# ADVANCING SITE SUSTAINABILITY THROUGH MINNESOTA'S EVOLVING B3 FRAMEWORK

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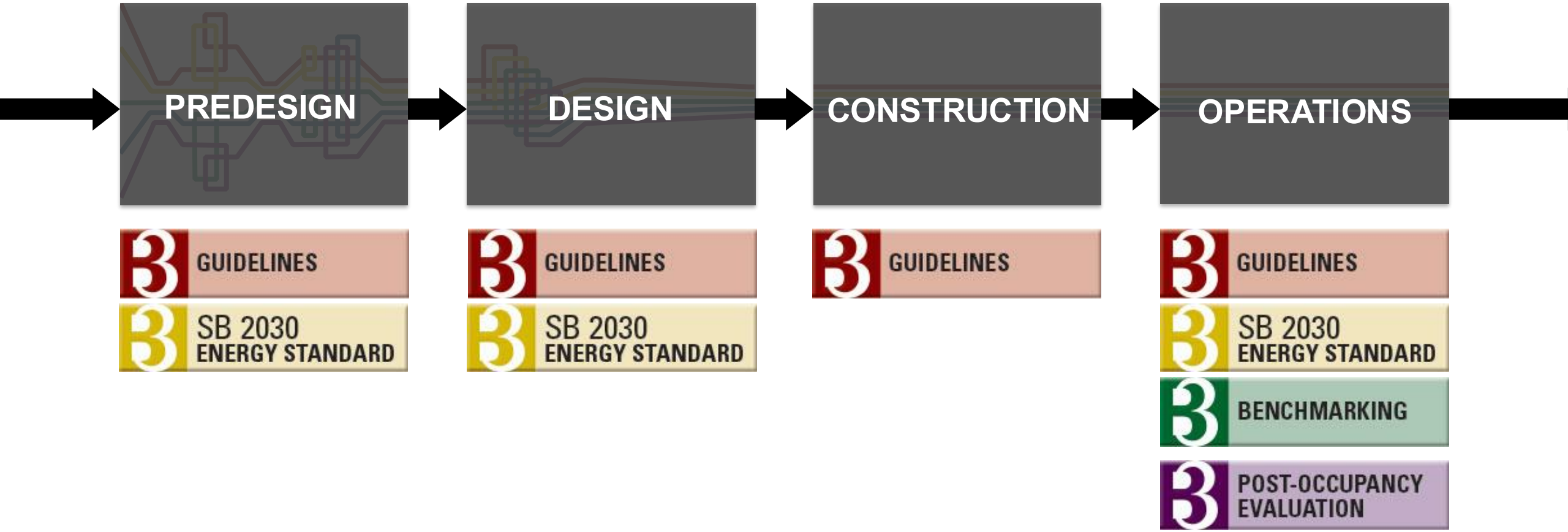
June 5, 2026

# SESSION OUTLINE

**B3 SITE + WATER GUIDELINES**

**CASE STUDIES**

**PANEL DISCUSSION**


PREDESIGN
DESIGN
CONSTRUCTION
OPERATIONS
GUIDELINES
SB 2030 ENERGY STANDARD
GUIDELINES
SB 2030 ENERGY STANDARD
GUIDELINES
GUIDELINES
SB 2030 ENERGY STANDARD
BENCHMARKING
POST-OCCUPANCY EVALUATION

# B3 SITE + WATER UPDATES

**VERSION 3.2 REVISION 3**

Matt Tierney, AIA
Research Fellow - CSBR

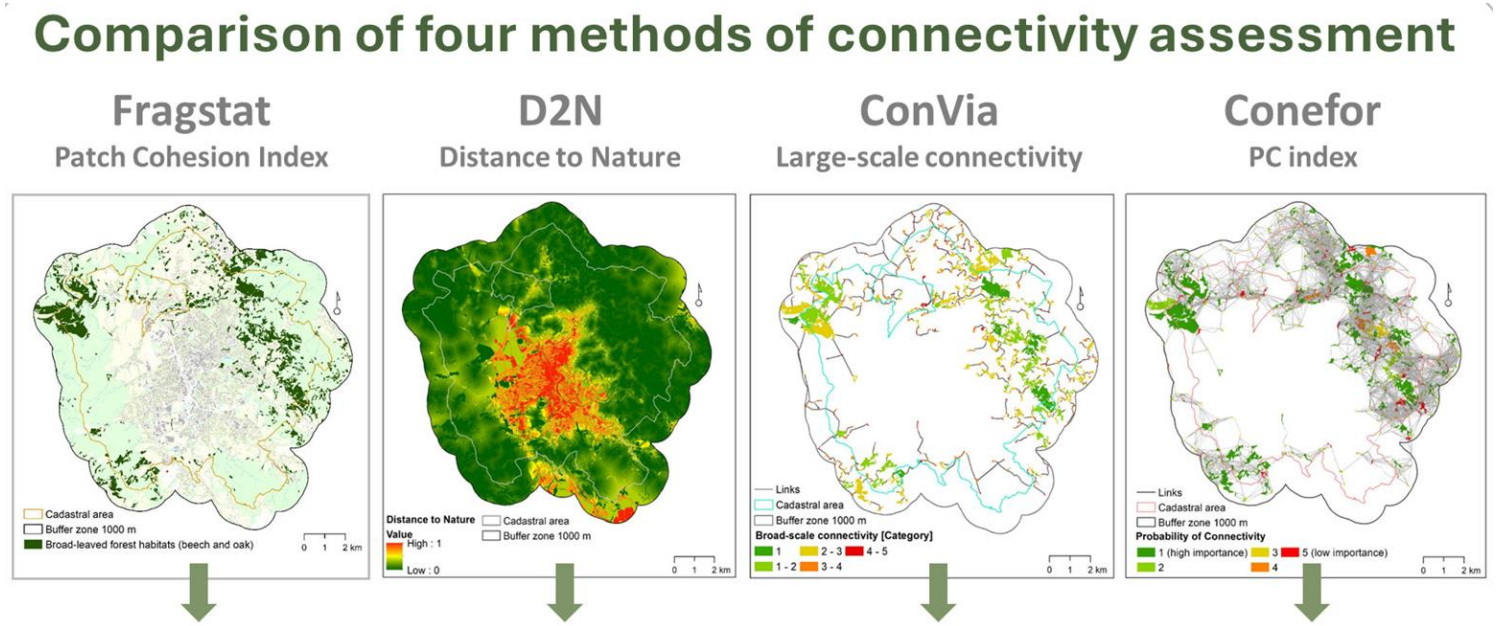
07/01/2025

# B3 - SITE AND WATER OVERVIEW

| Site and Water Guideline | New Buildings | Major Renovations |
|---|---|---|
| S.1 Site and Water Connections | Required | Required for Minimum Site Scope (See Guideline) |
| S.2 Site Water Quality and Efficiency | Required | Required for Minimum Site Scope (See Guideline) |
| S.3 Soil | Required | Required for Minimum Site Scope (See Guideline) |
| S.4 Vegetation | Required | Required for Minimum Site Scope (See Guideline) |
| S.5 Animal Habitat Support | Required | Required for Minimum Site Scope (See Guideline) |

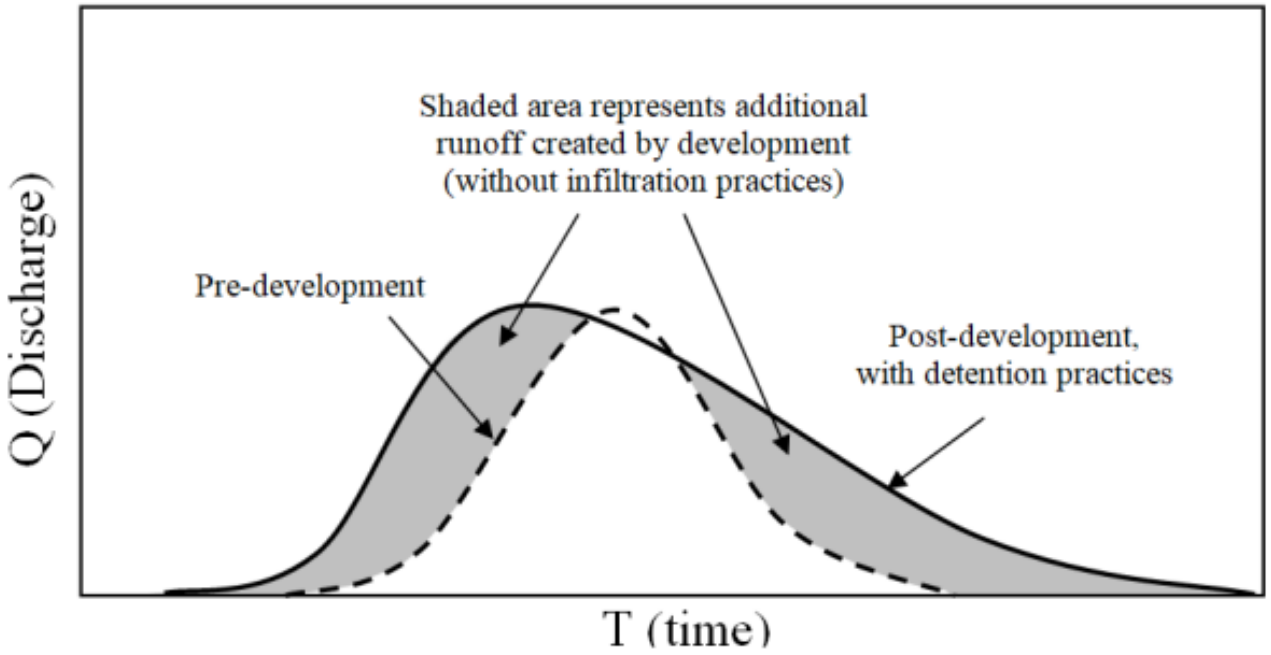
# S1 - SITE AND WATER CONNECTIONS

TO CREATE SITES THAT ARE RESILIENT, HEALTHY, AND SUSTAINABLE, AND TO **ENSURE CONNECTIONS BETWEEN THE SURROUNDING ENVIRONMENT AND THE SITE** THROUGH VEGETATION SELECTION, PROVISION OF ANIMAL HABITATS, AND CONNECTIONS TO HUMAN-MADE SYSTEMS.



# S2 – SITE WATER QUALITY AND EFFICIENCY

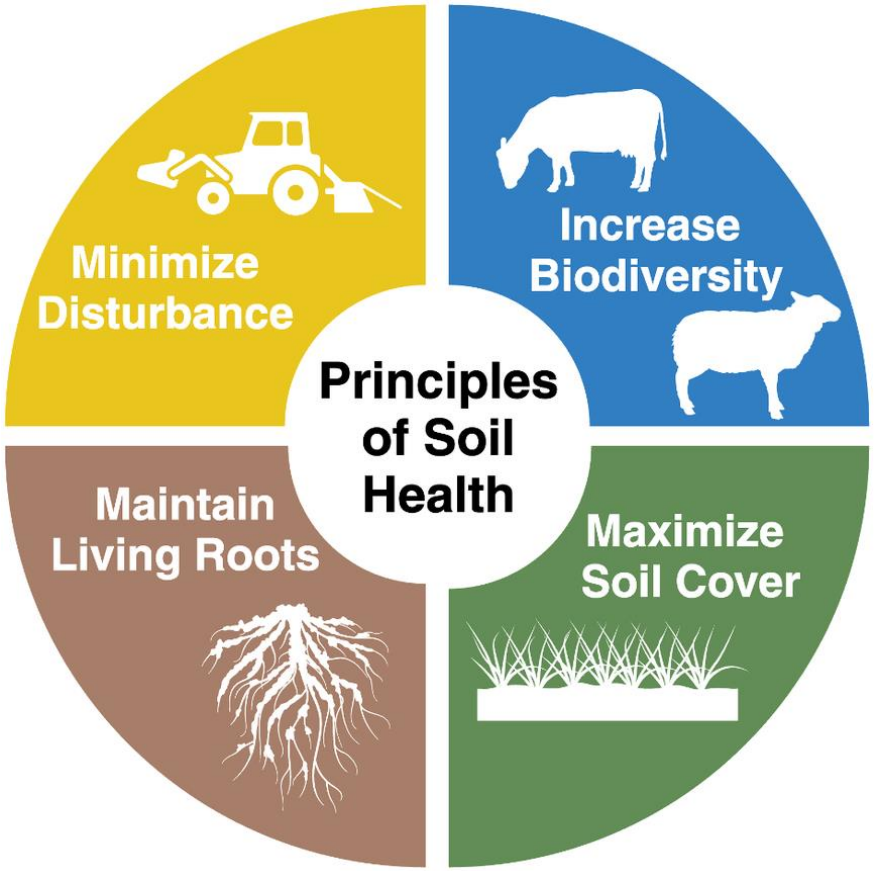
TO RESTORE THE NATURAL WATER CYCLE OF MINNESOTA BIOMES TO SUPPORT NATURAL HYDROLOGY, SOILS, VEGETATION, AND ANIMALS; **REDUCE AND LIMIT WATER BOUND POLLUTANTS LEAVING THE SITE; OPTIMIZE POTABLE WATER USE**; AND RESPOND TO THE ECOLOGICAL FACTORS OF THE PROJECT SITE AS A PART OF ITS LARGER WATERSHED.




ONLINE IMAGE : https://danecountystormwatermanual.com/lib/exe/fetch.php?w=600&tok=9d4873&media=wiki:images:discharge_with_controls.png

# S3 - SOILS

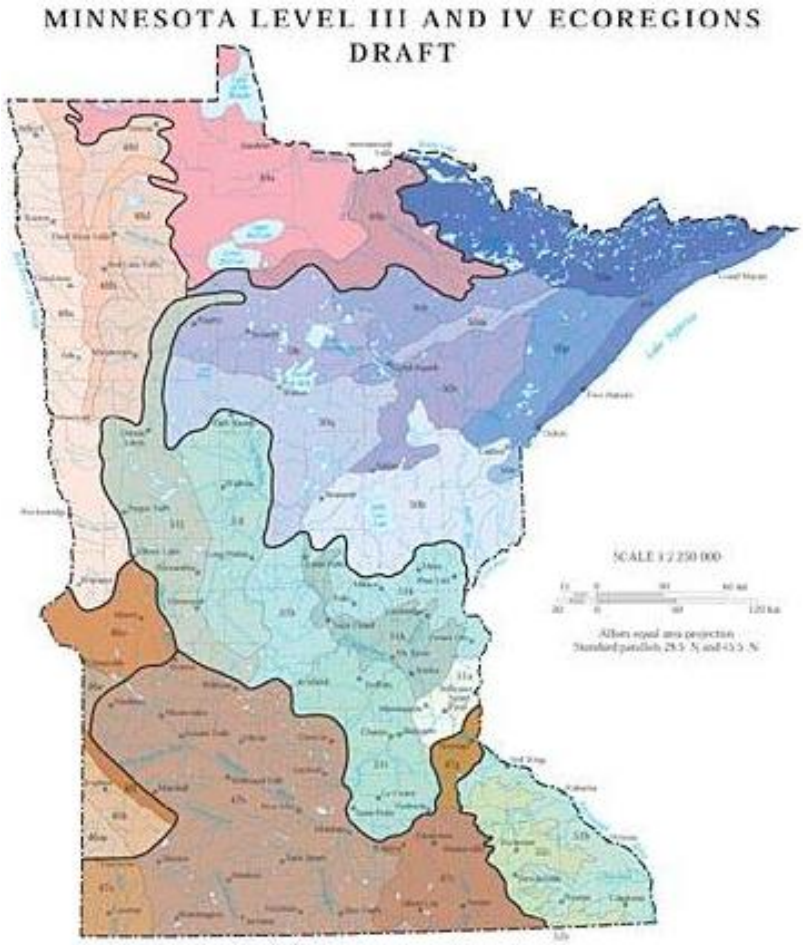
TO ENSURE THE MAINTENANCE AND RESTORATION OF HEALTHY SOILS BY DOCUMENTING EXISTING SOIL CONDITIONS, **PRESERVING AND PROTECTING BENEFITS OF EXISTING SOIL,** MINIMIZING THE IMPACTS OF CONSTRUCTION, REPAIRING SOILS TO RETURN TO SUPPORTIVE CONDITIONS, AND DOCUMENTING SOIL MAINTENANCE PRACTICES TO ENSURE ONGOING OPTIMAL SOIL CONDITIONS.

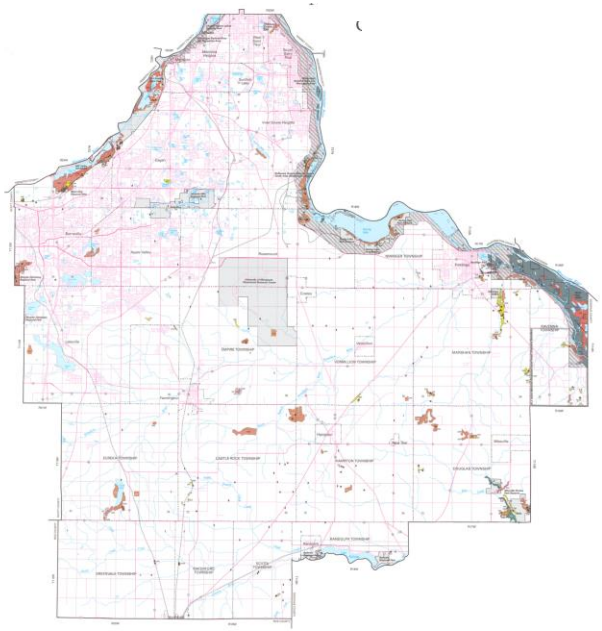



ONLINE IMAGE https://eit-wagpress-prod.s3.amazonaws.com/media/images/2023-09-Soil-Health-Principles.max-900x900.png
Figure 1. Soil health principles recommended by USDA-NRCS. Image created with BioRender.com

# S4 - VEGETATION

TO OPTIMIZE THE ECOLOGICAL FUNCTION OF PROJECT SITES BY **RESTORING MINNESOTA'S NATIVE VEGETATION, PROTECTING NATURAL AREAS, CONSERVING EXISTING SITE FEATURES, AND SELECTING VIBRANT AND APPROPRIATE VEGETATION** TO ENSURE THE OPTIMUM FUNCTIONING OF ECOSYSTEMS AND HUMAN USES ON THE PROJECT SITE.



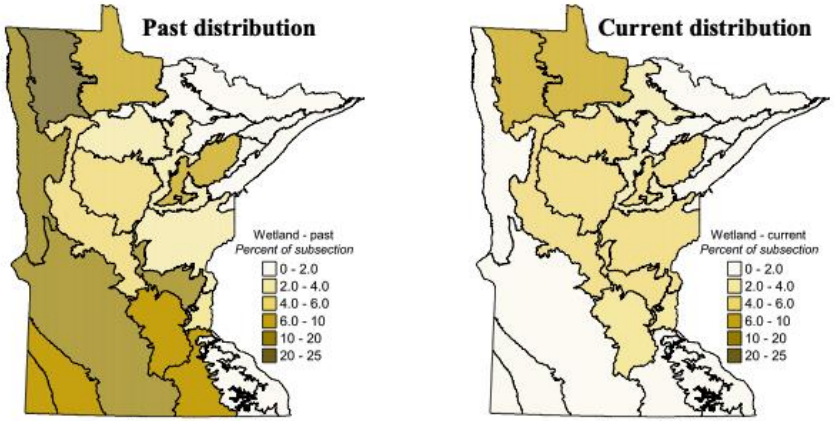
ONLINE IMAGE: https://stormwater.pca.state.mn.us/ecoregions
MN Stormwater Manual – MPCA

ONLINE IMAGE: https://files.dnr.state.mn.us/eco/mcbs/maps/dakota.pdf
MBS COUNTY LEVEL SURVEY – DAKOTA COUNTY

# S5 – ANIMAL HABITAT SUPPORT

TO PROTECT AND SUPPORT SITE ANIMAL HABITAT RESILIENCE BY REDUCING THE NEGATIVE IMPACT OF THE BUILT ENVIRONMENT ON ANIMAL SPECIES AND PROVIDING SUPPORTIVE ENVIRONMENTS FOR AT-RISK NATIVE SPECIES THAT ARE ESSENTIAL TO ECOSYSTEM HEALTH.

Sedge Meadow (WMn82b)




*Source*: Marschner 1930 *Source*: MN GAP 1993

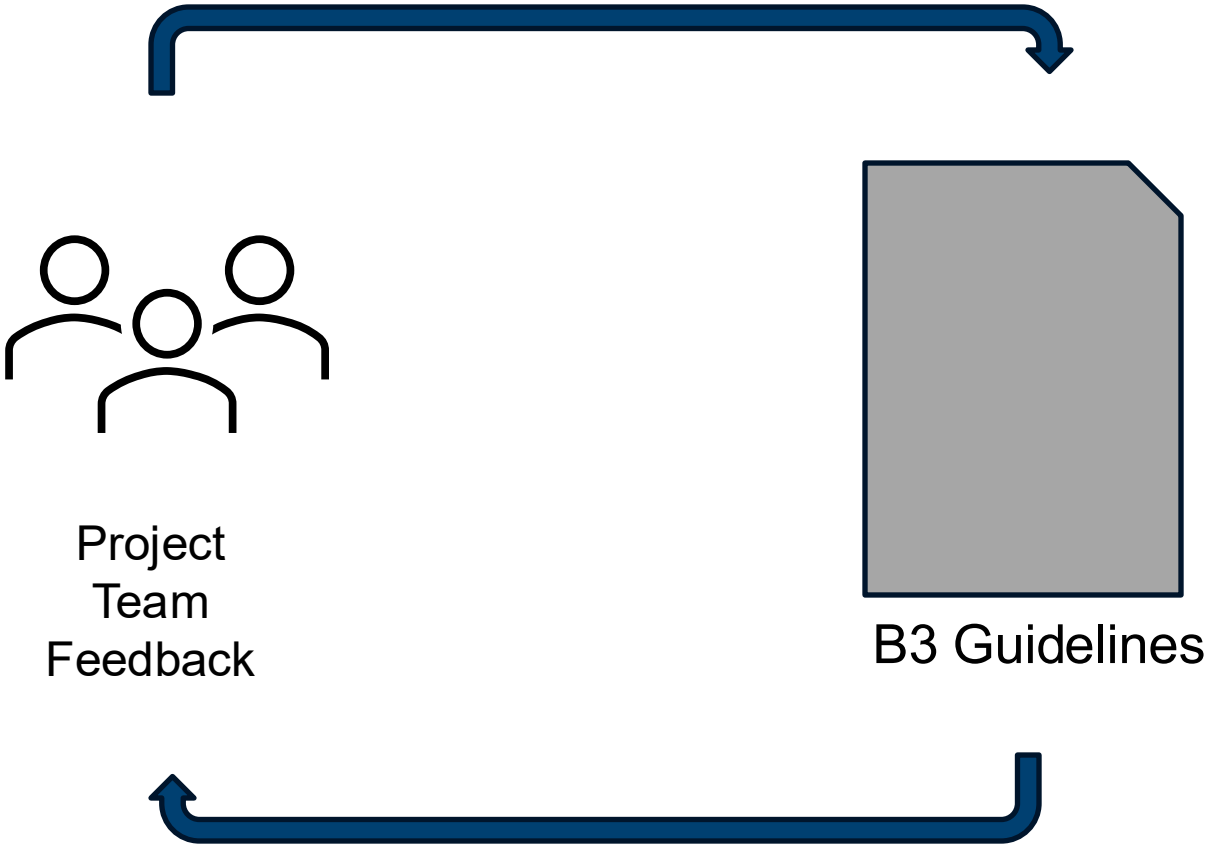
*Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*

**Management Options to Support Species in Greatest Conservation Need**

- Prevent loss or degradation of all types of nonforested wetlands.
- Preserve nonforested wetlands, especially in the Eastern Broadleaf Forest and Prairie Parkland provinces.
- Focus on protecting wetlands larger than 10 hectares (25 acres) and wetland complexes.
- Restore large wetland complexes, with attention to the habitat features required by SGCN.
- Avoid creating impoundments that flood wet meadows.
- Manage the invasions of invasive exotic plants in nonforested wetlands (e.g., purple loosestrife, *Phragmites*).
- Protect known nesting areas of Forster's terns.
- Enforce wetland protection regulations ("no-net loss").

ONLINE IMAGE: https://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/habitats/14.pdf
MN DNR –Subsection Profiles and Habitat Descriptions

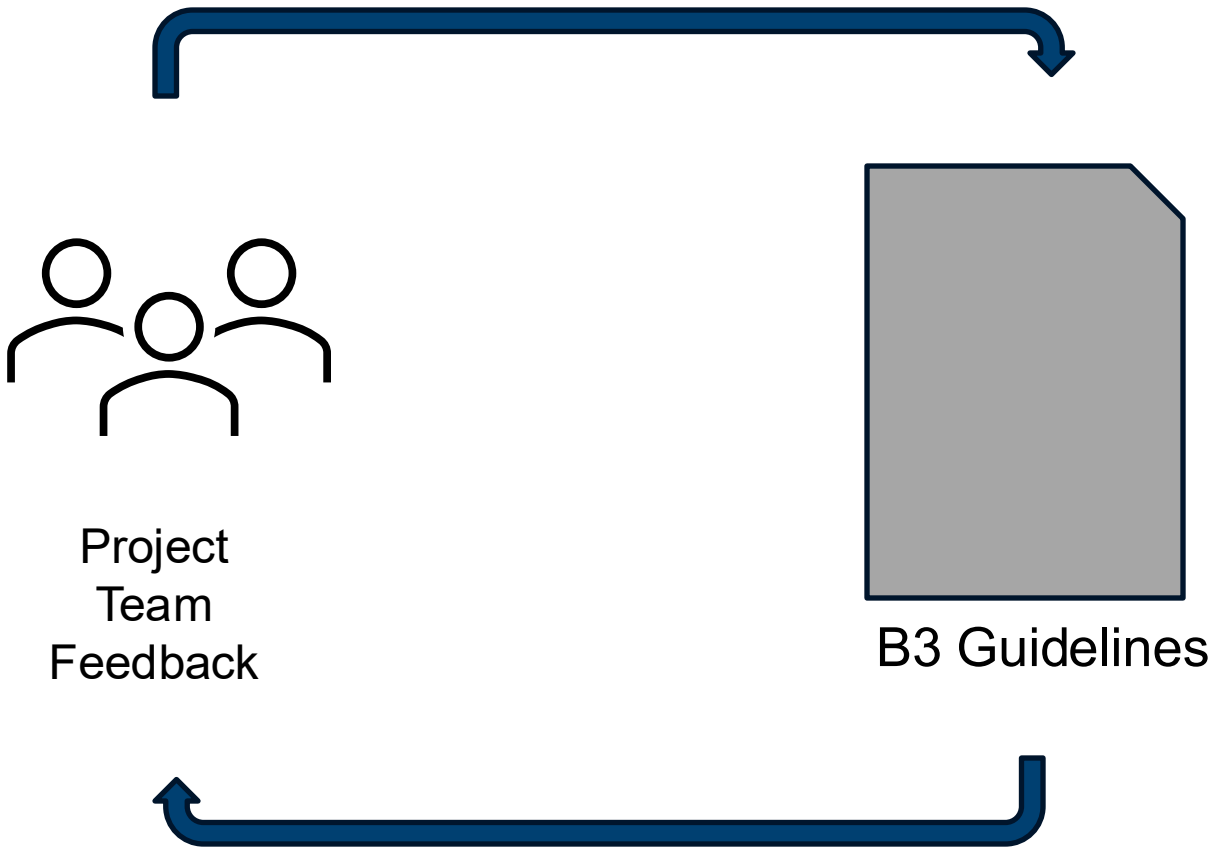
We welcome feedback from project teams participating in the B3 program. Please reach out to info@b3mn.org to schedule a meeting or to suggest proposed amendments/changes/additions to B3 requirements.




# UPDATES SUMMARY

The following changes are proposed and will be open for comment. Based on the feedback we have already received, and your comments following this presentation, along with ongoing maintenance and renovation of the guideline language, reporting strategy, and overall program structure, we hope to have a new set of guidelines by Fall 2026.

# OVERVIEW OF SITE + WATER CHANGES




S2 – Evapotranspiration Calculations
S2 – Site Albedo Calculations
S2 – Hydrologic Soil Group Determination
S2 – Irrigation and Outdoor Water Calc
S2 – Green Roof Incentives

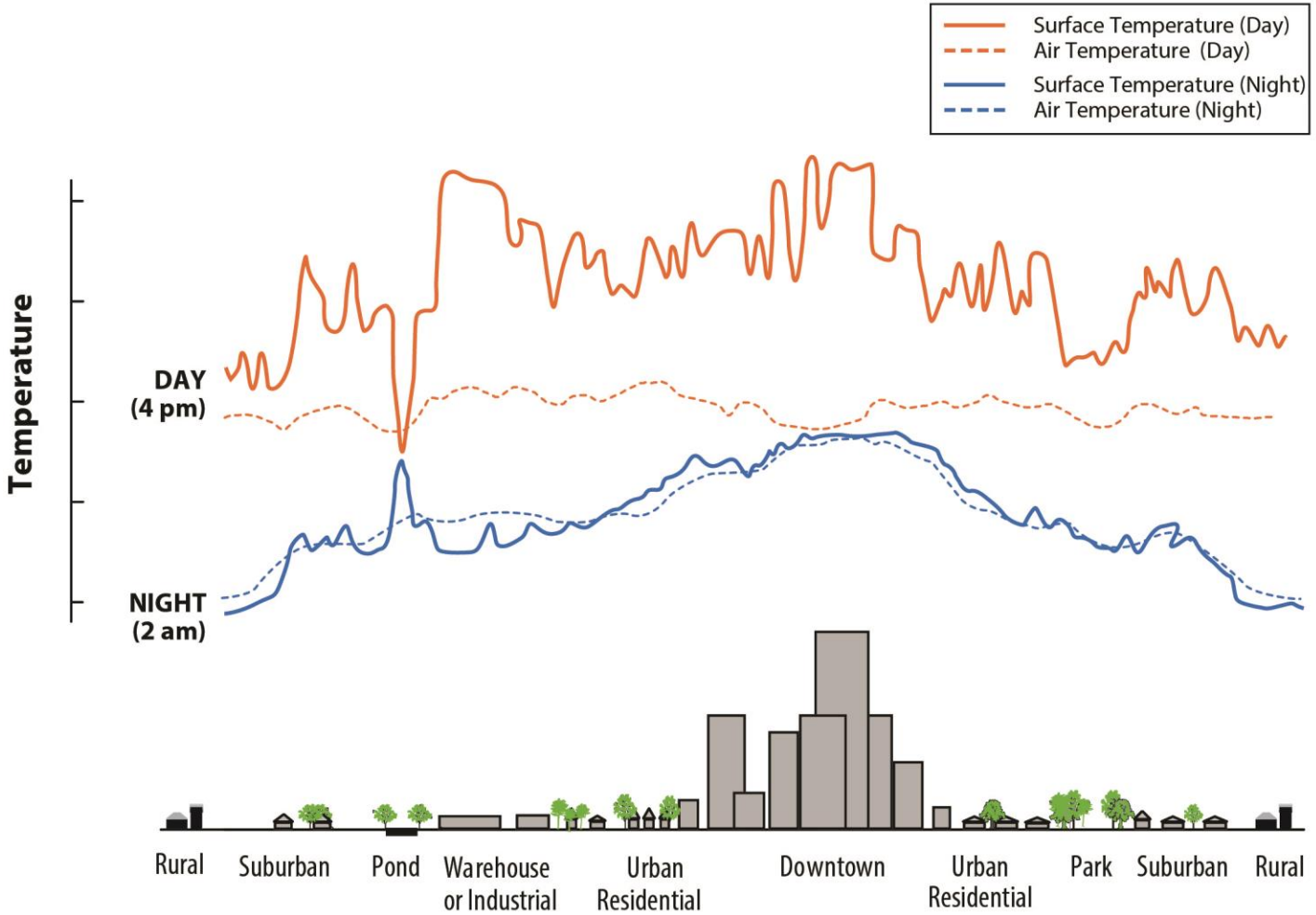
S3 – HSG Testing protocol and Methodology
S3 – Site Soil Protection Zones (SSPZ)

S4 – Green Roofs
S4 – Biomass Targets
S4 – Class Fact Sheets
S4 – Plant Communities and SNAs
S5 – Habitat Requirements
S5 – Habitat Determination

# S4 – Site Albedo + ET

Albedo measures the amount of absorption or reflectance a surface has. A higher albedo has more reflectance, a lower albedo has more absorptance.

B3 has been using the albedo calculator for many years to promote the use of more reflectance in site materials to mitigate the effects of urban heat island effect.

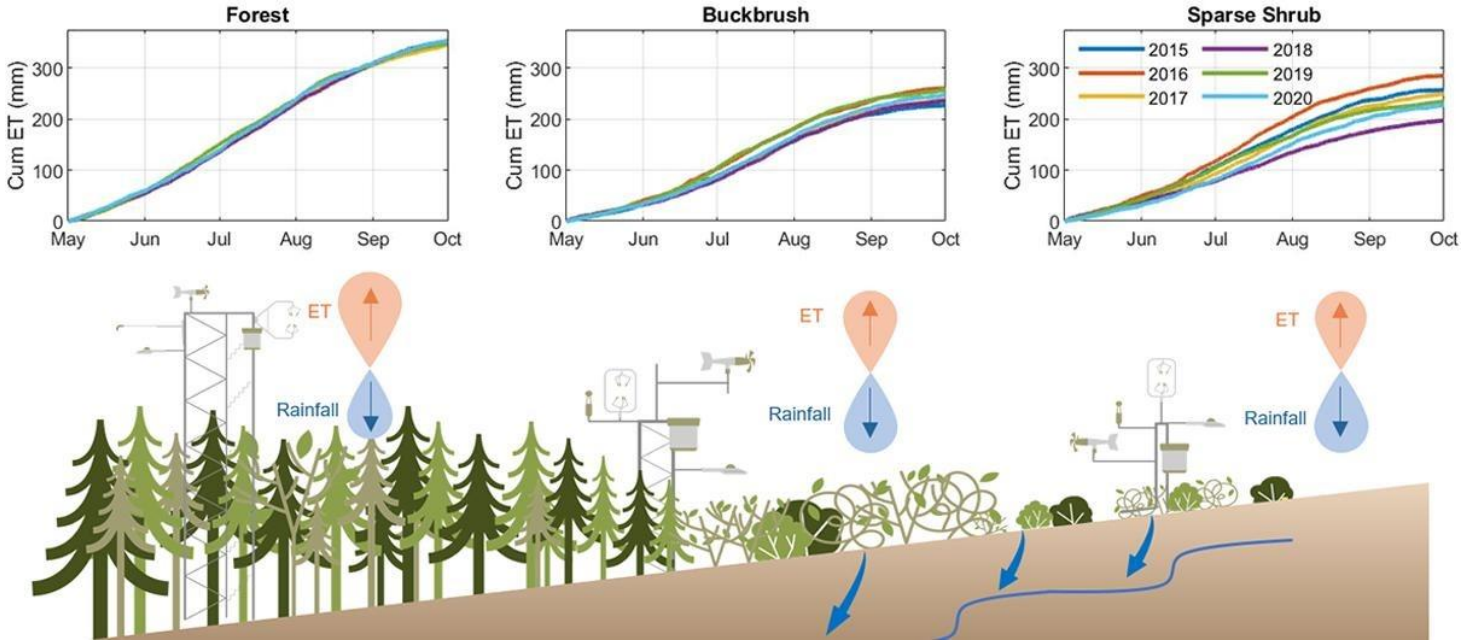



ONLINE IMAGE https://www.epa.gov/sites/default/files/2020-07/heat_island_effect_diagram.jpg
What are Heat Islands? US EPA

# ET Added

Now B3 has integrated Evapotranspiration calculations for non-stormwater BMP vegetative cover within the Site Albedo Calculator. This allows project teams to account for and easily calculate the Evapotranspiration of trees, shrubs, ground cover, and turf as part of their overall on-site volume reductions.

The calculator also promotes the use of vegetation over impervious (and often lower albedo materials) for site areas.



# S2 – Evapotranspiration Calculations

**EXISTING: Mean Site Albedo + Evapotranspiration before development**

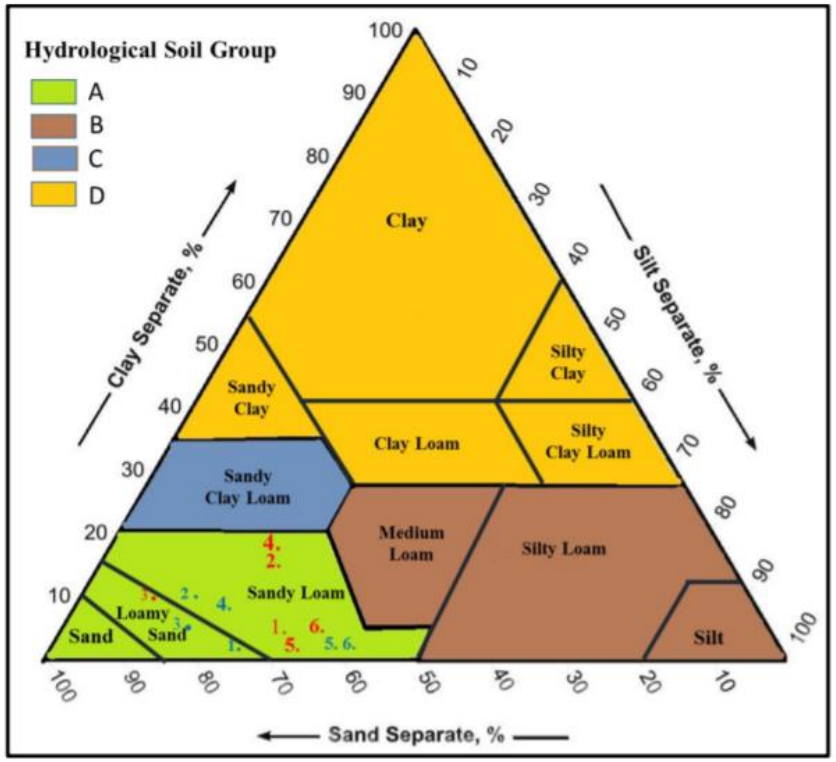
| | Hardscape/Building | | | | | | | | | Vegetation | | | | | | | Existing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of Material | Material | Material | Material | Material | Material | Material | Material | Material | Total Hardscape | Turf | Deciduous Tree Canopy **/*** | Coniferous Tree Canopy **/*** | Grasses + Shrubs | Stormwater BMP From MIDS * | Total Vegetation | Total Area (ft2) | Mean Site Albedo | |
| Square Feet of Area | | | | | | | | | 0 | | | | | | 0 | | #DIV/0! | #DIV/0! |
| Percent of Total Area | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | | | | | #DIV/0! | 0% | #DIV/0! | | |
| Albedo of Area | | | | | | | | | #DIV/0! | 28% | 40% | 40% | 30% | 30% | 34% | | Site Evapotranspiration | |
| | | | | | | | | | ET Rates: | 0.1 | 0.5 | 0.5 | 0.3 | 0 | | | #VALUE! | inches/storm event |
| | | | | | | | | | | | | | | | | | #VALUE! | |

**PROPOSED: Mean Site Albedo and Evapotranspiration after development**

| | Hardscape/Building | | | | | | | | | Vegetation | | | | | | | Proposed | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of Material | Material | Material | Material | Material | Material | Material | Material | Material | Total Hardscape | Turf | Deciduous Tree Canopy **/*** | Coniferous Tree Canopy **/*** | Grasses + Shrubs | Stormwater BMP From MIDS * | Total Vegetation | Total Area (ft2) | Mean Site Albedo | |
| Square Feet of Area | | | | | | | | | 0 | | | | | | 0 | | #DIV/0! | #DIV/0! |
| Percent of Total Area | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | | | | | #DIV/0! | #DIV/0! | #DIV/0! | | |
| Albedo of Area | | | | | | | | | #DIV/0! | 28% | 40% | 40% | 30% | 30% | 34% | | Site Evapotranspiration | |
| | | | | | | | | | ET Rates: | 0.1 | 0.5 | 0.5 | 0.3 | 0 | | | #VALUE! | inches/storm event |
| | | | | | | | | | | | | | | | | | MIDS Default Event Volume | 1.1 inches |
| | | | | | | | | | | | | | | | | | Remaining Event Volume | #VALUE! inches |
| | | | | | | | | | | | | | | | | | **MIDS Total Event Volume** | 0.00 acre ft |
| | | | | | | | | | | | | | | | | | **MIDS reductions** | 2.5 acre ft |
| | | | | | | | | | | | | | | | | | **ET reductions from this sheet** | #VALUE! acre ft |
| | | | | | | | | | | | | | | | | | **Total Volume Reductions (MIDS + ET)** | #VALUE! acre ft |
| | | | | | | | | | | | | | | | | | **Total % Volume Managed on site** | #VALUE! Total M |

# S2 – Hydrologic Soil Group (HSG) Determination

S2 Hydrologic Soil Group Determination– Added testing protocol and clarified methodology for determining the site's Hydrologic Soil Group (HSG) for use in MIDS calculations. https://stormwater.pca.state.mn.us/index.php/Design_infiltration_rates




| Hydrologic soil group | Infiltration rate (inches/hour) | Infiltration rate (centimeters/hour) | Soil textures | Corresponding Unified Soil Classification[1] |
|---|---|---|---|---|
| A | Although a value of 1.63 inches per hour (4.14 centimeters per hour) may be used, it is ***Highly recommended*** that you conduct field infiltration tests or amend soils.[b] See Guidance for amending soils with rapid or high infiltration rates and Determining soil infiltration rates. | | gravel<br>sandy gravel | GW - Well-graded gravels, fine to coarse gravel<br>GP - Poorly graded gravel |
| | 1.63[a] | 4.14 | silty gravels<br>gravelly sands<br>sand | GM - Silty gravel<br>SW - Well-graded sand, fine to coarse sand |
| | 0.8 | 2.03 | sand<br>loamy sand<br>sandy loam | SP - Poorly graded sand |
| B | 0.45 | 1.14 | silty sands | SM - Silty sand |
| | 0.3 | 0.76 | loam, silt loam | MH - Elastic silt |
| C | 0.2 | 0.51 | Sandy clay loam, silts | ML - Silt |
| D | 0.06 | 0.15 | clay loam<br>silty clay loam<br>sandy clay<br>silty clay<br>clay | GC - Clayey gravel<br>SC - Clayey sand<br>CL - Lean clay<br>OL - Organic silt<br>CH - Fat clay<br><br>OH - Organic clay, organic silt |

[1]For Unified Soil Classification, we show the basic text for each soil type. For more detailed descriptions, see the following links: The Unified Soil Classification System, CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) UNIFIED SOIL CLASSIFICATION SYSTEM

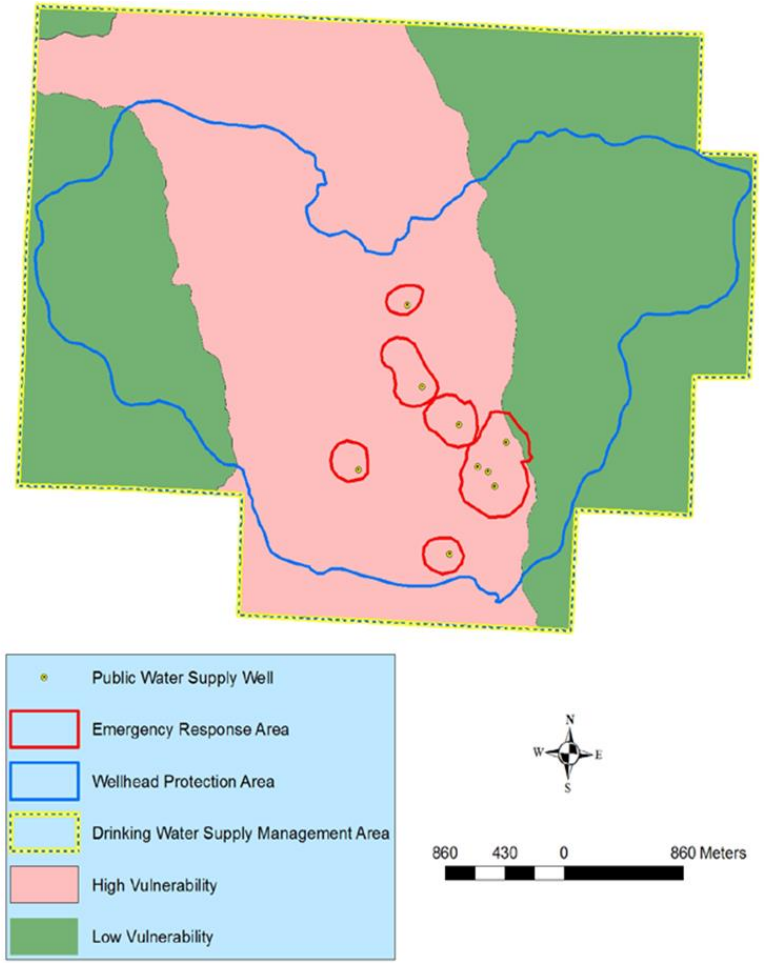
ONLINE IMAGE: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcTjUI3Cr_9aN4FGhMnoEpRuzaJfoHM_qPOKJg&s

# S2 – Stormwater Requirements for sites with infiltration restrictions

| | | | | |
|---|---|---|---|---|
| **D Soils: 0.006 in./hr. ***Or if no infiltration is allowed on site.** | Use MIDS Default | Use MIDS Default | 15% | ***85%*** |

For sites that have a qualified infiltration restriction which allows for 0% infiltration within the project site area (ex. karst soils, wellhead protection zones, easements, etc.) the project team can now provide proof of that restriction and can use the volume requirements within S2A for “D” type Hydrologic Soil Group sites regardless of actual soil conditions tested/reported for the site.

This allows for less stringent requirements given that the project site cannot use infiltration which is likely the easiest and likely the least costly method to manage stormwater volume on site.




ONLINE IMAGE
https://stormwater.pca.state.mn.us/sites/stormwater/files/Wellhead_protection_example.png
MN PCA – MN Stormwater Manual - Wellhead protection zones

# S2 – Irrigation and Outdoor Water Calculations

S2 – We have rebuilt the irrigation calculator tool to encourage drought tolerant plantings (after establishment) and high efficiency irrigation systems that utilize captured rain/roof water if project conditions (especially D typ soil conditions and other obstacles to infiltration) require alternative means of volume management within the project site.

**Appendix S2C: Irrigation Water Calculator**

**B3 Guidelines - Version 3.2r03**

| | | |
|---|---|---|
| KEY: | | Blue highlighted areas show constants or outputs calculated by the spreadsheet |
| | | Yellow highlighted areas show required inputs |

**Purpose:**

The purpose of this worksheet is to calculate the base case and design case irrigation water consumption.

**Planting requirements:**

Planting requirements should achieve 100% coverage of soil at full maturity (this can be met with turf as well but non-turf planting areas should be 100% canopy coverage at full maturity)

**Definitions:**

| | |
|---|---|
| Plantings - high water demand: | Species that need more water than most plants within that type of vegetation (e.g., trees, shrubs, groundcover) or use 70 to 90 percent of ETo. |
| Plantings - moderate water demand: | Species that need a typical amount of water as compared to other plants within that type of vegetation or use 40 to 60 percent of ETo. |
| Plantings - low water demand: | Species that need less water than most plants within that type of vegetation or use less than 30 percent of ETo. |
| ETo: | Reference evapotranspiration rate. The amount of water use (evaporation + transpiration) by a well-irrigated, growing, mowed grass. |
| Irrigation system efficiency - high: | 85% efficiency, irrigation systems that deliver water directly to the root zone via micro-spray or drip systems, with regular maintenance and proper scheduling |
| Irrigation system efficiency - medium: | 60% efficiency, sprinkler-type systems such as pop-up heads and rotors that have regular maintenance and proper scheduling |
| Irrigation system efficiency - low: | 50% efficiency, sprinkler type systems such as pop-up heads and rotors that are aging with poor maintenance, alignment, and lack of proper scheduling |
| Microclimate - protected: | areas shaded from sunlight and protected from wind and heat gain such as a landscape on a north side of a building or with a protective wind barrier |
| Microclimate - open: | areas that are in an open flat field such as a park or athletic field |
| Microclimate - intense: | areas exposed to high heat gain or windy conditions such as a landscape with southern exposure or near highly reflective surface like a street median |

**Design Case Planting Demand**

| Hydrozone | Landscape Planting Type | Microclimate | Baseline Irrigation Water Demand (gal/ft2/yr) | Design Case Irrigation Water demand (gal/ft2/yr) | Hydrozone Area (ft2) | Irrigation Water Use (gal/yr) | Baseline Irrigation Water Demand |
|---|---|---|---|---|---|---|---|
| 1 | Turf grass - required by program | Open | 5.3 | 5.3 | 8000 | 42400 | 42400 |
| 2 | Turf grass - not required by program | Open | 5.3 | 5.3 | 8002 | 42411 | 42411 |
| 3 | Plantings - low water demand | Protected | 3.63 | 0 | 8003 | 0 | 29051 |
| 4 | Plantings - low water demand | Open | 5.3 | 0 | 8004 | 0 | 42421 |
| 5 | Plantings - low water demand | Intense | 11.98 | 0 | 8001 | 0 | 95852 |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
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| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| | | | | **Total irrigated area in ft2** | **40010** | **84811** | Gal/YR |
| | | | | | | **252135** | Gal/YR |
| | | | | | | **42400** | Gal/YR |
| | | | | | | **80%** | |
| | | | | | | **84811** | Gal/YR |

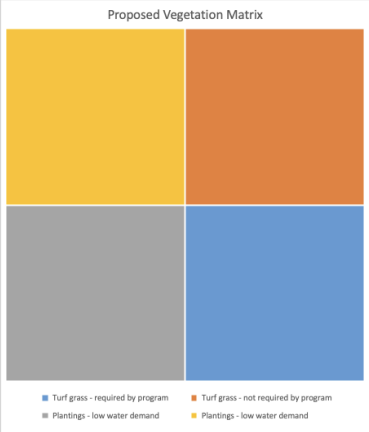
Total Design Planting Demand

Total Baseline Planting Demand

Turf Grass Required By Program Design Demand

**Irrigation consumption reduction (excluding program required turf grass)**

Alternative Source Volume Demand (If using path 3)



# S2 – Green Roof Incentives

S2 – Green Roofs - Incentivized roof captured rainwater/reuse by making roof area contribution to be 1.5x actual area. This allows for greater potential to capture and reuse stormwater on sites that cannot easily infiltrate (D soils, Wellhead protection zones, perched aquifers, karst soils, etc.)

ONLINE IMAGE: https://inhabitat.com/wp-content/blogs.dir/1/files/2011/05/Minneapolis-Central-Library-10.jpg
Minneapolis Central Library Green Roof

# S4 – Class Fact Sheets for Determining Adjacencies

Clarified that project teams should either use the applicable MN DNR Class Fact Sheets or the nearest applicable Scientific Natural Area (SNA) to determine vegetative reinforcement/replication of surrounding habitat.

WET FOREST SYSTEM
*Northern Floristic Region*

**WFn53** - continued -

## *WFn53 Northern Wet Cedar Forest* — Species Frequency & Cover

| Forbs, Ferns & Fern Allies | freq% | cover |
|---|---|---|
| Dwarf raspberry *(Rubus pubescens)* | 95 | ●●● |
| Starflower *(Trientalis borealis)* | 93 | ● |
| Bunchberry *(Cornus canadensis)* | 91 | ● |
| Naked miterwort *(Mitella nuda)* | 91 | ●● |
| Common oak fern *(Gymnocarpium dryopteris)* | 84 | ● |
| Wild sarsaparilla *(Aralia nudicaulis)* | 82 | ●● |
| Sweet-scented bedstraw *(Galium triflorum)* | 82 | ● |
| Goldthread *(Coptis trifolia)* | 82 | ●● |
| Bluebead lily *(Clintonia borealis)* | 80 | ● |
| Canada mayflower *(Maianthemum canadense)* | 78 | ● |
| Lady fern *(Athyrium filix-femina)* | 77 | ●● |
| Alpine enchanter's nightshade *(Circaea alpina)* | 72 | ● |
| Spinulose shield fern or Glandular wood fern* | 61 | ● |
| Twinflower *(Linnaea borealis)* | 58 | ● |
| Common strawberry *(Fragaria virginiana)* | 53 | ● |
| Large-leaved aster *(Aster macrophyllus)* | 52 | ● |
| Common marsh marigold *(Caltha palustris)* | 49 | ● |
| Woodland horsetail *(Equisetum sylvaticum)* | 48 | ●● |
| Crested fern *(Dryopteris cristata)* | 48 | ● |
| Rose twistedstalk *(Streptopus roseus)* | 46 | ● |
| Touch-me-not *(Impatiens* spp.) | 45 | ● |
| Rattlesnake fern *(Botrychium virginianum)* | 44 | ● |
| Palmate sweet coltsfoot *(Petasites frigidus)* | 43 | ● |
| Long beech fern *(Phegopteris connectilis)* | 43 | ● |
| Nodding trillium *(Trillium cernuum)* | 40 | ● |
| Red-stemmed aster *(Aster puniceus)* | 39 | ● |
| Kidney-leaved violet *(Viola renifolia)* | 39 | ● |
| Red baneberry *(Actaea rubra)* | 36 | ● |
| Three-leaved false Solomon's seal *(Smilacina trifolia)* | 35 | ● |
| Shining firmoss *(Huperzia lucidula)* | 34 | ● |
| Wood anemone *(Anemone quinquefolia)* | 32 | ● |
| Interrupted fern *(Osmunda claytoniana)* | 28 | ● |
| Northern bugleweed *(Lycopus uniflorus)* | 28 | ● |
| Cinnamon fern *(Osmunda cinnamomea)* | 23 | ● |
| One-flowered pyrola *(Moneses uniflora)* | 23 | ● |

| Grasses & Sedges | freq% | cover |
|---|---|---|
| Bristle-stalked sedge *(Carex leptalea)* | 54 | ●● |
| Bladder sedge *(Carex intumescens)* | 52 | ● |
| Long-stalked sedge *(Carex pedunculata)* | 48 | ●● |
| Soft-leaved sedge *(Carex disperma)* | 46 | ● |
| Three-fruited bog sedge *(Carex trisperma)* | 45 | ●● |
| Fowl manna grass *(Glyceria striata)* | 44 | ● |
| Drooping woodreed *(Cinna latifolia)* | 33 | ● |
| Drooping wood sedge *(Carex arctata)* | 30 | ● |
| Graceful sedge *(Carex gracillima)* | 29 | ● |
| **Low Shrubs** | | |
| Creeping snowberry *(Gaultheria hispidula)* | 36 | ● |
| Labrador tea *(Ledum groenlandicum)* | 33 | ● |
| Red raspberry *(Rubus idaeus)* | 31 | ● |
| **Tall Shrubs** | | |
| Fly honeysuckle *(Lonicera canadensis)* | 71 | ● |
| Speckled alder *(Alnus incana)* | 67 | ●●● |
| Beaked hazelnut *(Corylus cornuta)* | 63 | ● |
| Mountain maple *(Acer spicatum)* | 62 | ●●● |
| Swamp red currant *(Ribes triste)* | 51 | ● |
| Red-osier dogwood *(Cornus sericea)* | 47 | ● |
| Juneberries *(Amelanchier* spp.) | 43 | ● |
| Dwarf alder *(Rhamnus alnifolia)* | 29 | ● |

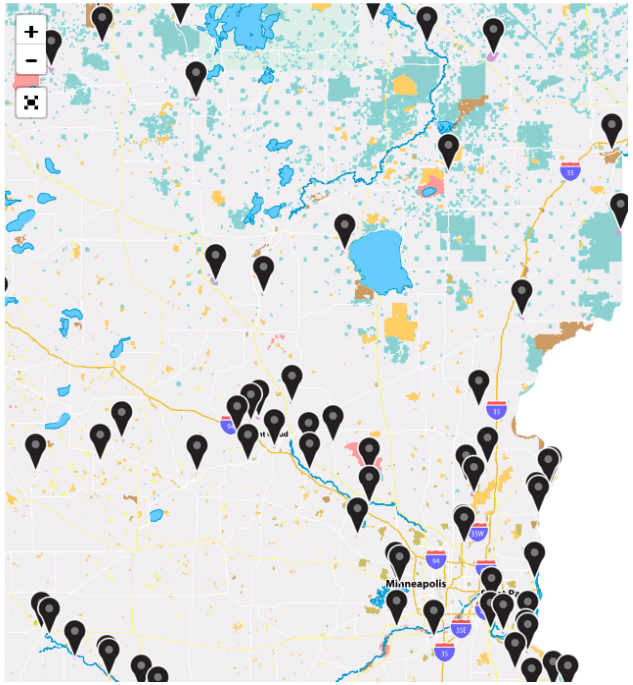
| Trees | Canopy freq% | Canopy cover | Subcanopy freq% | Subcanopy cover | Shrub Layer freq% | Shrub Layer cover |
|---|---|---|---|---|---|---|
| White cedar | 83 | ●●●● | 70 | ●●● | 70 | ● |
| Balsam fir | 46 | ●● | 59 | ●●● | 80 | ●● |
| Black ash | 42 | ●●● | 57 | ●●● | 75 | ●● |
| Paper birch | 40 | ●● | 36 | ● | 39 | ● |
| Black spruce | 24 | ●● | 17 | ●● | 19 | ● |
| White spruce | 18 | ●● | 17 | ● | 29 | ● |
| Yellow birch | 17 | ● | 25 | ●● | 28 | ● |
| Red maple | - | - | 13 | ● | 50 | ● |
| Mountain ash | - | - | 11 | ● | 39 | ● |
| American elm | - | - | 9 | ● | 23 | ● |

*Spinulose shield fern or Glandular wood fern *(Dryopteris carthusiana* or *D. intermedia)*

# S4 – Plant Communities and Scientific Natural Areas (SNA)

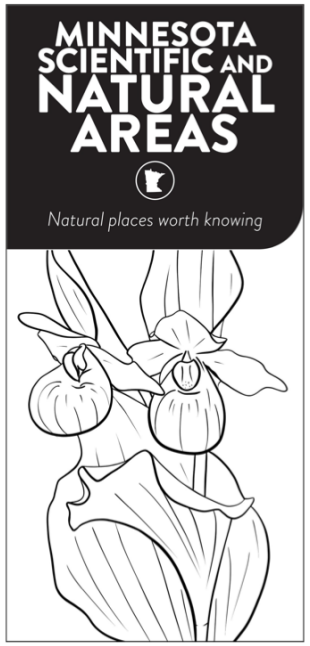
Aligned the B3 plant community requirements so project teams are either referencing the class fact sheet or the nearest applicable Scientific Natural Areas (SNA) for vegetative reinforcement based on actual site conditions/continuity instead of solely relying on proximity to SNAs which may not be the most applicable or useful plant community to reinforce or replicate on the project site.

**Minnesota Scientific and Natural Areas Find by Map**




**PLANT CHECKLIST**

Roscoe Prairie SNA



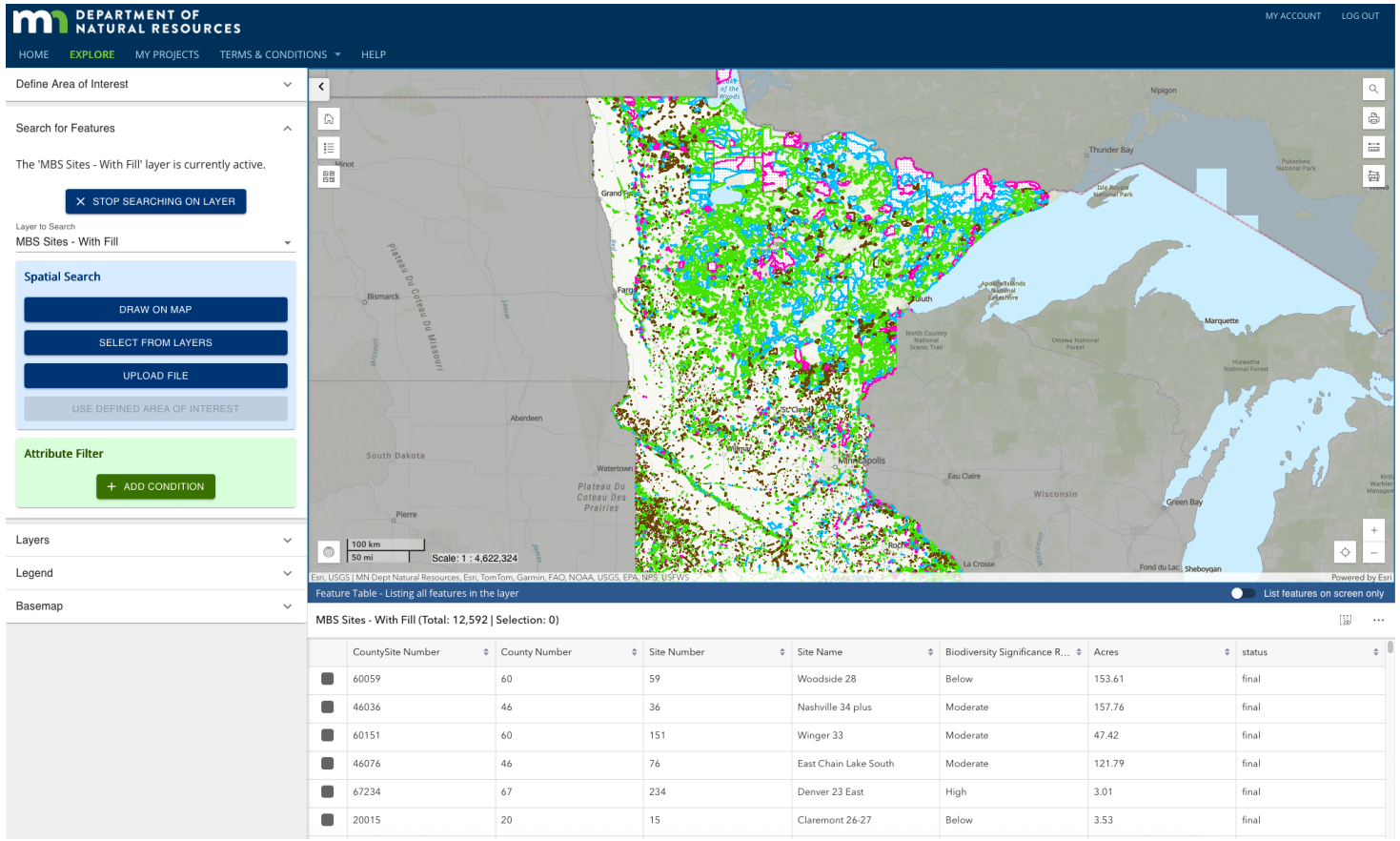

DEPARTMENT OF NATURAL RESOURCES

| Species | Confidence |
|---|---|
| **AQUATICS** | |
| __ water smartweed (*Persicaria amphibia*) | 2 |
| **FERNS AND LYCOPHYTES** | |
| __ field horsetail (*Equisetum arvense*) | 2 |
| __ water horsetail (*Equisetum fluviatile*) | 3 |
| __ common scouring rush (*Equisetum praealtum*) | 3 |
| **FORBS** | |
| __ common yarrow (*Achillea millefolium*) | 2 |
| __ slender-leaved false foxglove (*Agalinis tenuifolia*) | 2 |
| __ glaucous false dandelion (*Agoseris glauca*) | 2 |
| __ prairie wild onion (*Allium stellatum*) | 2 |
| __ long-headed thimbleweed (*Anemone cylindrica*) | 3 |
| __ pasqueflower (*Anemone patens*) | 3 |
| __ field pussytoes (*Antennaria neglecta*) | 2 |
| __ American hemp (*Apocynum cannabinum*) | 3 |
| __ swamp milkweed (*Asclepias incarnata*) | 2 |
| __ common milkweed (*Asclepias syriaca*) | 2 |
| __ Canada milk-vetch (*Astragalus canadensis*) | 1 |
| __ ground plum (*Astragalus crassicarpus*) | 1 |
| __ common marsh marigold (*Caltha palustris*) | 2 |
| __ hedge bindweed (*Calystegia sepium*) | 3 |
| __ white lamb's quarters (*Chenopodium album*)* | 3 |
| __ spotted water hemlock (*Cicuta maculata*) | 2 |
| __ field thistle (*Cirsium discolor*) | 2 |
| __ Flodman's thistle (*Cirsium flodmanii*) | 3 |
| __ swamp thistle (*Cirsium muticum*) | 3 |
| __ Hill's thistle (*Cirsium pumilum*) | 1 |
| __ bastard toadflax (*Comandra umbellata*) | 2 |
| __ bird's foot coreopsis (*Coreopsis palmata*) | 2 |
| __ small white lady's slipper (*Cypripedium candidum*)[SPC] | 1 |
| __ white prairie clover (*Dalea candida*) | 2 |
| __ purple prairie clover (*Dalea purpurea*) | 2 |
| __ Canada tick trefoil (*Desmodium canadense*) | 3 |
| __ flat-topped aster (*Doellingeria umbellata*) | 2 |
| __ tall cinquefoil (*Drymocallis arguta*) | 3 |

| Species | Confidence |
|---|---|
| __ narrow-leaved purple coneflower (*Echinacea angustifolia*) | 2 |
| __ daisy fleabane (*Erigeron strigosus*) | 2 |
| __ common boneset (*Eupatorium perfoliatum*) | 2 |
| __ grass-leaved goldenrod (*Euthamia graminifolia*) | 2 |
| __ spotted Joe pye weed (*Eutrochium maculatum*) | 2 |
| __ common strawberry (*Fragaria virginiana*) | 2 |
| __ northern bedstraw (*Galium boreale*) | 2 |
| __ bottle gentian (*Gentiana andrewsii*) | 2 |
| __ downy gentian (*Gentiana puberulenta*) | 1 |
| __ lesser fringed gentian (*Gentianopsis virgata*) | 3 |
| __ prairie smoke (*Geum triflorum*) | 2 |
| __ autumn sneezeweed (*Helenium autumnale*) | 2 |
| __ sawtooth sunflower (*Helianthus grosseserratus*) | 2 |
| __ Maximilian's sunflower (*Helianthus maximiliani*) | 2 |
| __ stiff sunflower (*Helianthus pauciflorus*) | 3 |
| __ rough hawkweed (*Hieracium umbellatum*) | 2 |
| __ yellow star-grass (*Hypoxis hirsuta*) | 2 |
| __ two-flowered cynthia (*Krigia biflora*) | 2 |
| __ marsh vetchling (*Lathyrus palustris*) | 3 |
| __ veiny pea (*Lathyrus venosus*) | 2 |
| __ field peppergrass (*Lepidium campestre*)* | 3 |
| __ rough blazing star (*Liatris aspera*) | 2 |
| __ northern plains blazing star (*Liatris ligulistylis*) | 2 |
| __ dotted blazing star (*Liatris punctata*) | 3 |
| __ great blazing star (*Liatris pycnostachya*) | 2 |
| __ Michigan lily (*Lilium michiganense*) | 3 |
| __ wood lily (*Lilium philadelphicum*) | 2 |
| __ hoary puccoon (*Lithospermum canescens*) | 2 |
| __ hairy puccoon (*Lithospermum caroliniense*) | 1 |
| __ great lobelia (*Lobelia siphilitica*) | 3 |
| __ pale-spiked lobelia (*Lobelia spicata*) | 3 |
| __ cut-leaved bugleweed (*Lycopus americanus*) | 2 |
| __ rough bugleweed (*Lycopus asper*) | 2 |

# S5 – Habitat Requirements
# S5 – Habitat Determination and Documentation

S5 – Habitat Determination + Documentation – Clarified the protocol for rare/threatened species investigation to use the MN DNR Conservation Explorer Tool and the automated Natural Historic Inventory System (NHIS) reporting to determine the presence of state-listed rare, threatened, or protected species within, or adjacent to the project site. There is no need to coordinate with the MBS Staff or MN DNR to make protected species habitat determinations and management plans in this revision.




| CountySite Number | County Number | Site Number | Site Name | Biodiversity Significance R... | Acres | status |
|---|---|---|---|---|---|---|
| 60059 | 60 | 59 | Woodside 28 | Below | 153.61 | final |
| 46036 | 46 | 36 | Nashville 34 plus | Moderate | 157.76 | final |
| 60151 | 60 | 151 | Winger 33 | Moderate | 47.42 | final |
| 46076 | 46 | 76 | East Chain Lake South | Moderate | 121.79 | final |
| 67234 | 67 | 234 | Denver 23 East | High | 3.01 | final |
| 20015 | 20 | 15 | Claremont 26-27 | Below | 3.53 | final |

From the Conservation Explorer Tool Interface
MN Department of Natural Resources – Online portal

# S5 – Habitat Requirements
# S5 – Habitat Determination and Documentation

S5 – Habitat Requirements – Year-Round Water Feature – The year-round open water habitat requirement has been scaled back to only apply to large sites above 20 acres.

All sites are still required to have aquatic habitat in the size and type specified in the B3 Guidelines but the <u>year-round</u> requirement is only required for large sites above 20 acres.

https://scontent-msp1-1.xx.fbcdn.net/v/t39.30808-6/485351188_1049524127219682_2934846594470281814_n.jpg?_nc_cat=101&ccb=1-7&_nc_sid=127cfc&_nc_ohc=2WjUF3pgu78Q7kNvwEWPddb&_nc_oc=AdpZxgylOVXJkEn7zRhCxsMQ0_olqUJycTfRpbx3x0FDJAeZweI8y6MlflLSwSvqoQA&_nc_zt=23&_nc_ht=scontent-msp1-1.xx&_nc_gid=qz0t6fiT78ih51Hp9zf2A&_nc_ss=7b2a8&oh=00_AfBFA9ozN94nn_HtKr0d4UtC2xoLjxdIGoJrxpNjSvxZXw&oe=6A262460

# OVERVIEW OF CHANGES

S2 – Evapotranspiration Calculations
S2 – Site Albedo Calculations
S2 – Hydrologic Soil Group Determination
S2 – Irrigation and Outdoor Water Calculations
S2 – Green Roof Incentives

S3 – HSG Testing protocol and Methodology
S3 – Site Soil Protection Zones (SSPZ)

S4 – Green Roofs
S4 – Biomass Targets
S4 – Class Fact Sheets for Determining Adjacencies
S4 – Plant Communities and Scientific Natural Areas (SNA)

S5 – Habitat Requirements
S5 – Habitat Determination and Documentation

MINNESOTA B3 GUIDELINES

# v3.2 r3 SITE + WATER CHANGES

**For questions or comments please send an email to info@b3benchmarking.com**

# B3 RESOURCES

B3 Home | Case Studies Database | NEW! Best of B3 2025 | Training and Education | Project Team | Sponsors

MINNESOTA B3 GUIDELINES

Guidelines Home | v3.2r02 | v3.1 | v3.0 | v2.2 | Training | Documents | Previous Versions

## Training Materials

All Guidelines

3.0 3.1

3.2r02

**B3 and SB 2030 YouTube Channel**

### B3 Program Guidance

- An Introduction to B3 (B3/SB2030 Training, on demand) – Recording & Slides
- Project Role: Guideline Leader (B3/SB2030 Training, on demand) – Recording, Slides. and Guidance Document
- Project Role: Agency Contact (B3/SB2030 Training, on demand) – Recording, Slides and Guidance Document.
- Project Role: B3 Team Member (B3/SB2030 Training, on demand) – Recording, Slides, and Guidance Document
- Navigating the B3 Tracking Tool (B3/SB2030 Training, on demand) – Recording

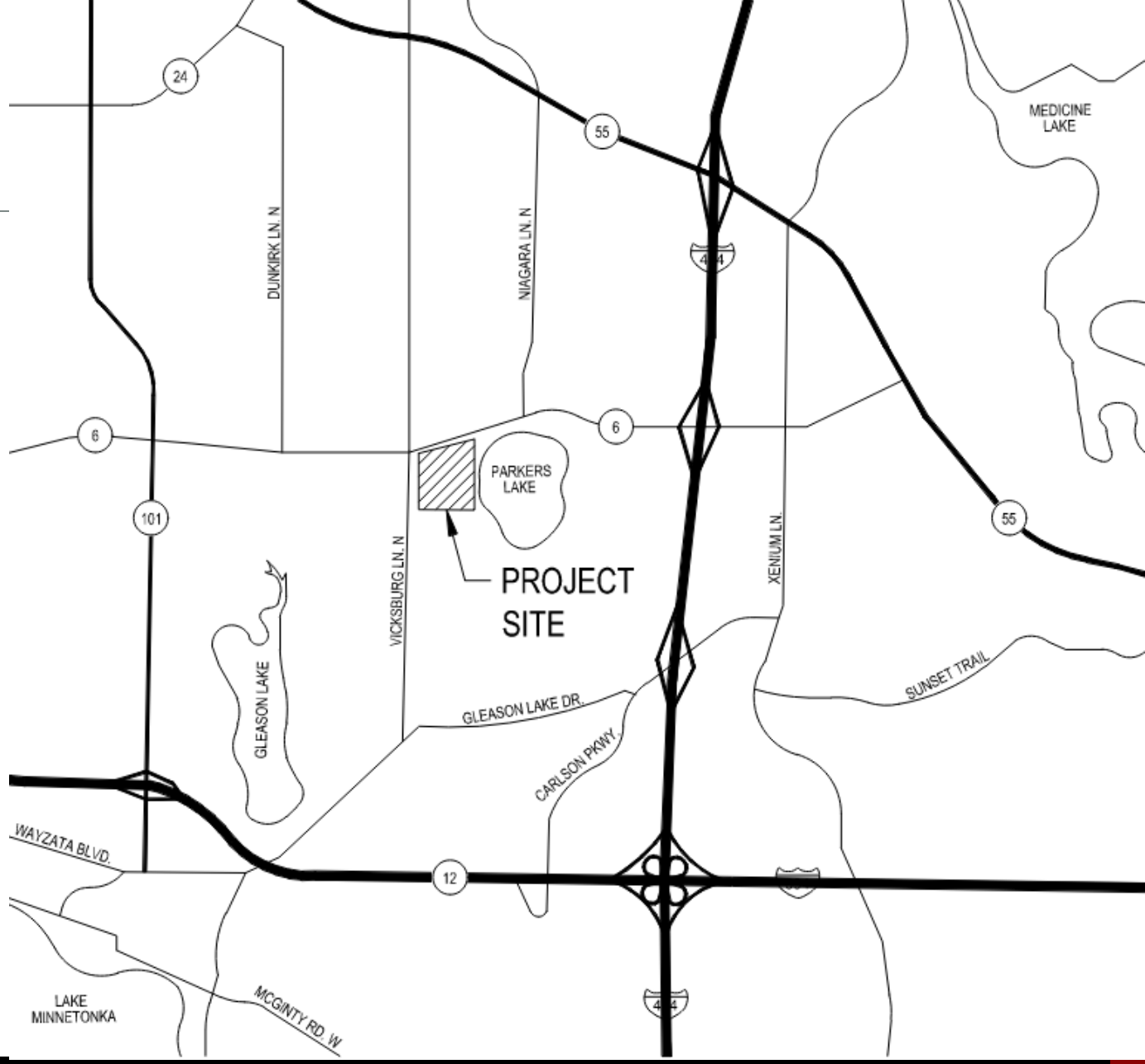
# CASE STUDY

## HENNEPIN COUNTY SHERIFF'S OFFICE
## PUBLIC SAFETY SERVICES FACILITY

# BACKGROUND

| | |
|---|---|
| Location: | Plymouth, MN |
| Cost: | $41 Million |
| Completed: | Spring 2025 |
| Client: | Hennepin County |
| Design Team: | Civil - Elan Design Lab, Inc. |
| | Architecture - Leo A Daly |
| | Landscape Architecture - Damon Farber |

# PROJECT SITE



# HENNEPIN COUNTY CAMPUS

Parkers Lake Community Playfield
Parkers Lake Baptist Church
Darryl's Small Engine Repair
Parkers Lake Park
Weston Ln N
6
PROJECT SITE
Hennepin County Corrections Work...
Keys To Joy Music Studio
Shenandoah Ln N
Wicksburg Ln N
15th Ave N
LionsPark
14th Ave N
13th Pl N
Kingsview Ln N
13th Ave N
12th Ave N
Schwaller Susan
Hennepin County Adult Corrections
Parkers Lake Golf Center
Domino's Pizza
Zanzibar Ln N
Carfreelife
Luce Line Trailhead (Plymouth Township /...
Luce Line Trail Parking
9th Ave N
10th Ave N

# PROJECT GOALS

**HENNEPIN COUNTY CLIMATE ACTION PLAN**

Goal to achieve Net Zero

**INCORPORATE STORMWATER REQUIREMENTS:**

City of Plymouth (Parkers Lake)

Bassett Creek Watershed Management Commission

Minnehaha Creek Watershed District

B3 (elected)

MPCA NPDES

**PROVIDE A FUNCTIONAL SITE**

**MAINTAIN OPERATIONS DURING CONSTRUCTION**

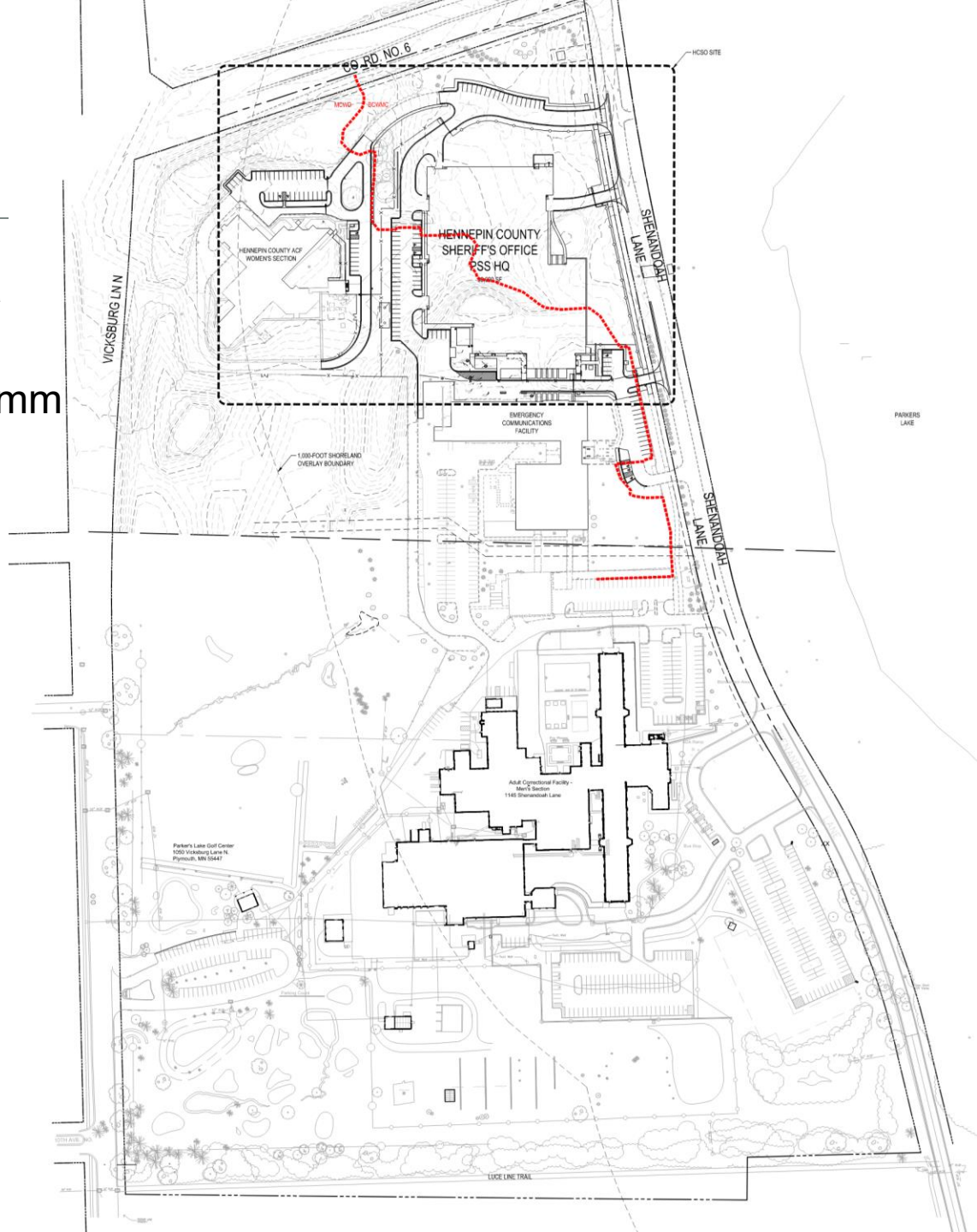
**DESIGN WITH MAINTENANCE IN MIND**

# CAMPUS AND WATERSHEDS

City: City of Plymouth Shoreland Overlay District

Watershed: Bassett Creek Watershed Management Comm
Minnehaha Creek Watershed District

Sustainability: Hennepin Climate Action Plan, B3



# REGULATORY REQUIREMENTS

| Agency / Contact | Jurisdictional Threshold | Volume Control | Rate Control | Water Quality |
|---|---|---|---|---|
| **City of Plymouth** | Soil Disturbance > 0.5 acres | Follow MIDS | No increase in the 2, 10, or 100-year storm event rates from existing to proposed conditions. | 85% TSS Removal and 60% TP removal from proposed conditions. Follow MIDS |
| **City of Plymouth:** ***Shoreland Overlay District*** | 1,000 feet from Parkers Lake | 25% maximum impervious surface coverage | | |
| **Minnesota B3:** **Guideline S.2** (Assuming HSG C soils) NOTE: See Table 3 for requirements for all HSG Designations. | Site disturbance greater than 3,000 sf or area of imperviousness renovated greater than 2,000 sf | Infiltrate a min. of 30% of storm event. Evapotranspirate (ET) a minimum of 55% of design storm.* Reuse a min. of 7% of the design storm. See Table 3 below. | The site shall be designed to not exceed the pre-settlement runoff rate for native soil and vegetation conditions, per NRCS TR-55. | Remove 80% post development TSS and 60% TP. Reduce area of impervious surfaces requiring chlorides by 20%. Provide a Chloride management plan. |
| **Bassett Creek Water Management Commission (BCWMC)** | One or more acres of new impervious surfaces. | Capture and retain onsite 1.1 inches of runoff from the new and/or fully reconstructed impervious surfaces OR meet a Flexible Treatment Option** (FTO) | No increase in the 2, 10, or 100-year storm event rates from existing to proposed conditions. | If unable to meet 1.1 inch performance goal, meet water quality requirements in applicable FTO. |
| **Minnehaha Creek Watershed District (MCWD)** | Any new impervious surfaces | Provide Abstraction of the first one inch of rainfall | No net increase in the peak runoff rate for the 1-, 10- and 100-year design storms | Meet MPCA volume control requirements |
| **MPCA** **Construction Stormwater Permit** | 1 acre of new impervious | Infiltrate 1" from new impervious surfaces. | | |

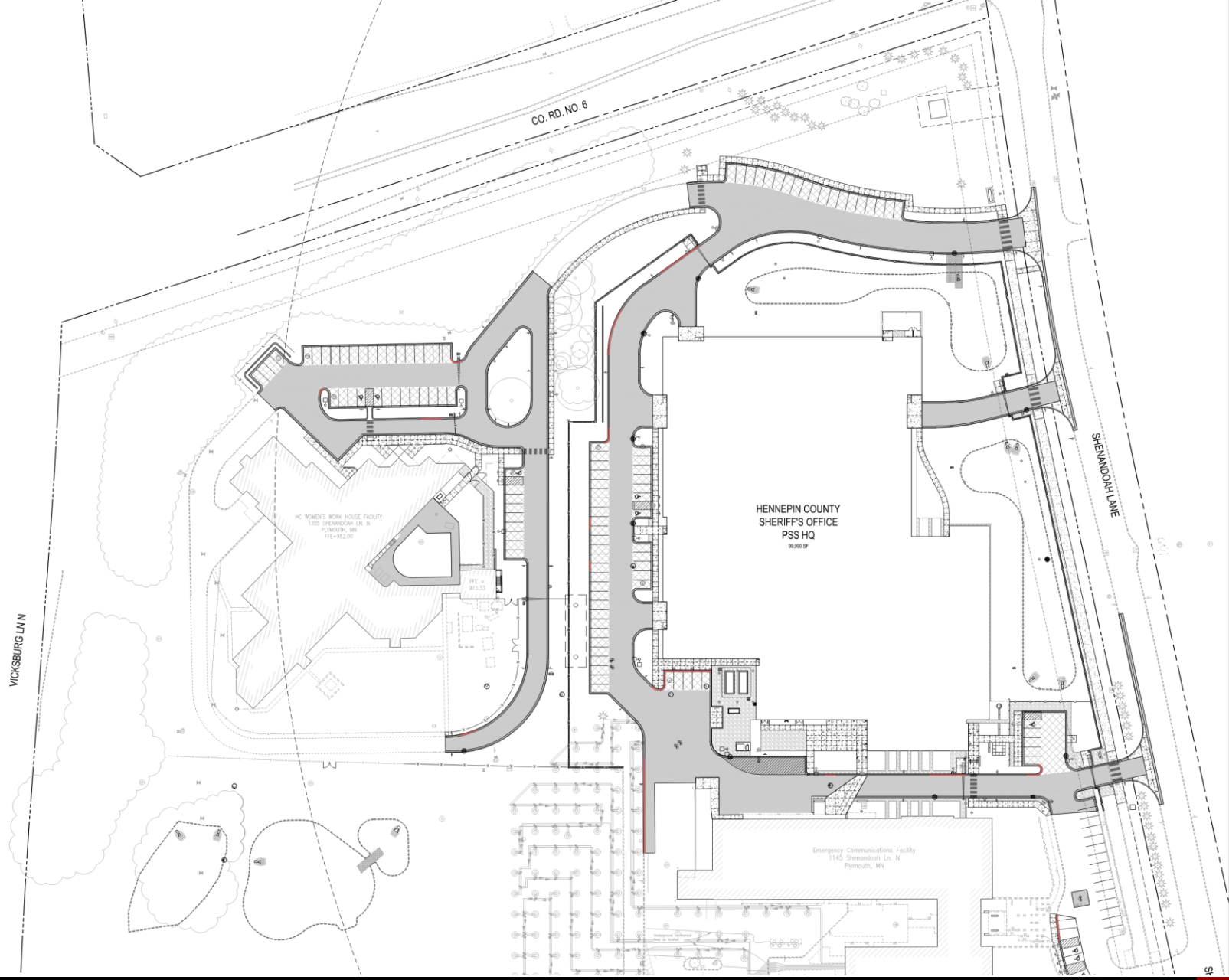
## B3 VERSION 3.2

**Table 5.0: B3 Guideline 3.2.A.1 – Site Water Cycle Requirements***

| Hydrological Soil Groups | Infiltration at Least | Evapotranspiration at Least | Onsite Reuse | Runoff Not to Exceed | *Total Onsite Managed* |
|---|---|---|---|---|---|
| **A Soils: 1.63–0.8 in./hr.** | 100% | 0% | 0% | 0% | *100%* |
| **B Soils: 0.45–0.3 in./hr.** | 50% | 40% | 5% | 5% | *95%* |
| **C Soils: 0.2 in./hr.** | 30% | 55% | 7% | 8% | *92%* |
| **D Soils: 0.006 in./hr.** | 0% | 60% | 25% | 15% | *85%* |

*Note: B3 Guideline S.2 par. A.1.ii states, "Additional infiltration above the percentage required may be used to meet ET & onsite reuse requirements."

# SITE PLAN


SHENANDOAH LANE
HENNEPIN COUNTY
SHERIFF'S OFFICE
PSS HQ
98,900 SF
Emergency Communications Facility
1145 Shenandoah Ln. N
Plymouth, MN
HC WOMEN'S WORK HOUSE FACILITY
1355 SHENANDOAH LN. N
PLYMOUTH, MN
FFE=982.00
FFE =
973.33
CO. RD. NO. 6
VICKSBURG LN N

# SITE COORDINATION

**ITERATIVE PROCESS**

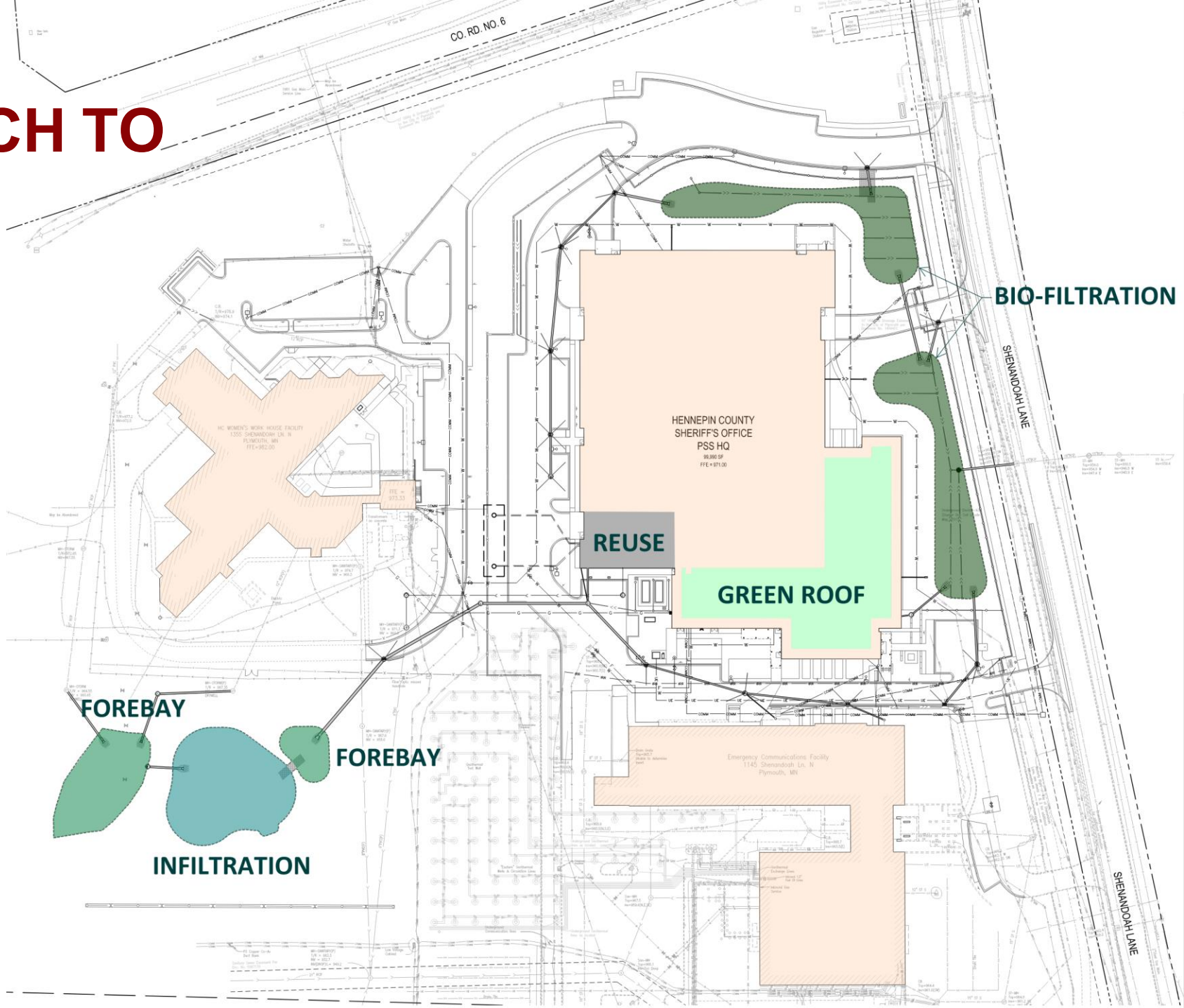
**NOT ONE SOLUTION WORKED**

**ALTERNATE CONSIDERATIONS:**

- Green roof
- Reuse (grey water or irrigation)
- Off site exploration of soils

**REDUCE MANAGED TURF**

# CAMPUS APPROACH TO STORMWATER MANAGEMENT



# GREEN ROOF

# BIOFILTRATION BASINS

# INFILTRATION AND VEGETATION

# RENDERING

# HCSO PSS FACILITY

# B3 SITE COORDINATION

**SITE AND WATER CONNECTIONS**

Animal Network

**SITE WATER QUALITY AND EFFICIENCY**

Irrigation

**SOIL**

Topsoil

Soil Disturbance

Off-site exploration of soils

**VEGETATION**

Site Albedo Minimum

**ANIMAL HABITAT SUPPORT**

Protection of rate, threatened, and endangered species

A
PUBLIC SAFETY
SERVICES
HENNEPIN COUNTY SHERIFF'S OFFICE
K9 MEMORIAL
THE HENNEPIN COUNTY SHERIFF'S OFFICE ESTABLISHED A K9 PROGRAM IN 1984 WITH DEPUTY ROBERT NICHOLS AND K9 CASEY. SINCE THEN, THE K9 PROGRAM HAS GROWN THROUGH THE DEDICATION OF ITS DEPUTIES AND K9 PARTNERS.
THIS MEMORIAL HONORS THEIR SERVICE, SACRIFICE, AND COUNTLESS HOURS COMMITTED TO TRAINING AND OPERATIONS. THESE TEAMS SERVE IN CRIMINAL APPREHENSION, TRACKING, SEARCH AND RESCUE, NARCOTICS AND EXPLOSIVE ORDNANCE DETECTION, AND MORE.
THE LOYALTY AND COURAGE OF OUR DEPUTIES AND THEIR K9S WILL NEVER BE FORGOTTEN. ALWAYS AS PARTNERS AND PROTECTORS.
"BRAVERY DOESN'T MEAN YOU AREN'T SCARED IT MEANS YOU GO ANYWAY"

# THANK YOU!

# CASE STUDY-

## MN ZOO WATERFRONT RENEWAL PROJECT (PREVIOUSLY LAKESIDE PLAZA)

# BACKGROUND

| | |
|---|---|
| **CLIENT** | MN ZOOLOGICAL GARDEN - APPLE VALLEY, MN |
| **BUDGET** | $15M (2023 MN STATE BONDING) |
| **DESIGN TEAM** | LANDSCAPE ARCHITECTURE – DAMON FARBER<br>ARCHITECTURE / LEAD- LEO A DALY<br>CIVIL- LOUCKS |
| **STATUS** | IN CONSTRUCTION |
| **B3** | SMALL-BUILDING PATH |

CALL OF THE WILD

# CLIENT GOALS

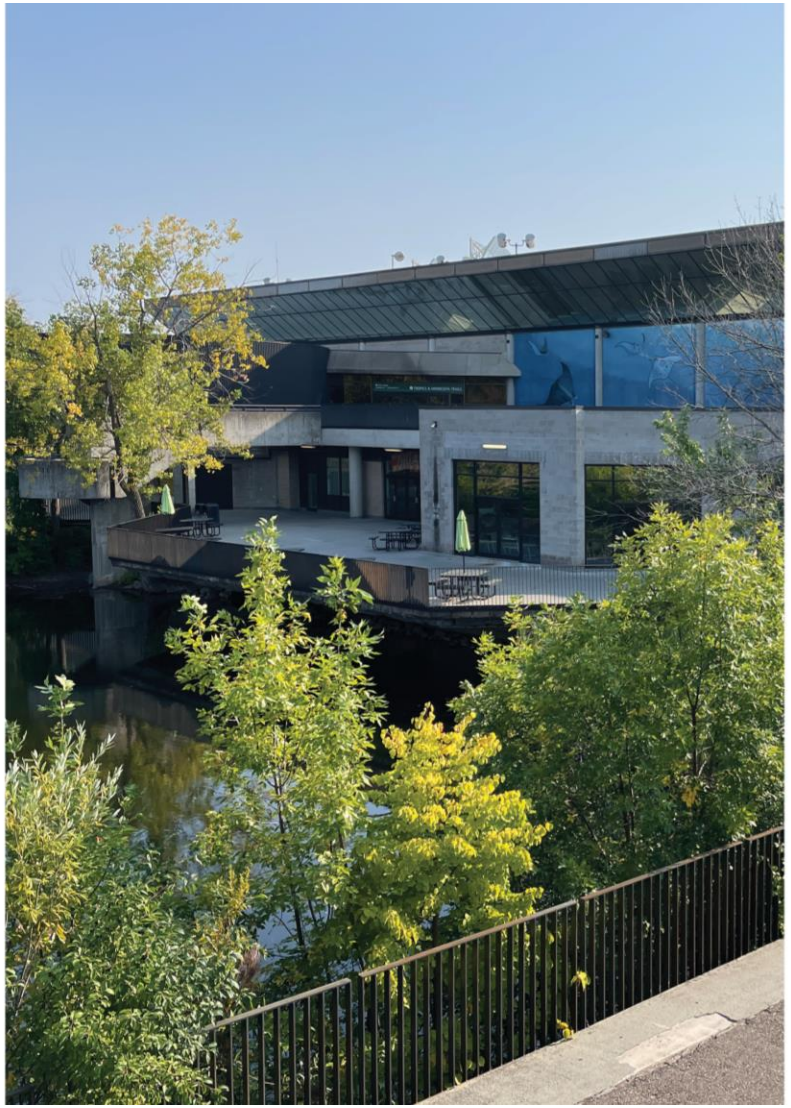
Slow, clean, and utilize plaza stormwater runoff

Establish habitat for threatened and endangered species

Improve the water quality of the lake

Improve immersive zoo experience and provide learning opportunities

Use existing site resources- logs for waterfront habitat & mucky soils for turtle habitat



# OVERLAYING B3 REQUIREMENT

- 13 NEW OVERSTORY TREES MINIMUM
- A TOTAL OF 59,819 SQ. FT. OF NATIVE PLANTING AREA IS REQUIRED
- (CURRENTLY 100% NATIVE PLANTING SPECIES shy by 19,026 sq ft )
- 50% OF ALL PLANT MATERIAL RICH IN POLLEN
- THREE SEASONS OF BLOOMING, TWO SPECIES FOR EACH SEASON
- HABITAT CREATION: RUSTY PATCH BUMBLEBEES AND BLANDING'S TURTLES
- INCORPORATE KEYSTONE SPECIES: BUR OAK
- INCORPORATE UPLAND PRAIRIE CLASSIFICATION SPECIES
- INCORPORATE PINE BEND BLUFF SNA SPECIES

# S.5 ANIMAL HABITAT SUPPORT

## BLANDINGS TURTLES THREATENED

+ Calm, shallow water bodies with mud bottoms and abundant aquatic vegetation (cattails and water lilies)
+ Overwinter in mud
+ Shallow water is breeding ground for amphibians and invertebrates that are important food source
+ 3:1 slope is manageable and should be vegetated with native grasses and forbs
+ DNR mentioned 10:1 is more desirable
+Nest in sandy, upland soils and open areas

+ Utilize tree removal for turtle basking logs
+ submerged logs

## RUSTY PATCH BUMBLEBEES ENDANGERED

+ Variety of flowers that bloom at different times that are high in nectar, March - October
+ Native and pesticide-free

### USFWS Regulatory Layers

To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool. This report is not a substitution for a Section 7 review.

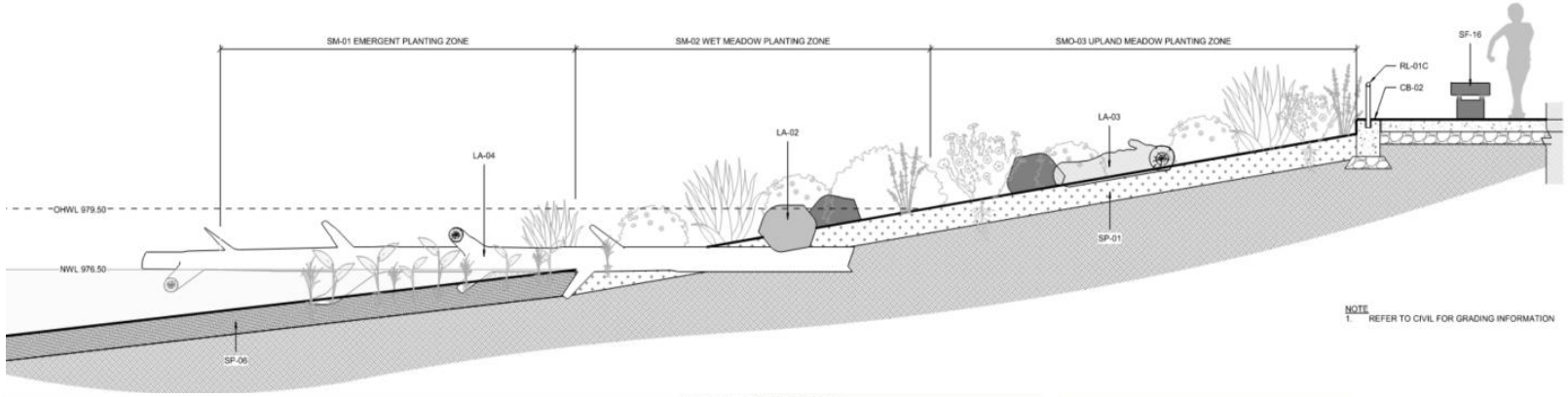
For informational purposes only, this tool currently checks the following USFWS Regulatory Layers:

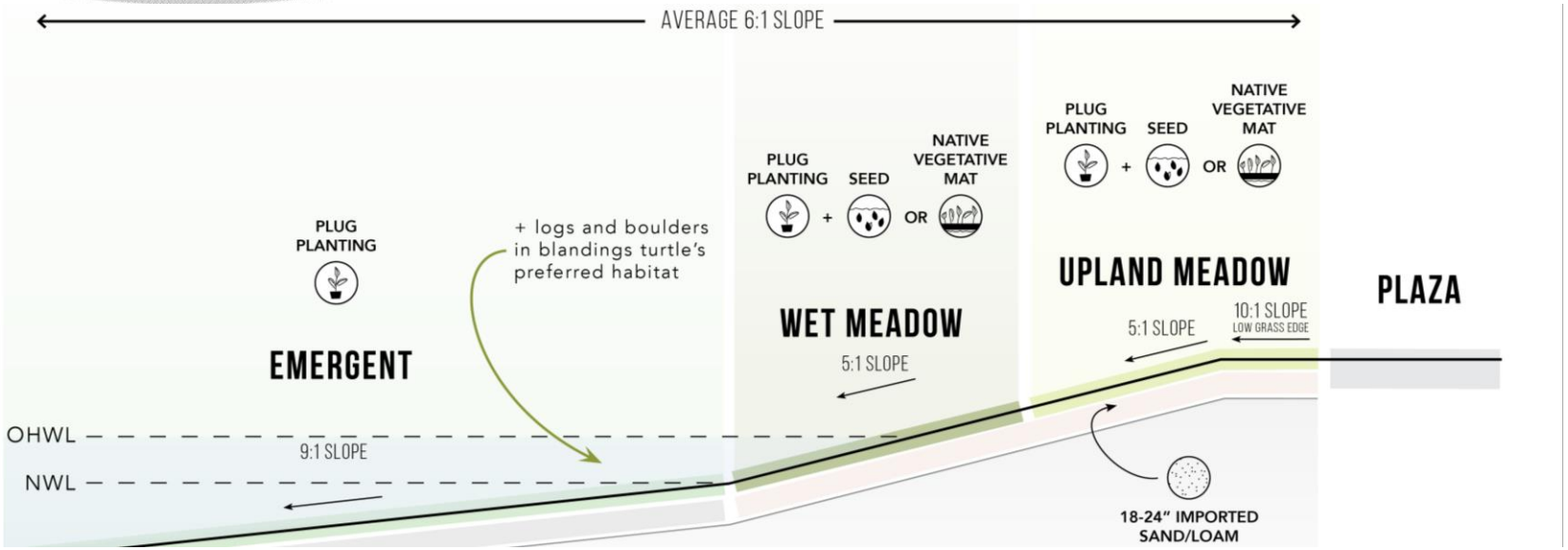
Rusty Patched Bumblebee High Potential Zones: (*search distance = 0; within area of interest only*) The rusty patched bumble bee (*Bombus affinis*), federally listed as endangered, is likely to be present in suitable habitat within the high potential zones. From April through October this species uses underground nests in upland grasslands, shrublands, and forest edges, and forages where nectar and pollen are available. From October through April the species overwinters under tree litter in upland forests and woodlands. The rusty patched bumble bee may be impacted by a variety of land management activities including, but not limited to, prescribed fire, tree-removal, haying, grazing, herbicide use, pesticide use, land-clearing, soil disturbance or compaction, or use of non-native bees. The USFWS RPBB guidance provides guidance on avoiding impacts to rusty patched bumble bee and a key for determining if actions are likely to affect the species; the determination key can be found in the appendix. Please visit the USFWS Rusty Patched Bumble Bee Map for the most current locations of High Potential Zones.

The following USFWS Regulatory Species are within the search area:

- Rusty Patched Bumble Bee High Potential Zone

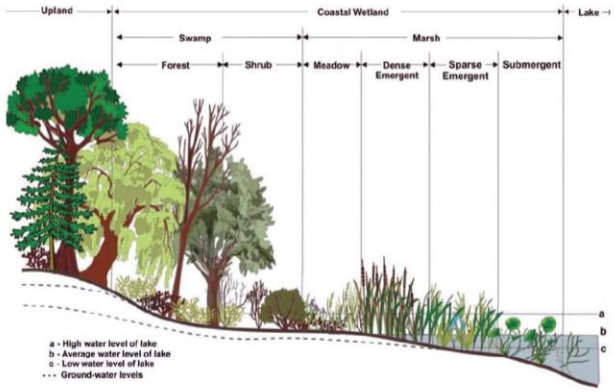
# S.5 HABITAT SUPPORT

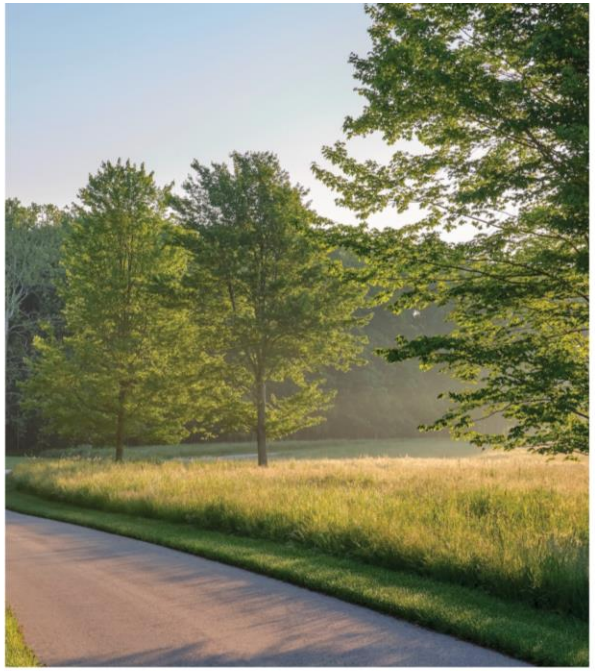


# S.4 VEGETATION (NATIVE PLANTING + AESTHETIC)

70% of the project site area (excluding the building footprint and code-minimum parking) shall be planted using native species.



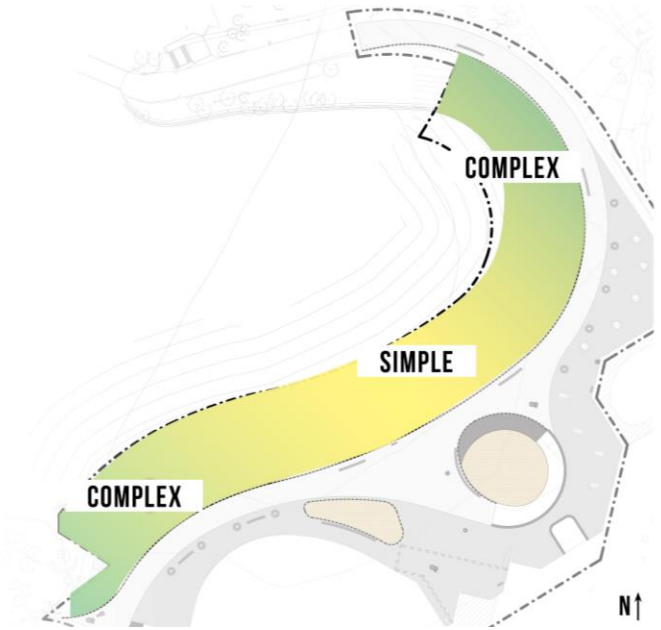


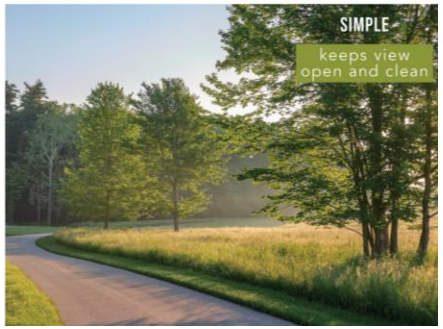
**FUNCTION FORWARD** ⟷ **FORMAL**

+ enhanced biodiversity
+ resilience
+ improved water quality

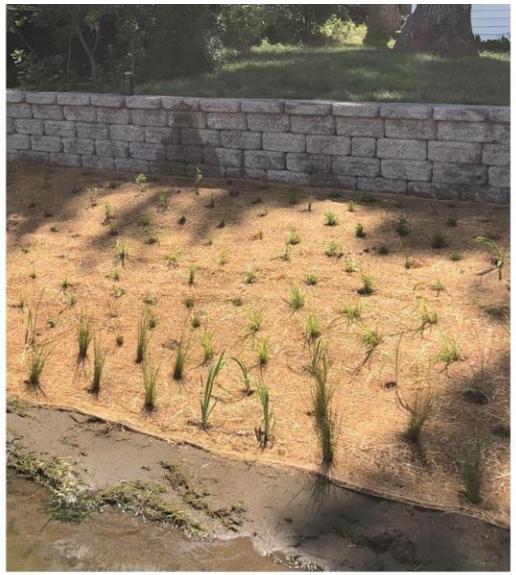
+ aesthetically refined
+ different type of maintenance

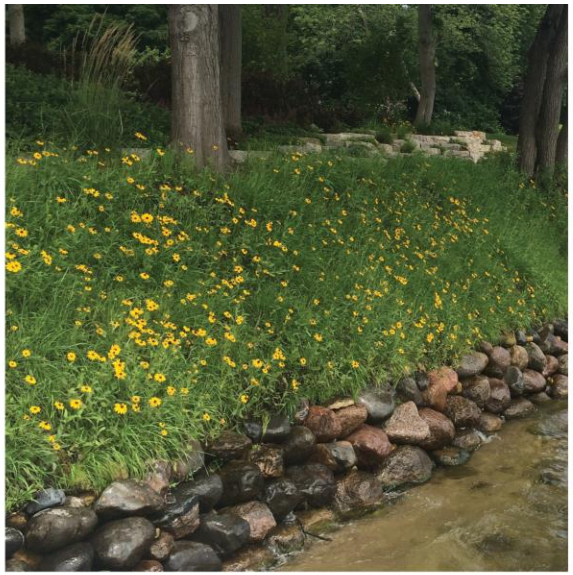
# S.4 VEGETATION (NATIVE PLANTING + AESTHETIC)





# S.4 VEGETATION (NATIVE PLANTING + INSTALLATION)





## SEED + PLUG

+ lower cost
+ several year establishment period
+ day-one appearance consideration
+ mix customization possible

## NATIVE VEGETATED MAT

+ labor savings
+ erosion control savings
+ skip awkward establishment period/ maintenance labor associated with weed-control
+ best day-one appearance
+ mix customization possible

# S.4 VEGETATION (LONG-TERM MAINTENANCE)

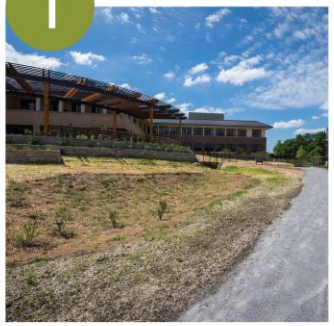
## CASE STUDIES

**BOHEMIAN FLATS OAK SAVANNA**
SEEDING & TREE PLANTING

YEAR 2

YEAR 3

YEAR 1



YEAR 2

YEAR 3

# S.4 ADEQUATE TREE CONDITIONS

Minimum volume of rootable soil volume per tree shall follow the requirements below:

- Small trees 400 cubic feet
- Medium trees  800 cubic feet
- Large trees1,200 cubic feet
- If using structural soils, multiply the total soil volumes above by five (x5)

## SOIL LEGEND

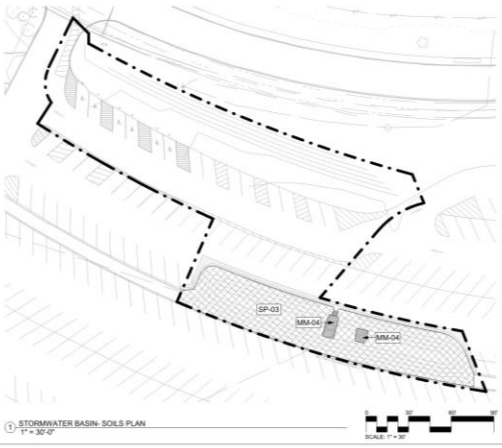
| SYMBOL | DESCRIPTION |
|---|---|
| SP-01 | SOIL TYPE 01- 24" DEPTH IMPORTED SANDY LOAM PLANTING SOIL- SHORELINE RESTORATION |
| SP-02 | SOIL TYPE 02- 36" DEPTH IMPORTED PLANTING SOIL - TREE PLANTER |
| SP-03 | SOIL TYPE 03- 30" DEPTH IMPORTED PLANTING SOIL - STORMWATER |
| SP-04 | SOIL TYPE 04- 36" DEPTH IMPORTED STRUCTURAL PLANTING SOIL |
| SP-05 | SOIL TYPE 05- 18" DEPTH IMPORTED PLANTING SOIL |
| SP-06 | SOIL TYPE 06- 24" DEPTH IMPORTED LAKE BOTTOM SOIL |
| SP-07 | SOIL TYPE 6" DEPTH IMPORTED SANDY SOIL - TURTLE NESTING |

## NOTES

1. PLANTING SOILS TO BE IMPORTED. EXISTING TOPSOIL SUITABLE FOR REUSE NOT PRESENT ON SITE.
2. SOIL TEST SHALL BE REQUIRED FOR IMPORTED SOILS PRIOR TO SOILS PLACEMENTS, REFER TO SPECIFICATIONS.
3. SUBGRADE PREPARATION TO BE APPROVED BY LA PRIOR TO PLACEMENT OF SOILS.
4. REFER TO LP011 FOR SOIL SCHEDULE.
5. PER B3 REQUIREMENT, SOIL VOLUME FOR LARGE TREES WITHIN STRUCTURAL SOILS WILL REQUIRE 3,000 CUBIC FT PER TREE, AND OTHER LARGE TREES IN-GRADE WILL REQUIRE 1,200 CUBIC FT PER TREE AT 3 FT DEPTH.

## SOIL MOCK UP

1. PRIOR TO PLACEMENT OF SOIL MIXES THROUGHOUT SITE, PROVIDE MOCK-UP OF EACH SOIL TYPE. CONSTRUCT MOCK UPS IN LOCATION THAT SHALL BE FREE OF CONSTRUCTION TRAFFIC DURING SOILS INSTALLATION. MOCK UP INSTALLATION TO BE REVIEWED BY LANDSCAPE ARCHITECT FOR APPROVAL OF PRACTICES & PROFILES.
2. MOCK UP SIZE SHALL BE 10'X10' AND SHALL BE PROTECTED FOR DURATION OF SOIL PLACEMENT.
3. MOCK UP SHALL INCLUDE SUBGRADE PREPARATION, PLACEMENT OF ORGANIC AMENDMENTS, TILLING INTO SOIL COLUMN, COMPACTION METHODS INCLUDING TYPE OF COMPACTION EQUIPMENT AND NUMBER OF PASSES.
4. SOIL COMPACTION FROM MOCK UP SHALL BE TESTED IN SOILS TESTING LAB FOR BULK DENSITY; PROVIDE 4 SAMPLES / MOCK UP AND AVERAGE RESULTS.
5. SOIL MOISTURE SHALL BE TESTED FROM MOCK UP USING CONE PENETROMETER & SOIL MOISTURE METER. SAMPLE 4 READINGS TAKEN AT SAME TIME AS BULK DENSITY TESTING.
6. IN THE EVENT SOIL TESTS OF MOCK UP FAIL TO CONFORM TO SPECIFICATIONS, MOCK UP SHALL BE RECONSTRUCTED AND RETESTED.
7. PROTECT MOCK UP DURING INSTALLATION OF REMAINING SOIL. APPROVED MOCK UPS SHALL BE USED TO CALIBRATE PENETROMETER READINGS.




MN Zoological Garden
Waterfront Renewal Project
and Macaque Exhibit Remodel
13000 Zoo Blvd
Apple Valley, MN 55124

MINNESOTA ZOO

MN Zoological Board
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Apple Valley, MN 55124

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Minneapolis, MN 55402-2455
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Landscape Consultant:
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510 Marquette Avenue South, Suite 900
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Tel 612.338.0713

Exhibit Consultant:
MOORE IACOFANO & GOLTSMAN
119 Pine Street, Suite 400
Seattle, Washington 98101
Tel 206.323.5326

Technology & Security Consultant:
TRUE NORTH
140 3rd Street South
Stillwater, MN 55082
Tel 651.430.2772

KEY PLAN

REVISIONS

| NO. | DESCRIPTION | DATE |
|---|---|---|

FILE LOG

| ACTIVITY | BY |
|---|---|
| Manager | SC |
| Designer | SC JH |
| Drafter | JHND |
| Check | JMANDLER |

I hereby certify that this document was prepared by me or under my direct supervision and that I am a duly licensed Landscape Architect under the laws of the State of Minnesota.

NAME JEFF MOBERWEN
REGISTRATION # 43041
SIGNATURE DATE 12/12/25

Project No. 23-202

SOILS PLANS

LP200

CONSTRUCTION DOCUMENTS

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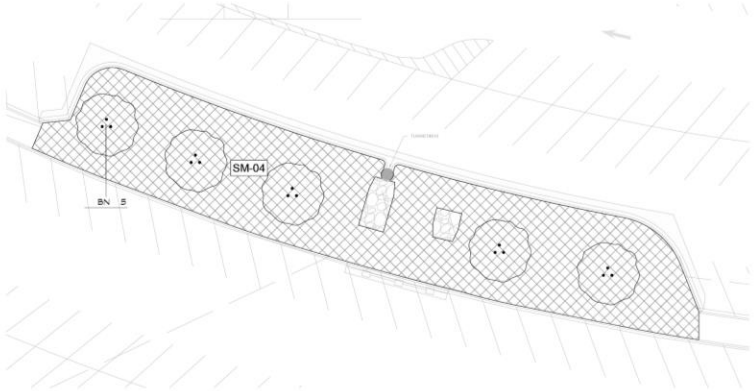
DF/

# S.2 SECONDARY SITES

| | Scientific Name | Common Name | % of Mix | Seeds/ Sq Ft | PLS lbs/ac | Bloom Season |
|---|---|---|---|---|---|---|
| **Grasses:** | Andropogon gerardii | Big Bluestem | 9.00 | 2.98 | 0.81 | |
| | Calamagrostis canadensis | Blue-joint Grass | 0.30 | 2.78 | 0.03 | |
| | Elymus virginicus | Virginia Wild Rye | 18.00 | 2.50 | 1.62 | |
| | Glyceria striata | Fowl Manna Grass | 3.50 | 10.41 | 0.32 | |
| | Leersia oryzoides | Rice Cutgrass | 10.00 | 11.24 | 0.90 | |
| | Panicum virgatum | Switchgrass | 4.75 | 2.20 | 0.43 | |
| | Sorghastrum nutans | Indian Grass | 16.00 | 6.35 | 1.44 | |
| | Spartina pectinata | Prairie Cordgrass | 7.00 | 1.53 | 0.63 | |
| **Sedges/Rushes:** | Carex scoparia | Pointed Broom Sedge | 0.50 | 1.39 | 0.05 | |
| | Carex stipata | Awl-fruited Sedge | 0.75 | 0.84 | 0.07 | |
| | Carex vulpinoidea | Fox Sedge | 2.00 | 5.36 | 0.18 | |
| | Scirpus atrovirens | Green Bulrush | 0.50 | 7.60 | 0.05 | |
| | Scirpus cyperinus | Woolgrass | 0.25 | 14.05 | 0.02 | |
| **Forbs:** | Anemone canadensis | Canada Anemone | 0.20 | 0.05 | 0.02 | Spring |
| | Asclepias incarnata | Rose Milkweed | 4.50 | 0.71 | 0.41 | Summer |
| | Bidens cernua | Nodding Beggarstick | 1.50 | 1.74 | 0.14 | Summer |
| | Boltonia asteroides | False Aster | 1.00 | 5.29 | 0.09 | Fall |
| | Desmodium canadense | Showy Tick-trefoil | 3.00 | 0.55 | 0.27 | Summer |
| | Eutrochium maculatum | Joe-pye Weed | 0.50 | 1.99 | 0.05 | Summer |
| | Eupatorium perfoliatum | Boneset | 0.50 | 4.13 | 0.05 | Fall |
| | Helenium autumnale | Sneezeweed | 0.80 | 3.44 | 0.07 | Fall |
| | Hypericum pyramidatum | Great St. Johnswort | 0.25 | 1.57 | 0.02 | Summer |
| | Liatris pycnostachya | Prairie Blazing Star | 1.25 | 0.45 | 0.11 | Summer |
| | Lythrum alatum | Winged Loosestrife | 0.20 | 6.25 | 0.02 | Summer |
| | Mimulus ringens | Monkey Flower | 0.15 | 11.40 | 0.01 | Summer |
| | Monarda fistulosa | Wild Bergamot | 0.50 | 1.16 | 0.05 | Summer |
| | Ratibida pinnata | Yellow Coneflower | 1.25 | 1.24 | 0.11 | Summer |
| | Silphium perfoliatum | Cup Plant | 2.25 | 0.09 | 0.20 | Summer |
| | Solidago rigida | Stiff Goldenrod | 1.00 | 1.36 | 0.09 | Fall |
| | Sparganium eurycarpum | Giant Burreed | 2.00 | 0.03 | 0.18 | Summer |
| | Symphyotrichum novae-angliae | New England Aster | 0.75 | 1.64 | 0.07 | Fall |
| | Thalictrum dasycarpum | Purple Meadow Rue | 0.50 | 0.33 | 0.05 | Summer |
| | Verbena hastata | Blue Vervain | 1.00 | 3.07 | 0.09 | Summer |
| | Vernonia fasciculata | Ironweed | 2.75 | 2.18 | 0.25 | Summer |
| | Veronicastrum virginicum | Culver's Root | 0.40 | 10.58 | 0.04 | Summer |
| | Zizia aurea | Golden Alexanders | 1.20 | 0.44 | 0.11 | Spring |
| | | | 100.00 | 128.91 | 9.00 | |



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# DISCUSSION

GUIDELINES@B3MN.ORG