Restoration Concept Plan

Heritage Gardens
Village of DeForest
Dane County, Wisconsin
Stantec Project #: 193704042

Stantec

[redacted]

Prepared by:
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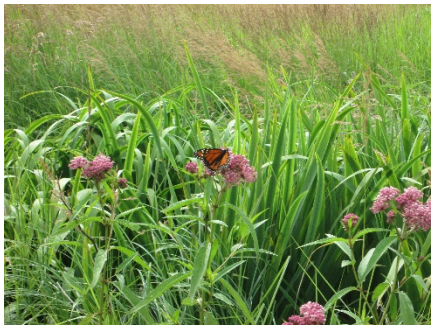

March 14, 2017

Sign-off Sheet

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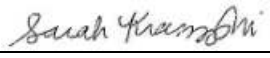
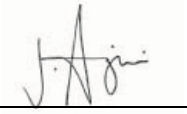
Prepared by  (signature)

Sarah Kraszewski, Environmental Scientist, PWS

Reviewed by  (signature)

Josh Arrigoni, Project Manager

Reviewed by  (signature)

Jeff Kraemer, Principal

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1.0 INTRODUCTION

Stantec Consulting Services Inc. ("Stantec") conducted a field assessment to document baseline conditions and evaluate the restoration potential of an approximate 18-acre area (the "Restoration Area") within the Heritage Gardens Property, on behalf of Elaine Erickson of the Intermezzo Gardens Foundation. The Heritage Gardens Property is located in Section 20, Township 9 North, Range 10 East, in the Village of DeForest, Dane County, Wisconsin (Figure 1). The majority of the property, currently within agricultural land use, is intended to be developed for residential and commercial building lots. Stantec understands that the Client intends to retain the existing barn and structures within the Restoration Area and restore the degraded native plant communities to an aesthetically pleasing landscape that incorporates the waterway with prairie and wetland habitat.

Stantec conducted a field assessment of the Restoration Area on September 11, 2015. A meander survey was conducted to define existing plant community boundaries, which were sketched on a recent aerial photograph. Plant species lists were compiled for each of the plant communities, which included notation of dominant species and invasive species within each community. Waterways within the Restoration Area were surveyed with a Global Positioning System (GPS) unit and mapped using Geographic Information System (GIS) software. Soil properties were characterized at six locations by hand auguring soil pits to depths ranging from 24-30 inches. Representative photos were taken throughout the Restoration Area to document baseline conditions and a photo log is provided in Appendix A.

In July 2016, Stantec conducted an additional field assessment focused on characterizing existing conditions of waterways within the Restoration Area. The assessment included GPS mapping of observed channel erosion and other significant bed and bank features, sampling of channel sediments and substrates, limited survey of channel cross-sections in select locations, and characterization of the overall channel and bank stability.

2.0 BASELINE CONDITIONS

The Restoration Area consists of agricultural lands, barn structures with maintained turf, old field, degraded wetlands, degraded woodland, and a waterway.

2.1 WATERWAYS

An unnamed tributary to the Yahara River flows from the northeastern corner of the Restoration Area to the southwestern corner (s-1, Figure 1). Within the upstream portions of the Restoration Area, s-1 is a wide, moderately entrenched channel with a gravel bed morphology in a flat-sloped, narrow valley. The channel narrows and becomes increasingly eroded further downstream, where the stream appears to have been straightened and modified for

agricultural purposes. A high berm runs along the left descending bank until the stream's confluence with an ephemeral swale (see Figure 1, PP2) where it becomes overly wide, and moderately entrenched, with bed aggradation and eroding banks. Erosion is evident throughout the proposed restoration reach and primarily consists of downcutting and slumping of land adjacent to the banks. However, the banks are generally well vegetated with the exception of the southern portion, where shading from mature trees may be reducing the herbaceous layer. An excavated channel (s-2, Figure 1) flows east into the waterway from the central portion of the Restoration Area and likely drains adjacent land to the north and south of the channel.

Observations of existing conditions indicate that the s-1 channel is following a standard evolution of degradation (erosion), widening, and aggradation (sediment deposition) which is likely to impact the overall watershed through increased sediment loading, higher water temperatures, loss of instream and terrestrial habitat, and an overall lowering of the surrounding water table which can impact agricultural, livestock, and/or wildlife management.

2.2 PLANT COMMUNITIES

Degraded wet meadow is located along the western portion of the waterway and in the transitional area between the channel and agricultural fields east of the waterway (Figure 1). Reed canary grass (*Phalaris arundinacea*), an invasive grass species common in degraded wetlands, was the dominant plant species within this community and was estimated to comprise greater than 90% total vegetative cover during the field assessment. Canada goldenrod (*Solidago canadensis*) and saw-tooth sunflower (*Helianthus grosseserratus)* were secondary dominants with approximately 10% and 5% cover, respectively. Scattered shrubs, primarily willows (*Salix* spp.), and asters (*Symphyotrichum* spp.) were observed. Invasive species observed within this plant community include reed canary grass, wild parsnip (*Pastinaca sativa*), and Canada thistle (*Cirsium arvense*). A comprehensive list of species recorded within the wetland plant communities is provided in Appendix B.

Shrub-carr wetland is located within a small area in the northern portion of the Restoration Area and within an additional area near the southern portion (Figure 1). In general, the herbaceous species observed within this plant community were similar to those noted within the wet meadow plant community with some additional shade tolerant species. The community was dominated by sandbar willow (*Salix interior*) and meadow willow (*Salix petiolaris*) in the shrub layer and reed canary grass in the herbaceous layer. Scattered black willow (*Salix nigra*) and box elder (*Acer negundo*) trees were observed. Invasive species observed within the shrub-carr areas included reed canary grass, wild parsnip, garlic mustard (*Alliaria petiolata*), multiflora rose (*Rosa multiflora*), common burdock (*Arctium minus*), and sweet clover (*Melilotus* spp.).

Degraded wet-mesic woodland is located near the southern portion of the Restoration Area, primarily east of the waterway (Figure 1). Portions of the woodland, particularly near the banks of the waterway, are wetland. The banks of the waterway in this location have areas of bare and eroded soils resulting from scouring as well as topsoil loss and slumping from above the

stream banks. Box elder is the dominant tree in this plant community, with secondary dominance by black willow. Box elder has shaded out the herbaceous layer in some locations along the banks of the waterway. Scattered willow shrubs were observed and the herbaceous layer is dominated by reed canary grass. Other invasive species observed in the woodland include Canada thistle, garlic mustard, common burdock, and dame's rocket (*Hesperis matronalis*).

The shrub-carr areas were cleared of shrubs in February 2017. Undesirable trees, such as box elder and black willow, were also removed from the banks of the waterway in February 2017. The purpose of the shrub and tree clearing was to prepare the areas for herbicide treatments to target reed canary grass and for native seed installation.

Old field upland was located in a topographically high area south of the barns (Figure 1). Plant species composition was difficult to determine during 2015 due to recent mowing. A comprehensive species list was not compiled, however the dominant species appeared to be Canada goldenrod, Kentucky bluegrass (*Poa pratensis*), and Queen Anne's lace (*Daucus carota*). Common dandelion (*Taraxacum offincinale*), common mullein (*Verbascum thapsus*), and wild parsnip were also observed. This area was plowed up and planted to corn during 2016 and will be planted again to a Roundup Ready crop during the 2017 growing season. Weedy upland is also present along the corridor of the railroad track located at the western extent of the Restoration Area and northeast of the barn.

2.3 SOILS

Soil borings were conducted at six locations (sb-1:sb-6) within the Restoration Area. Soil boring locations are exhibited on Figure 1 and soil boring logs are provided in Appendix C. In general, soils consisted of silty clay loam underlain by silty clay. Soil within the degraded woodland (sb-1) consisted of silt loam. The soil profile at sb-3, within the degraded wet meadow community near the southern portion of the Restoration Area, contained depositional material from higher upslope; likely related to soil movement from farming practices. NRCS hydric soil field indicators were present at all soil boring locations with the exception of sb-4, which is located within the old field plant community.

3.0 RESTORATION CONCEPT

The existing topography and hydrology within the Restoration Area provide excellent opportunities to restore prairie and wetland plant communities that will enhance ecosystem function within the watershed, increase floristic diversity and pollinator habitat, and provide an aesthetically pleasing landscape. Restoring the wetlands and providing for adequate buffers from future development will improve the water quality and habitat associated with the waterway. The Restoration Area is intended to be passively used

and enjoyed by the public. Figure 2 displays the restoration concept for the Restoration Area, including the proposed locations for the restored plant communities and a meandering trail system.

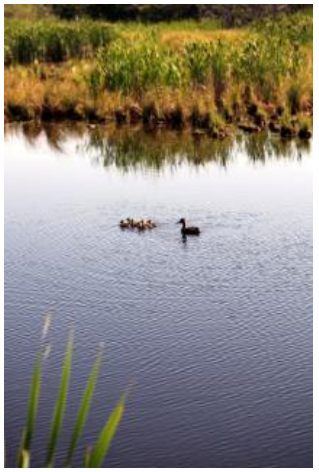
3.1 NATIVE PLANT COMMUNITIES

Mesic prairie will be restored within upland portions of the agricultural field (previous old field plant community) south of the barn. The prairie will be seeded with a diversity of native prairie grasses and wildflowers. The intent is to establish a showy, mid-stature prairie that will provide habitat for pollinators and birds. The top of the prairie knoll will serve as reflection area and provide an overlook for the remainder of the Restoration Area.

Wet meadow wetland will be restored within the existing degraded wet meadow and shrub-carr plant communities. The wet meadow will be seeded with a variety of native grasses, sedges, rushes, and wildflowers. The target hydrology will be seasonally saturated. Plant species will transition from drier species at higher elevations along the prairie/wet meadow transition to wetter species within the wet meadow community. The wet meadow will provide a vegetative buffer to the waterway which will slow surface runoff and assist in preventing soil erosion.

A shallow marsh plant community will be created in the central portion of the Restoration Area by constructing a "scrape", or shallow excavation within the degraded wet meadow. These lower elevations are likely to have an increased hydroperiod, and may support areas of shallow inundation throughout most of the growing season. Additionally, the shallow marsh may be connected to the s-1 stream channel through controlled inlet and outlet structures (see Figure 2), such that a portion of the stream flow can be diverted to the marsh during high-water events. In this way, the shallow marsh is intended to mimic the function of the floodplain wetlands that historically flanked the channel. The marsh will provide habitat for emergent wetland plant species, such as arrowheads and bulrushes, and will provide habitat for frogs and waterfowl.

3.2 STREAM RESTORATION



Stream restoration is recommended to assist in stabilizing adjacent grades, reducing soil erosion, and improving overall water quality within the watershed. Typically, stream restoration attempts to return the stream to equilibrium by reconstructing the channel and floodplain to a stable condition mimicking either its original stage (higher elevation) or its final evolution stage (lower elevation). The concept plan for the s-1 stream is to restore the channel to a higher elevation, in order to reduce grading and preserve existing elevations where possible.

Stream channel and bank restoration will be accomplished through construction of various in-stream grade control structures to restore a stepped channel profile to the stream. This includes targeted installation of stone and large woody debris to create riffles, weirs, and drop structures, as well as excavation of pools. Banks may be armored with stone or reinforced vegetation to reduce erosion in select locations.

Overbank areas within the s-1 stream corridor will be graded to restore a stable cross-section and floodplain bench throughout the restoration reach (see Figure 3). A functional, well-vegetated floodplain bench is critical for restoring channel and bank stability, increasing flood attenuation, and providing riparian plant and wildlife habitat.

3.3 WETLAND AND WATERWAY BUFFER RESTORATION

Land north of the barn and structures and land to the east of the waterway, particularly within a 75-foot buffer from the delineated wetland boundaries, shall be restored to serve as wetland and waterway buffer. The goals for the buffer areas are to reduce nutrient run-off and spread of invasive species from adjacent development and land use and to provide native habitat. Invasive species will be controlled (as feasible within the banks of the waterway), native prairie seed will be installed in the upland areas, and native wet meadow seed will be installed in the wetland areas. Seed mixes designed for the buffer areas will include species that have greater tolerance to disturbance and invasion by invasive species. Native plant installation is also recommended for the slopes and berms of future retention basins associated with residential development that may be located east of the waterway.

3.4 TRAIL SYSTEM AND LABYRINTH

A meandering trail system will be installed that will take visitors through the Restoration Area (Figure 2). The trail will begin at the barn and meander to the top of the prairie knoll where a bench may be situated to enjoy the view. This segment of the trail is anticipated to be crushed gravel that will allow for accessibility for a variety of users. The trail will continue as a mown path that will loop the southern portion of the prairie. Two trail spurs are proposed with elevated boardwalks that will take the trail user along the perimeter of the shallow marsh restoration,

through the wet meadow restoration, and end at an overlook/interactive space along the restored stream bank.

The Intermezzo Gardens Foundation intends to install a prairie garden labyrinth within a portion of the upland area south of the barn. This labyrinth is intended to provide a contemplative space for property users. An area has been set aside within the restoration concept plan (Figure 2) for this labyrinth.

3.5 TREE AND SHRUB PLANTINGS

Native trees and shrubs will be strategically installed over the Restoration Area to increase habitat availability and structure, provide shade at select locations, provide screening to the railroad and other man-made structures, and provide a sense of depth to the property. Flowering trees and shrubs are recommended for installation within the maintained landscape near the barn.

4.0 IMPLEMENTATION PLAN

Implementation of the concept plan will involve a sequence of work tasks consisting of site preparation, construction, native species installation, and vegetation management. The estimated sequencing of implementation activities is listed below, with individual tasks detailed in the following sections:

1. Conduct seed bed preparation, herbicide applications, and woody vegetation removal
2. Install prairie seed mix within prairie restoration areas
3. Obtain necessary wetland/waterway permits
4. Install erosion and sediment control required for wetland and waterway construction
5. Complete stream and shallow marsh grading in coordination with adjacent mass-grading for development
6. Construct in-stream grade control features, and bed and bank improvements
7. Install temporary cover crop over disturbed soils
8. Install native seed mixes within wetland areas. Install plant plugs within shallow marsh community.
9. Install native trees and shrubs at selected locations
10. Install trail system and boardwalk (if applicable)
11. Remove temporary erosion control once the site vegetation has been established to a minimum of 70% cover
12. Commence vegetation management activities

4.1 SITE PREPARATION

Existing vegetation within the proposed prairie and wet meadow restoration areas will need to be removed and controlled until adequate weed suppression has been achieved to facilitate native seed and plant installation. Roundup Ready corn or soybeans will be planted throughout the prairie restoration area to provide weed competition, stabilize topsoil, and facilitate non-selective herbicide treatments during the site preparation period. It is anticipated that two years of Roundup Ready crops will provide sufficient weed control and seed bed preparation for prairie seed installation.

The wet meadow restoration area will be treated with non-selective, aquatic approved herbicide (e.g.; trade name Rodeo or Aquaneat) approximately twice during the growing season for two consecutive years, or until adequate control of reed canary grass is achieved. A temporary cover crop of oats may be sown following herbicide applications if erosion control concerns arise, particularly near the streambanks, or if live cover is desired within this area during the site preparation period.

In order to reduce localized shading and facilitate removal of reed canary grass, shrubs within the existing shrub-carr communities shall be cut, and the cut stumps treated with herbicide to prevent resprouting. Woody debris generated from shrub removal will be removed from the site or chipped in place. The herbaceous layer of the shrub-carr community will be treated with herbicide concurrently with the degraded wet meadow community. Invasive and aggressive native trees, particularly box elder, will be removed from the woodland and from along the banks of the waterway to increase available light in the ground layer, promote establishment of herbaceous native species, and stabilize eroding soils. A few desirable trees and shrubs may be saved within this area, such as oak trees and elderberry shrubs (*Sambucus nigra*). Woody debris generated from tree removal will be chipped in place or removed from site, and the cut-stumps will be treated with an appropriate herbicide.

4.2 SITE CONSTRUCTION

Site construction will consist of grading and excavation as needed to achieve target wetland hydrology in the shallow marsh plant community, and to stabilize stream banks (if desired). In the shallow marsh plant community, grading will include creation of a shallow excavation centered on the existing channel (s-2). The area will be scraped to a maximum depth of approximately three feet and will be contoured to match existing grades at the marsh edge. Excavated spoils will be used to construct a low berm between the eastern edge of the shallow marsh scrape and the waterway, in order to provide a separation of surface water hydrology between the two features. The western portion of s-2 will remain intact, and will convey flow into the shallow marsh. The proposed hydrology for the shallow marsh is shallow inundation for the majority of

the growing season.

Overbank areas within the s-1 stream corridor will be graded to restore a stable cross-section (see Figure 3). Bank re-grading will lessen overall bank steepness and create a floodplain bench throughout the restoration reach. Because proposed overbank elevations are consistently lower than existing, grading will result in surplus of excavated spoils and will require fill to be placed within upland areas outside of the Restoration Area. For this reason, and to increase construction efficiencies, Stantec recommends that grading operations for the stream restoration and shallow marsh creation are closely coordinated with mass grading in adjacent areas of the planned development.

An erosion control plan and all applicable wetland/waterway permits shall be in place prior to any ground disturbance associated with construction. Temporary erosion control and cover crops, if needed, will be installed over bare soils following construction.

4.3 NATIVE SPECIES INSTALLATION

Native seed mixes have been designed for the prairie, wet meadow, and shallow marsh restoration areas as well as for the buffer communities (Appendix D). Native seed shall be procured from a reputable nursery that specializes in native seed production within the Midwest and shall not contain noxious weed seed.

Permanent native seed establishment is most successful when installed during the spring and the fall seasons. The spring season begins as soon as the ground is snow free until approximately June 15th. The dormant fall season begins around November 1st until snow cover. Native seed installed during the spring season shall be installed with a temporary cover crop, such as oats (*Avena sativa*). Native seed may be installed with a native seed drill, a broadcast seeder, or by hand-broadcasting; the strategy shall be dependent on site conditions at the time of seed installation.

In addition to seed, native plant plugs will be installed along the open water perimeter of the shallow marsh. Species recommended for planting are listed in Appendix D. These include species that can tolerate periods of seasonal inundation, and which provide immediate plant cover while native seed becomes established.

Native trees and shrubs will be installed at select locations throughout the Restoration Area. Trees and shrubs shall be installed during the early spring, prior to bud burst, or during the fall.

4.4 VEGETATION MANAGEMENT

The restored plant communities will require management during the period of native species establishment to reduce competition from invasive species. Adaptive management strategies shall be employed which will incorporate information gathered during site inspections and management events to tailor the management strategies to address current management priorities. A proposed maintenance schedule is provided in Table 1.

Mowing of the prairie and wet meadow plant communities (ground conditions permitting) will be conducted during the first 1-3 growing seasons to reduce weed competition, weed seed production, and to increase surface light levels to allow for the germination of native seeds. During the first two growing seasons following seed installation, mowing will be timed when weed species are in flower and prior to seed maturation. Vegetation should be cut level with the ground surface to a height of 8-12 inches. Selective mowing can be used on an as-needed basis once the native vegetation is established to reduce weed seed production. Mowing equipment shall be appropriately cleaned to remove soil and weed seed prior to being used in the Restoration Area.

Spot applications of herbicide will be used to control persistent weed species, with particular emphasis on reed canary grass and Canada thistle. Herbicide products, application methodology, and treatment timing will be determined based on target species and site conditions. Selective herbicides (e.g.; broadleaf selective, grass selective) shall be used when possible to reduce the creation of bare areas. Overseeding of bare areas due to herbicide use or lack of native species establishment shall occur as needed.

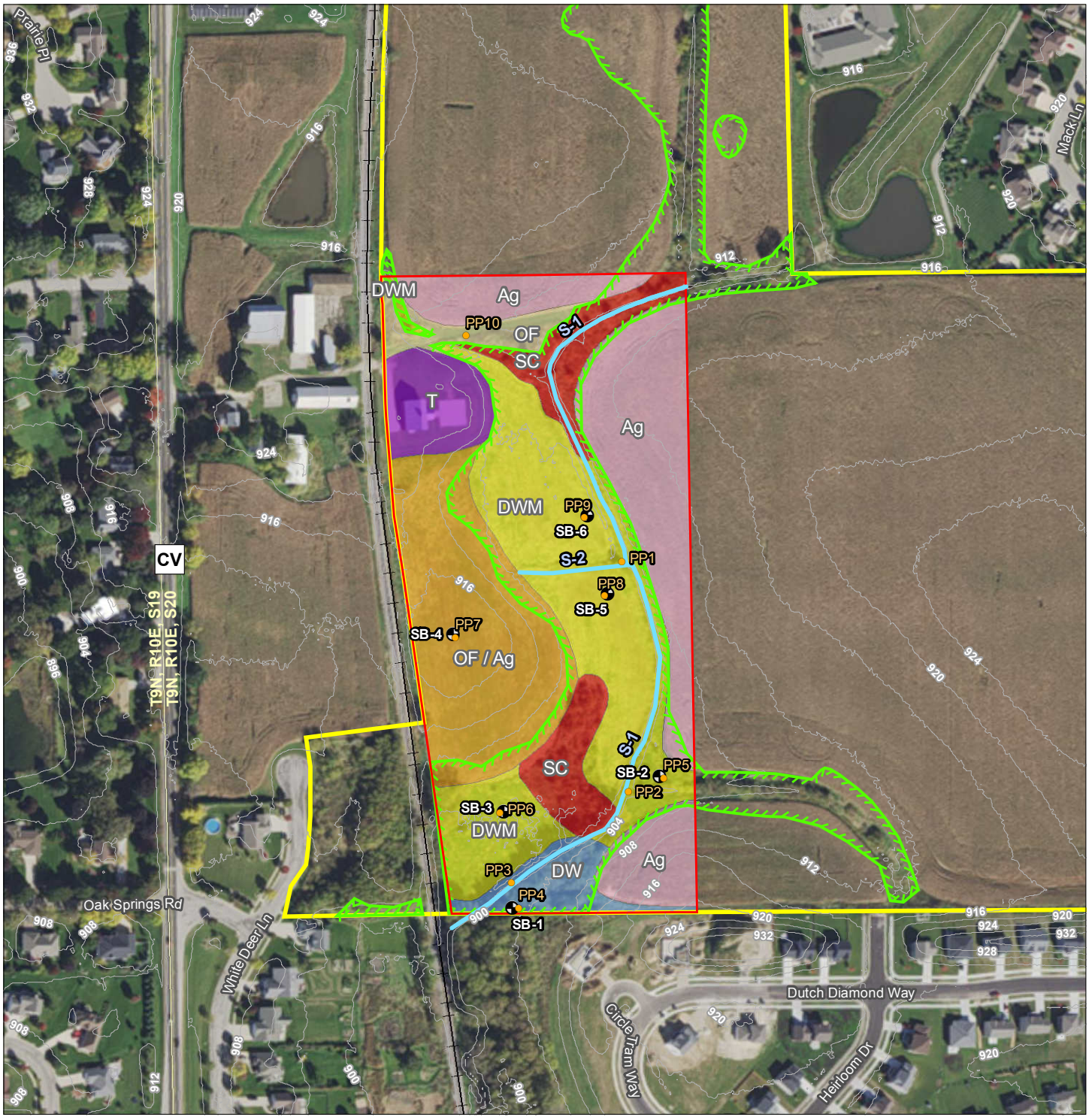
Prescribed burning, if feasible and permissible by the Village of DeForest, may be used as a management tool after the native vegetation is established, typically after Year 3. Prescribed burning assists with the removal of vegetation litter build-up, supports native wetland and prairie vegetation establishment and vigor, and may reduce the presence of non-native species and invasive woody vegetation. Burning shall be conducted by trained professionals with the necessary permits and only under appropriate weather and site conditions.

Table 1. Recommended Vegetation Management Schedule: Years 1 - 5

Year after Installation	Management Task
1	• Mow the entire Restoration Area, if feasible (2-3 events) • Spot herbicide treatments to target invasive species (2-3 events) • Water installed trees and shrubs, as needed
2	• Mow the entire Restoration Area, if feasible (2 events) • Spot herbicide treatments to target invasive species (2-3 events) • Reseed bare areas, as needed
3-5	• Selectively mow to control invasive species, as needed • Spot herbicide treatments to target invasive species (2-3 events each year) • If feasible, conduct one prescribed burn when vegetation is established and conditions are appropriate

Long-term monitoring and management of the Site is recommended to maintain the restored wetland and prairie plant communities, and prevent encroachment from invasive species over time.

FIGURES AND APPENDICES



Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec, WDOT, WDNR
3. Orthophotography: NAIP 2015

Legend

- Approximate Property Boundary (136 acres)
- Restoration Area (18 acres)
- Soil Boring Location
- Photo Points
- Field Delineated Waterway
- Field Delineated Wetland (2016)
- 4 ft Contour Line
- Railroad

Existing Plant Communities

- Ag - Agricultural Lands
- DW - Degraded Woodland
- DWM - Degraded Wet Meadow
- OF - Old Field
- OF/Ag - Old Field/Agricultural Lands
- SC - Shrub-Carr
- T - Maintained Turf/Barn Structures

Figure No.
1

Title
Baseline Conditions

Client/Project
Intermezzo Gardens Foundation
Heritage Gardens

Project Location
T09N, R10E, S20
Village of DeForest,
Dane Co., WI

193704042
Prepared by SF on 2017-03-15
Technical Review by MP on 2017-03-16
Independent Review by SK on 2017-03-16

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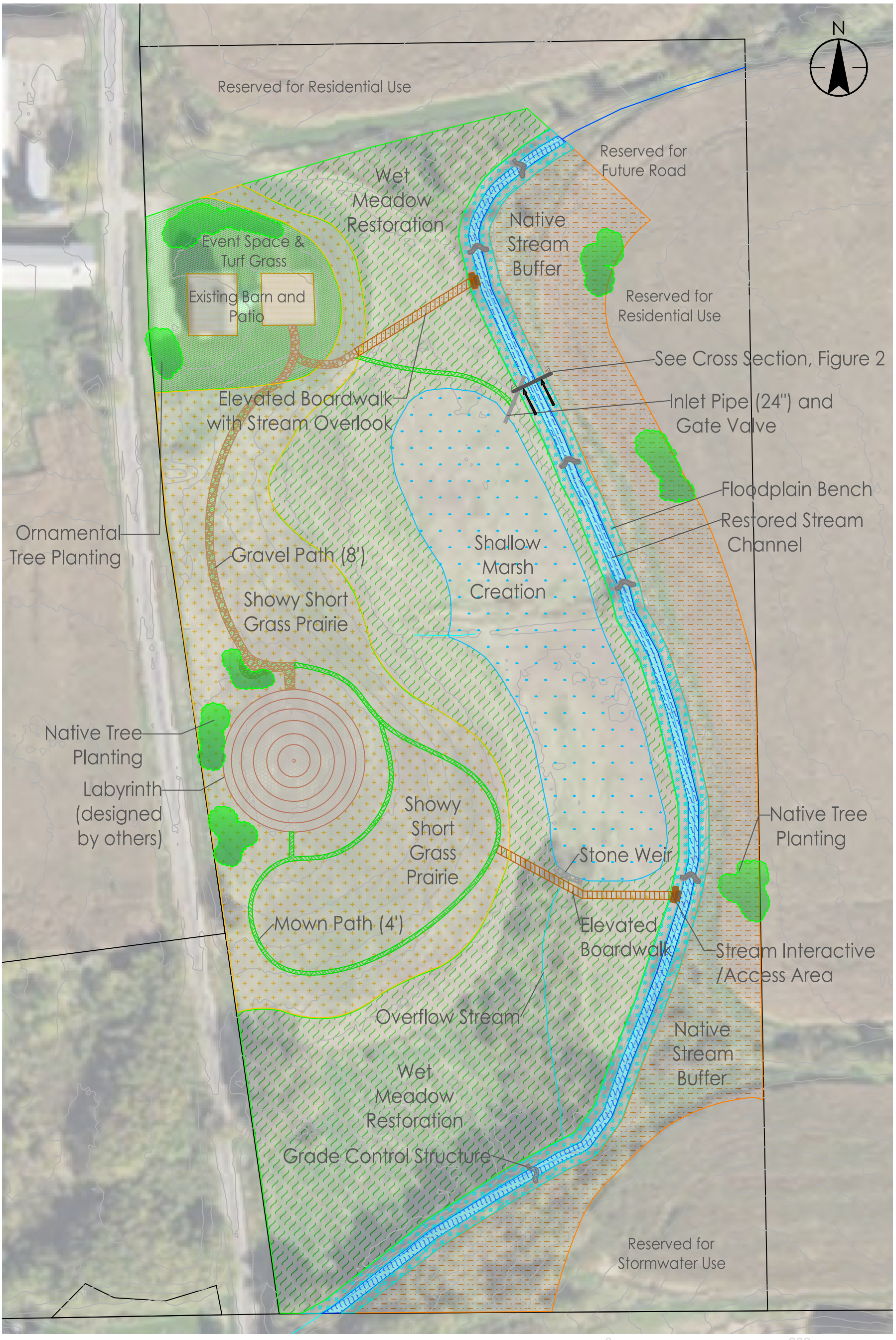

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193704042
March 2017

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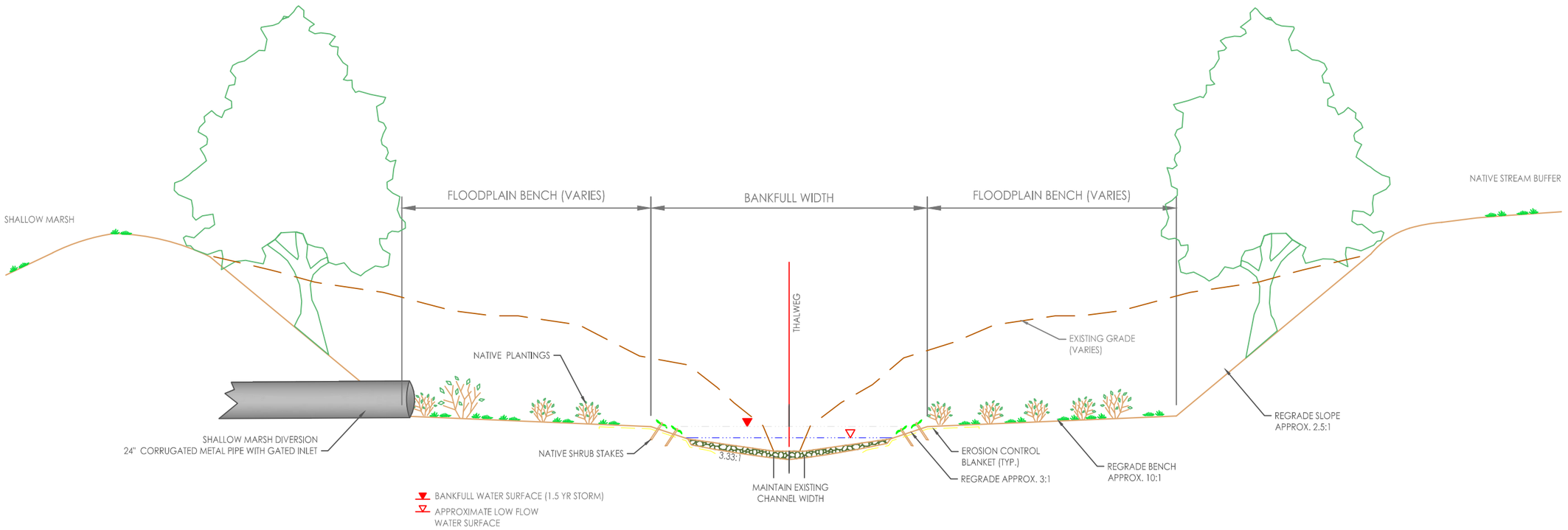
Client/Project
INTERMEZZO GARDENS FOUNDATION
Heritage Gardens
Dane County, Wisconsin

Figure No.
2.0

Title
ECOLOGICAL RESTORATION CONCEPT MAP



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INTERMEZZO GARDENS FOUNDATION
HERITAGE GARDENS
Dane County, Wisconsin

Figure No.
3.0

Title
Proposed Restored Stream Cross Section

APPENDIX A PHOTO LOG

pp1_vNNW, representative of N. portion of S-1 - September 2015

pp2_vN. Riffle habitat in S-1 - September 2015

pp2_vS within banks of S-1 toward shrub-carr community - September 2015

pp3_vNE, representative of S. portion of S-1 - September 2015

pp3_vS across channel of S-1 in degraded woodland - September 2015

pp3_vSW - September 2015

pp4_vS, representative of degraded woodland - September 2015

pp5_vN of degraded wet meadow E. of S-1 - September 2015

pp6_vN of degarded wet meadow in SW portion of site - September 2015

pp7_vE from top of knoll - September 2015

pp7_vN from top of knoll toward barn - September 2015

pp8_vN toward S-2 channel - September 2015

pp9_vN of degraded wet meadow N. of S-2 - September 2015

pp10_vSE of shrub-carr - September 2015

pp10_vSW towards maintained turf and barn - September 2015

Stream Assessment - July 2016

Woody Clearing - February 2017

Woody Clearing - February 2017 (2)

After Woody Clearing_vN - February 2017

APPENDIX B WETLAND SPECIES LIST

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Appendix B. Wetland Species Inventory

This inventory is a combined listing of species observed within wetland communities on September 11, 2015. Additional species may be present.

Scientific Name	Common Name	Native / Non-Native	Physiognomy
Acer negundo	box elder	native	tree
Alliaria petiolata	invasive garlic mustard	non-native	forb
Ambrosia artemisiifolia	common ragweed	native	forb
Ambrosia trifida	giant ragweed	native	forb
Apocynum cannabinum	Indian hemp	native	forb
Arctium minus	common burdock	non-native	forb
Asclepias syriaca	common milkweed	native	forb
Bidens cernua	nodding beggar-ticks	native	forb
Bidens frondosa	common beggar-ticks	native	forb
Boehmeria cylindrica	small-spike false nettle	native	forb
Carex trichocarpa	hairy-fruit lake sedge	native	sedge
Cirsium arvense	Canada thistle	non-native	forb
Echinochloa crus-galli	barnyard grass	non-native	grass
Echinocystis lobata	balsam-apple	native	vine
Epilobium coloratum	cinnamon willow-herb	native	forb
Helianthus grosseserratus	saw-tooth sunflower	native	forb
Impatiens capensis	orange jewelweed	native	forb
Leersia oryzoides	rice cut grass	native	grass
Melilotus officinalis	yellow invasive sweet-clover	non-native	forb
Pastinaca sativa	invasive wild parsnip	non-native	forb
Persicaria pensylvanica	Pennsylvania smartweed	native	forb
Phalaris arundinacea	reed canary grass	non-native	grass
Plantago rugelii	red-stalked plantain	native	forb
Rosa multiflora	multiflora invasive rose	non-native	shrub
Rubus occidentalis	black raspberry	native	shrub
Salix discolor	pussy willow	native	tree
Salix interior	sandbar willow	native	shrub
Salix nigra	black willow	native	tree
Salix petiolaris	meadow willow	native	shrub
Scirpus atrovirens	dark-green bulrush	native	sedge
Solanum dulcamara	bittersweet nightshade	non-native	vine
Solidago canadensis	Canada goldenrod	native	forb
Solidago gigantea	giant goldenrod	native	forb
Symphyotrichum lanceolatum	white panicle aster	native	forb
Symphyotrichum novae-angliae	New England aster	native	forb
Symphyotrichum puniceum	purple-stem aster	native	forb
Trifolium pratense	red clover	non-native	forb
Urtica dioica	stinging nettle	native	forb
Verbena hastata	blue vervain	native	forb
Vitis riparia	riverbank grape	native	vine

APPENDIX C SOIL BORING LOGS

Stantec

Soil Log

Project Name: Heritage Gardens
Client: Intermezzo Gardens Foundation
Project #:193703765

Date: 9/11/2015

Soil Pit Number & Location: sb-1 Notes: Located within degraded wet-mesic woods
Conditions: no saturation or water table observed

Depth	Horizon	Description / Color	Texture	Mottles / Redox Color / Abundance	Remarks
0-16	1	10 YR 3/2	SiL		
16-28	2	10 YR 3/1	L	10 YR 3/3 C, 5%	
28-32	3	10 YR 5/1	SiL	10 YR 5/6 C, 15%	

Notes: Dominant Vegetation: reed canary grass, box elder, black willow, orange jewelweed

Stantec

Soil Log

Project Name: Heritage Gardens
Client: Intermezzo Gardens Foundation
Project #:193703765

Date: 9/11/2015

Soil Pit Number & Location: sb-2 Notes: Located within degraded wet meadow near agricultural field
Conditions: no saturation or water table observed

Depth	Horizon	Description / Color	Texture	Mottles / Redox Color / Abundance	Remarks
0-6	1	10 YR 3/1	SiCL		
6-28	2	10 YR 3/1	SiCL	7.5 YR 3/4 C, 15%	

Notes: Dominant vegetation: reed canary grass

Stantec

Soil Log

Project Name: Heritage Gardens
Client: Intermezzo Gardens Foundation
Project #:193703765

Date: 9/11/2015

Soil Pit Number & Location: sb-3 Notes: Located within degraded wet meadow
Conditions: water table observed at 23 inches below soil surface

Depth	Horizon	Description / Color	Texture	Mottles / Redox Color / Abundance	Remarks
0-4	1	7.5 YR 3/1	SiCL		
4-12	2	7.5 YR 3/1	SiCL	7.5 YR 3/3 C, 5%	
12-18	3	N 2.5/0	SiCL		
18-24	4	N 2.5/0, 50% 2.5 Y 5/1, 40%	SiCL	10 YR 3/6, 10%	Mixed matrix with cobble

Notes: Dominant vegetation: reed canary grass

Stantec

Soil Log

Project Name: Heritage Gardens
Client: Intermezzo Gardens Foundation
Project #:193703765

Date: 9/11/2015

Soil Pit Number & Location: sb-4 Notes: Located within old field, within high point of Restoration Area

Conditions: Field recently mown, no indicators of wetland hydrology

Depth	Horizon	Description / Color	Texture	Mottles / Redox Color / Abundance	Remarks
0-12	1	10 YR 4/3	SiCL		
12-24	2	10 YR 5/6	SiC		

Notes: Dominant vegetation: Kentucky bluegrass

Stantec

Soil Log

Project Name: Heritage Gardens
Client: Intermezzo Gardens Foundation
Project #:193703765

Date: 9/11/2015

Soil Pit Number & Location: sb-5

Notes: Located within degraded wet meadow

Conditions: Field recently mown

Depth	Horizon	Description / Color	Texture	Mottles / Redox Color / Abundance	Remarks
0-24	1	N 2.5/0	SiCL		
24-27	2	10 YR 3/1	SiC	10 YR 4/6 C, 20%	
27-31	3	2.5 Y 5/2	SiC	10 YR 4/6 C, 20%	

Notes: Dominant vegetation: reed canary grass, Canada goldenrod, sedges

Stantec

Soil Log

Project Name: Heritage Gardens
Client: Intermezzo Gardens Foundation
Project #:193703765

Date: 9/11/2015

Soil Pit Number & Location: sb-6

Notes: Located within degraded wet meadow

Conditions: Field recently mown

Depth	Horizon	Description / Color	Texture	Mottles / Redox Color / Abundance	Remarks
0-12	1	N 2.5/0	SiCL		
12-30	2	N 2.5/0	SiC		

Notes: Dominant vegetation: reed canary grass, Canada goldenrod, Kentucky bluegrass

APPENDIX D NATIVE SEED AND PLANT MIXES

Appendix D-1. Wet Meadow Seed Mix

Scientific Name	Common Name	Oz per Acre
Grasses		
Andropogon gerardii	Big Bluestem	4.00
Elymus virginicus	Virginia Wild Rye	30.00
Glyceria grandis	American Manna Grass	1.00
Spartina pectinata	Prairie Cord Grass	4.00
Sedges and Rushes		
Carex hystericina	Porcupine Sedge	2.50
Carex scoparia	Lance-fruited Oval Sedge	2.00
Carex stipata	Common Fox Sedge	2.00
Carex vulpinoidea	Brown Fox Sedge	4.00
Juncus effusus	Common Rush	0.20
Juncus torreyi	Torrey's Rush	0.50
Scirpus atrovirens	Dark-green Bulrush	0.50
Scirpus cyperinus	Wool Grass	0.20
Forbs		
Angelica atropurpurea	Great Angelica	2.00
Asclepias incarnata	Swamp Milkweed	4.00
Bidens cernua	Nodding Bur Marigold	1.00
Chelone glabra	Turtlehead	0.50
Eupatorium perfoliatum	Boneset	1.50
Euthamia graminifolia	Grass-leaved Goldenrod	0.20
Eutrochium maculatum	Joe Pye Weed	2.00
Helenium autumnale	Sneezeweed	1.00
Helianthus grosseserratus	Saw-tooth Sunflower	0.50
Hypericum ascyron ssp. pyramidatum	Great St. John's Wort	0.50
Liatris pycnostachya	Prairie Blazing Star	3.00
Lobelia cardinalis	Cardinal Flower	0.20
Lobelia siphilitica	Great Blue Lobelia	1.00
Lycopus americanus	Water Horehound	0.50
Lythrum alatum	Winged Loosestrife	0.20
Mimulus ringens	Monkey Flower	0.50
Penthorum sedoides	Ditch Stonecrop	0.20
Physostegia virginiana	Obedient Plant	1.00
Pycnanthemum virginianum	Mountain Mint	1.00
Rudbeckia laciniata	Wild Golden Glow	1.00
Scutellaria lateriflora	Mad-dog Skullcap	0.50
Silphium perfoliatum	Cup Plant	4.00
Solidago riddellii	Riddell's Goldenrod	1.00
Symphyotrichum novae-angliae	New England Aster	1.20
Symphyotrichum puniceum	Swamp Aster	1.20
Thalictrum dasycarpum	Purple Meadow Rue	2.00
Verbena hastata	Blue Vervain	4.00
Vernonia fasciculata	Common Ironweed	2.00
Veronicastrum virginicum	Culver's Root	0.60
Zizia aurea	Golden Alexanders	4.00
	Total oz per acre	**93.20**

Appendix D-2. Prairie Seed Mix

Scientific Name	Common Name	Oz per Acre
Grasses		
Bouteloua curtipendula	Side-oats Grama	18.00
Bromus kalmii	Prairie Brome	5.00
Elymus canadensis	Canada Wild Rye	28.00
Koeleria macrantha	June Grass	1.00
Schizachyrium scoparium	Little Bluestem	18.00
Sorghastrum nutans	Indian Grass	6.00
Sedges and Rushes		
Carex annectens	Yellow-headed Fox Sedge	1.00
Carex molesta	Field Oval Sedge	1.00
Forbs		
Agastache foeniculum	Blue Giant Hyssop	0.50
Allium cernuum	Nodding Onion	1.50
Artemisia ludoviciana	Louisiana Sage Wort	0.20
Asclepias syriaca	Common Milkweed	2.00
Asclepias tuberosa	Butterfly Weed	2.00
Astragalus canadensis	Canadian Milk Vetch	2.00
Baptisia alba	White Wild Indigo	4.00
Chamaecrista fasciculata	Partridge Pea	4.00
Dalea candida var. candida	White Prairie Clover	2.00
Dalea purpurea	Purple Prairie Clover	6.00
Desmodium illinoense	Illinois Tick Trefoil	2.00
Echinacea pallida	Pale Purple Coneflower	3.00
Eryngium yuccifolium	Rattlesnake Master	4.00
Heliopsis helianthoides	False Sunflower	2.00
Liatris aspera	Rough Blazing Star	2.00
Lupinus perennis	Wild Lupine	3.00
Monarda fistulosa	Wild Bergamot	1.75
Parthenium integrifolium	Wild Quinine	2.00
Pycnanthemum virginianum	Mountain Mint	0.20
Ratibida pinnata	Yellow Coneflower	2.00
Rudbeckia hirta	Black-eyed Susan	5.00
Silphium integrifolium	Rosinweed	3.00
Silphium laciniatum	Compass Plant	5.00
Silphium terebinthinaceum	Prairie Dock	3.00
Solidago rigida	Stiff Goldenrod	2.00
Solidago speciosa	Showy Goldenrod	1.00
Symphyotrichum laeve	Smooth Blue Aster	1.00
Symphyotrichum oolantangiense	Sky Blue Aster	1.00
Tradescantia ohiensis	Ohio Spiderwort	3.00
Verbena stricta	Hoary Vervain	1.00
Veronicastrum virginicum	Culver's Root	0.20
Zizia aurea	Golden Alexanders	3.00
	Total oz per acre	**152.35**

Appendix D-3. Shallow Marsh Seed Mix

Scientific Name	Common Name	Oz per Acre
Grasses		
Elymus virginicus	Virginia Wild Rye	18.00
Glyceria grandis	American Manna Grass	2.00
Sedges and Rushes		
Carex comosa	Bottlebrush Sedge	3.00
Carex lurida	Shallow Sedge	3.00
Carex vulpinoidea	Brown Fox Sedge	4.00
Juncus effusus	Common Rush	0.70
Scirpus acutus	Hardstem Bulrush	1.00
Scirpus atrovirens	Dark-green Bulrush	0.50
Scirpus cyperinus	Wool Grass	0.25
Schoenoplectus tabernaemontani	Softstem Bulrush	3.00
Forbs		
Alisma subcordatum	American Water Plantain	2.00
Asclepias incarnata	Swamp Milkweed	3.00
Bidens cernua	Nodding Bur Marigold	1.00
Eutrochium maculatum	Joe Pye Weed	2.00
Lobelia cardinalis	Cardinal Flower	0.75
Lobelia siphilitica	Great Blue Lobelia	1.00
Lycopus americanus	Water Horehound	1.00
Mimulus ringens	Monkey Flower	0.50
Penthorum sedoides	Ditch Stonecrop	0.50
Sagittaria latifolia	Common Arrowhead	1.00
Verbena hastata	Blue Vervain	2.00
	Total oz per acre	**50.20**

Appendix D-4. Shallow Marsh Plant List

Scientific Name	Common Name	Quantity per 1,000 sq. ft.
Asclepias incarnata	Swamp Milkweed	32
Carex comosa	Bottlebrush Sedge	32
Carex lacustris	Common Lake Sedge	32
Carex pellita	Broad-leaved Woolly Sedge	32
Eutrochium maculatum	Joe Pye Weed	64
Iris virginica	Southern Blue Flag	64
Rumex britannica	Great Water Dock	32
Sagittaria latifolia	Common Arrowhead	64
Scirpus acutus	Hardstem Bulrush	32
Sparganium eurycarpum	Broad-fruit Bur Reed	32
	Total plants per 1,000 sq. ft.	**416**

Appendix D-5. Wetland Buffer Seed Mix (Wetland Soils)

Scientific Name	Common Name	Oz per Acre
Grasses		
Elymus virginicus	Virginia Wild Rye	30.00
Glyceria grandis	American Manna Grass	1.00
Leersia oryzoides	Rice Cut Grass	1.00
Spartina pectinata	Prairie Cord Grass	4.00
Sedges and Rushes		
Carex stipata	Common Fox Sedge	2.00
Carex vulpinoidea	Brown Fox Sedge	4.00
Juncus effusus	Common Rush	0.20
Juncus torreyi	Torrey's Rush	0.25
Scirpus atrovirens	Dark-green Bulrush	0.50
Scirpus cyperinus	Wool Grass	0.50
Schoenoplectus fluviatilis	River Bulrush	3.00
Forbs		
Alisma subcordatum	American Water Plantain	1.00
Asclepias incarnata	Swamp Milkweed	4.00
Bidens cernua	Nodding Bur Marigold	2.00
Helenium autumnale	Sneezeweed	2.00
Helianthus grosseserratus	Saw-tooth Sunflower	1.00
Lycopus americanus	Water Horehound	0.50
Mimulus ringens	Monkey Flower	0.50
Penthorum sedoides	Ditch Stonecrop	0.50
Solidago gigantea	Late Goldenrod	0.20
Symphyotrichum novae-angliae	New England Aster	1.00
Thalictrum dasycarpum	Purple Meadow Rue	2.00
Verbena hastata	Blue Vervain	4.00
	Total oz per acre	**65.15**

Appendix D-6. Buffer Seed Mix (Upland Soils)

Scientific Name	Common Name	Oz per Acre
Grasses		
Andropogon gerardii	Big Bluestem	6.00
Bouteloua curtipendula	Side-oats Grama	18.00
Elymus canadensis	Canada Wild Rye	28.00
Schizachyrium scoparium	Little Bluestem	18.00
Sorghastrum nutans	Indian Grass	8.00
Sedges and Rushes		
Carex molesta	Field Oval Sedge	2.00
Juncus dudleyi	Dudley's Rush	0.10
Forbs		
Asclepias syriaca	Common Milkweed	3.00
Asclepias tuberosa	Butterfly Weed	1.00
Astragalus canadensis	Canadian Milk Vetch	2.00
Chamaecrista fasciculata	Partridge Pea	8.00
Dalea purpurea	Purple Prairie Clover	2.00
Eryngium yuccifolium	Rattlesnake Master	3.00
Heliopsis helianthoides	False Sunflower	2.50
Liatris aspera	Rough Blazing Star	1.00
Monarda fistulosa	Wild Bergamot	1.50
Pycnanthemum virginianum	Mountain Mint	0.50
Ratibida pinnata	Yellow Coneflower	3.00
Rudbeckia hirta	Black-eyed Susan	6.00
Silphium perfoliatum	Cup Plant	4.00
Solidago rigida	Stiff Goldenrod	3.00
Solidago speciosa	Showy Goldenrod	1.00
Symphyotrichum laeve	Smooth Blue Aster	1.00
Symphyotrichum novae-angliae	New England Aster	1.00
	Total oz per acre	**123.60**