

Table 2 Total Projected Phosphorus Credits Generated by Year

Field ID	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Interim	23.1	25.8	48.2	145.7	128.9					
Long Term	6.8	10.3	26.8	37.9	161.5	139.4	108.8	106.6	106.6	134.4
Total	29.9	36.1	75.0	183.6	290.4	139.4	108.8	106.6	106.6	134.4

Note: Table 2 generated by revising Table 3 from WQT-2024-0002. Changes in red.

Table 3 Updated Phosphorus Credits from Table 1 of WQT-2024-0002 Approval Letter

Year	Available Credits (lbs/yr) – Interim	Available Credits (lbs/yr) – Long Term	Available Credits (lbs/yr) – Total
2024	0	108.8	108.8
2025	0	106.6	106.6
2026	0	106.6	106.6
2027	0	134.4	134.4
2028	0	138.2	138.2
2029	0	138.2	138.2

Note: Table 3 generated by revising Table 1 from WQT-2024-0002 approval letter. Changes in red.

Attachment 1

Seed Mix

GRASSES, SEDGES & RUSHES	COMMON NAME	OZ/ACRE	COLOR	HT	BLOOM	MOISTURE	SUN	SEEDS/OZ	SEEDS/SF	% OF MIX
Andropogon gerardii	Big Bluestem	12.88	Green	4-7'	Aug-Sep	WM-Dry	FP	12000	3.55	7.1%
Bouteloua curtipendula	Side Oats Grama	8.59	Green	1-3'	July-Aug	Mesic-Dry	FP	12500	2.46	4.9%
Carex bicknellii	Copper-Shouldered Oval Sedge	0.81	Green	1-3'	June-July	WM-DM	F	27000	0.50	1.0%
Elymus canadensis	Canada Wild Rye	17.18	Green	3-5'	June-Oct	WM-Dry	FP	6000	2.37	4.7%
Elymus virginicus	Virginia Wild Rye	17.18	Green	3-5'	July-Aug	Wet-Mesic	FPS	4200	1.66	3.3%
Juncus tenuis	Path Rush	0.11	Green	1'	May-Aug	Mesic-Dry	FP	1500000	3.70	7.4%
Panicum virgatum	Switchgrass	4.29	Green	4-6'	May-Sep	WM-Dry	FP	25000	2.46	4.9%
Schizachyrium scoparium	Little Bluestem	6.44	Green	2-3'	June-Aug	Mesic-Dry	FP	20000	2.96	5.9%
Sorghastrum nutans	Indian Grass	12.88	Green	4-6'	Aug-Sep	Mesic-Dry	FP	12500	3.70	7.4%
	GRASSES, SEDGES & RUSHES TOTAL	**80.36**							**23.35**	**46.7%**

WILDFLOWERS	COMMON NAME	OZ/ACRE	COLOR	HT	BLOOM	MOISTURE	SUN	SEEDS/OZ	SEEDS/SF	% OF MIX
Allium cernuum	Nodding Onion	2.15	Pink	1-2'	July-Aug	WM-DM	FP	8500	0.42	0.8%
Amorpha canescens	Leadplant	1.07	Purple	1-3'	June-Aug	Mesic-Dry	FP	24000	0.59	1.2%
Aster azureus	Sky Blue Aster	0.54	Blue	1-3'	Aug-Oct	Mesic-Dry	FP	82000	1.01	2.0%
Aster novae-angliae	New England Aster	0.54	Purple	4-5'	Sep-Oct	Wet-DM	FP	100000	1.23	2.5%
Baptisia leucantha (alba)	White Wild Indigo	1.07	White	3-5'	May-June	WM-Dry	FP	2200	0.05	0.1%
Coreopsis palmata	Prairie Coreopsis	0.81	Yellow	1-2'	June-Aug	Mesic-Dry	FP	14000	0.26	0.5%
Coreopsis tripteris	Tall Coreopsis	0.54	Yellow	4-7'	July-Oct	WM-DM	FP	16000	0.20	0.4%
Dalea candida	White Prairie Clover	1.61	White	1-2'	June-Oct	Mesic-Dry	F	26000	0.96	1.9%
Dalea purpurea	Purple Prairie Clover	1.34	Purple	1-2'	June-Aug	Mesic-Dry	F	23000	0.71	1.4%
Desmodium canadense	Canada Tick Trefoil	1.07	Purple	2-5'	July-Aug	WM-DM	F	5500	0.14	0.3%
Echinacea pallida	Pale Purple Coneflower	2.15	Purple	3-5'	June-July	Mesic-Dry	FP	5500	0.27	0.5%
Echinacea purpurea	Purple Coneflower	3.22	Purple	3-4'	July-Aug	WM-DM	FP	7000	0.52	1.0%
Eryngium yuccifolium	Rattlesnake Master	1.34	White	3-4'	July-Aug	WM-DM	F	12000	0.37	0.7%
Helianthus grosseserratus	Sawtooth Sunflower	0.27	Yellow	4-8'	July-Oct	WM-DM	FP	15000	0.09	0.2%
Heliopsis helianthoides	Early Sunflower	4.29	Yellow	3-5'	June-Oct	WM-DM	FP	6500	0.64	1.3%
Liatris pycnostachya	Prairie Blazing Star	1.61	Purple	2-4'	July-Sep	Mesic-DM	FP	15000	0.55	1.1%
Monarda fistulosa	Wild Bergamot	1.07	Lavender	2-4'	June-Aug	WM-Dry	FP	100000	2.46	4.9%
Penstemon digitalis	Foxglove Beard Tongue	0.27	White	1-3'	May-July	Mesic-DM	FPS	120000	0.74	1.5%
Potentilla arguta	Prairie Cinquefoil	0.11	White	1-2'	June-July	DM-Dry	F	230000	0.57	1.1%
Pycnanthemum virginianum	Mountain Mint	0.11	White	1-3'	July-Sep	Wet-Mesic	FP	220000	0.54	1.1%
Ratibida pinnata	Yellow Coneflower	1.21	Yellow	4-5'	July-Aug	Mesic-DM	FP	30000	0.83	1.7%
Rudbeckia hirta	Black-Eyed Susan	1.88	Yellow	1-3'	June-Sep	WM-Dry	FP	130000	5.61	11.2%
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	1.07	Yellow	4-5'	July-Sep	WM-DM	FP	65000	1.60	3.2%
Silphium laciniatum	Compass Plant	1.07	Yellow	4-9'	June-Sep	WM-Dry	FP	1000	0.02	0.0%
Silphium perfoliatum	Cup Plant	1.34	Yellow	4-9'	July-Sep	WM-Mesic	FP	1900	0.06	0.1%
Solidago graminifolia	Grass-Leaved Goldenrod	0.11	Yellow	1-3'	July-Aug	Wet-DM	FP	650000	1.60	3.2%
Solidago rigida	Stiff Goldenrod	0.67	Yellow	3-5'	July-Sep	WM-Dry	F	50000	0.77	1.5%
Verbena hastata	Blue Vervain	0.81	Blue	3-5'	July-Sep	Wet-Mesic	FP	100000	1.85	3.7%
Veronicastrum virginicum	Culver's Root	0.11	White	3-5'	July-Aug	WM-DM	FP	800000	1.97	3.9%
	WILDFLOWERS TOTAL	**33.44**							**26.65**	**53.3%**

	OZ/ACRE	SEEDS/SF	% OF MIX
SEED MIX TOTALS	**113.81**	**50.00**	**100.0%**