

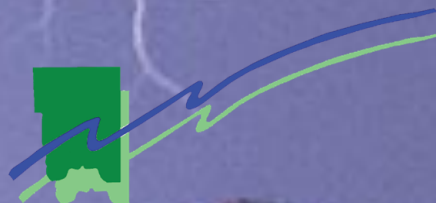
Are We Prepared?

*Community Resilience in a
Changing Environment*

June 20, 2017

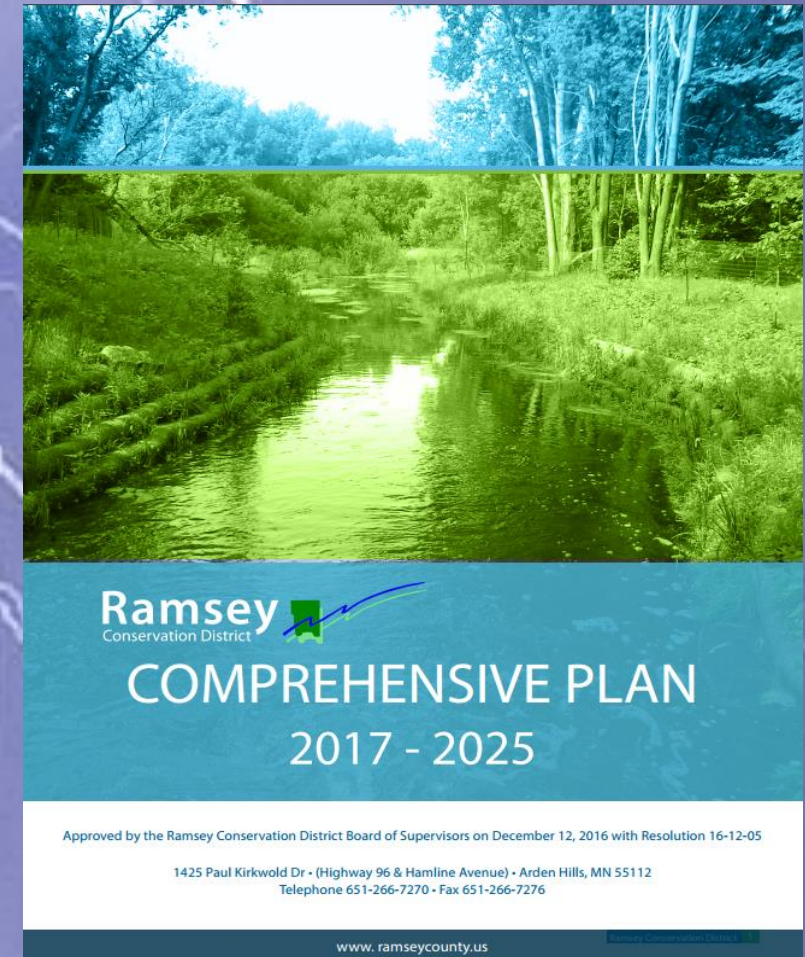
9-11 a.m.

Ramsey
Conservation District



Why this topic? Why now?

- Ramsey Conservation District's Comprehensive Plan 2017-2025
 - 7 Objectives Identified
 - Including **'Adapting to Climate Variabilities and Minimizing Flooding'**



Today's Speakers



- Pete Boulay, *Assistant State Climatologist with the MN State Climate Office*
- Melissa Lewis, *Assistant Section Manager at the Minnesota Board of Water and Soil Resources*
- Bruce Jacobson, *Senior Research Fellow at the Minnesota Design Center*



Weather Trends

Pete Boulay | Climatologist, EWR State Climatology
Office

Ramsey Conservation Forum June 20, 2017

Today

1. Trends
2. Some items to bear in mind
(e.g., climate variability vs trends)



Stormy Skies over Maplewood
Courtesy: MNDNR State Climatology Office

1. Where our climate stands now and where the science tells us it's going
2. Focus on Ramsey Co and Minnesota

Minnesota's most pronounced trends

1. Minnesota is becoming warmer and wetter
 - **Major shift observed**
2. Cold temperatures are increasing fastest
 - **Rapid loss in cold extremes**
3. Extreme rainfall increasing
 - **More and larger “big” events**

Trends: 1. MN Getting Warmer and Wetter



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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



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Search



Home > Climate Monitoring > Climate at a Glance

May Global Release: Mon, 19 Jun 2017, 11:00 AM EDT

Climate at a Glance

Climate Monitoring

State of the Climate

Temp, Precip, and Drought

Climate at a Glance

Extremes

Societal Impacts

Snow and Ice

Teleconnections

GHCN Monthly

Monitoring References

[Time Series](#) | [Mapping](#) | [Data Information](#) | [Background](#)

NCEI added Alaska climate divisions to its nClimDiv dataset on Friday, March 6, 2015, coincident with the release of the February 2015 monthly monitoring report. For more information on this data, please visit the Alaska Climate Divisions FAQ.

Time Series

U.S.

Globe

Choose from the options below and click "Plot" to create a time series graph.

Please note, Degree Days are not available for Agricultural Belts, NWS Regions, Alaska and Cities; Palmer Indices are not available for NWS Regions, Alaska and Cities.

Parameter: Average Temperature

Time Scale: 1-Month

Month: May

Start Year: 1895

End Year: 2017

State/Region: Minnesota

Climate Division/City: Statewide

Options

Display Base Period

Start: 1901 End: 2000

Display Trend

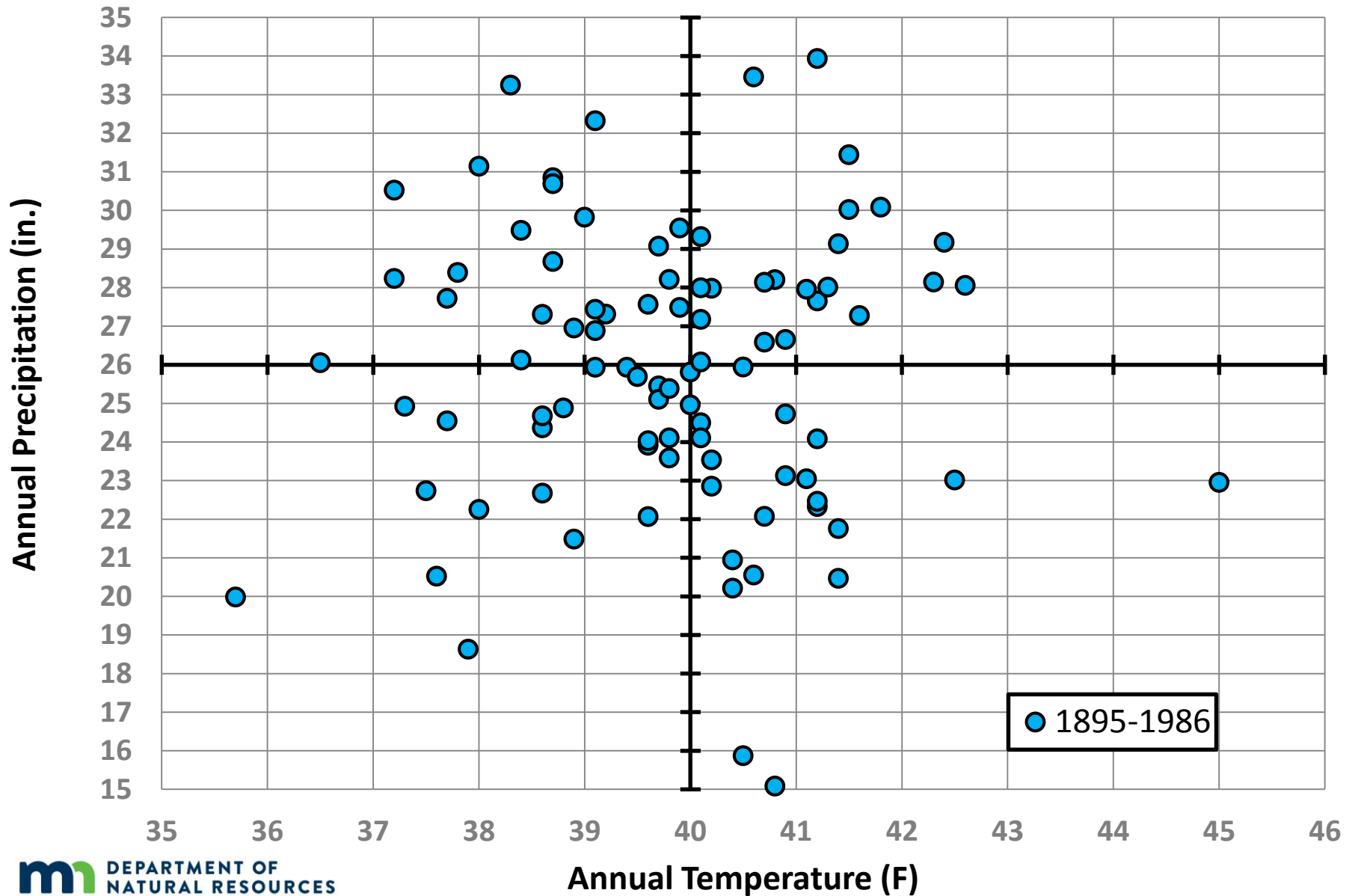
per Decade per Century

Start: 1895 End: 2017

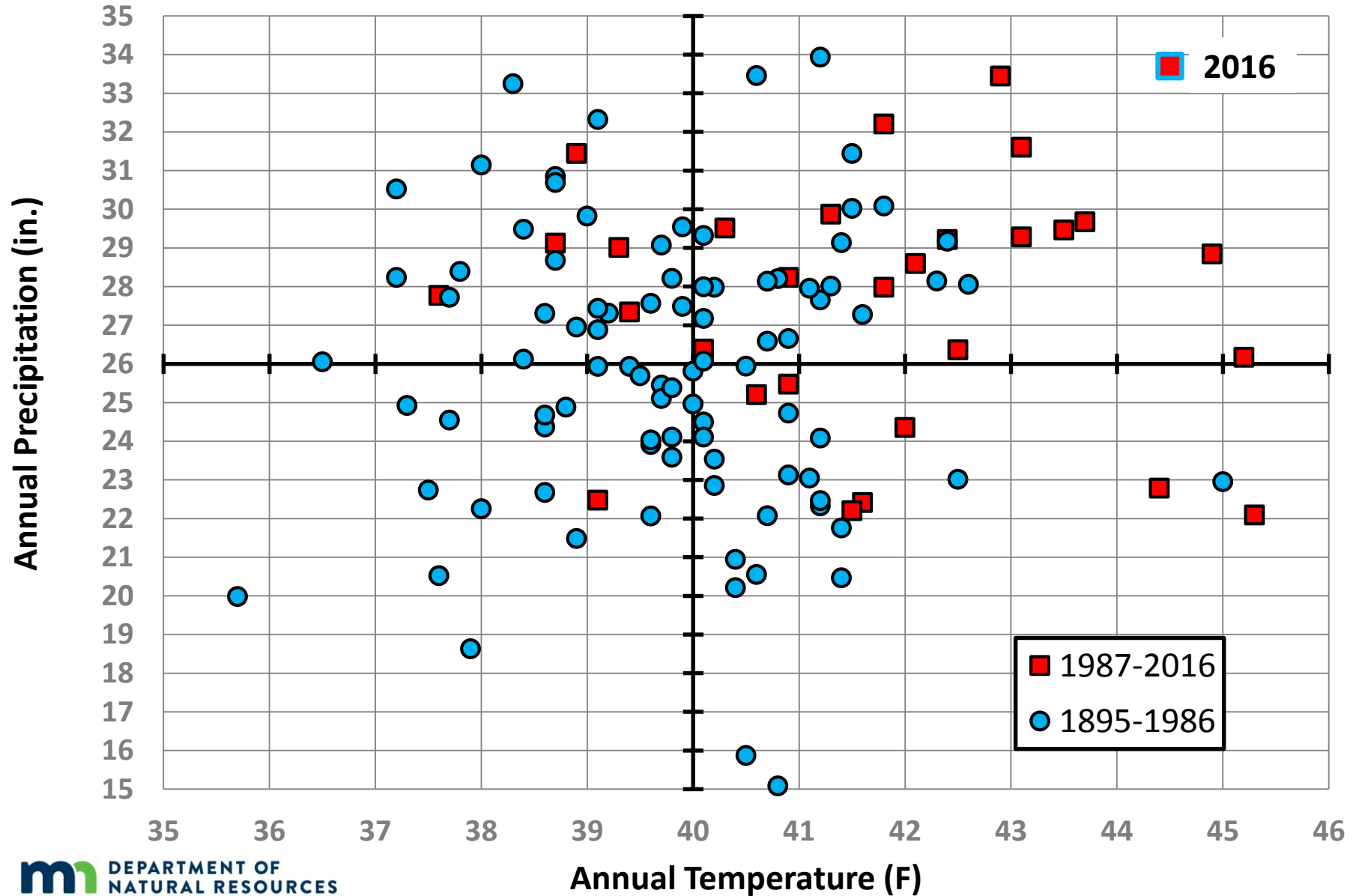
Smoothed Time Series

Binomial Filter LOESS

Minnesota Average Temperature and Precipitation

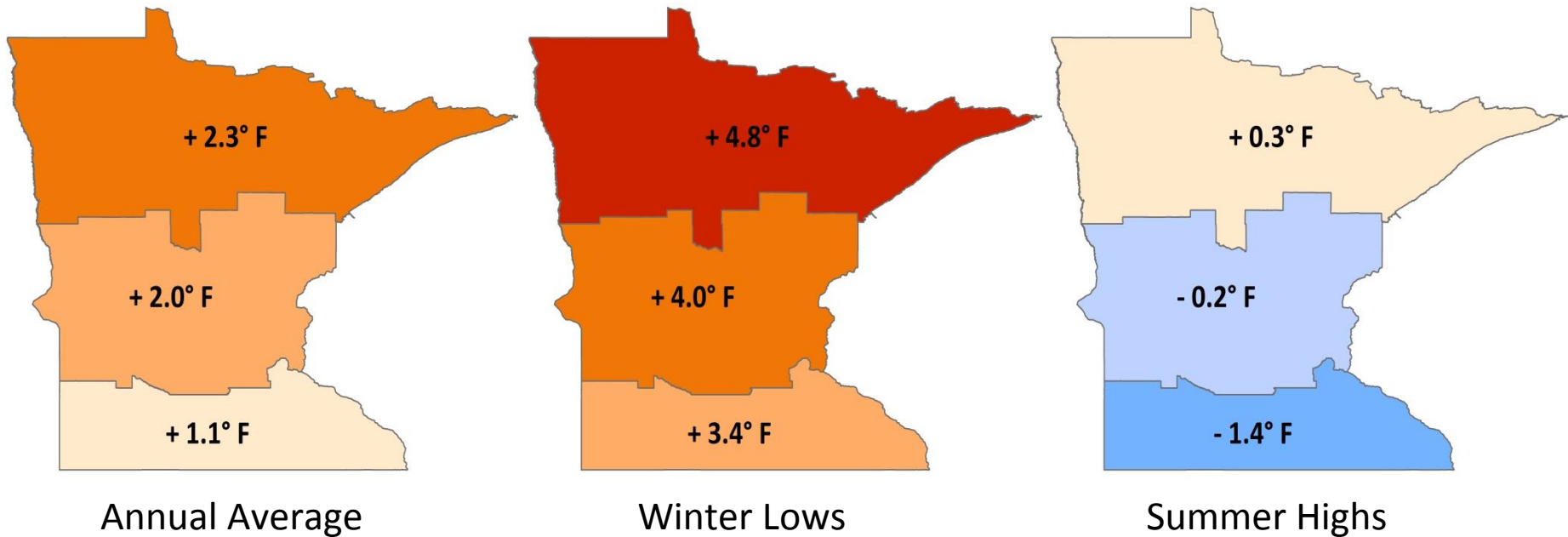


Minnesota Average Temperature and Precipitation



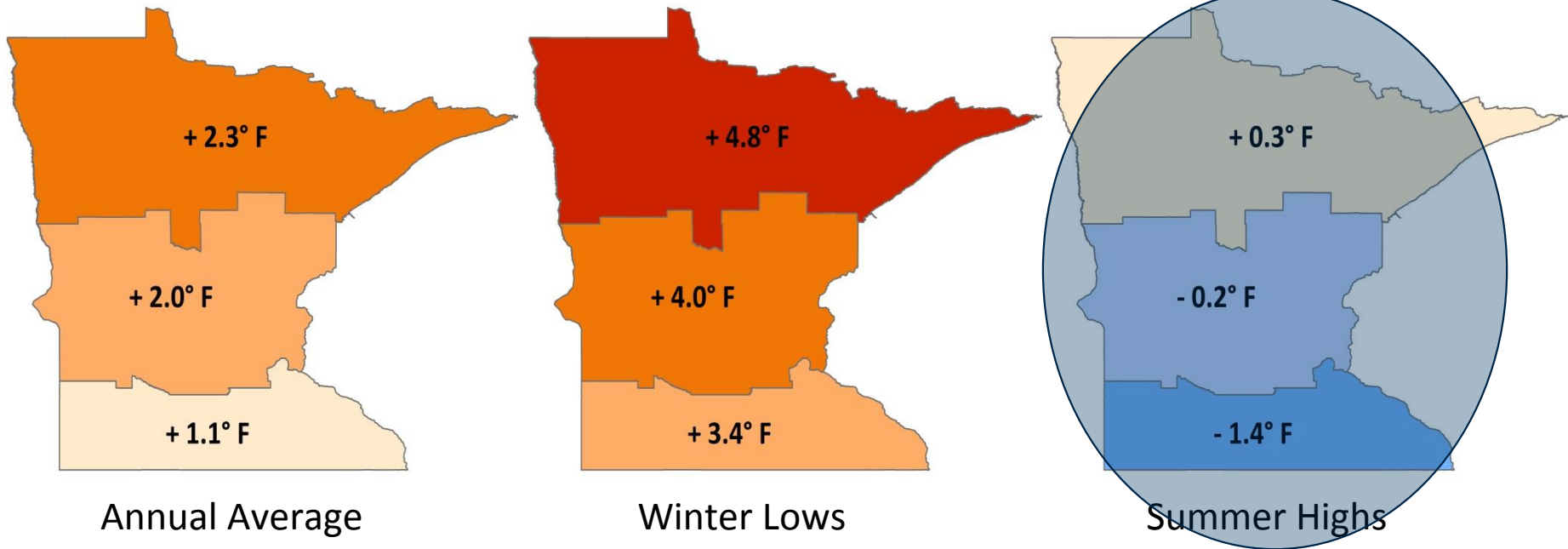
Temperature changes vary across regions, seasons, and times of day

Total temperature change, 1895-2015



Temperature changes vary across regions, seasons, and times of day

Total temperature change, 1895-2015



Trends: 2. Cold Temperatures Rising Fastest

- Rapid winter warming
- Loss of cold weather (more so than gain in warm weather)
- Fewer cold extremes

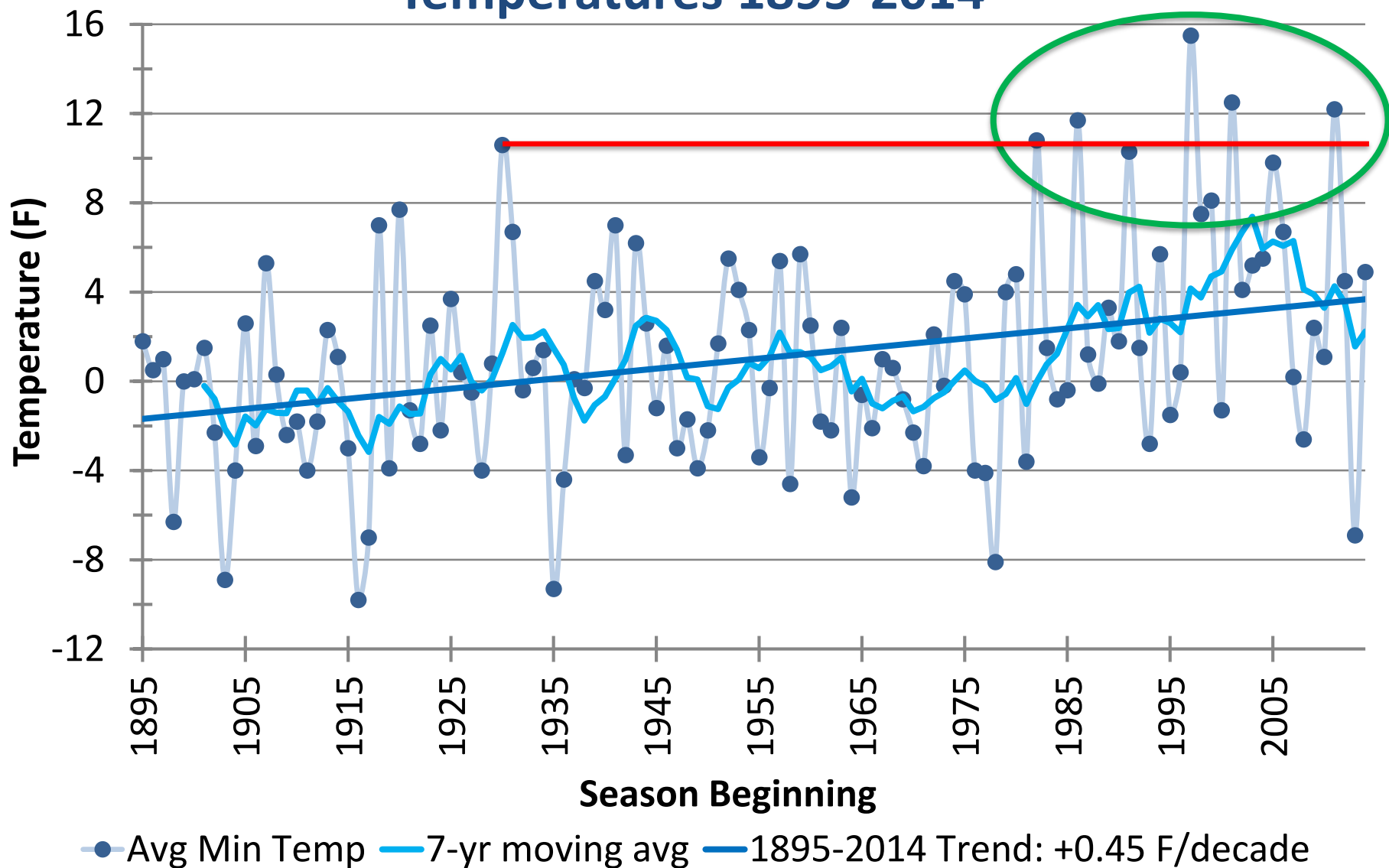
Feb 2, 1996 Record Cold
Courtesy: MNDNR State Climatology Office



Winter warming 10x faster than summer

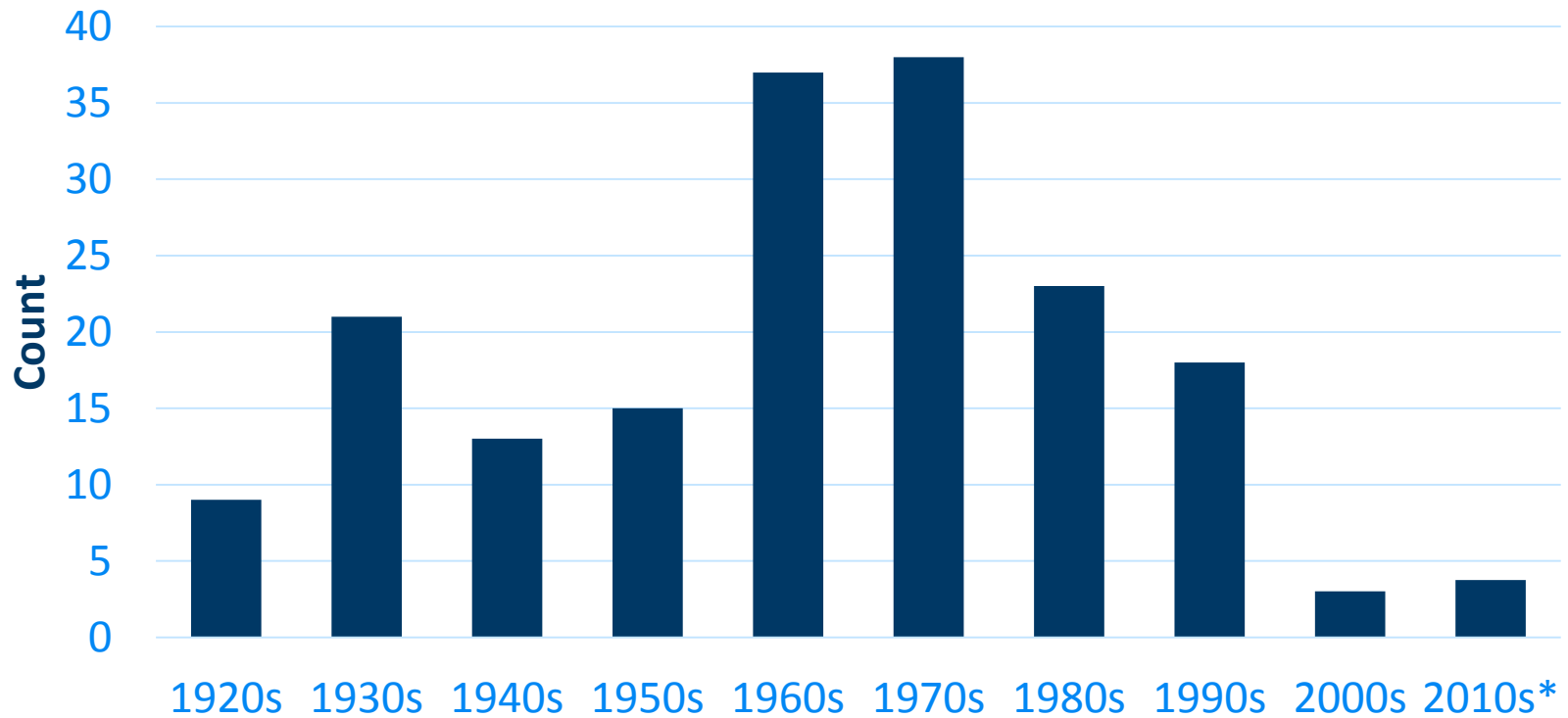
Season	Temperature Metric	Avg. change <u>per decade</u> since 1895	Avg. change <u>per decade</u> since 1970
Winter (Dec - Feb)	Seasonal Avg.	+ 0.36°F	+ 1.00°F
Summer (Jun - Aug)	Seasonal Avg.	+ 0.14°F	+ 0.10°F

Minnesota Average Winter Minimum Temperatures 1895-2014



Loss of -20 F Lows in The Twin Cities

Count of Minimum Temps -20F or Lower, by Decade
Minneapolis/ St. Paul



* Prorated

Trends: 3. Extreme Rainfall Increasing

- Increases in frequency of heavy rainfall
- Increases in magnitude of heaviest rainfall
- Increased occurrence of large areal coverage extreme rainfall events



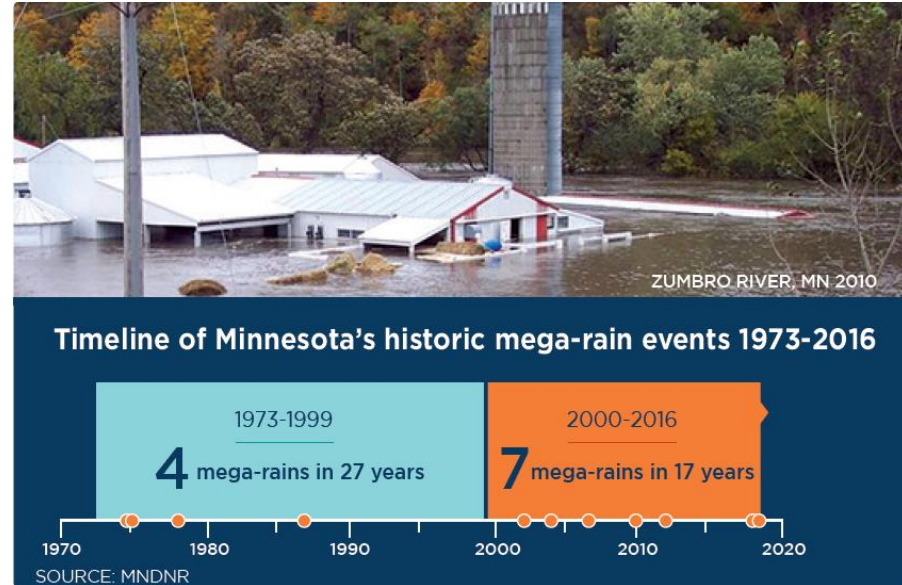
July 1993: Another Heavy Rain
Courtesy: MNDNR State Climatology Office

All Minnesota seasons getting wetter

Season	Total precipitation change, 1895-2016
Winter (Dec - Feb)	+ 6% (0.13")
Spring (Mar – May)	+15% (0.93")
Summer (Jun - Aug)	+11% (1.21")
Fall (Sep – Nov)	+11% (0.66")
Growing Season (May – Sep)	+ 9% (1.55")
Annual	+12% (2.98")

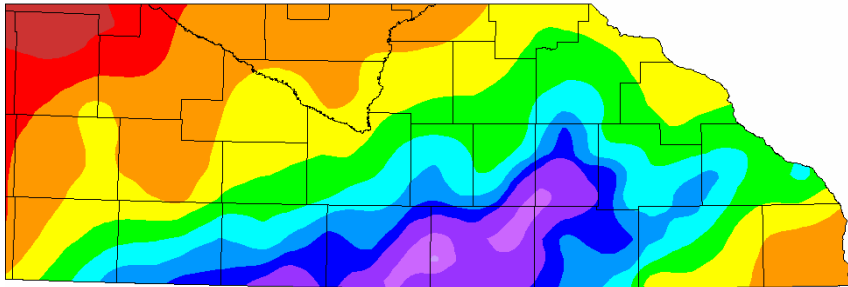
Extreme rainfall: “Mega” rain events (6” + over 1000 sq mi) are increasing

- June 28-29, 1975, Northwest MN
- June 30-July 2, 1978, Southeast MN
- July 23-24, 1987, Twin Cities Superstorm
- **June 9-10, 2002, Northern MN**
- **September 14-15, 2004 Southern MN**
- **August 18-20, 2007, Southern MN**
- **September 22-23, 2010 Southern MN**
- **June 19-20, 2012, Northeast MN**
- **July 11-12, 2016, East-central MN**
- **August 10-11, 2016, Central and Southeast MN**

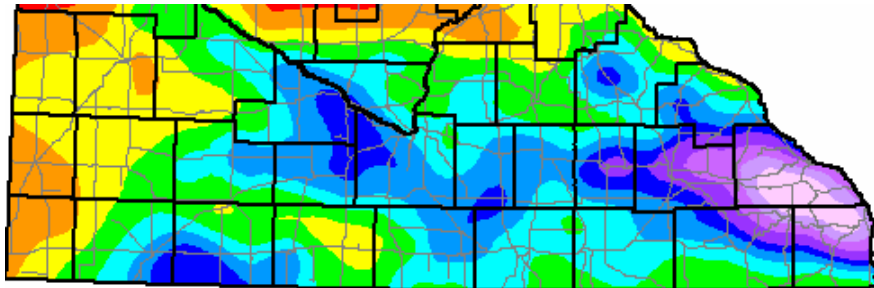


Source: 2017 MN EQB Environment and Energy Report Card (via DNR)

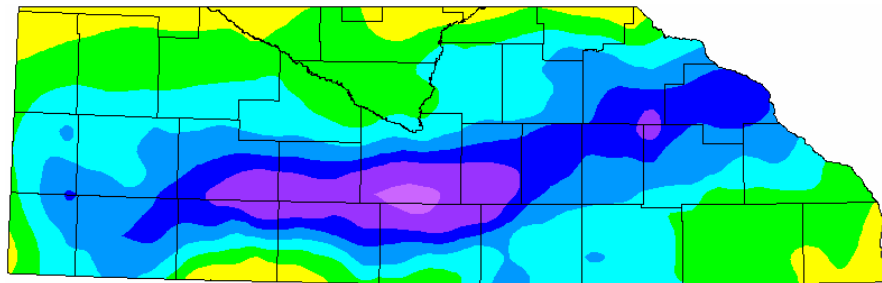
Extreme rainfall: “Mega” rain events (6” + over 1000 sq mi) are increasing



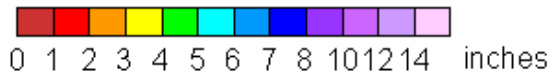
Sep 14-15,
2004



Aug 18-20,
2007



Sep 22-23,
2010



At this rate areas that add up to the size of southern Minnesota would be covered by 10” in 100 years.

Note points near the Waseca-Freeborn Border that got 7” or more in each of the 3 years.

Source: MN DNR State Climatology Office

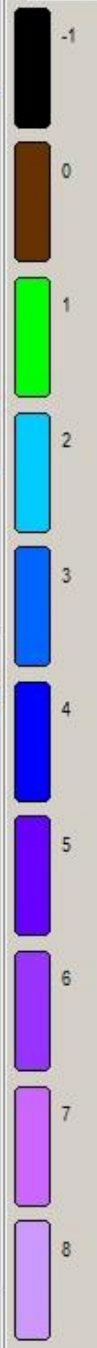
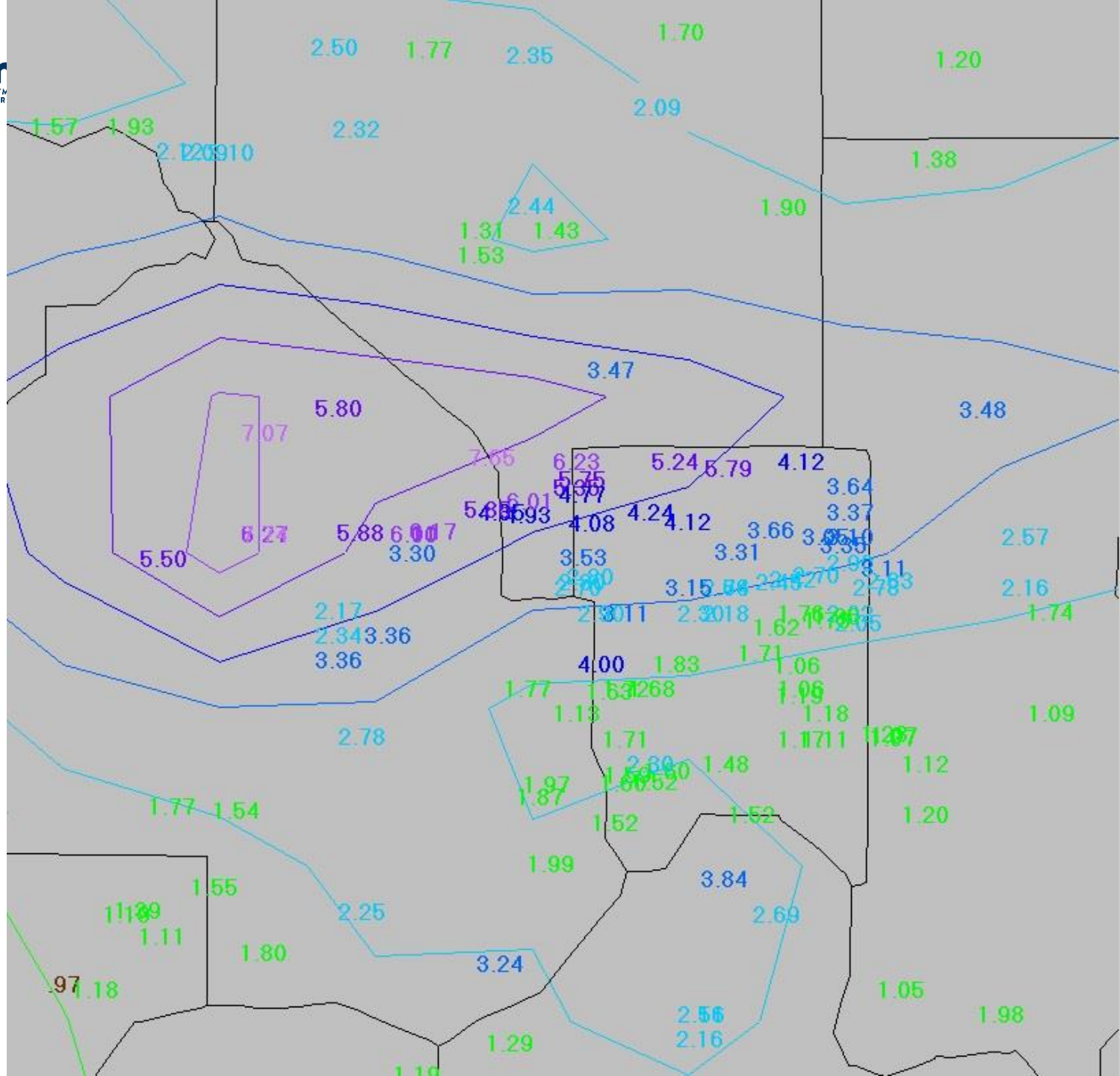
Heavy Rains of September 20-22, 2016

- Was one of seven heavy rain events in 2016
- Hit northwest Twin Cities and south central Minnesota
- Indoor ice rink in Waseca had six inches of standing water
- Loon Lake in Waseca flowed into streets,
- Was ***Not*** a Mega Rain Event!

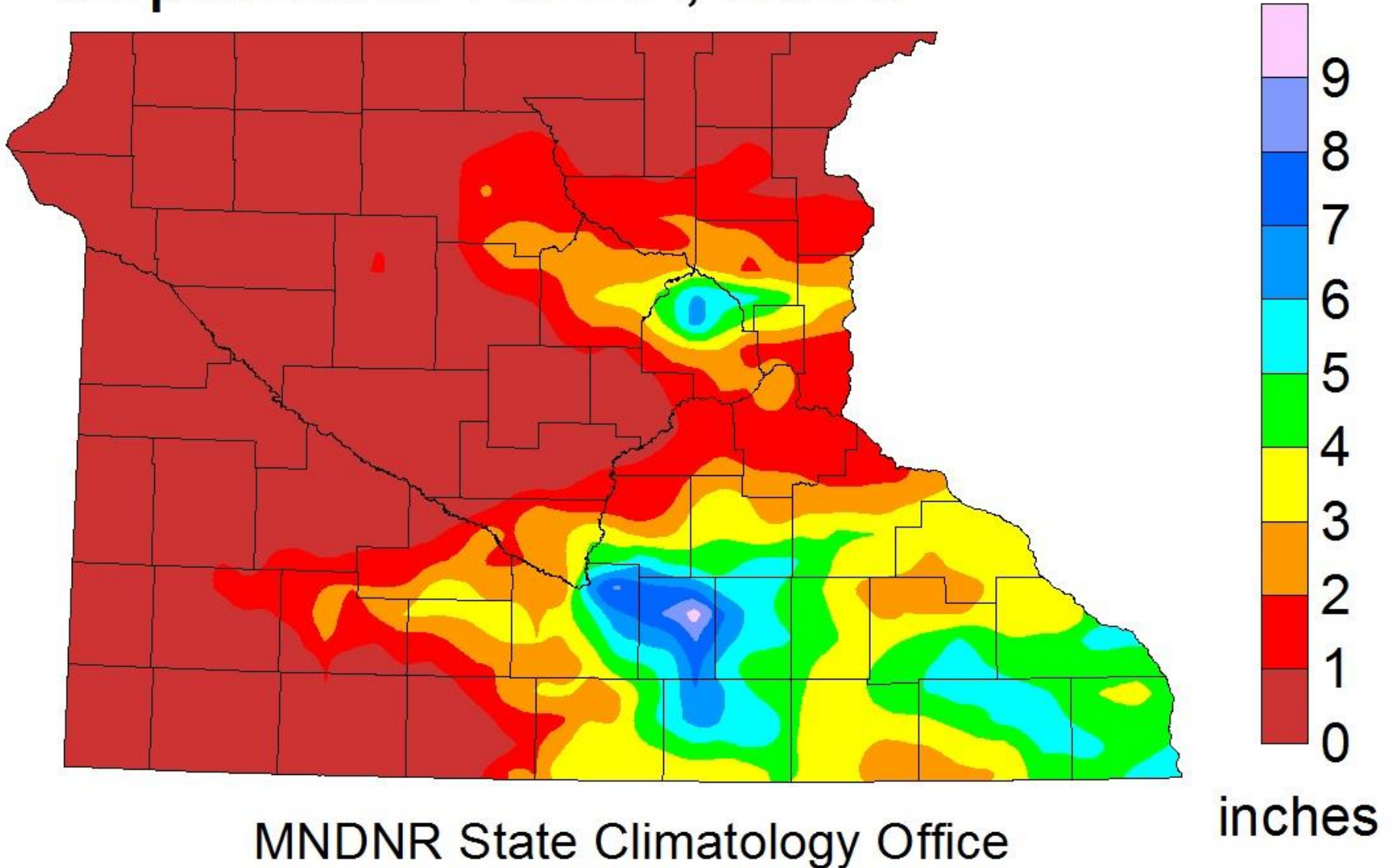
Stormy Skies: Sept 20, 2016

Courtesy: NMDNR State Climatology Office

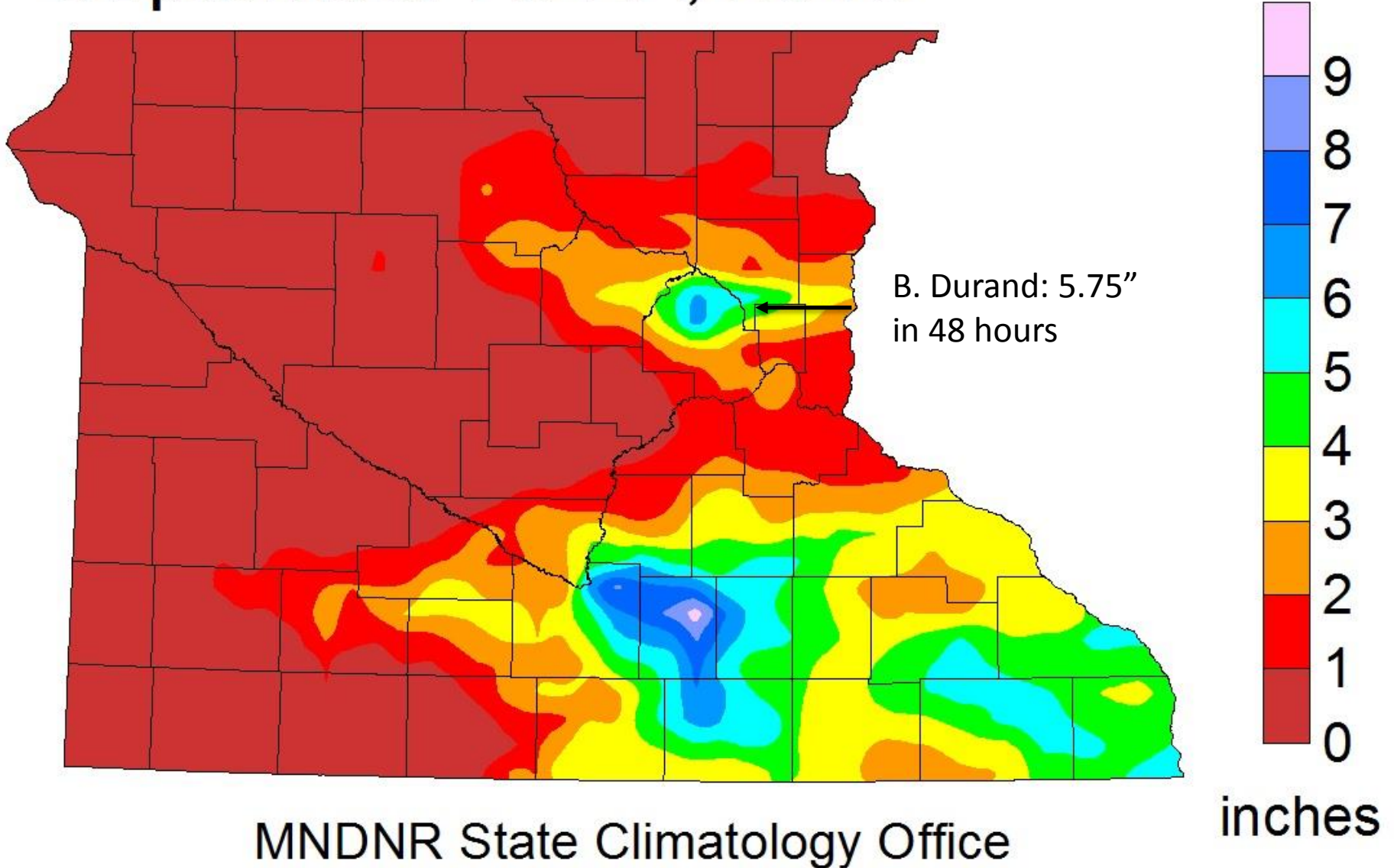




Precipitation Total September 20-22, 2016



Precipitation Total September 20-22, 2016

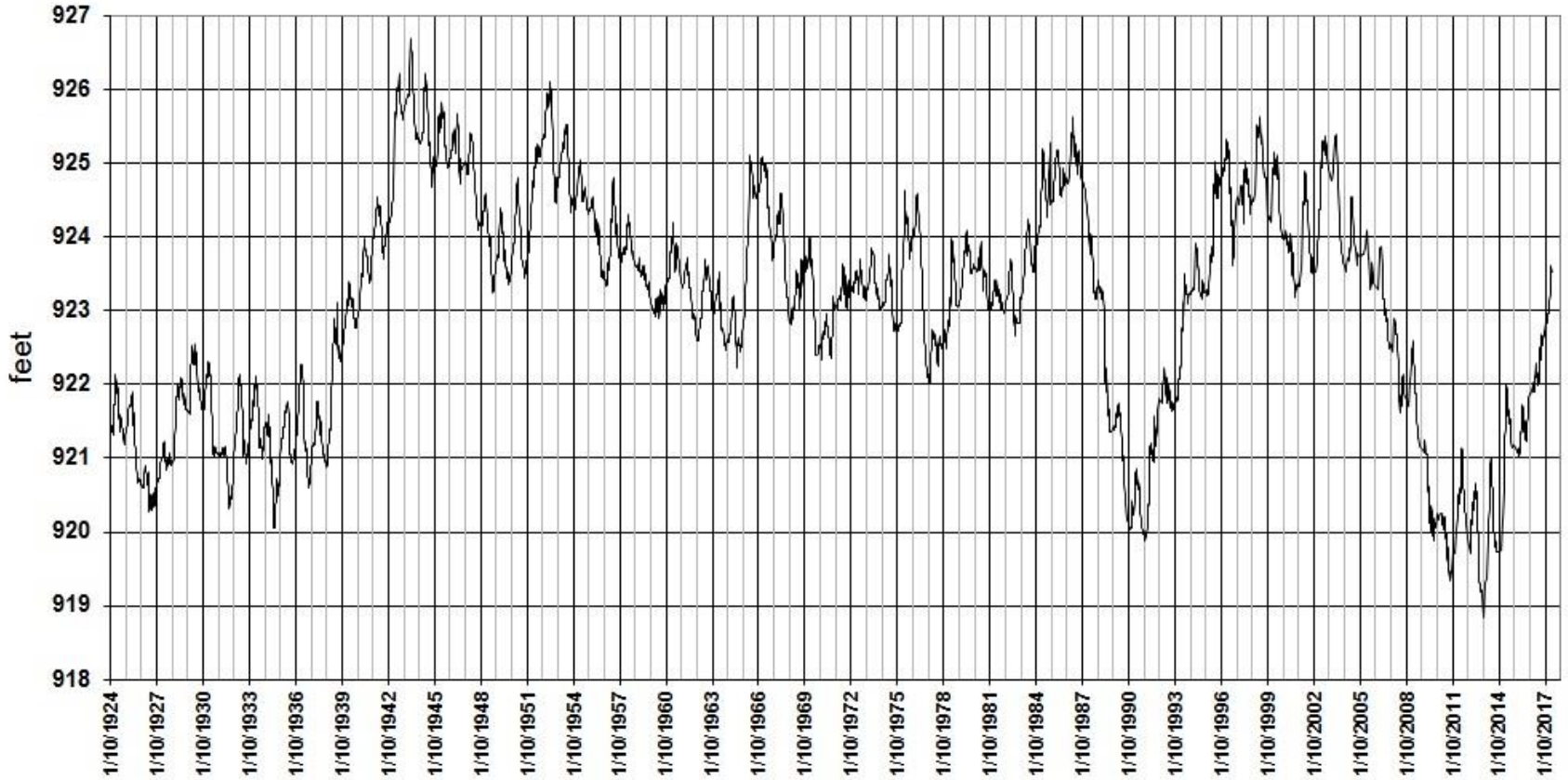




Culvert Blowout in Bass Creek Park: Brooklyn Park

Courtesy: Greg Spoden MNDNR State Climatology Office

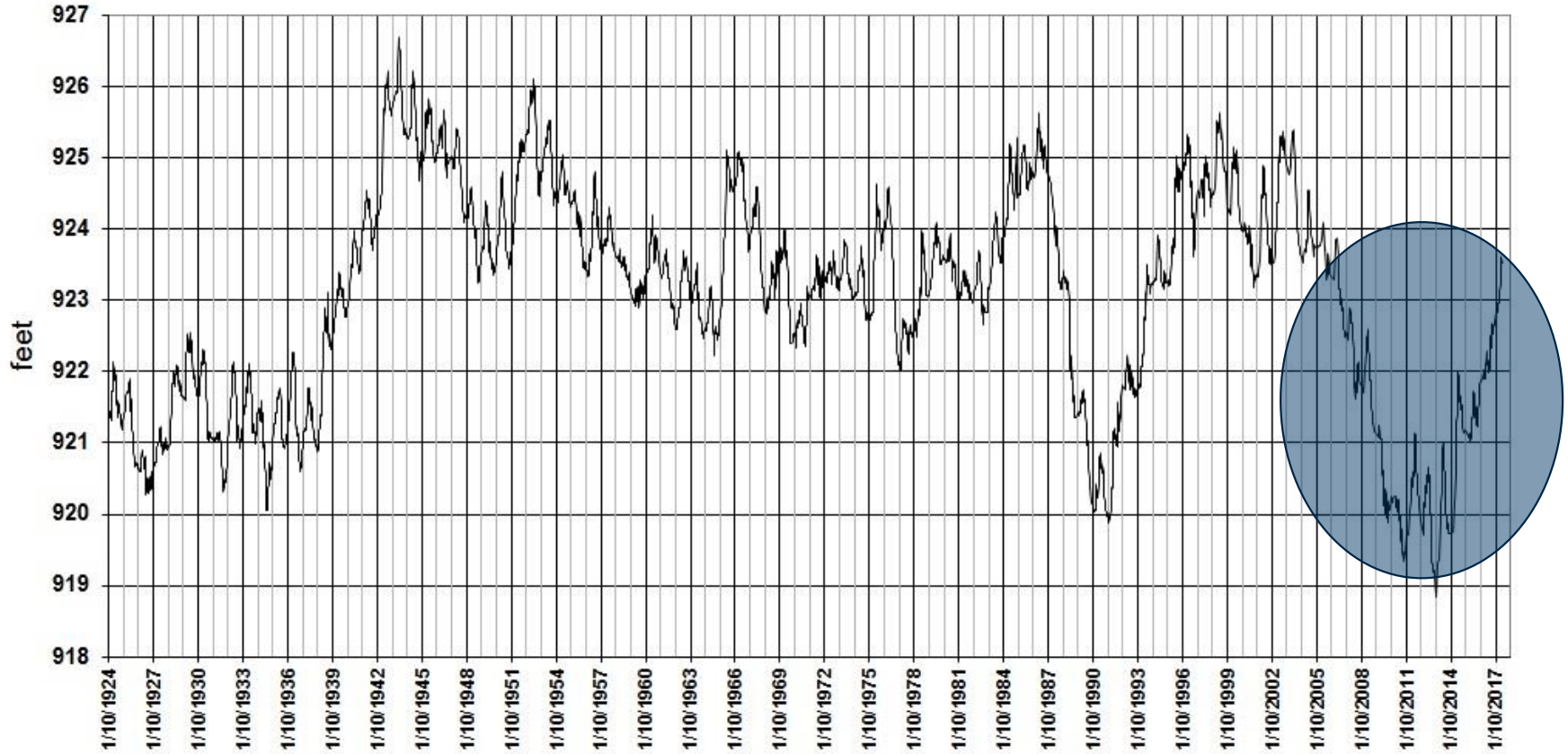
White Bear Lake (OHW 924.89)
recent level 923.54 on 6/16/2017
record low is 918.84 on 1/10/2013



White Bear Lake Levels: 1924 to 2017

Courtesy: MNDNR State Climatology Office

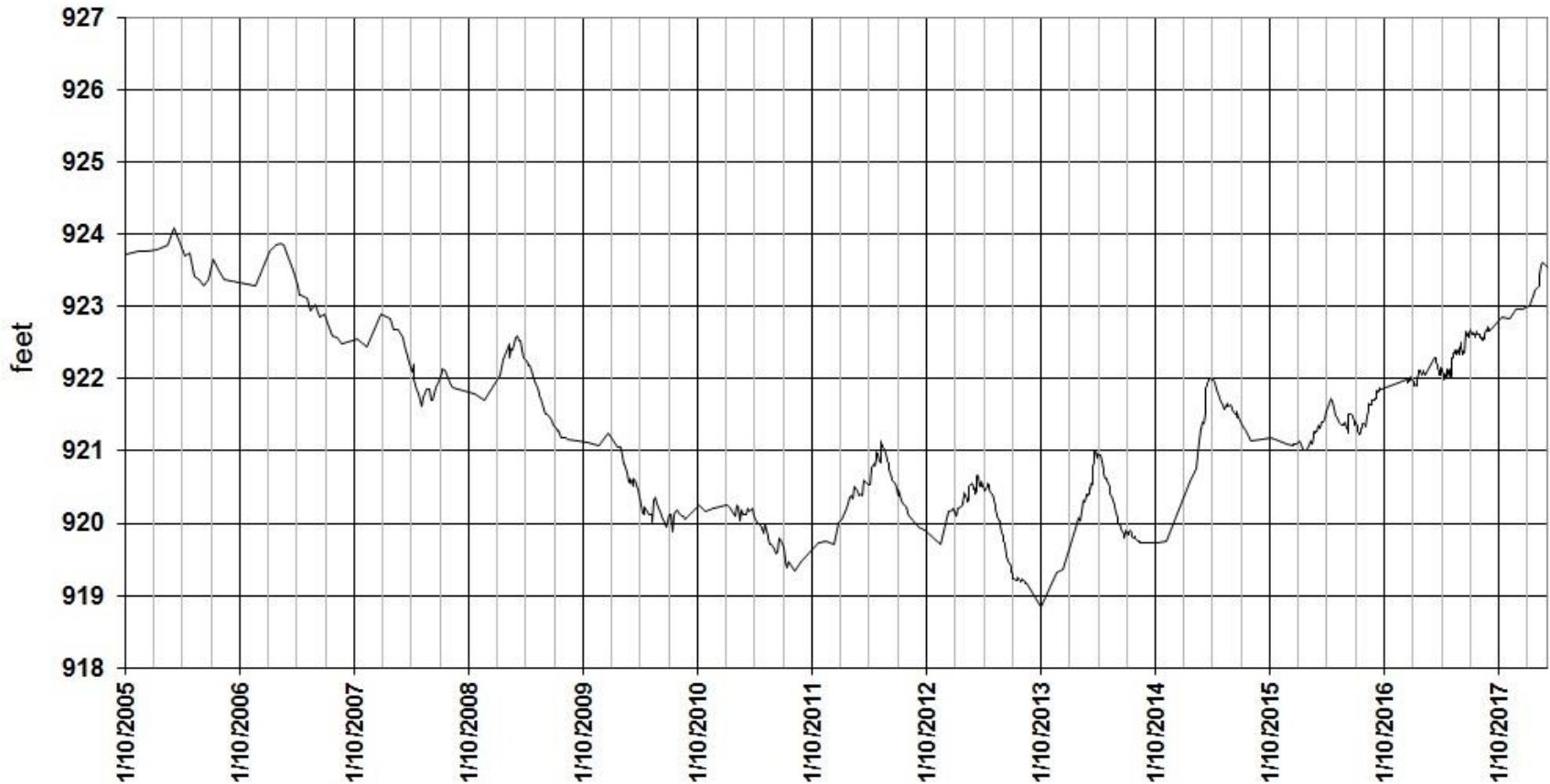
White Bear Lake (OHW 924.89)
recent level 923.54 on 6/16/2017
record low is 918.84 on 1/10/2013



White Bear Lake Levels: 1924 to 2017

Courtesy: MNDNR State Climatology Office

White Bear Lake (OHW 924.89)
recent level 923.54 on 6/16/2017
record low is 918.84 on 1/10/2013



White Bear Lake Levels: 2005 to 2017

Courtesy: MNDNR State Climatology Office



Ramsey Beach at White Bear Lake Open: June 10, 2017

Courtesy: Pete Boulay MNDNR State Climatology Office

In 2016 Waseca Set the Minnesota State Record for the Most Annual Precipitation

Station	2016 Record Precip. Amount	Previous Record (year)
Waseca	56.24"	50.46" (1991)
St. James	52.55"	42.72" (2010)
Harmony	51.71"	47.41" (1983)
Austin	48.35"	46.01" (1993)
Theilman	48.33"	47.20" (2010)
Minnesota City Dam	45.73"	44.29" (1968)
Winona Dam	43.57"	43.27" (1991)
Twin Cities	40.32"	40.15" (1911)

Source: MN DNR State Climatology Office

In Summary

1. Minnesota becoming warmer and wetter
2. Cold conditions warming fastest
3. Extreme rainfall events increasing



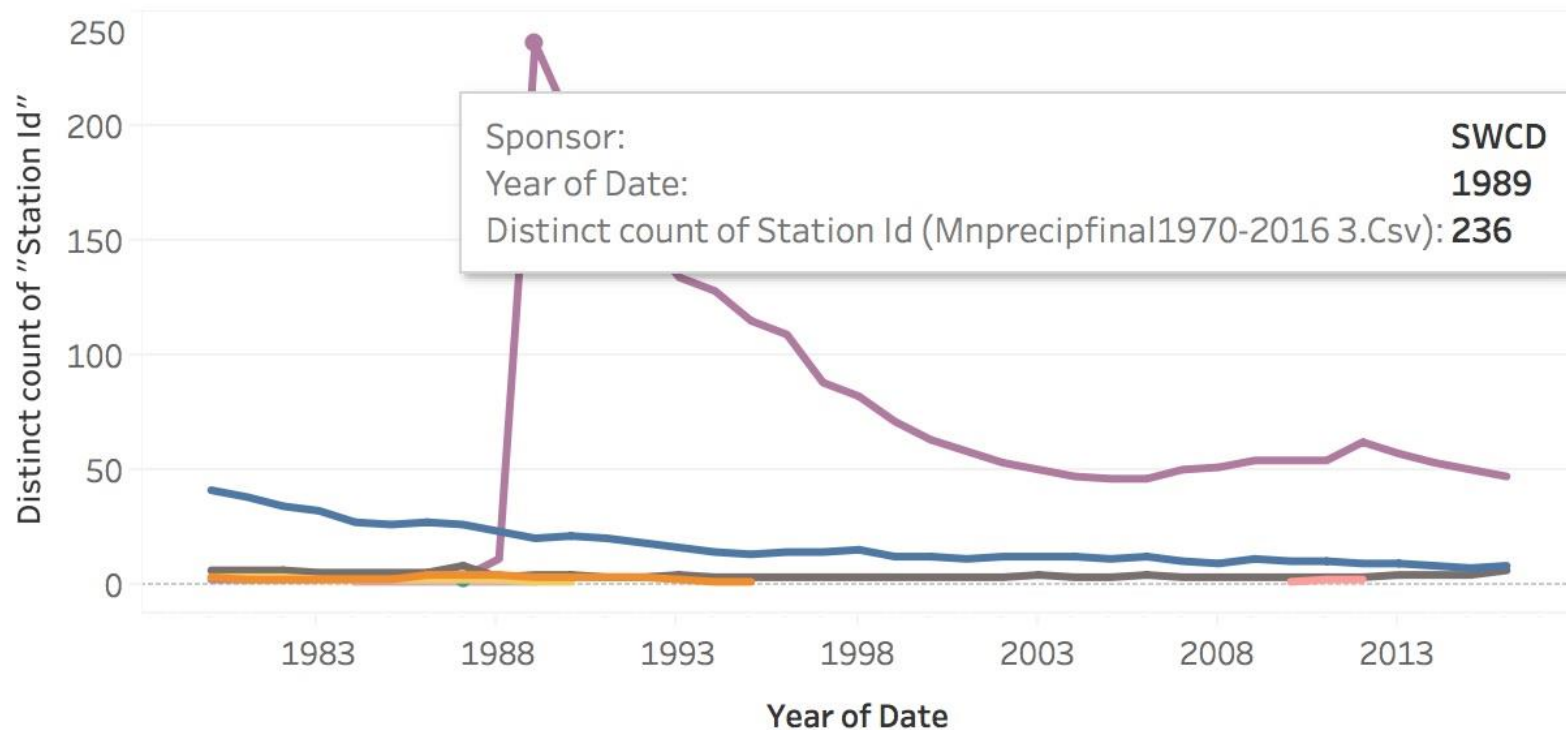
Thunderstorm: Nov 28, 2016

Courtesy: MNDNR State Climatology Office

The Future?

1. Keep on Watching the Weather!

Number of stations over time



Ramsey County SWCD Observers Over Time

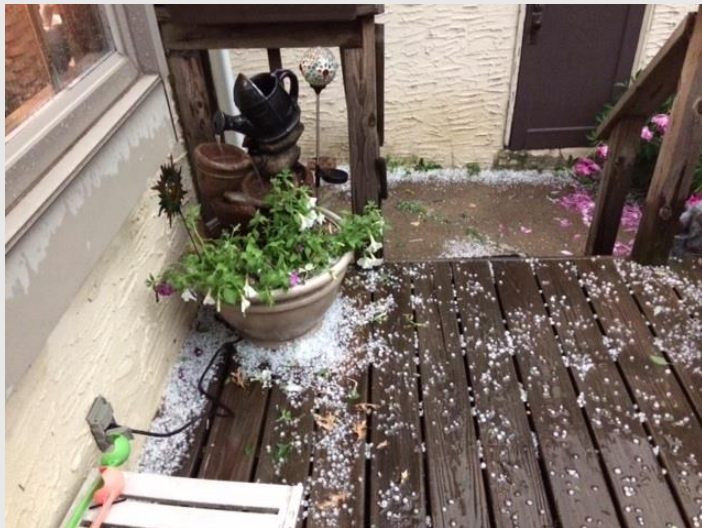
Courtesy: Kirk R. Wythers, U of M

Thank You!

Pete Boulay

Peter.Boulay@state.mn.us

651-296-4214





One Watershed One Plan





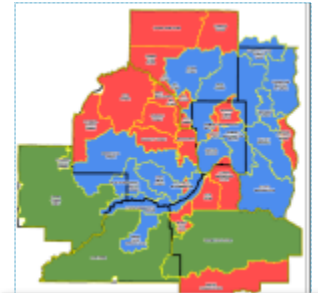
1937: Soil Conservation Law



1955: Watershed Act



1972: Federal Clean Water Act



1982: Metro Surface Water Mgmt. Act



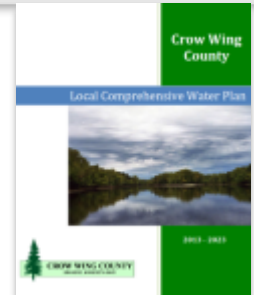
1938: First SWCD formed

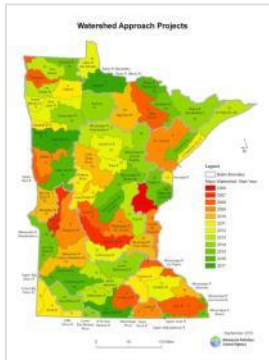


1957: First Watershed District



1987: County Water Management Act





2006: Clean Water Legacy Act



2011: Local Gov't Water Roundtable



2013: Clean Water Accountability Act



2008: Clean Water Land & Legacy



2012: Local water mgmt. coordination



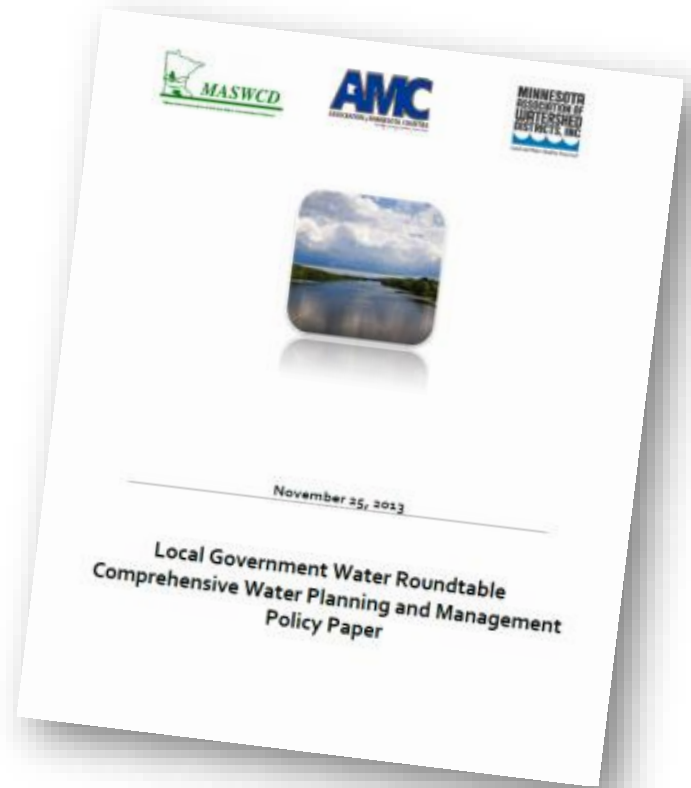
2015: Comprehensive Watershed Management Plans





Local Government Water Roundtable

- 2013 Policy Paper provided foundation
 - Scale (major watersheds)
 - Streamline (statute and programs)
 - Funding (predictable, equitable)





One Watershed One Plan

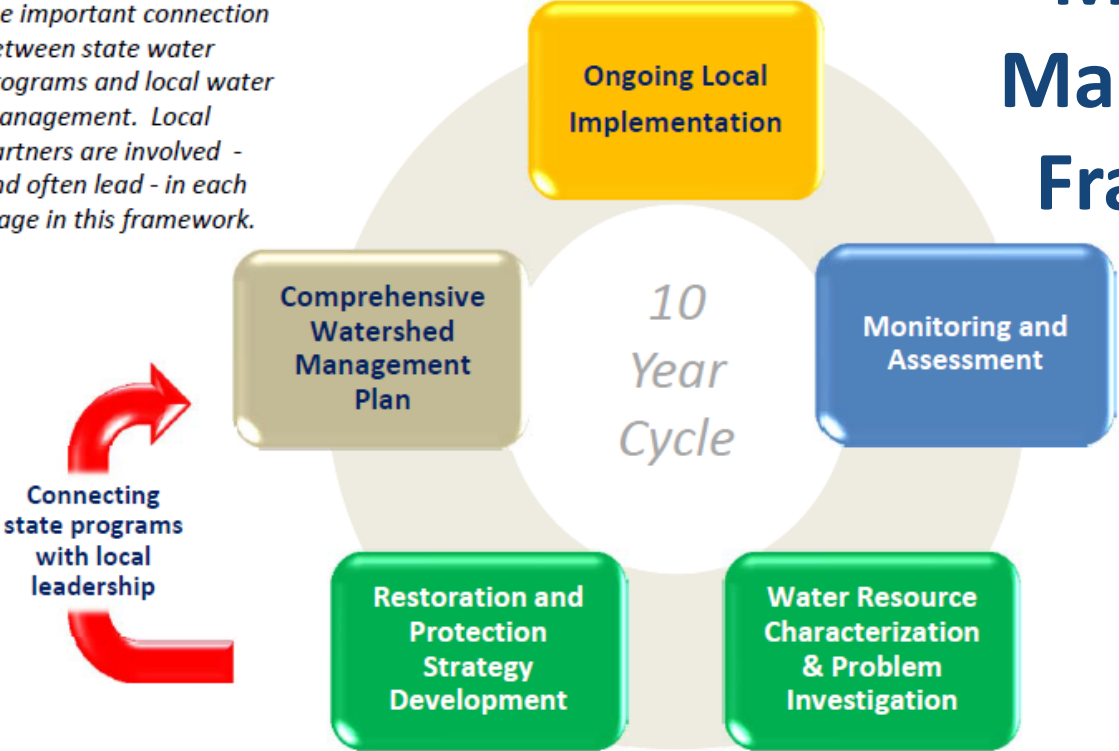


Vision:

Alignment of local water planning with state strategies on major watershed boundaries towards prioritized, targeted and measurable implementation plans.

MN Water Management Framework

The red arrow emphasizes the important connection between state water programs and local water management. Local partners are involved - and often lead - in each stage in this framework.





Guiding Principles

- Leverage long history of water planning to streamline plans
- Leverage streamlined plans to gain efficiency in implementation
- Build off Water Mgmt Framework



One Watershed, One Plan

Guiding Principles



December 18, 2013

Vision: DWSR's vision for One Watershed, One Plan is to align local water planning on major watershed boundaries with state strategies towards prioritized, targeted and measurable implementation plans – the next logical step in the evolution of water planning in Minnesota.

Purpose: The purpose of this document is to further outline the One Watershed, One Plan vision through providing the guiding principles that will direct and influence the program's future policies and procedures.

One Watershed, One Plan will result in plans with prioritized, targeted, and measurable implementation actions that meet or exceed current water plan content standards.

One Watershed, One Plan will set standards for plan content that will be consistent with or exceed the plan approval standards currently in place for local water plans. Most existing water management plans contain adequate inventories of resources and assessment of issues. One Watershed, One Plan will build from this point, with an expanded focus on prioritized, targeted, and measurable implementation of restoration and protection activities. The intent is for these future water plans to use existing plans, local knowledge and other studies and planning documents—including Watershed Restoration and Protection Strategies developed through the Minnesota Pollution Control Agency—to establish plans with clear implementation timelines, milestones, and cost estimates that will address the largest threats and provide the greatest environmental benefit unique to each watershed.

One Watershed, One Plan is not an effort to change local governance.

Local governments have been at the forefront of water management dating back to 1937 with the formation of the State's first soil and water conservation district. One Watershed, One Plan is intended to utilize the existing structures of counties, soil and water conservation districts, watershed districts and Metropolitan watershed management organizations by increasing collaboration and cooperation across political boundaries.

One Watershed, One Plan will strive for a systematic, watershed-wide, science-based approach to watershed management; driven by the participating local governments.

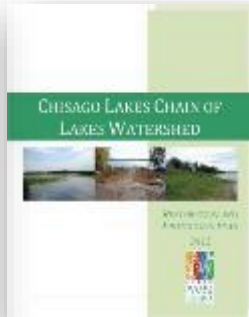
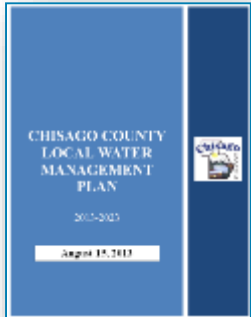
It is important for all communities to take part in managing their watersheds through goal setting, monitoring, restoring and protecting water resources and local habitats and ensuring a good quality of life for all who live, work, and recreate in those spaces. A decided "bottom up" approach for water management—allowing the key discussions of major water resource issues, concerns, problems, goals and objectives and potential solutions to originate and be first fully vetted at the stakeholder level—is envisioned. Expanding involvement and collaboration at the ground-level creates greater buy-in and support at all levels of government.

One Watershed, One Plan will use the state's delineated major watersheds (8-digit hydrologic unit codes or HUC8) as the starting point for defining the preferred state for local watershed management planning.

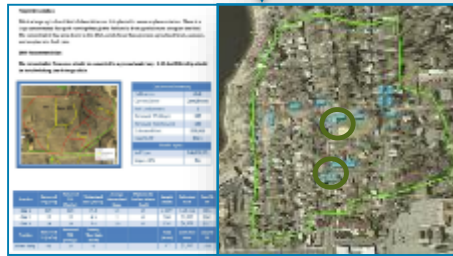
The Local Government Water Roundtable (LGWR), a collaboration between the Association of Minnesota Counties, the Minnesota Association of Watershed Districts, and the Minnesota Association of Soil and Water Conservation Districts, determined it is in the public interest to manage ground and surface water resources from the perspective of watersheds and aquifers and to achieve protection, preservation, enhancement, and restoration of the state's valuable water resources. This determination is consistent with the state's water management policy, furthered through legislation passed in 2012 that provided DWSR with the authority to develop and implement a

GOAL: Watershed Management Plans that:

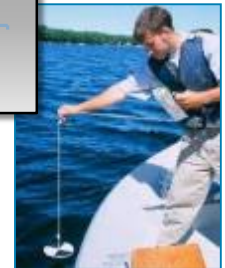
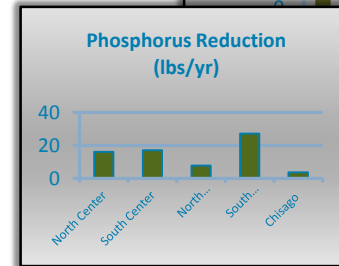
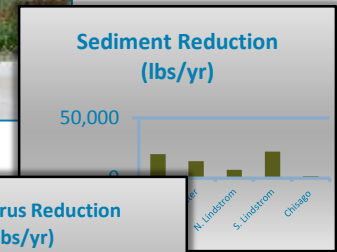
Prioritize areas to focus where implementation matters most.



Target practices within priority areas for on-the-ground action based on sound science.

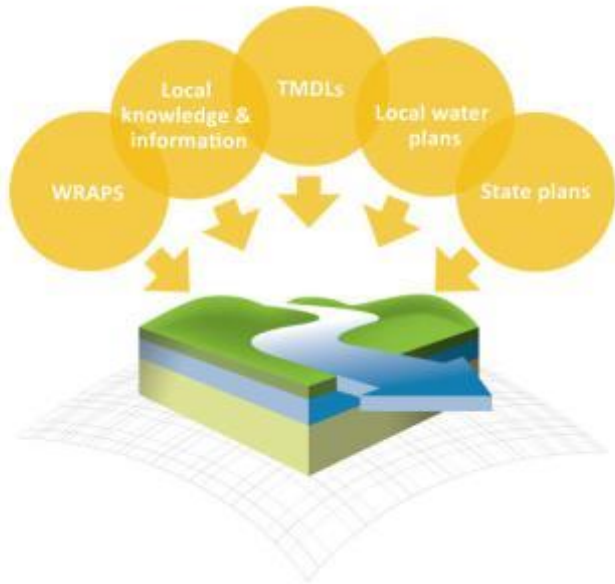


Measurable results that can show pace of progress toward the identified goals.





Operating Procedures & Plan Content Requirements

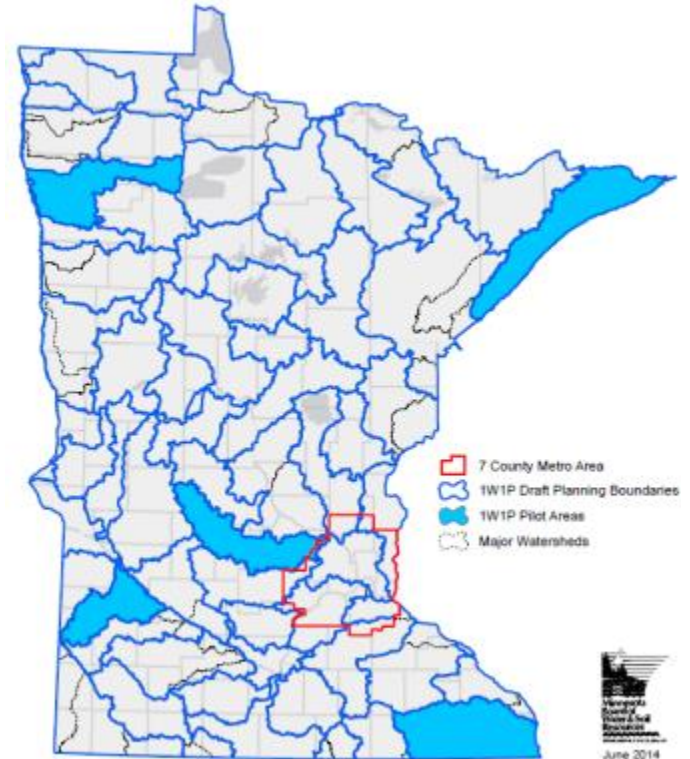


- Operating Procedures outline *how*
- Plan content requirements outline *what*



Pilot Watersheds

- 5 pilot watersheds selected
- Represent multiple areas of state
- Writing watershed-based plans by 2016/2017



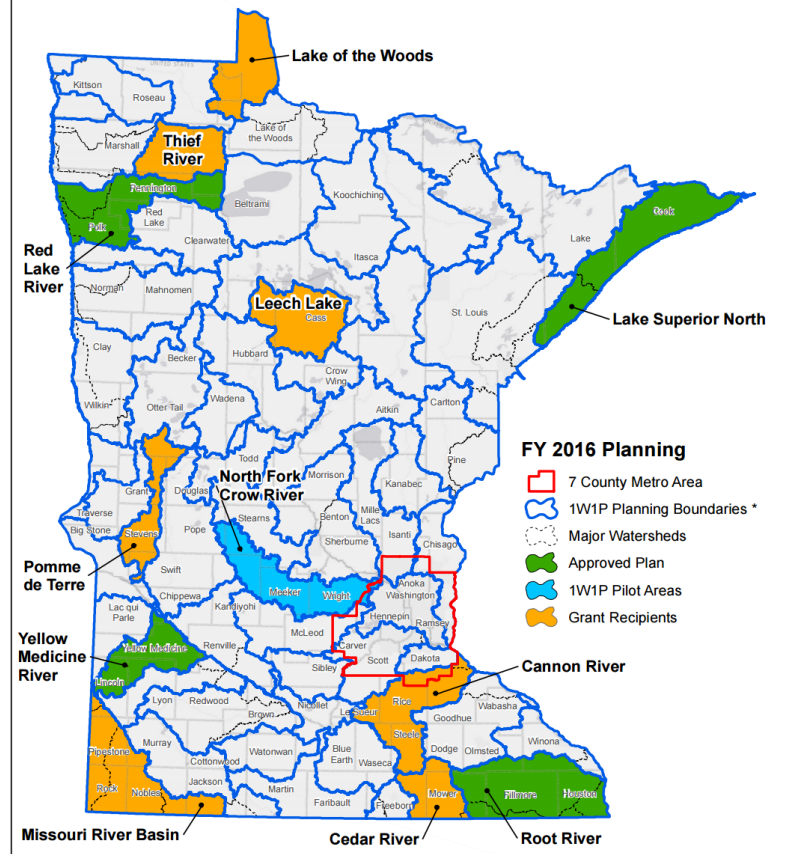
*Not legal boundaries. Intended for planning purposes through One Watershed, One Plan only.





One Watershed, One Plan

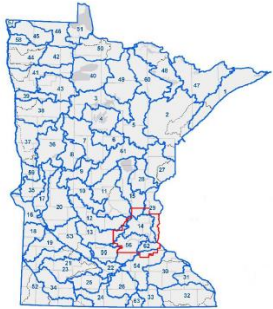
Participating Watersheds



*Not legal boundaries; intended for planning purposes through One Watershed, One Plan only.



Transition Plan
Version 1.0



March 2016
REVIEW DRAFT



Transition Plan

- Legislative goal to transition statewide by 2025
- Board adoption June 2016



Transition Plan



- Guiding principles maintained
- Purpose is to identify incentives for participation



Transition Plan

The Board of Water and Soil Resources will encourage initiation of comprehensive watershed management planning (One Watershed, One Plan) by:

1. Coordinating plan development with existing water plan processes and schedules.
2. Maintaining geographic distribution of planning efforts.
3. Providing planning grants as available.
4. Emphasizing and prioritizing planning that addresses the high-level state priorities identified in the Nonpoint Priority Funding Plan.

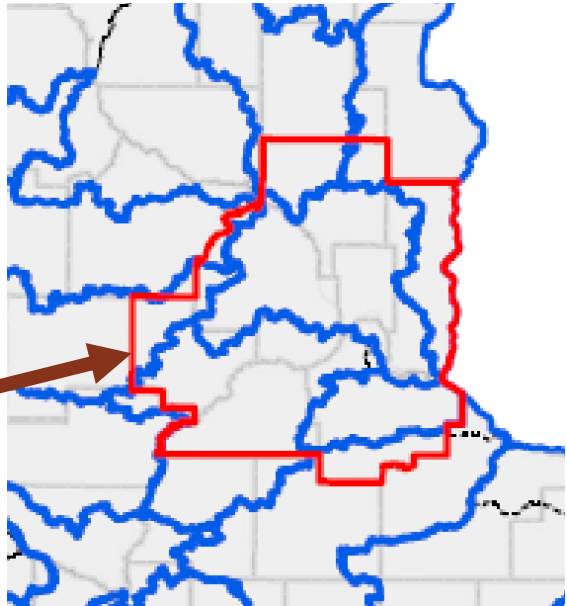
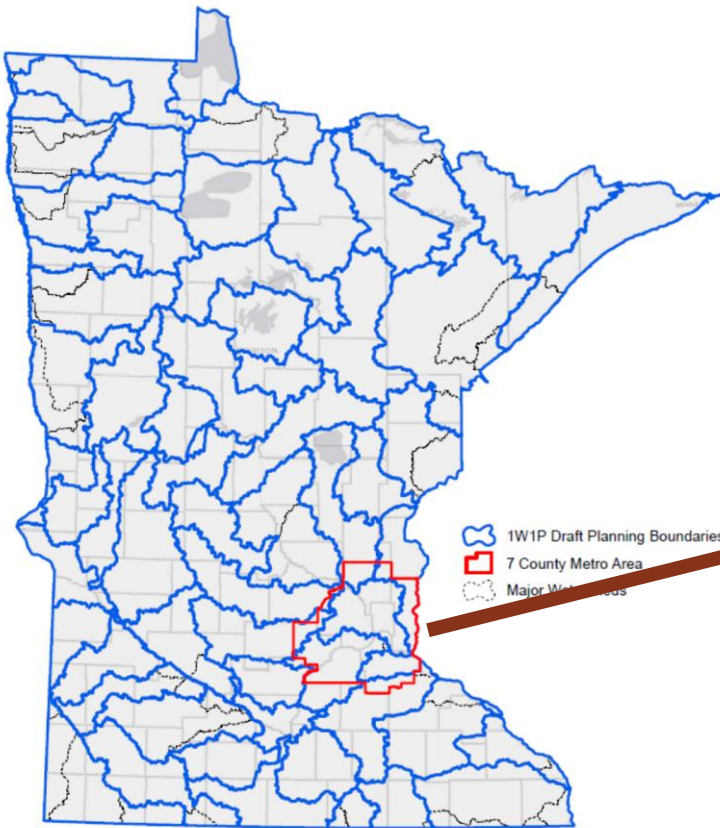


What about Ramsey County?

Table 2: Participation Requirements by Local Government

	Participation Requirement
Soil & Water Conservation District	Required (Metro* SWCDs optional)
County	Required (Metro* counties optional)
103D Watershed District	Required
103B (Metro*) Watershed District or Watershed Management Organization	Optional
Municipality (city or township)	Optional

*Metro means seven-county metropolitan area.



*Not legal boundaries; intended for planning purposes through One Watershed, One Plan only.



What about Community Resilience and a Changing Environment?



One Watershed, One Plan

Plan Content Requirements

March 23, 2016



Purpose: This document outlines plan content requirements for developing comprehensive watershed management plans, as per Minnesota Statutes §103B.801, through the One Watershed, One Plan Program.

Introduction

This document contains specific content requirements for drafting a comprehensive watershed management plan through the One Watershed, One Plan program. Full operating procedures for developing the plan - including initiating the planning process through review, approval, and adoption - are contained in the *One Watershed, One Plan Operating Procedures* document.

The following [Guiding Principles](#) provided sideboards and direction in the plan content requirements outlined in this document:

- One Watershed, One Plan will result in plans with prioritized, targeted, and measurable implementation actions that meet or exceed current water plan content standards.
- One Watershed, One Plan will strive for a systematic, watershed-wide, science-based approach to watershed management, driven by the participating local governments.
- Plans developed within One Watershed, One Plan should embrace the concept of multiple benefits in the development and prioritization of implementation strategies and actions.
- One Watershed, One Plan planning and implementation efforts will recognize local commitment and contribution.
- One Watershed, One Plan is not intended to be a one-size-fits-all model.

The requirements in this document are also supported by the vision of the Local Government Water Roundtable that future watershed-based plans will have sufficient detail that local government units can, with certainty, indicate a pollutant of concern in a water body, identify the source(s) of the pollutant, and provide detailed projects that address that particular source. This vision also includes a future of limited wholesale updates to watershed-based plans; with a streamlined process to incorporate collected data, trend analysis, changes in land use, and prioritization of resource concerns into the watershed-based plan; and an emphasis on watershed management and implementation through shorter-term work plans and budgeting. This vision includes acknowledging and building off of existing plans and data (including local and state plans and data), as well as existing local government services and capacity.





PUBLIC PLACES and DISTRICT STORMWATER MANAGEMENT

RAMSEY CONSERVATION DISTRICT – CONSERVATION FORUM

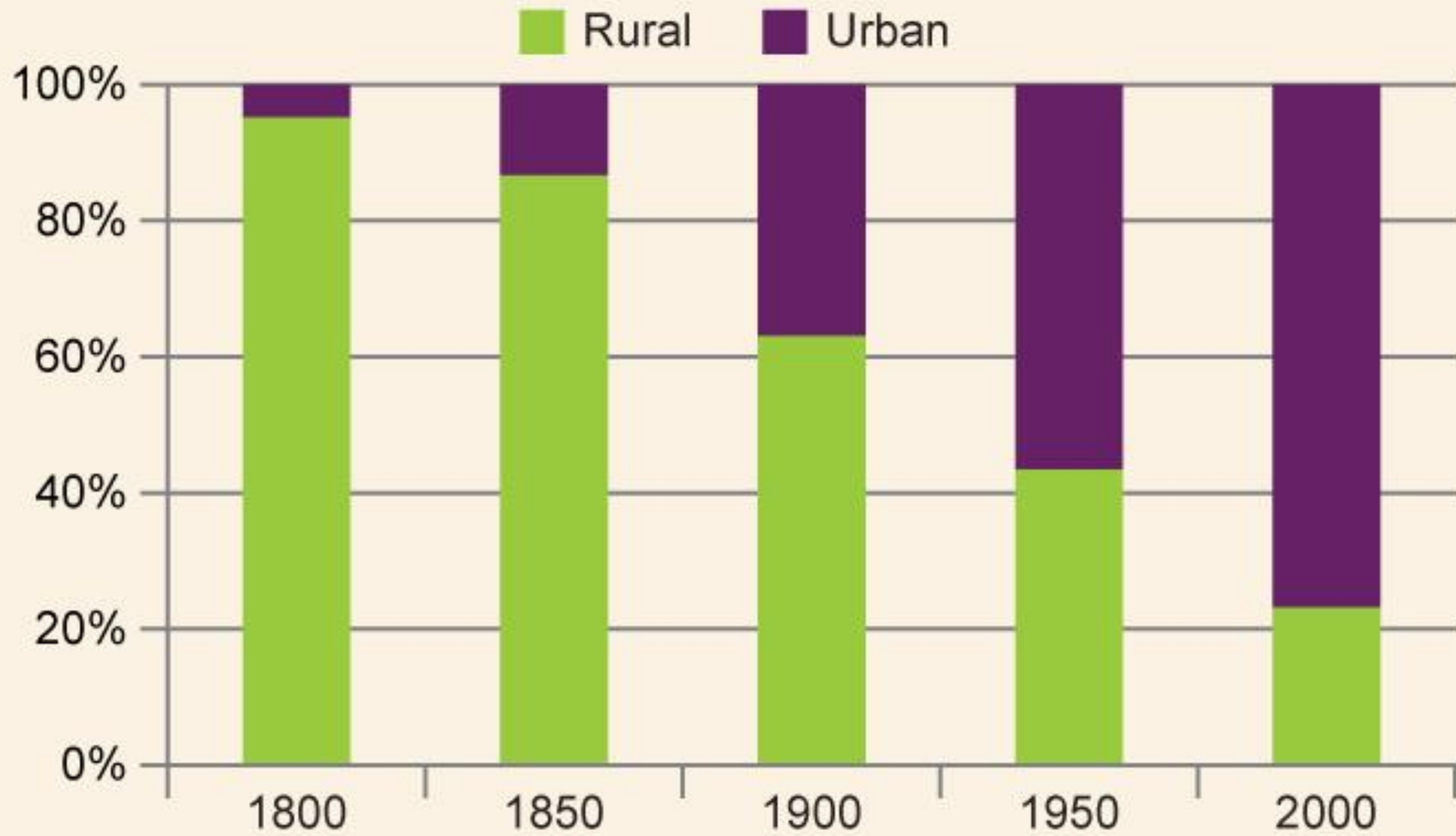
June 20, 2017

A photograph of a stone wall in a forest. The wall is constructed from irregular, light-colored stones and runs diagonally across the frame. The background is filled with dense green foliage and trees. A semi-transparent grey text box is overlaid on the lower portion of the image.

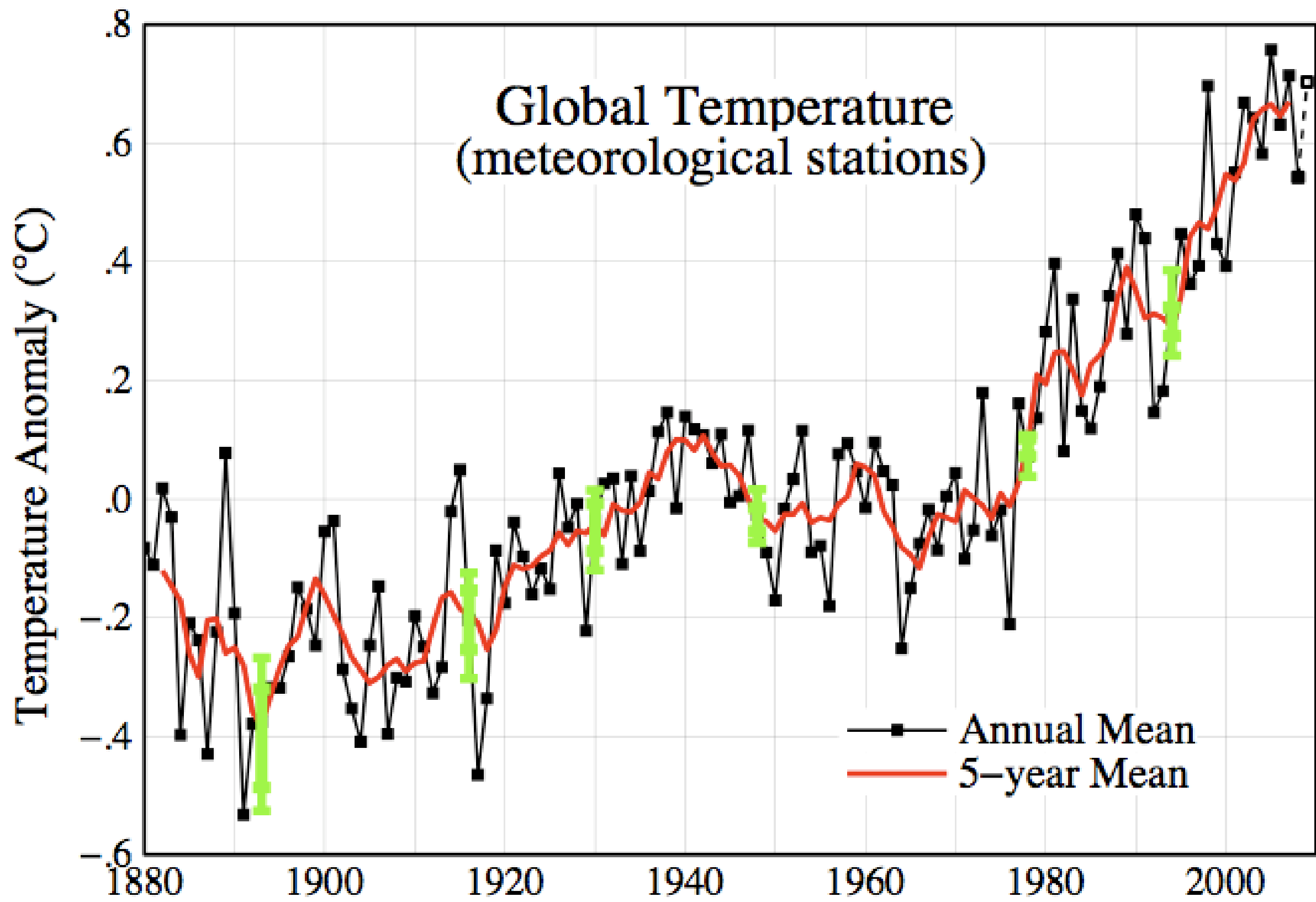
SUSTAINABLE + RESILIENT + RESTORATIVE
(buzz words – or - viable outcomes?)

What will influence design, policy, and measurable benefit?

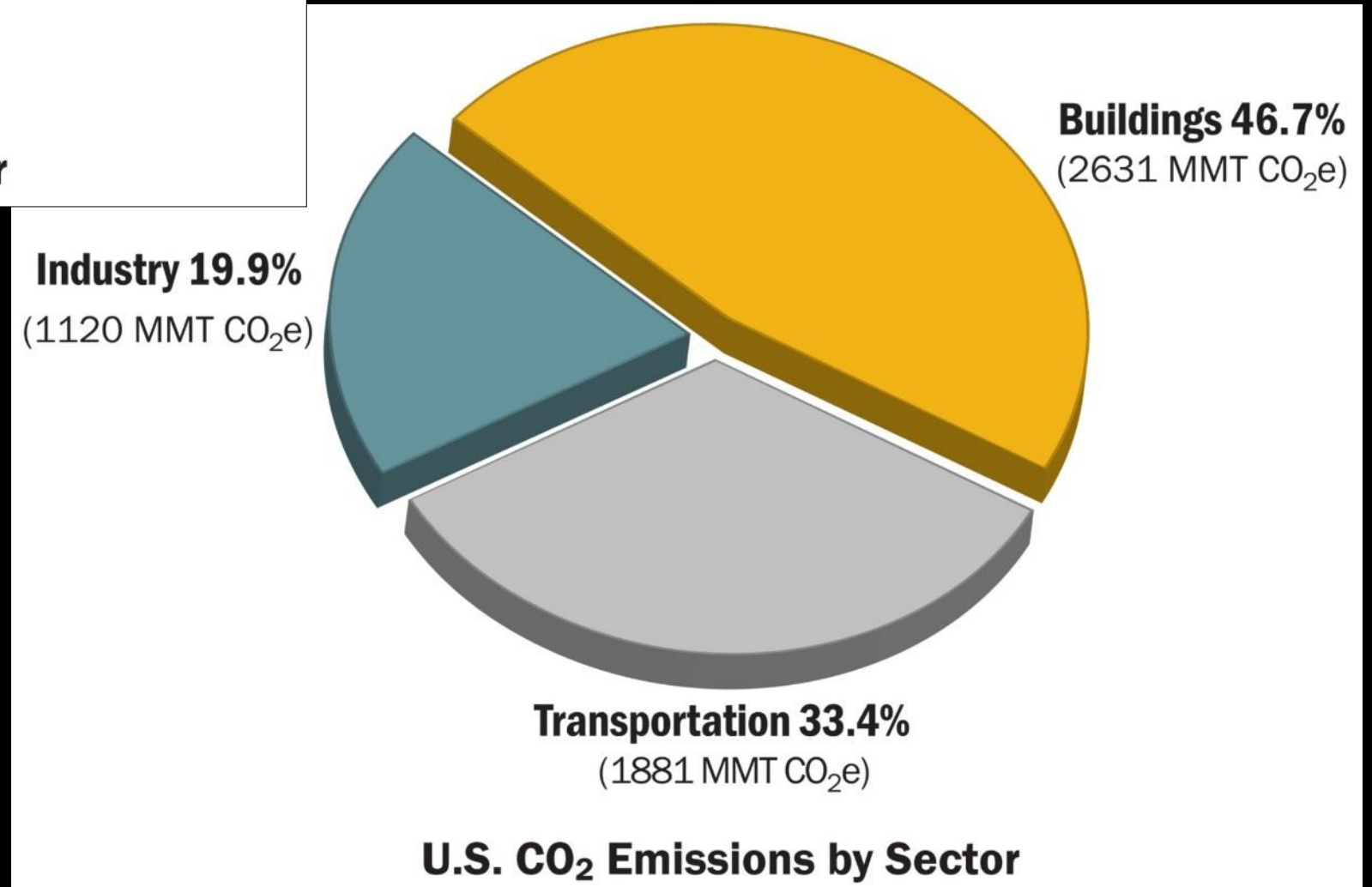
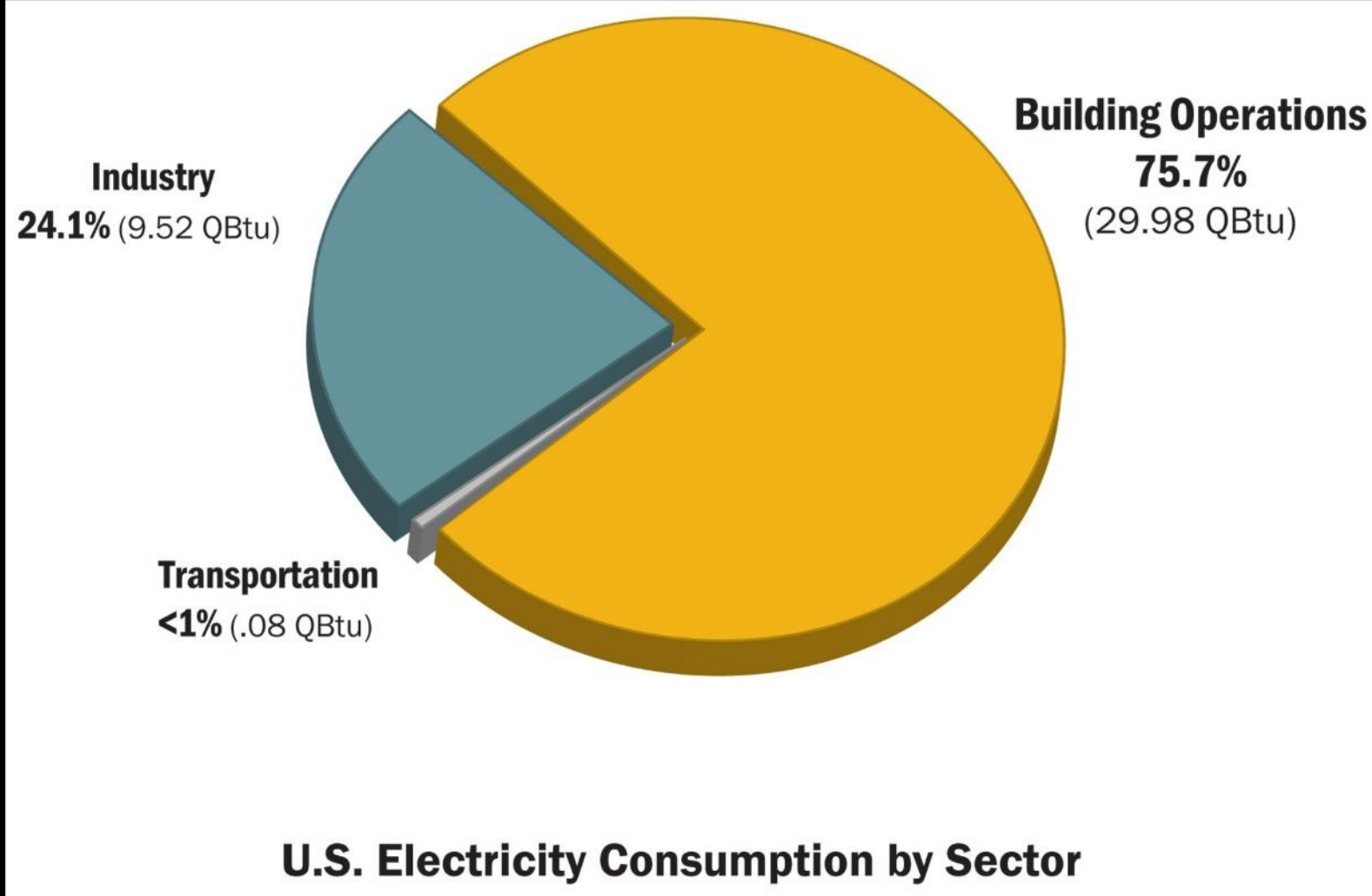
Percent of U.S. Population



Influences – rural to urban migration

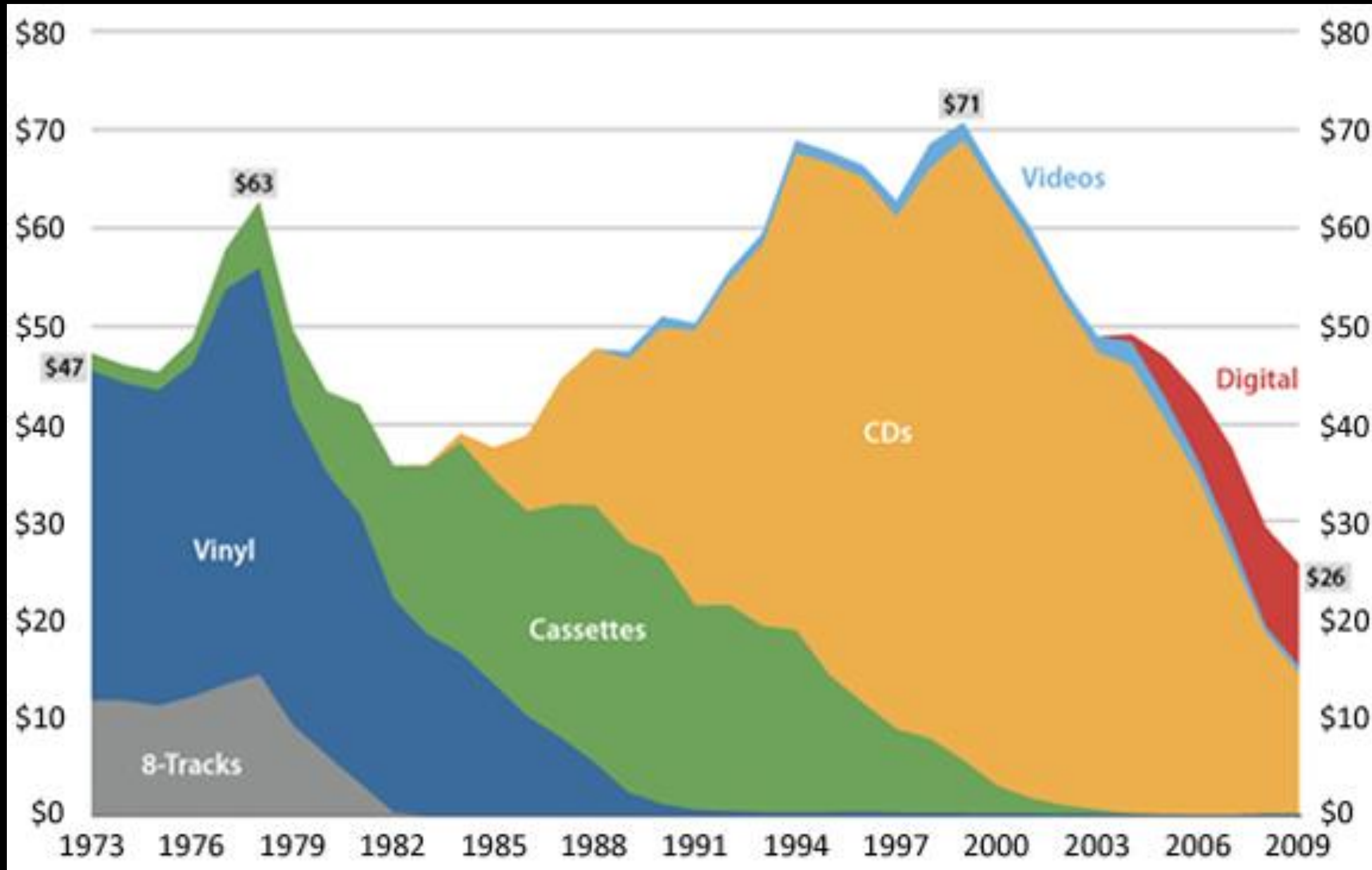


Influences – climate change



Influences – building design

We can't just keep holding on to the old thing, or we will die with it . . .



Influences – creative destruction



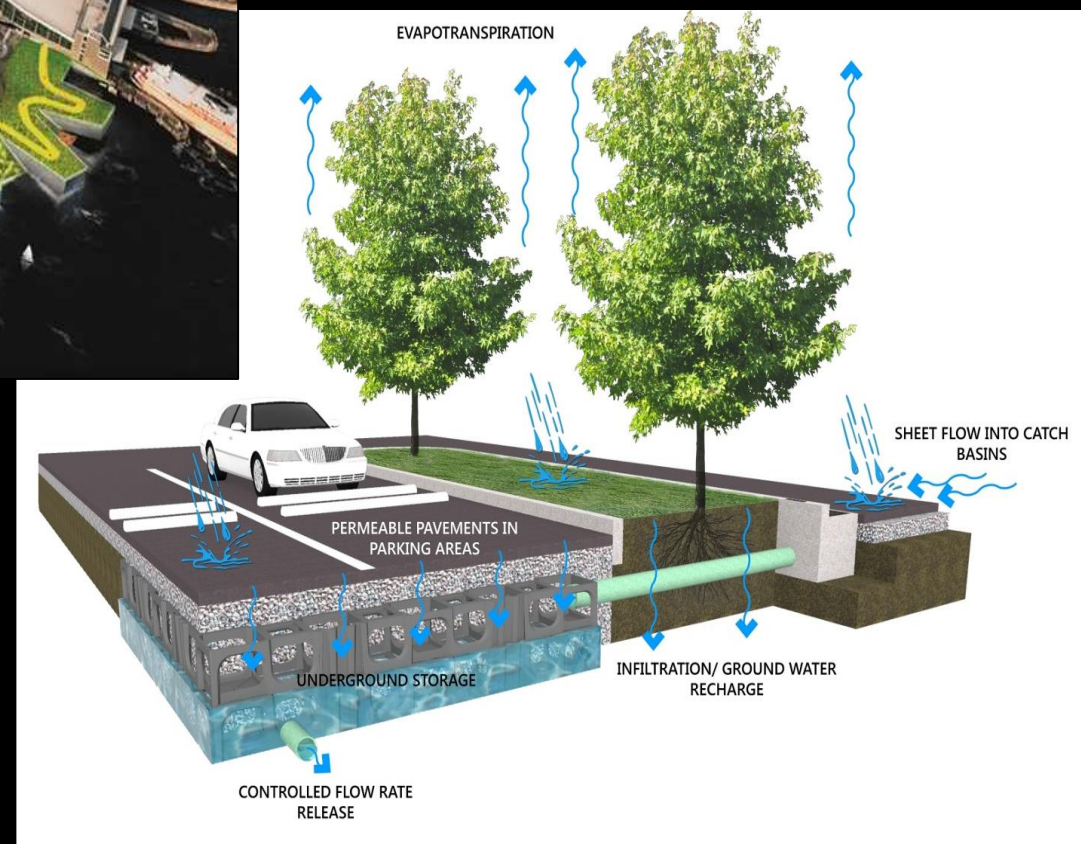
Influences – access to public places



Influences – access to nature



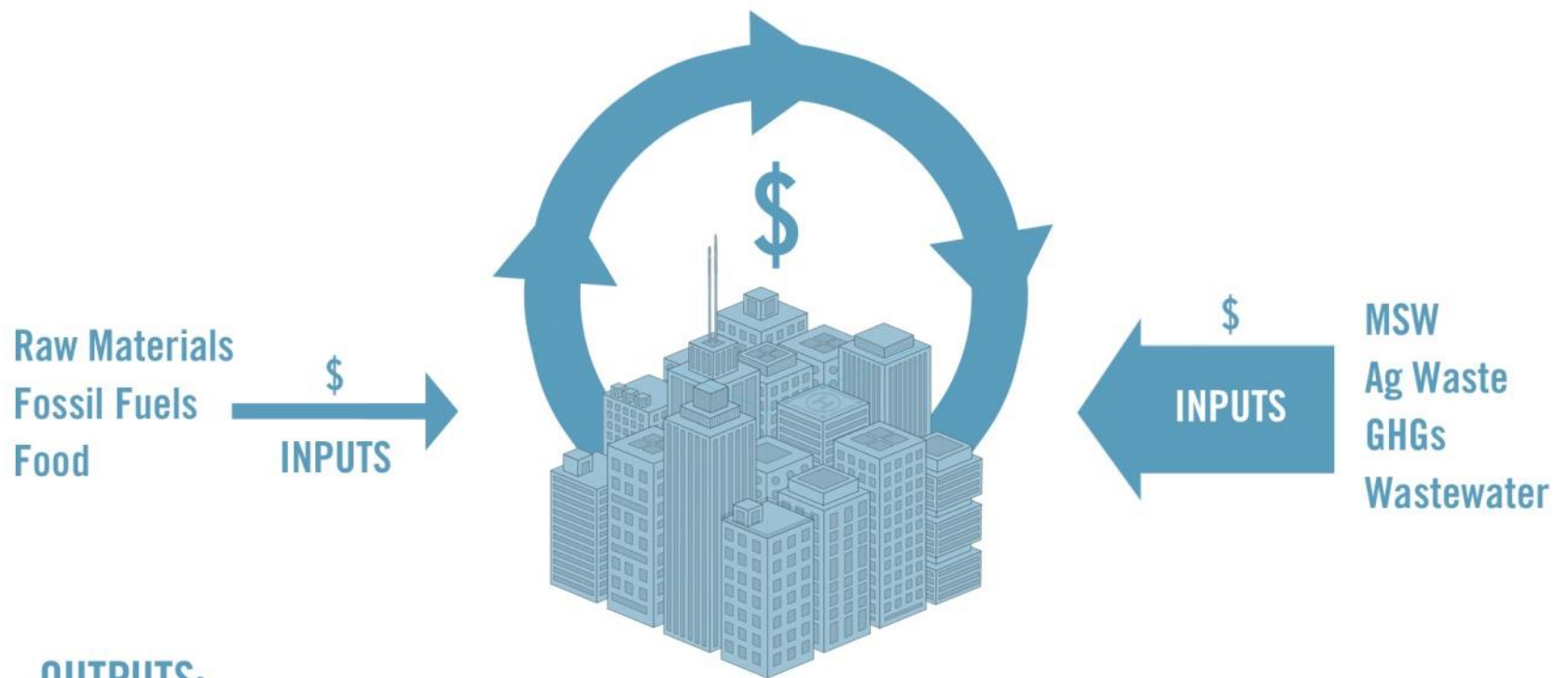
Influences – access to healthy food



Influences – effective use of the freebies



Every day we lose the equivalent of \$3-4bn worth of materials*

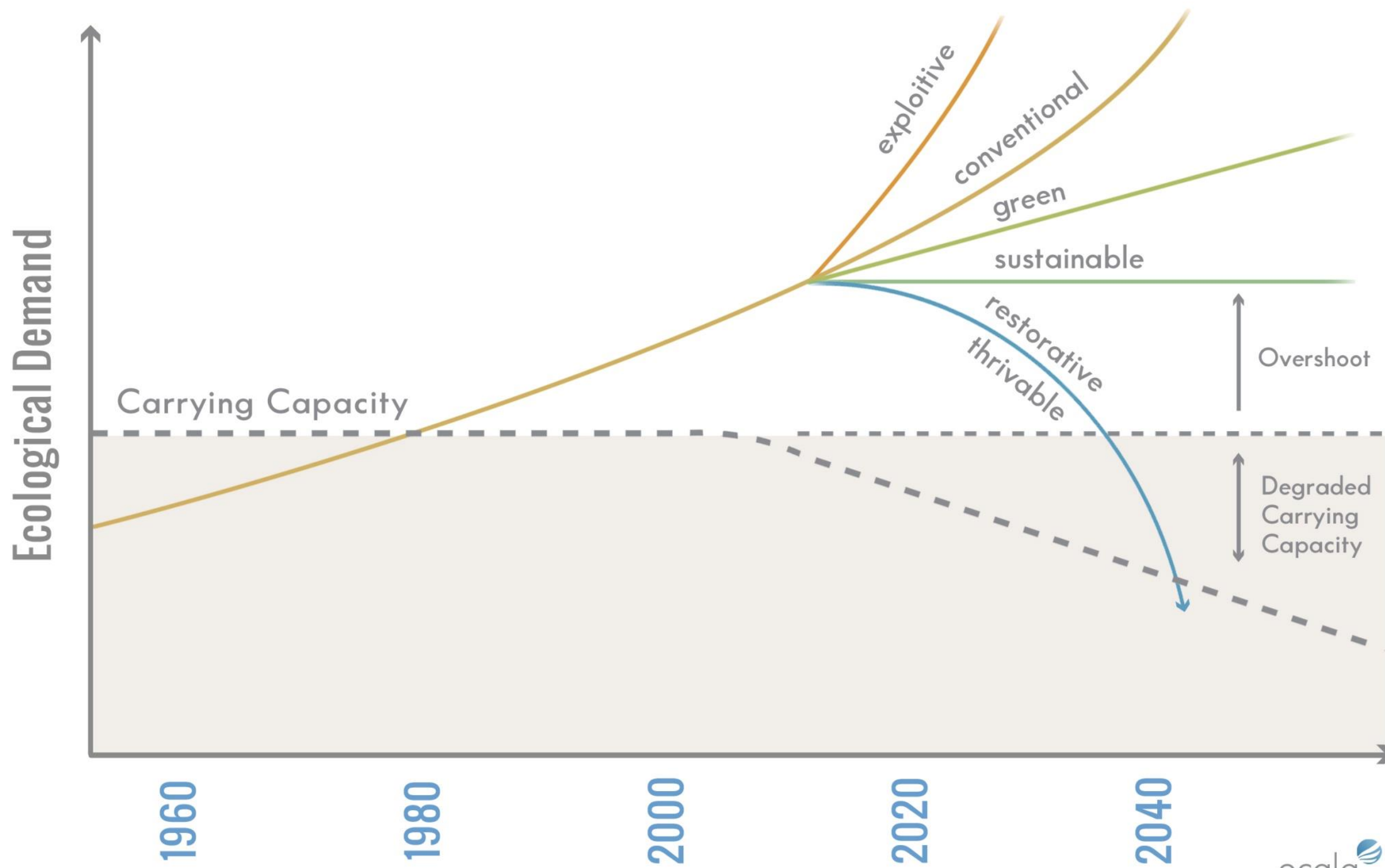


OUTPUTS:

Clean Air & Water
Ecological Restoration
Community Engagement

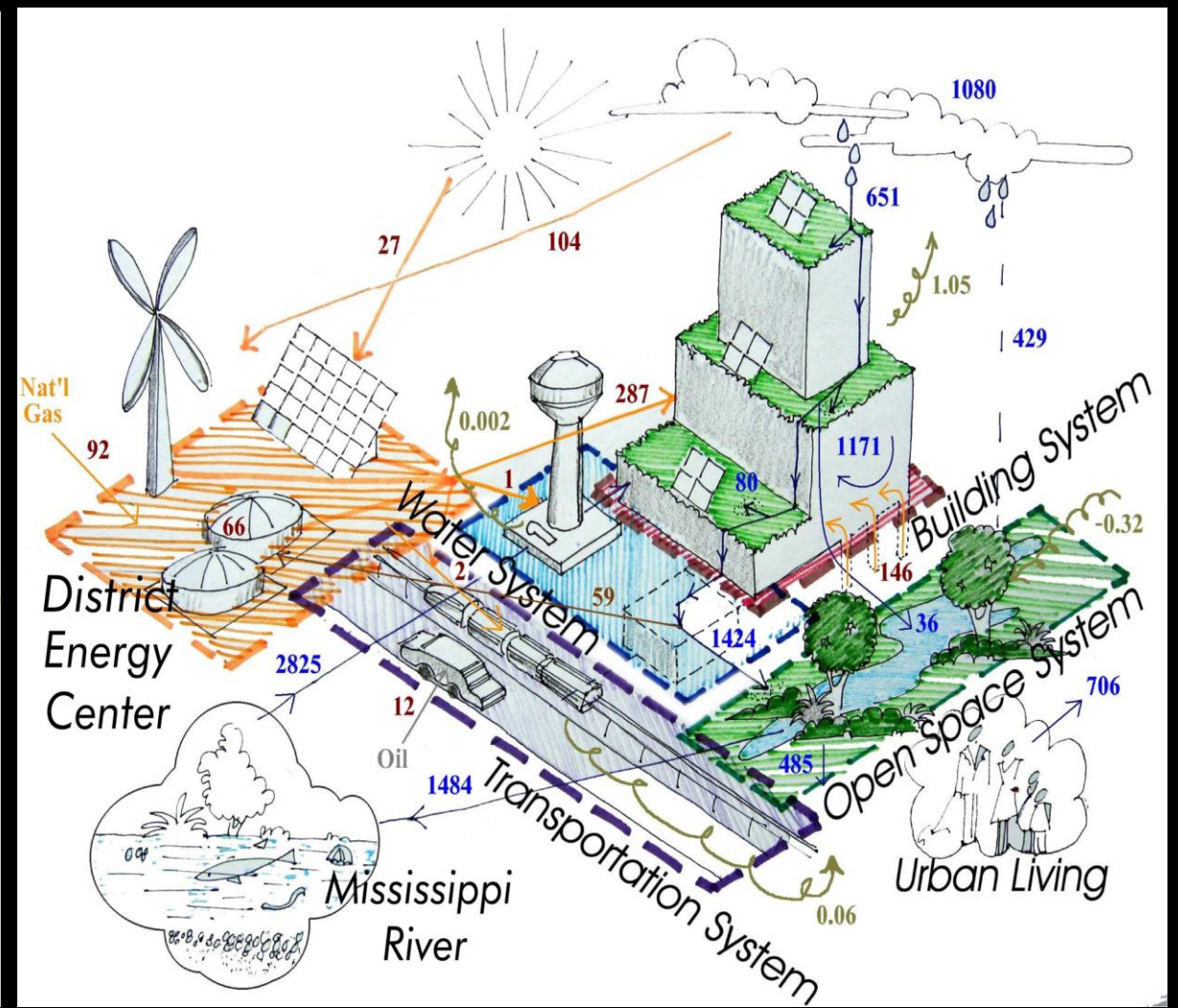
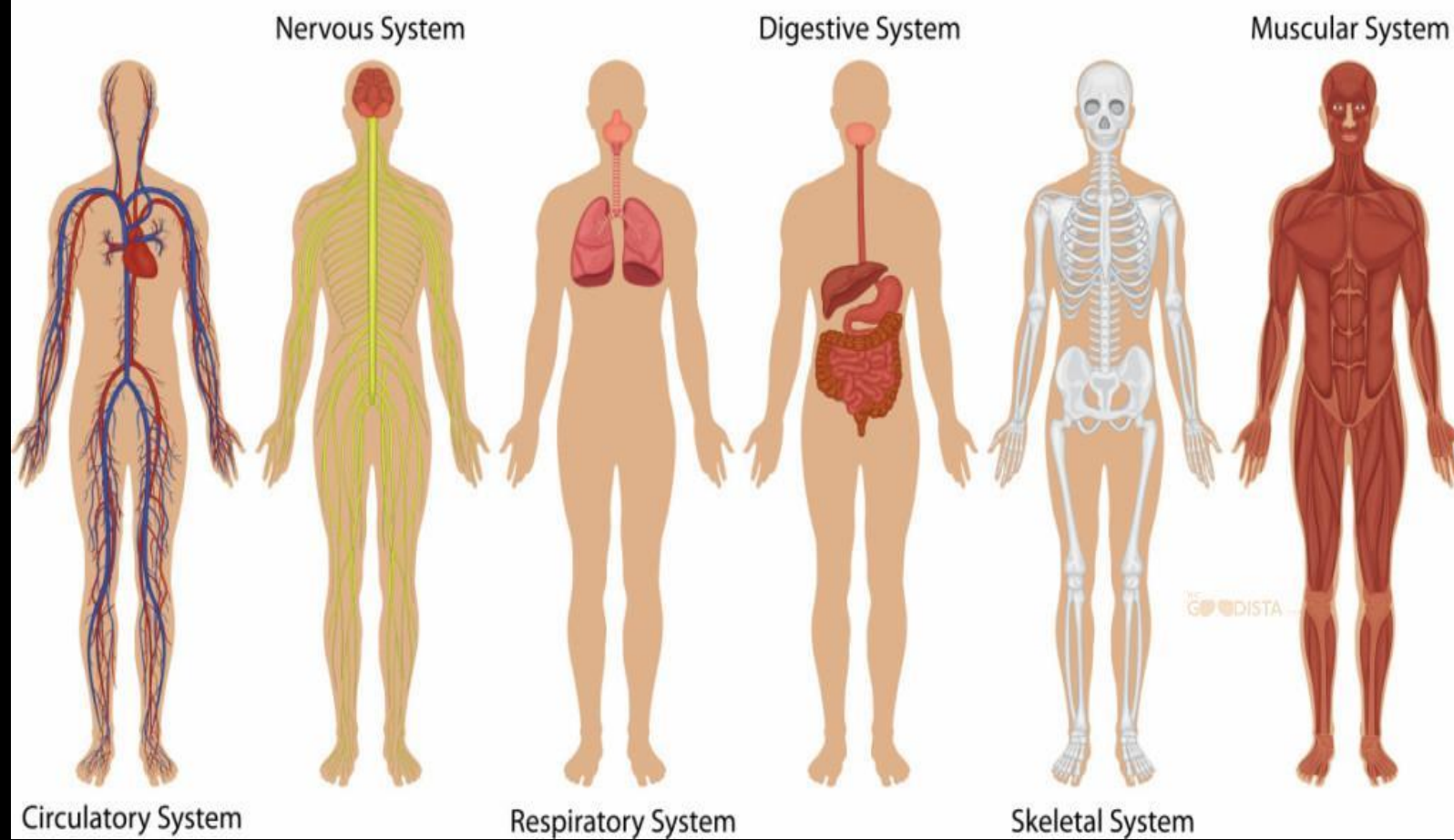
Local Economic Development
Energy Independence
Less Need for Governance

Food Security
Social Wellbeing
Regional Identity & Brand



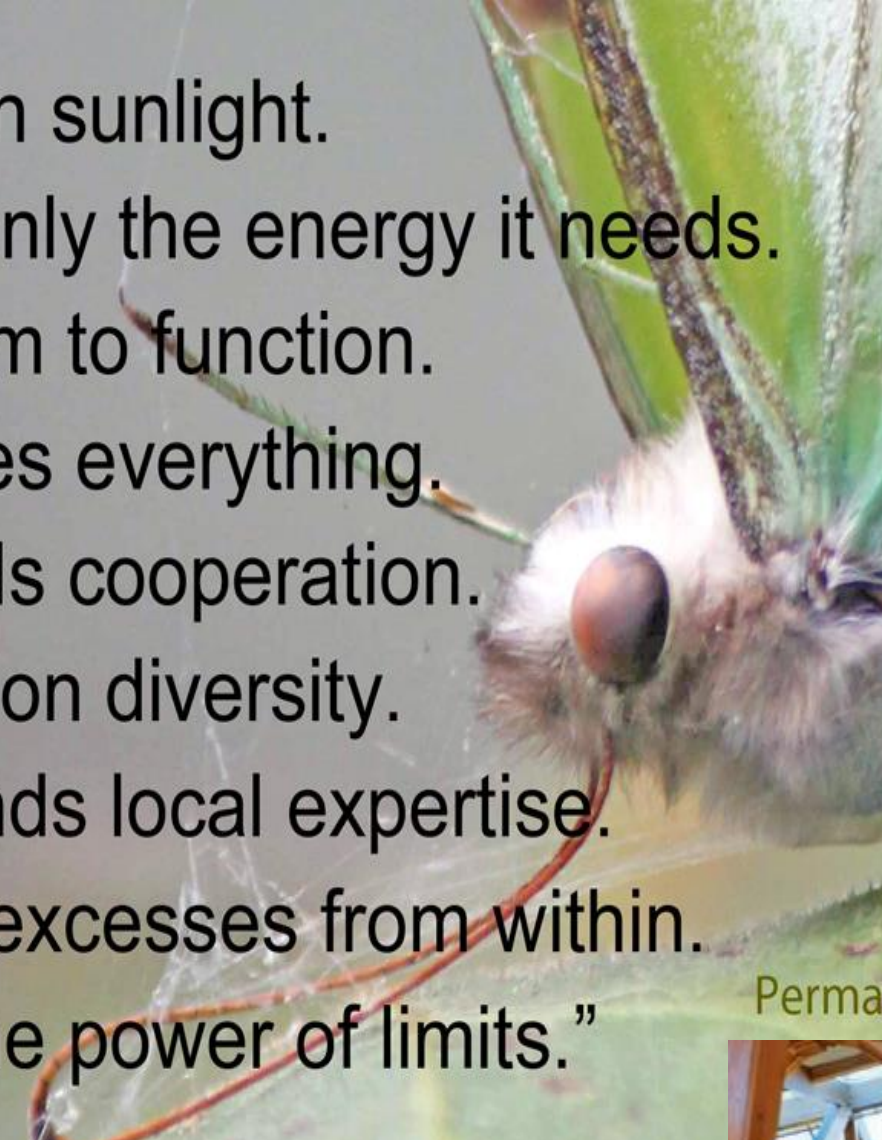
Influences – beyond sustainability

Human Body Systems



Influences – integrated systems thinking

1. Nature runs on sunlight.
2. Nature uses only the energy it needs.
3. Nature fits form to function.
4. Nature recycles everything.
5. Nature rewards cooperation.
6. Nature banks on diversity.
7. Nature demands local expertise.
8. Nature curbs excesses from within.
9. Nature taps the power of limits.”

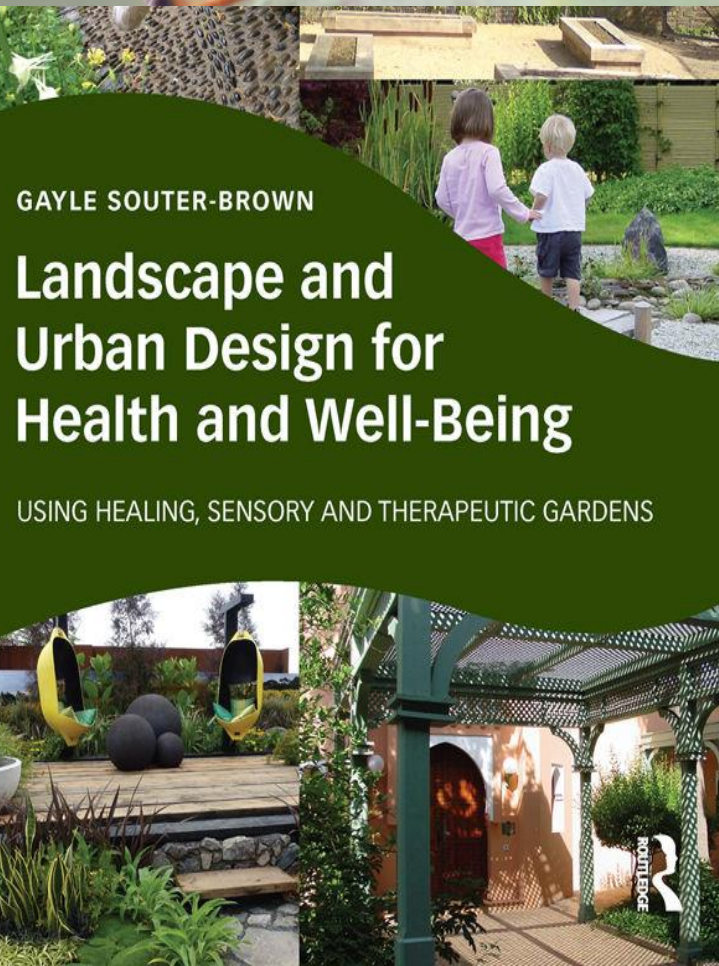


Examples of Biophilic Workplaces in Vermont

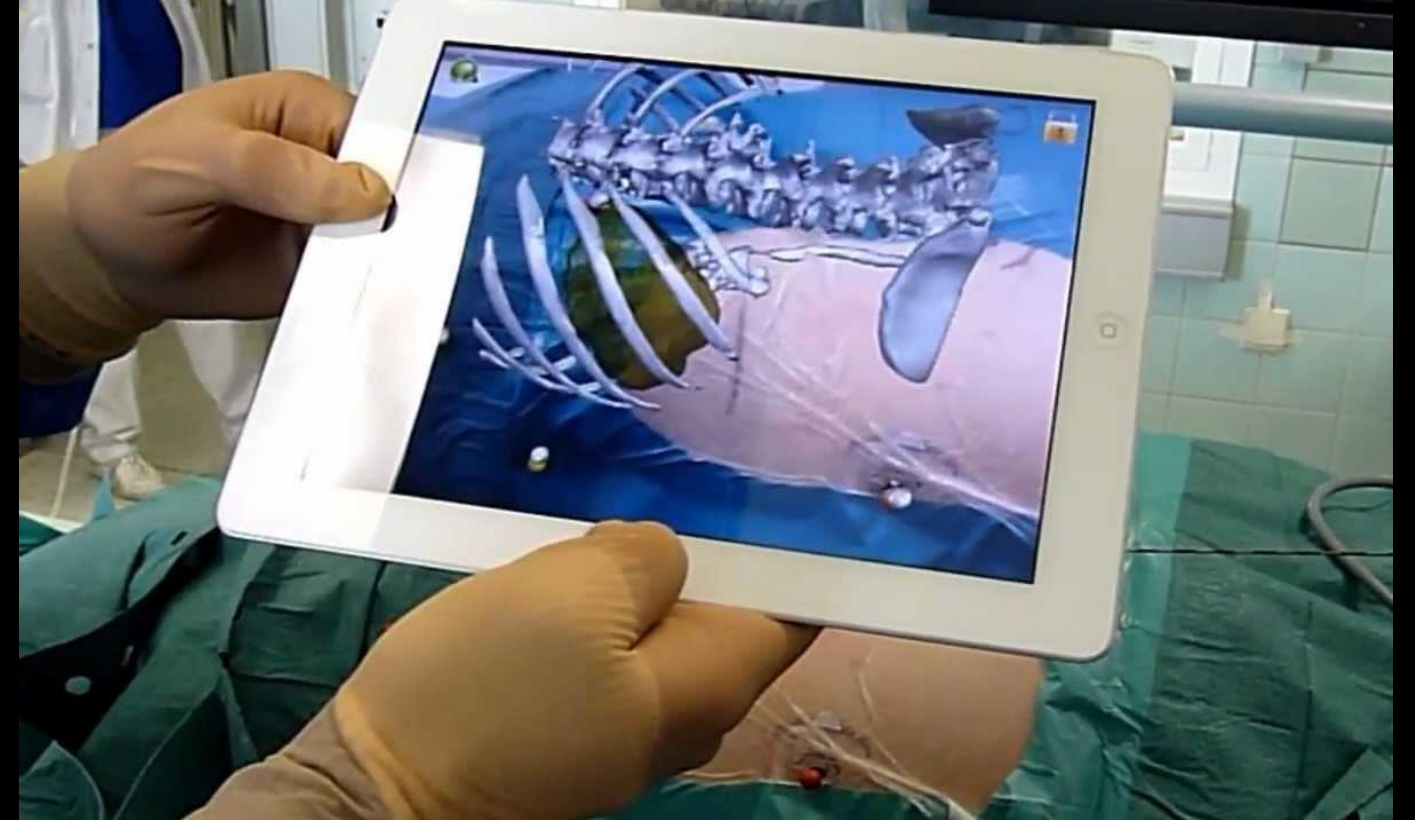


Nature's Inspiration: Biomimicry and Biophilia as a Powerful Business Tool

PermacultureVisions.com



Influences – salutogenics + biomimicry



Enterprise Technology Through the Years

A lot has changed in the office over the years. It started with a piece of paper and a phone. Here's a look at how we became a BYOD, on-demand, mobile workforce.

1950s **1960s** **1970s** **1980s** **1990s** **2000 - 2013** **Today**

Printers **Phones** **Storage** **Computers**

- 1953** Remington-Rand unveils the first high-speed printer.
- 1957** IBM markets the first dot matrix printer.
- 1963** Bell introduces the first fax machine.
- 1964** HP releases the Model 680 Strip Chart Recorder.
- 1969** IBM markets the first dot matrix printer.
- 1971** The first email is sent.
- 1971** Xerox develops Xerox—the original laser printer.
- 1971** The 8" floppy disk is introduced.
- 1976** IBM introduces the first high-speed laser printer.
- 1977** The first xerographic laser printer is released.
- 1979** Compact discs are widely adopted.
- 1983** Novell bases Novell NetWare on the idea of file sharing, not disk sharing.
- 1983** The 3.5-inch floppy disk is introduced.
- 1983** AOL is born.
- 1983** IBM introduces the first high-speed laser printer.
- 1983** Novell bases Novell NetWare on the idea of file sharing, not disk sharing.
- 1984** Apple releases the Macintosh.
- 1984** Cellular phones are made commercially available.
- 1988** Inkjet printers become consumer items.
- 1991** The first web page is created.
- 1991** The first text message is sent.
- 1994** IBM and Trek Technology introduce the USB flash drive.
- 1994** Xerox introduces the Zip drive.
- 1994** The first smartphone (IBM's Simon) is released.
- 1995** DVD storage is introduced.
- 1997** HP introduces the ProCurve printer.
- 1999** BackBerry introduces the first color screen BlackBerry mobile phone.
- 2000** Motorola develops the Flip.
- 2003** Amazon launches Elastic Compute Cloud.
- 2003** Novell introduces the first color screen BlackBerry mobile phone.
- 2006** Amazon launches Elastic Compute Cloud.
- 2007** Brother introduces the first wireless printer.
- 2007** Apple releases the first iPhone.
- 2008** Apple releases the MacBook Air.
- 2010** Apple releases the iPad.
- 2013** Novell introduces the first color screen BlackBerry mobile phone.
- 2013** Novell introduces the first color screen BlackBerry mobile phone.

SOURCES:
 IBM: www.ibm.com; Xerox: www.xerox.com; HP: www.hp.com; Apple: www.apple.com; Novell: www.novell.com; Remington-Rand: www.remingtonrand.com; Bell: www.bell.com; AOL: www.aol.com; Brother: www.brother.com; Amazon: www.amazon.com; Motorola: www.motorola.com; BlackBerry: www.blackberry.com; Cisco: www.cisco.com; e-trikala: www.e-trikala.com; TKT-3134: www.tkt-3134.com

Novell
www.novell.com

Influences – innovation + new technologies



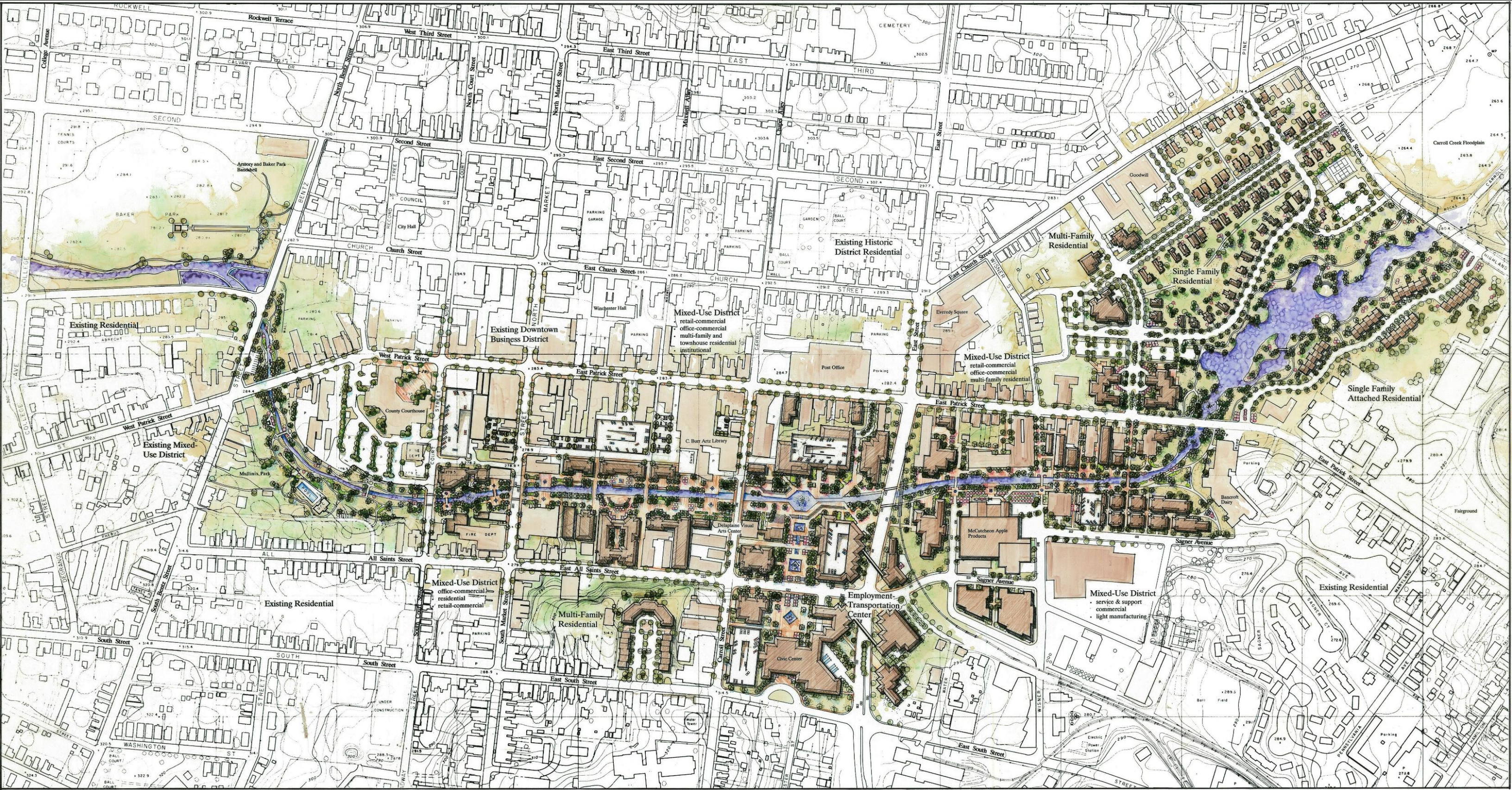
**Integrating district stormwater systems
with the design of public places – I'll
start with a couple stories about how
WATER began to influence my thinking !**



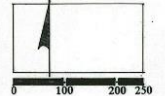
Downtown Frederick, Maryland – Carroll Creek Park







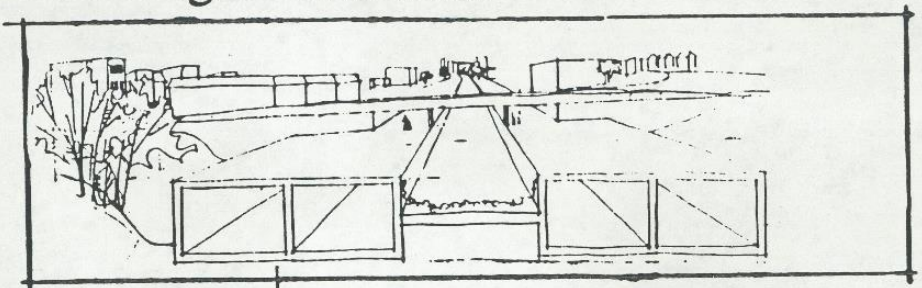
JACOBSON WALLACE ASSOCIATES



CARROLL CREEK PARK

Carroll Creek Park Master Plan
City of Frederick, Maryland 1991

Existing Conditions



Future East Street Bridge

Carroll Creek

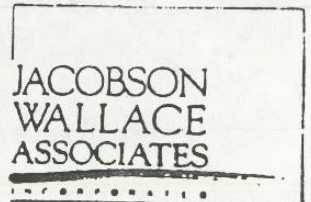
Flood Control Conduits

*View to east from Carroll Street Bridge
toward East Street Bridge*

PRELIMINARY

CHARACTER SKETCH

CARROLL CREEK PARK





SPEED
LIMIT
25







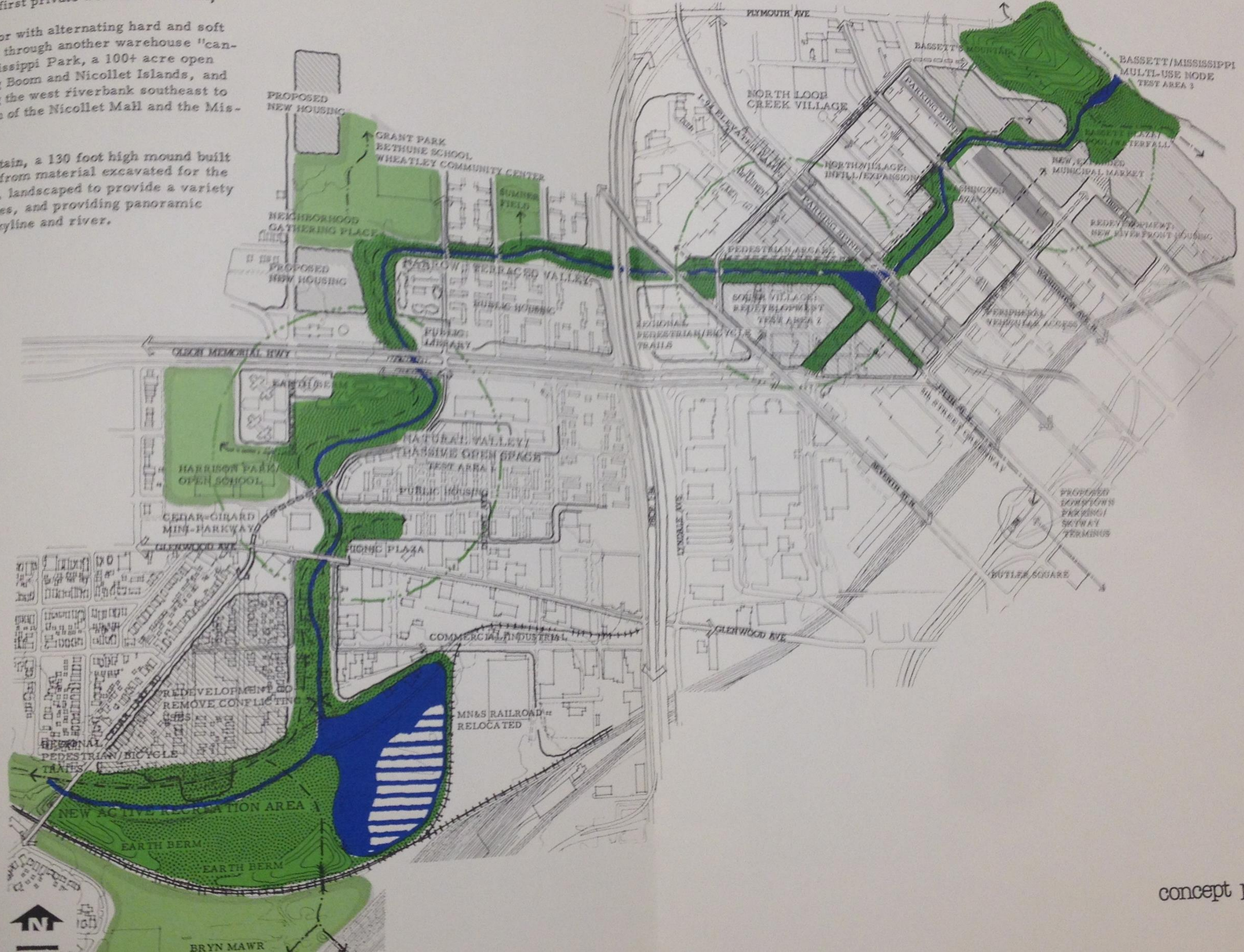




Heritage Park , Minneapolis – Bassett Creek

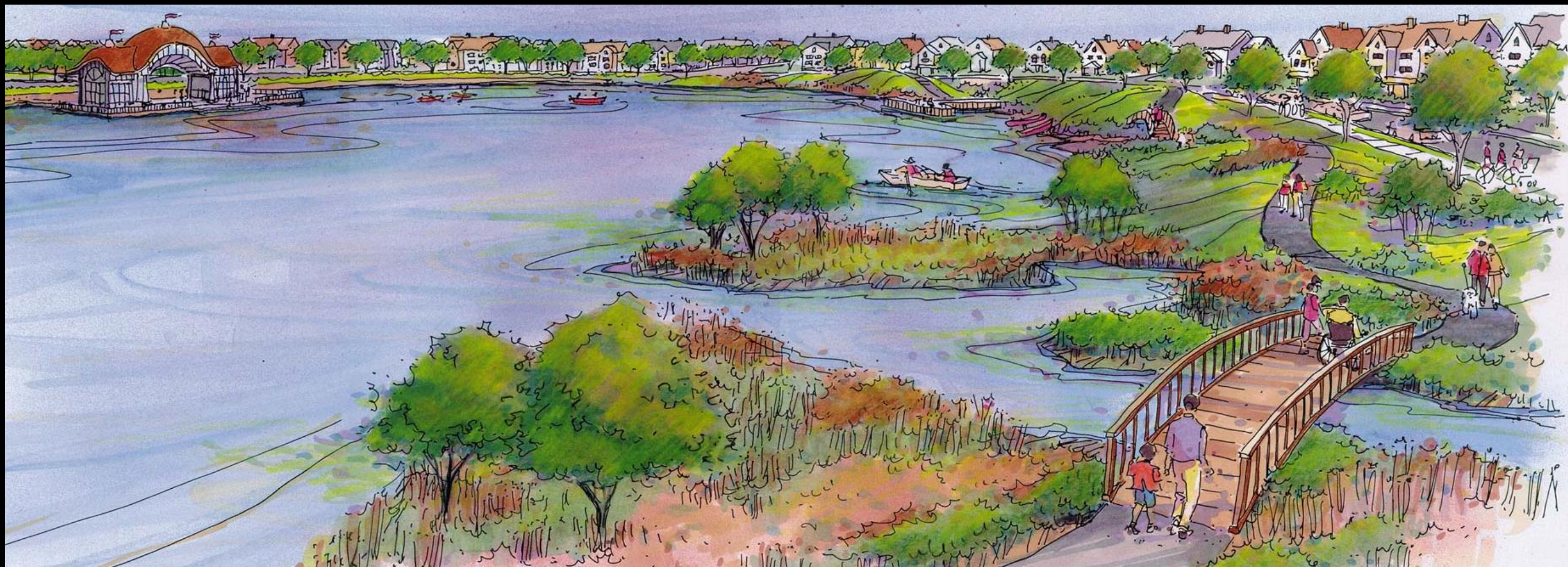
...a creek corridor with alternating hard and soft edges, passing through another warehouse "can- yon" into Mississippi Park, a 100+ acre open space including Boom and Nicollet Islands, and extending along the west riverbank southeast to the intersection of the Nicollet Mall and the Mississippi River,

- Bassett's Mountain, a 130 foot high mound built and sculptured from material excavated for the creek corridor, landscaped to provide a variety of activity spaces, and providing panoramic views of both skyline and river.



concept plan









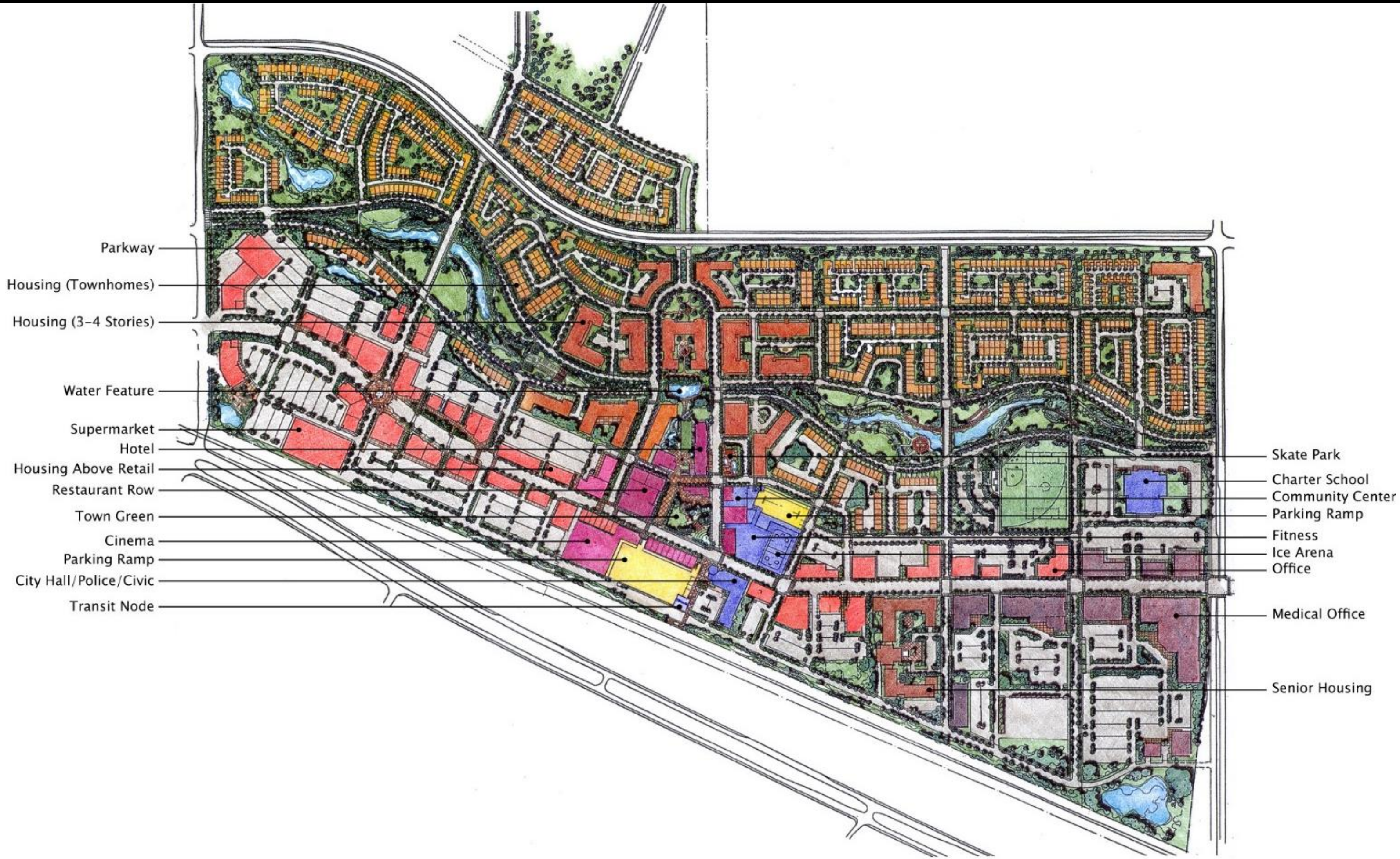


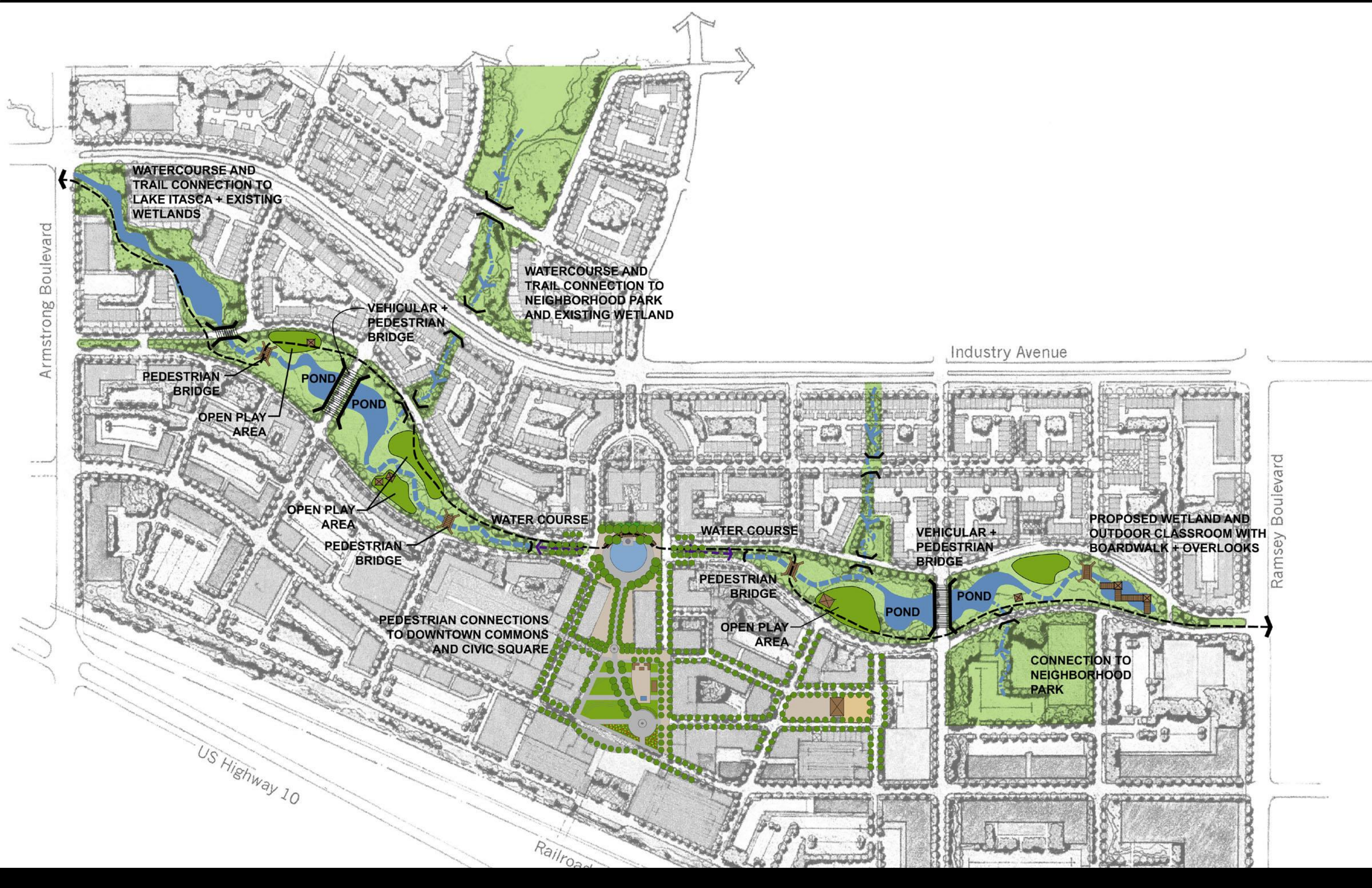






Ramsey Town Center – The COR





Armstrong Boulevard

WATERCOURSE AND TRAIL CONNECTION TO LAKE ITASCA + EXISTING WETLANDS

WATERCOURSE AND TRAIL CONNECTION TO NEIGHBORHOOD PARK AND EXISTING WETLAND

VEHICULAR + PEDESTRIAN BRIDGE

PEDESTRIAN BRIDGE

POND

POND

OPEN PLAY AREA

OPEN PLAY AREA

PEDESTRIAN BRIDGE

WATER COURSE

WATER COURSE

VEHICULAR + PEDESTRIAN BRIDGE

PROPOSED WETLAND AND OUTDOOR CLASSROOM WITH BOARDWALK + OVERLOOKS

PEDESTRIAN CONNECTIONS TO DOWNTOWN COMMONS AND CIVIC SQUARE

PEDESTRIAN BRIDGE

OPEN PLAY AREA

POND

POND

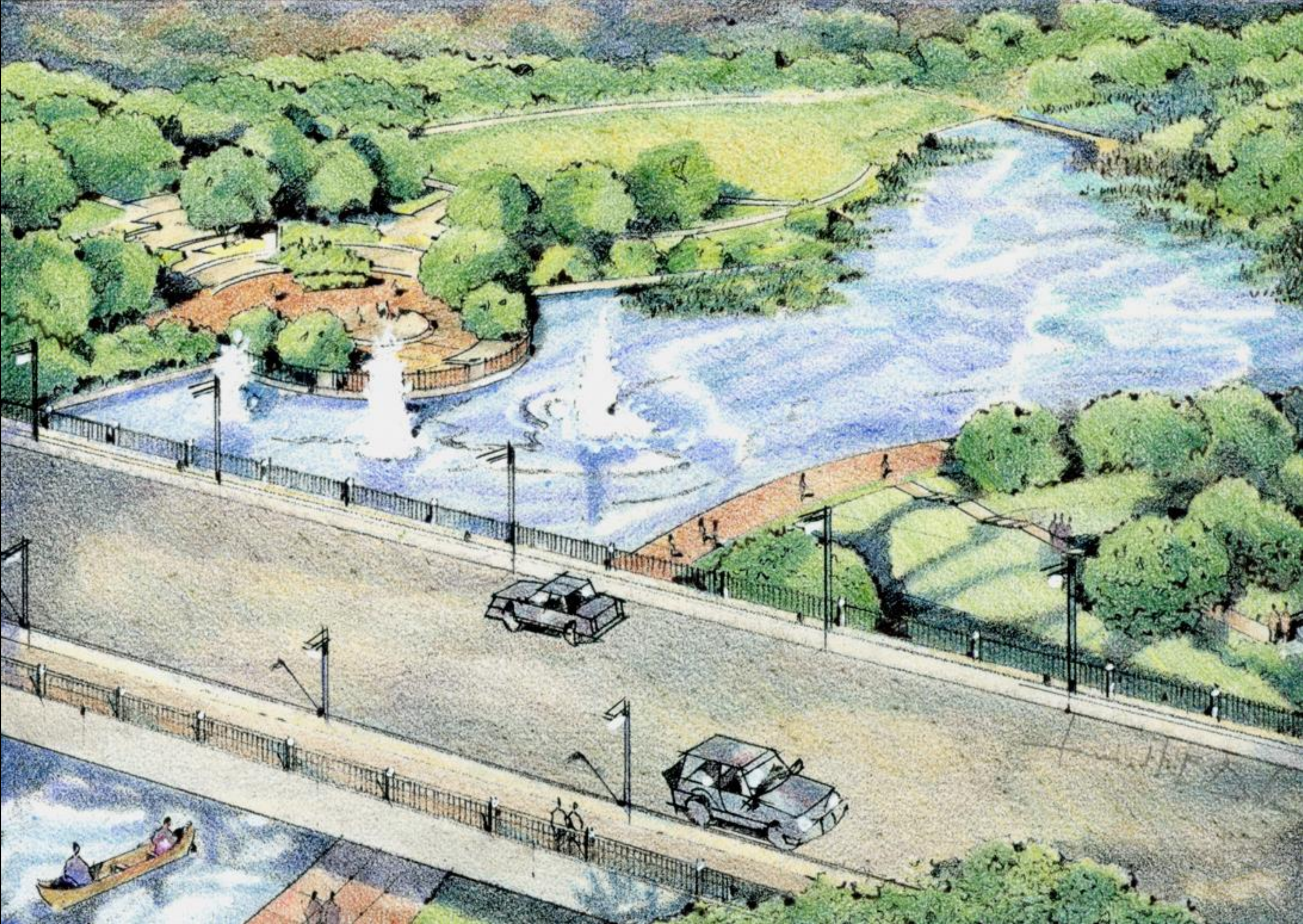
CONNECTION TO NEIGHBORHOOD PARK

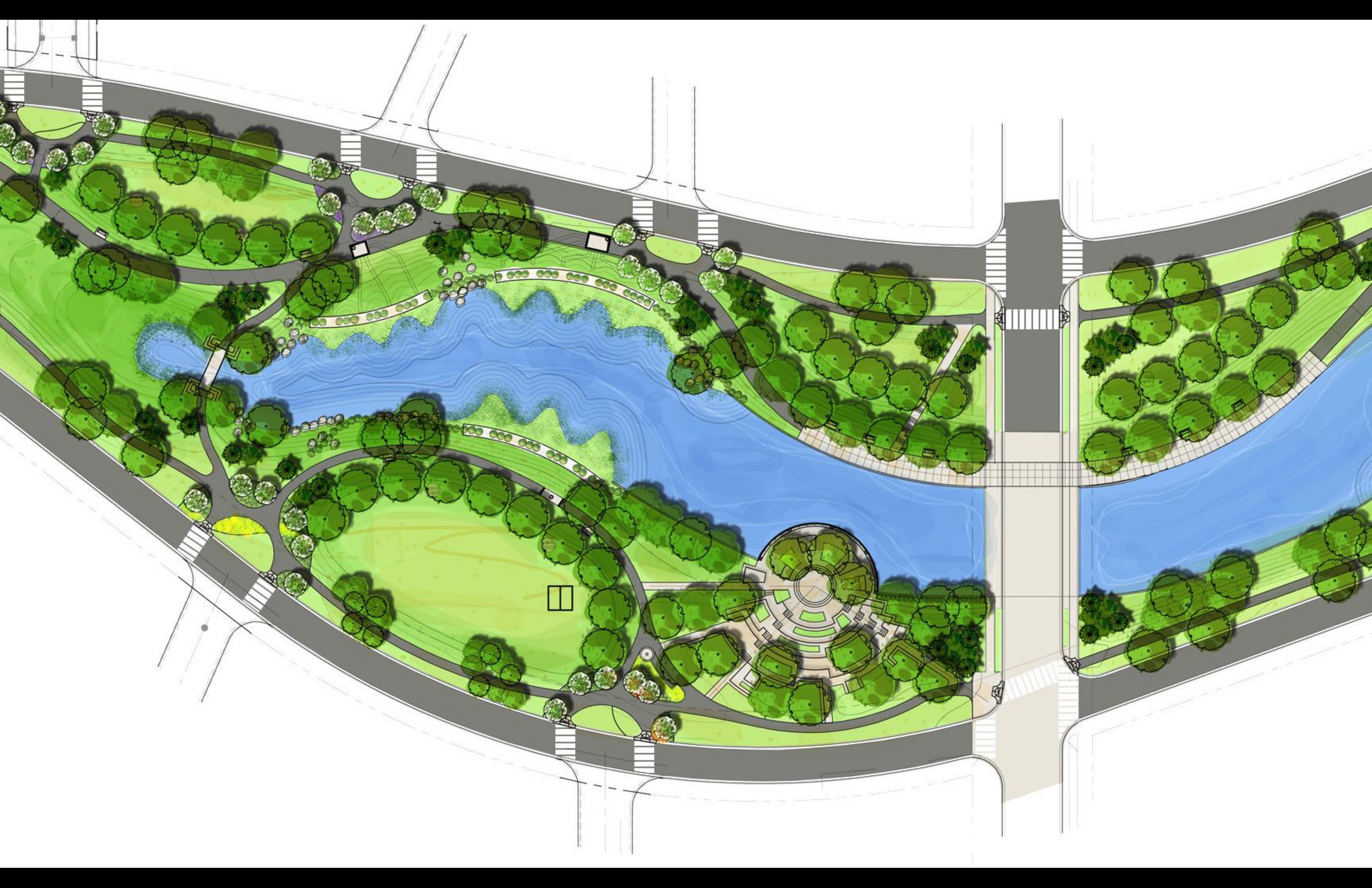
Industry Avenue

Ramsey Boulevard

US Highway 10

Railroad













THE TOWERSIDE INNOVATION DISTRICT

District Stormwater System Demonstration Project

- Water as valuable resource
- Water Budget (limited supply)
- Clean + Convey + Store + Reuse + Aesthetics



The VISION



ESTATE

Parking

Permeable Paver

Infiltration Garden

Water Recirculation

Playground

U of M Stadium

Residential and Office Mix

Commercial & Office Residential

Pavegen Energy Generation

Overflow





4th Street Redevelopment Area

New LRT Station

University of Minnesota
Inter-campus Transitway

DeMar IV Sites

New Incubators & Labs

DeMar I Sites

Community Open Space

Arvonia Sites

BNSF Rail Line

Como Neighborhood

Wetlands and Bio-
Phytoremediation

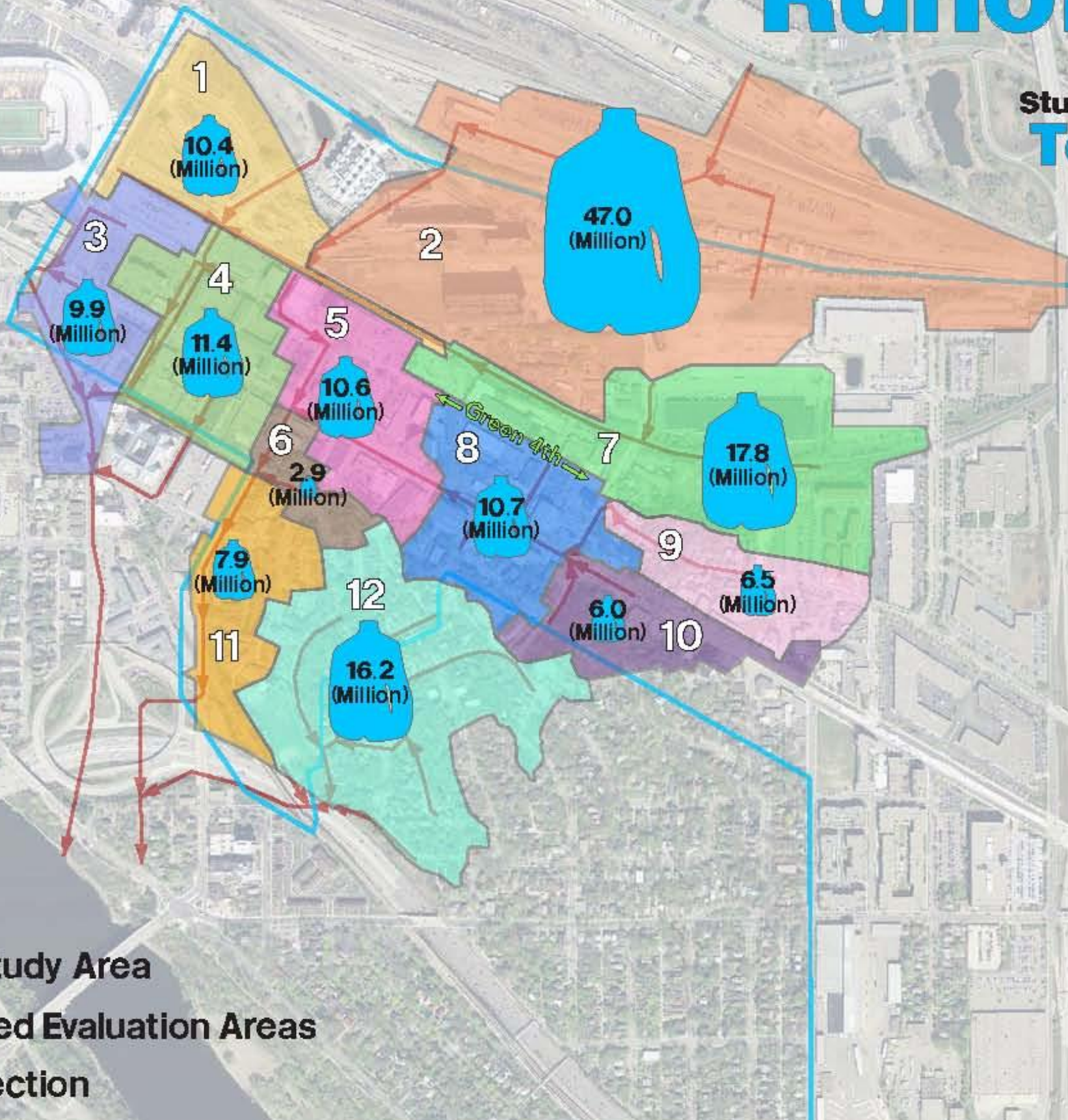
New University of Minnesota Innovation Campus

Future Saily Brew-pub
Development



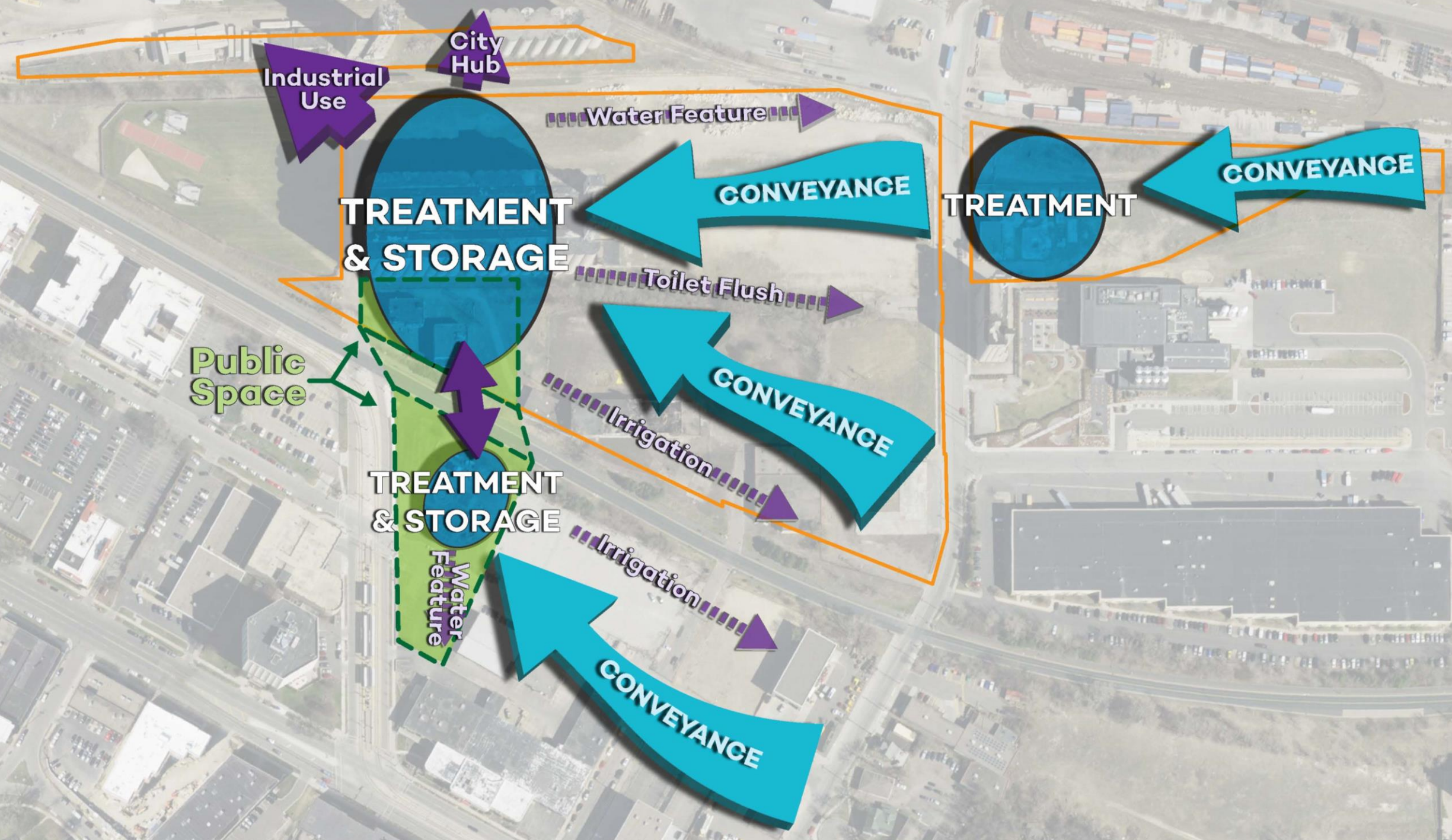
Gallons of Rain & Snowmelt Runoff Annually

Study Area
Total = **157** Million

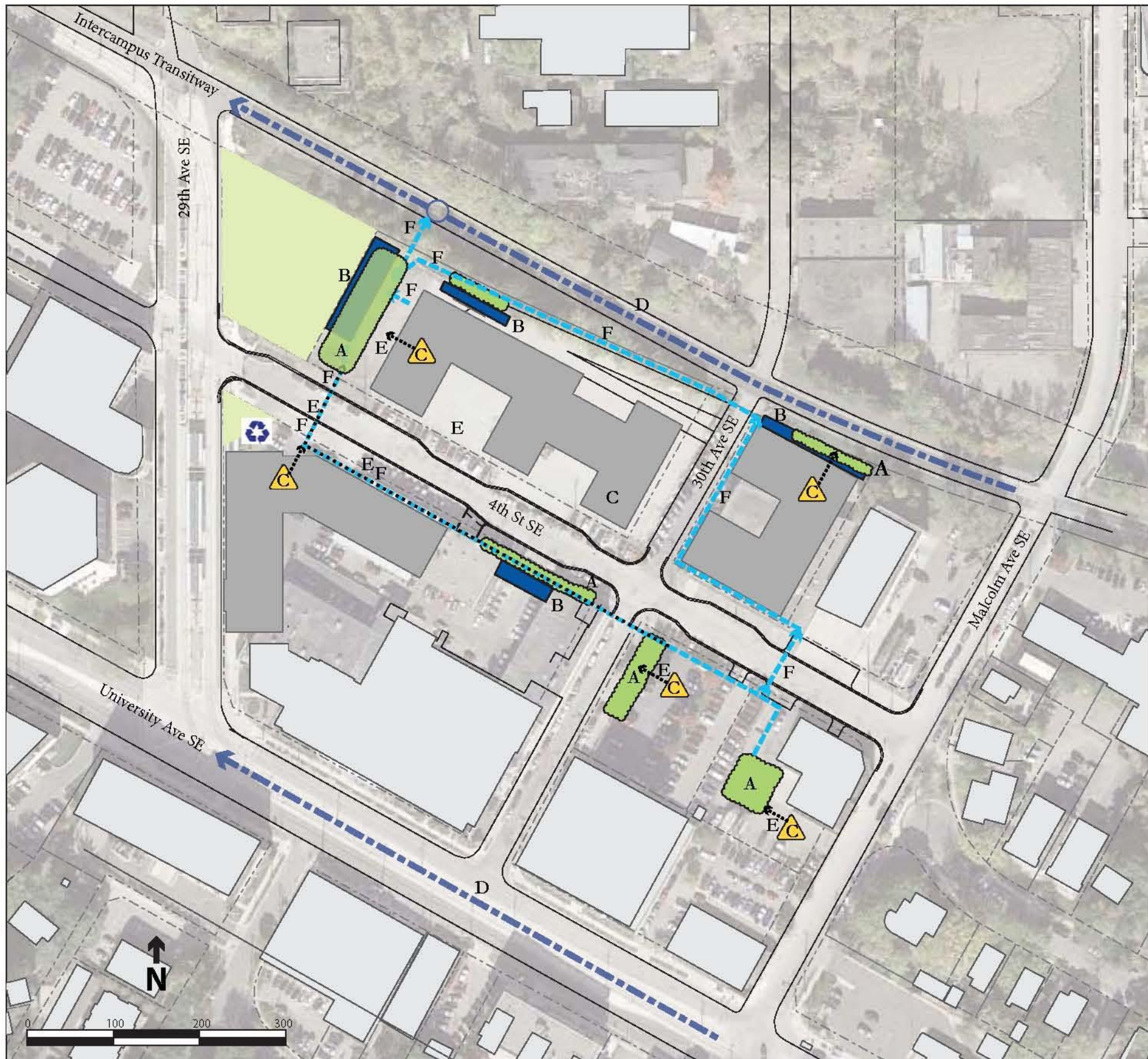










Zone	Total Area (ac)	% Impervious	Gallons of Runoff (millions)
1	19.22	82.6	10.4
2	99.01	69.3	47.0
3	16.83	91.3	9.9
4	19.63	90.1	11.4
5	18.77	86.7	10.6
6	5.56	79.8	2.9
7	37.92	67.9	17.8
8	20.11	80.4	10.7
9	13.22	72.7	6.5
10	13.43	64.1	6.0
11	15.10	78.4	7.9
12	42.28	51.0	16.2
Total	321.09	72.2	157

- Macro Study Area
- Watershed Evaluation Areas
- Flow Direction



Concept Diagram

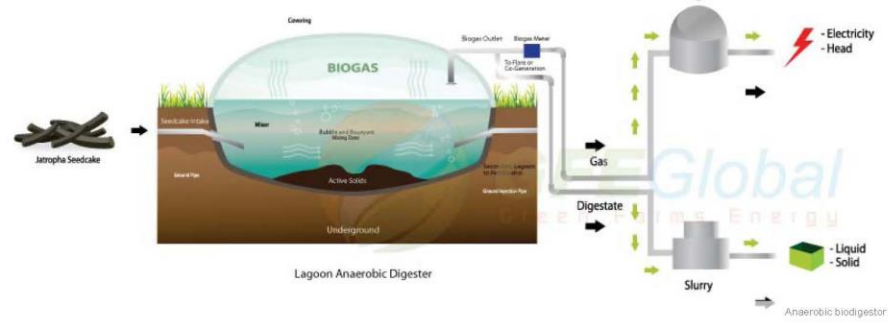
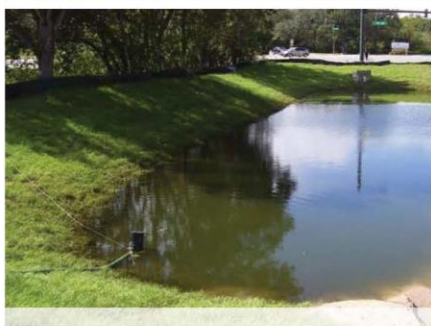
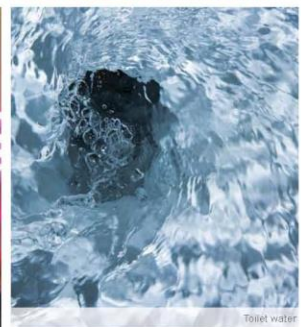
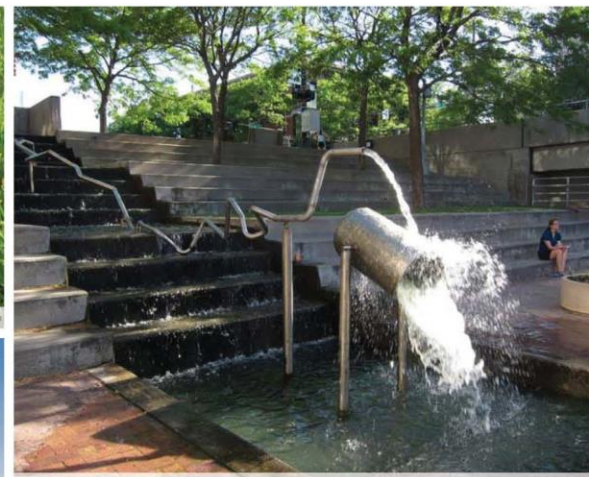
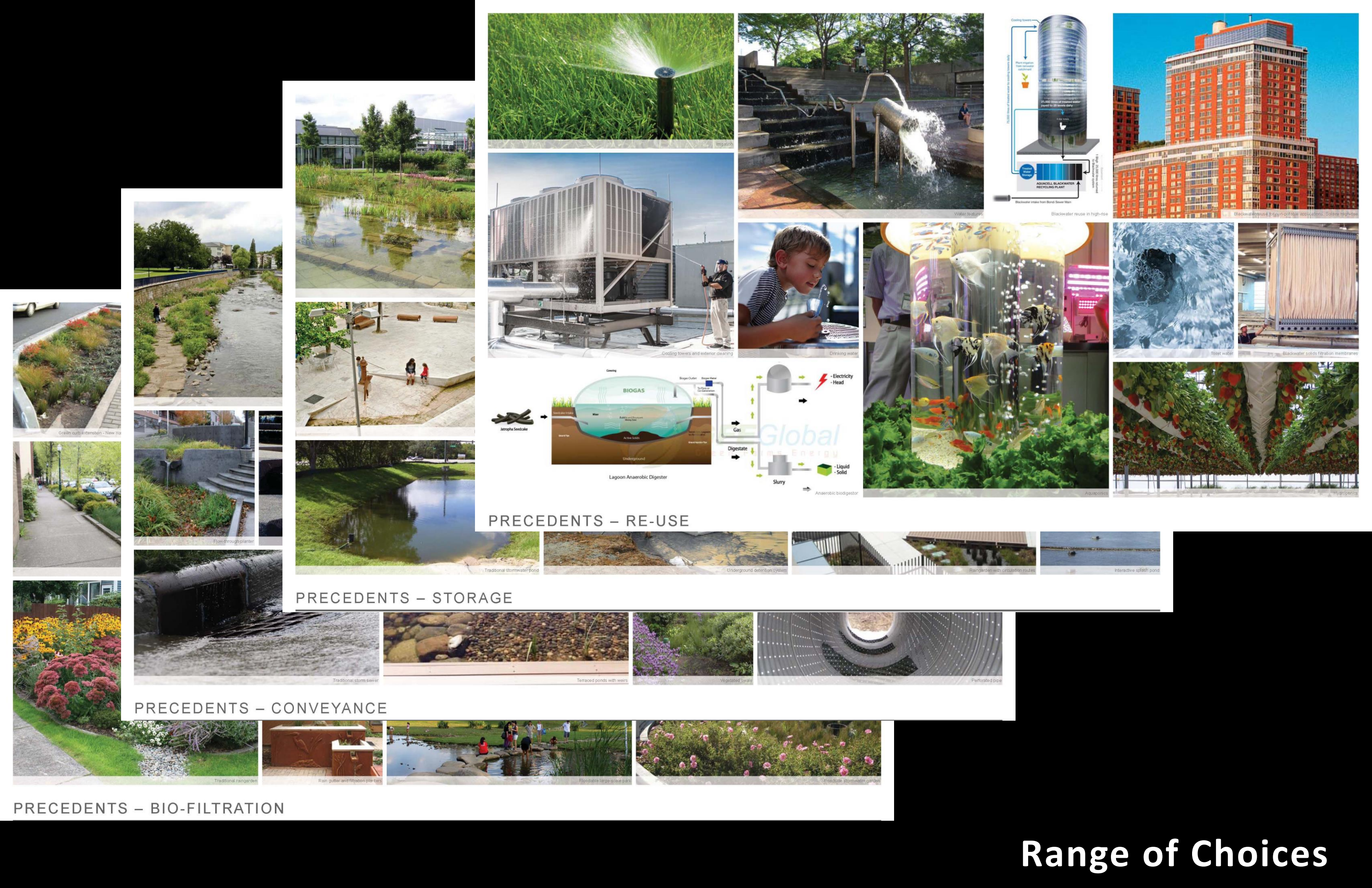


- A  BIOFILTRATION
- B  UNDERGROUND STORAGE
- C  DISCHARGE AREAS - NO TREATMENT
- D  EXISTING STORMWATER SYSTEM
- E  UNTREATED WATER
- F  TREATED WATER
-  RE-USE
-  PROPERTY / R.O.W. LINES

PROJECT COMPONENTS

UNIVERSITY AVENUE DISTRICT – DISTRICT STORMWATER SYSTEM

September 17, 2015



PRECEDENTS - RE-USE



PRECEDENTS - STORAGE



PRECEDENTS - CONVEYANCE



PRECEDENTS - BIO-FILTRATION

Range of Choices

RE-USE



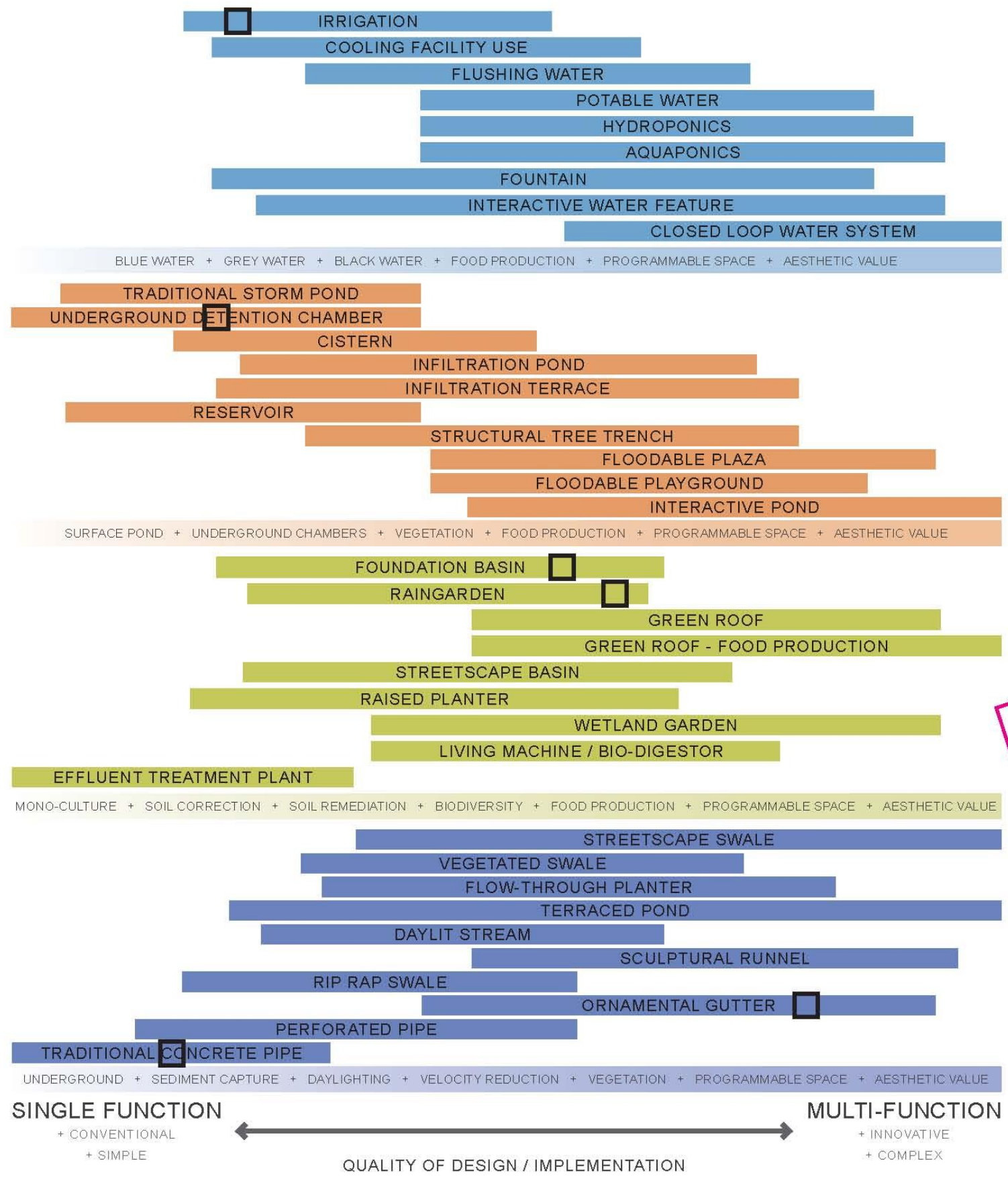
STORAGE



BIO-FILTRATION



CONVEYANCE



- Bio-F. areas and demonstration area; fountain
-
-
-
-
-
-
-

-
- Sized to MPLS City standard
-
-
-
-
-
-

- Works with Ornamental Gutter and courtyards
- Primary capture/filtration areas
-
-
-
-
-
-

-
-
-
-
-
-
-
- High-quality materials; interactive; ADA compliant
-
- For treated water conveyance, subsurface

SELECTION SITE ELEMENTS AND THEIR DESIGN PRIORITIES

WATER SYSTEMS DECISION MATRIX

UNIVERSITY AVENUE DISTRICT – WATER BUDGET DEMONSTRATION PROJECT

PREFERRED SCENARIO

September 17, 2015



CONVEYANCE



Ornamental surface gutters for untreated stormwater – roof water and surface runoff

BIO-FILTRATION



Large-scale raingardens that filter and evapo-transpirate untreated water – 3:1 slopes, 2' deep

STORAGE



Underground storage cells for treated stormwater retention – 6x8' cells, buried under park area

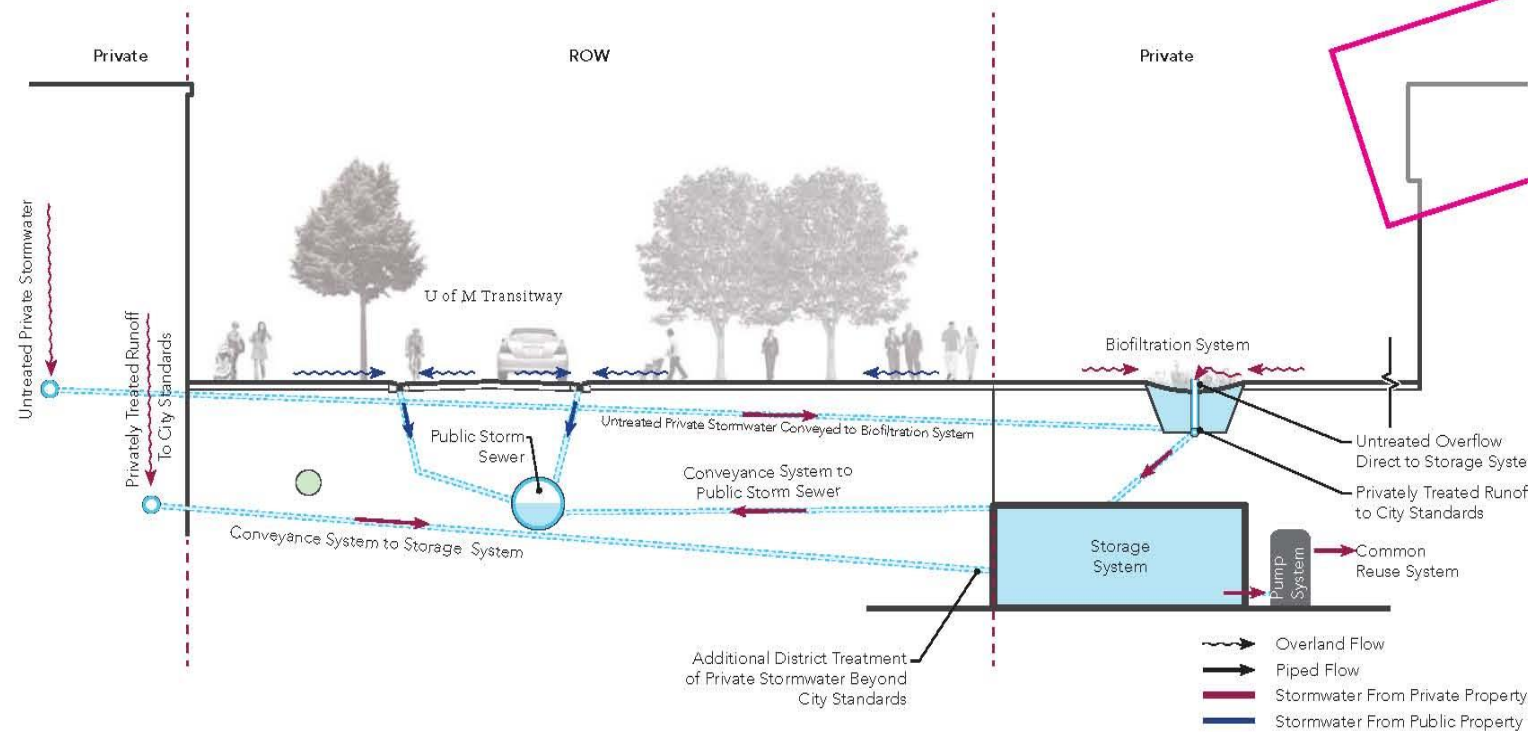
RE-USE



Electric-control recirculation pump for treated stormwater re-use



Underground stormwater pipes for treated water – post-Bio-filtration



Irrigation re-use of treated stormwater in demonstration area within district

WATER SYSTEMS COMPONENTS

UNIVERSITY AVENUE DISTRICT – WATER BUDGET DEMONSTRATION PROJECT

PREFERRED SCENARIO

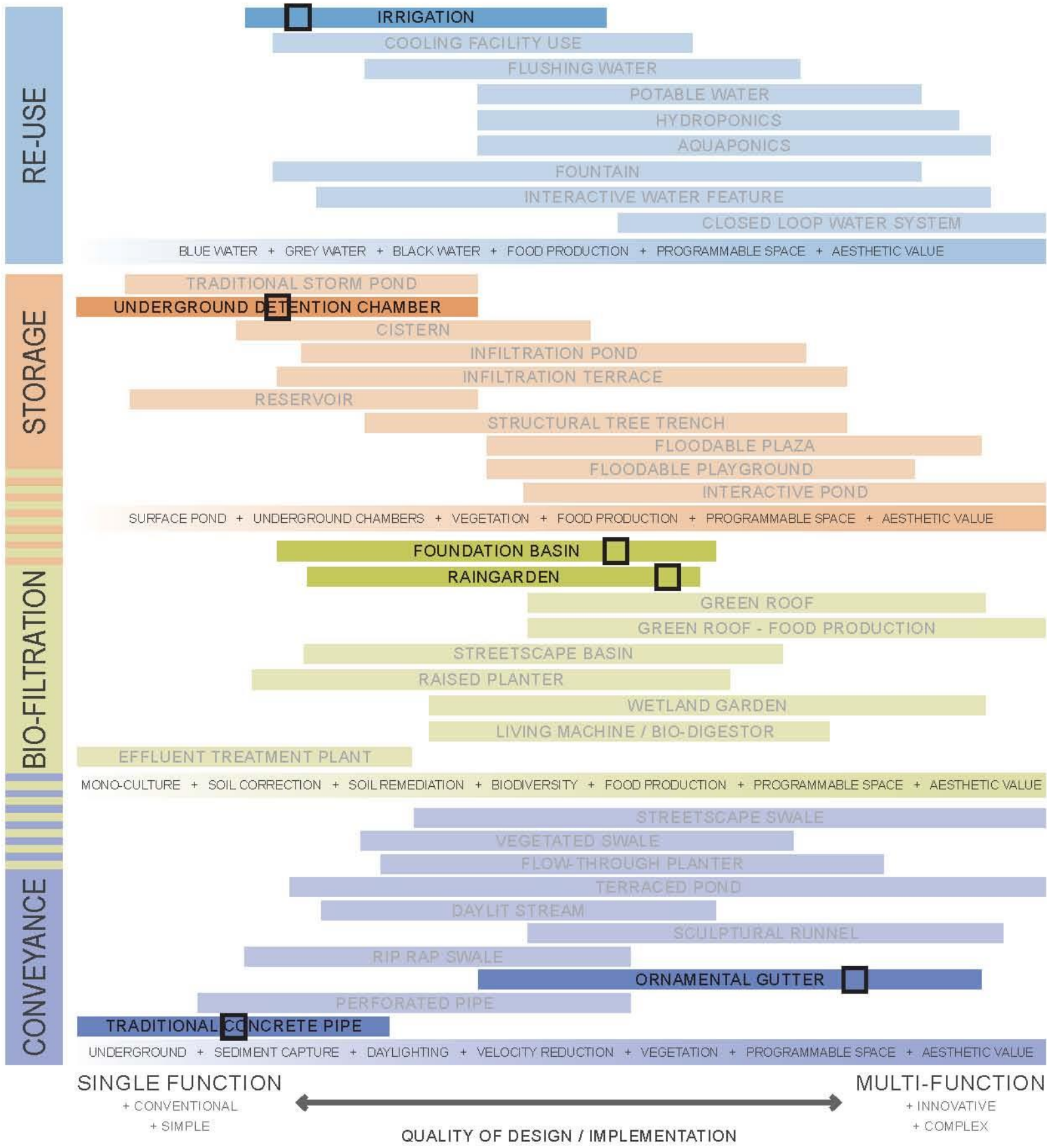
September 17, 2015



BRUCE JACOBSON
LANDSCAPE ARCHITECT



PERFORMANCE
DRIVEN DESIGN



SELECTION SITE ELEMENTS AND THEIR DESIGN PRIORITIES	CAPITAL COSTS BASED ON ESTIMATED AVERAGED	LANDOWNER CONTRIBUTION \$779,877	MWMO CONTRIBUTION \$1,200,000
<input checked="" type="checkbox"/> Bio-F. areas and demonstration area	\$65,000	\$65,000	
<input type="checkbox"/> Based on the assumption that: • A • B • C • D			
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<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input checked="" type="checkbox"/> Sized to MPLS City standard	\$900,000		\$900,000
<input type="checkbox"/>			
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<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input checked="" type="checkbox"/> Works with Ornamental Gutter	\$320,000	\$320,000	
<input checked="" type="checkbox"/> Primary capture/filtration areas	\$150,000	\$150,000	
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
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<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input checked="" type="checkbox"/> High-quality materials; interactive	\$100,000	\$60,000	\$40,000
<input type="checkbox"/>			
<input type="checkbox"/>			
<input checked="" type="checkbox"/> For treated water conveyance	\$100,000	\$20,000	\$80,000
	\$1,635,000	\$615,000	\$1,200,000

WATER SYSTEMS PRELIMINARY COST EVALUATION

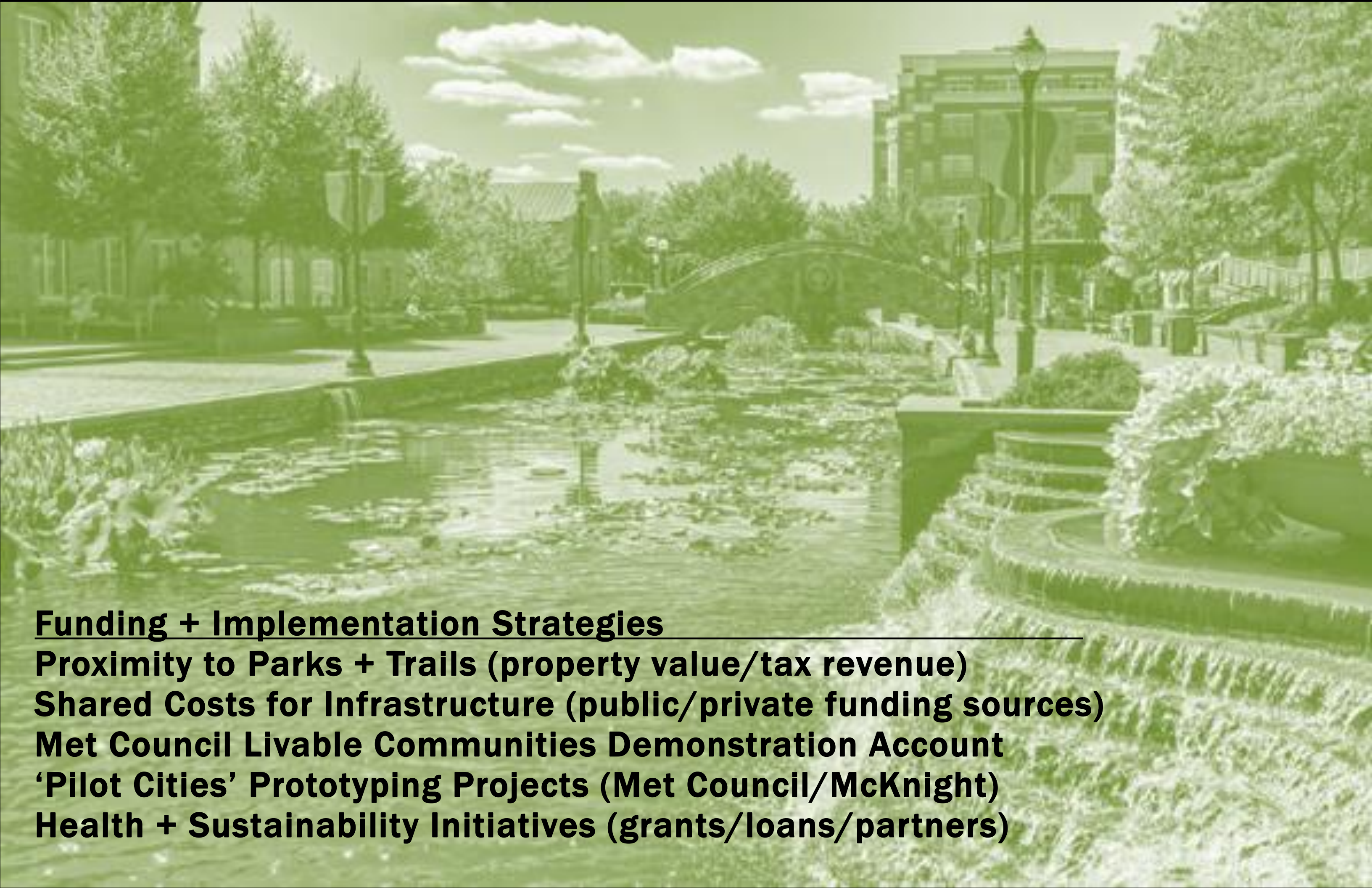




PARK AND POND



**IN MINNEAPOLIS, A DISTRICT-SCALE STORMWATER SYSTEM
DOUBLES AS PUBLIC SPACE.**



Funding + Implementation Strategies

Proximity to Parks + Trails (property value/tax revenue)

Shared Costs for Infrastructure (public/private funding sources)

Met Council Livable Communities Demonstration Account

'Pilot Cities' Prototyping Projects (Met Council/McKnight)

Health + Sustainability Initiatives (grants/loans/partners)



**For more information contact:
Bruce Jacobson; 612-244-7702; brucedjacobson@outlook.com**



Thank you for coming!

Mark your calendars for the Ramsey
Conservation District's next forum:

**Healthy Soils, Healthy Plants,
Healthy People**

Wednesday, August 16th

9-11 a.m. at Urban Roots