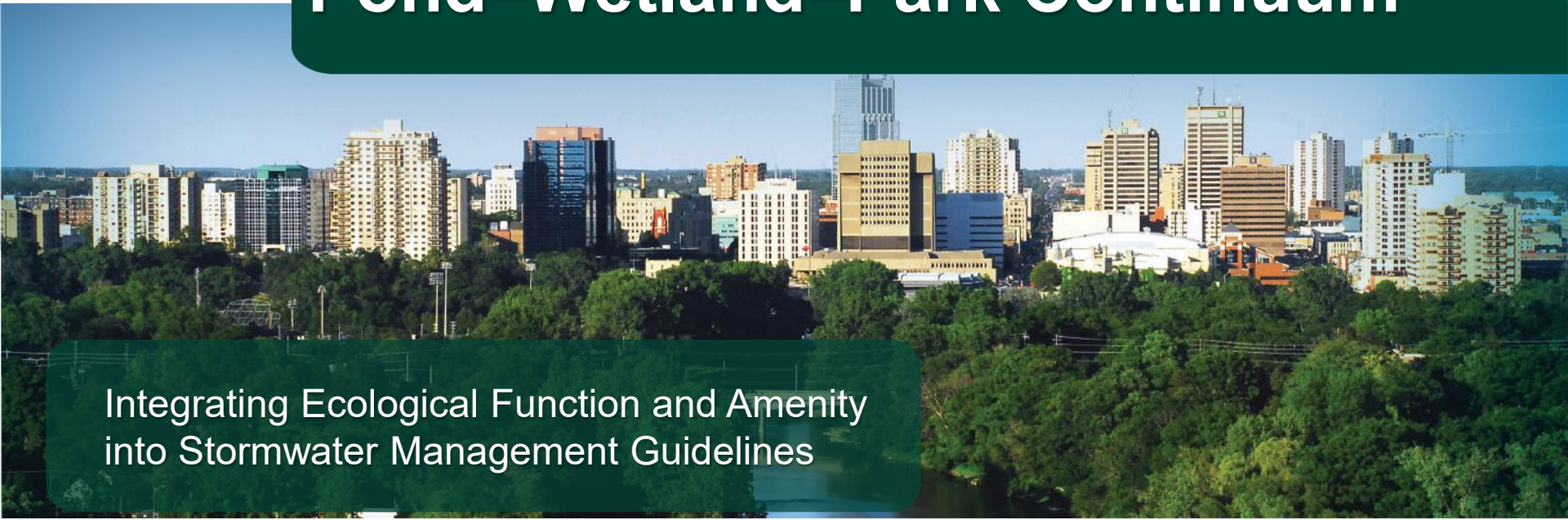
Pond–Wetland–Park Continuum



Integrating Ecological Function and Amenity into Stormwater Management Guidelines

Anton Skorobogatov

Nov 12, 2025

My take on Building for Tomorrow

About Me:

- Green Infrastructure Specialist at Kerr Wood Leidal Associates Ltd. (KWL) in **Calgary, AB**
- Champion of **nature-based solutions**

About KWL:

- Employee-owned Canadian firm specializing in **water, infrastructure,** and **environmental solutions**
- Support municipalities across Canada to deliver **climate-resilient, community-centered infrastructure**
- Office in Burlington, ON

What's wrong with today?

Calgary | News

Submerged cars, backed-up traffic, overflowing parks: Calgary drenched in rain

London

Parks and fields under water after two days of record-breaking rain

Calgary

Southwest stench, attributed to storm pond, has residents turning up their noses

Edmonton | News

Not-so-tiny goldfish big problem in Alberta town storm pond

By Craig Ellingson and Adel Ahmed

Published: October 20, 2024 at 2:16PM EDT

Calgary

Advocates worry southeast Calgary development could devastate natural wetlands and habitats

Worries for wetlands as Ontario aims to build homes quickly

WEATHER

Overflowing storm pond puts Calgary homes at risk of flooding

Water floods North Okanagan skate park, playground

News / Local News

Residents urged to stay off stormwater ponds

Kajal Dhaneshwari

Published Nov 12, 2021 • Last updated Nov 12, 2021 • 2 minute read

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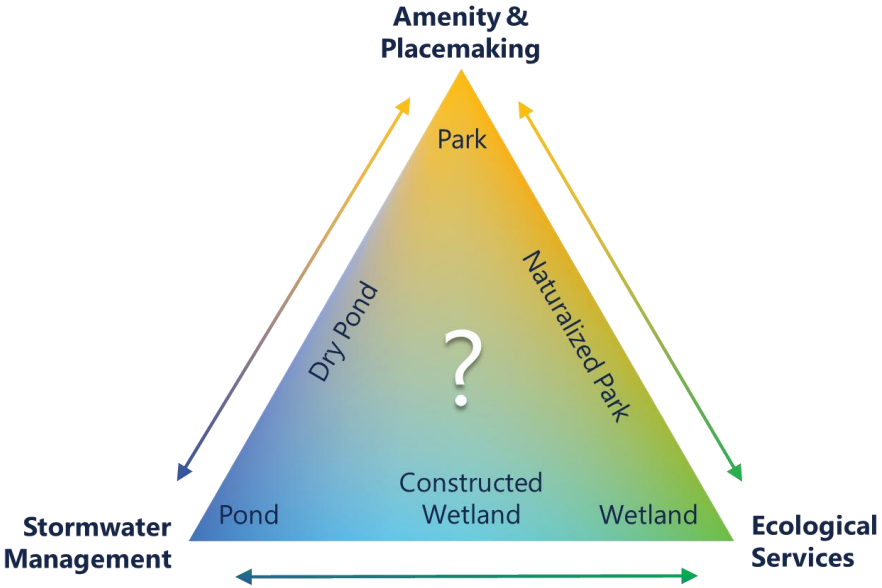


- Stormwater management facilities as multi-benefit infrastructure.
- Policies and guidelines are evolving
- Part of The City of Calgary's Stormwater Management Design Manual update.

https://www.calgary.ca/planning/water/bonnybrook-wastewaste-treatment-plant-upgrade-and-expansions.html

https://natural-history-journal.blogspot.com/2020/02/celebrate-biodiversity-on-world.html

https://trca.ca/conservation/flood-risk-management/infrastructure/

https://www.re-thinkingthefuture.com/architectural-community/a9292-an-overview-of-urban-parks/

https://skyviewranchhoa.ca/stormwater-ponds/

Expected to deliver multiple benefits:

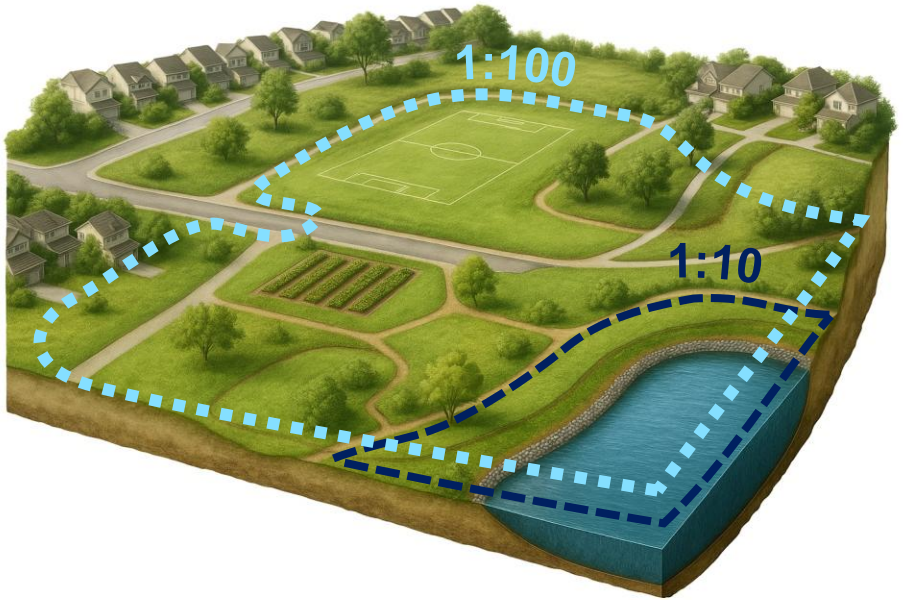
- Hydrology
- Water quality
- Biodiversity
- Amenity

Is it as good as a specialized “tool”?

- It depends

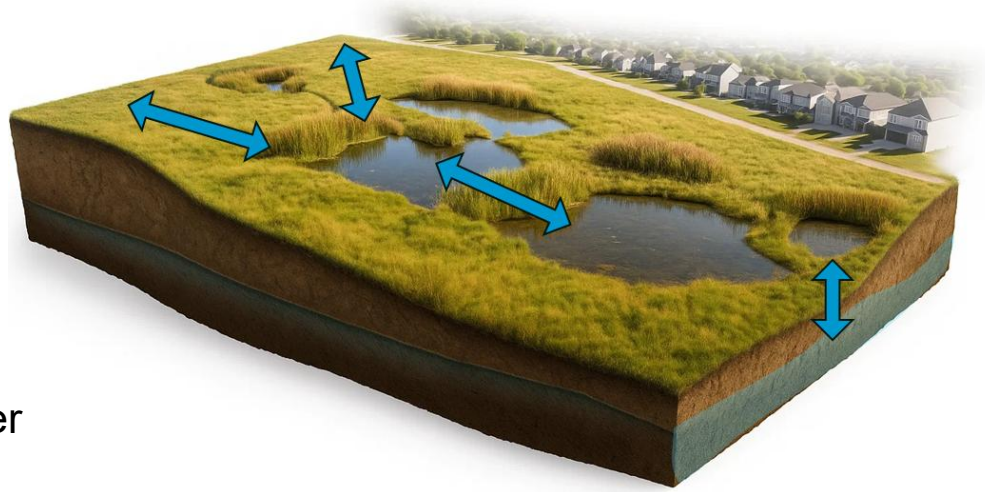
Flood Control & Resilience

- **Detention function** of stormwater management facilities is key to keeping our communities dry while protecting downstream environments
- Challenging drainage conditions or sensitive receiving streams – **may need substantial storage** for adequate management of flooding and discharge – **opportunities** for multi-functional use
- **Climate resilience** – sizing for extremes AND planning for everyday use



Environmental & Policy Pressures

- **Wetland loss** is a national & global issue
- Historically, urban development has not accommodated their **conservation, connectivity or functionality** well
- Preservation in situ doesn't mean sustaining the function – **landscape features need the landscape** and its processes
- Stormwater management facilities offer **opportunities** – ecosystem stepping stones and water



Competing Land Demands

- We are living in communities where planning efforts for stormwater infrastructure, open space programming, and natural areas have been competing for footprint

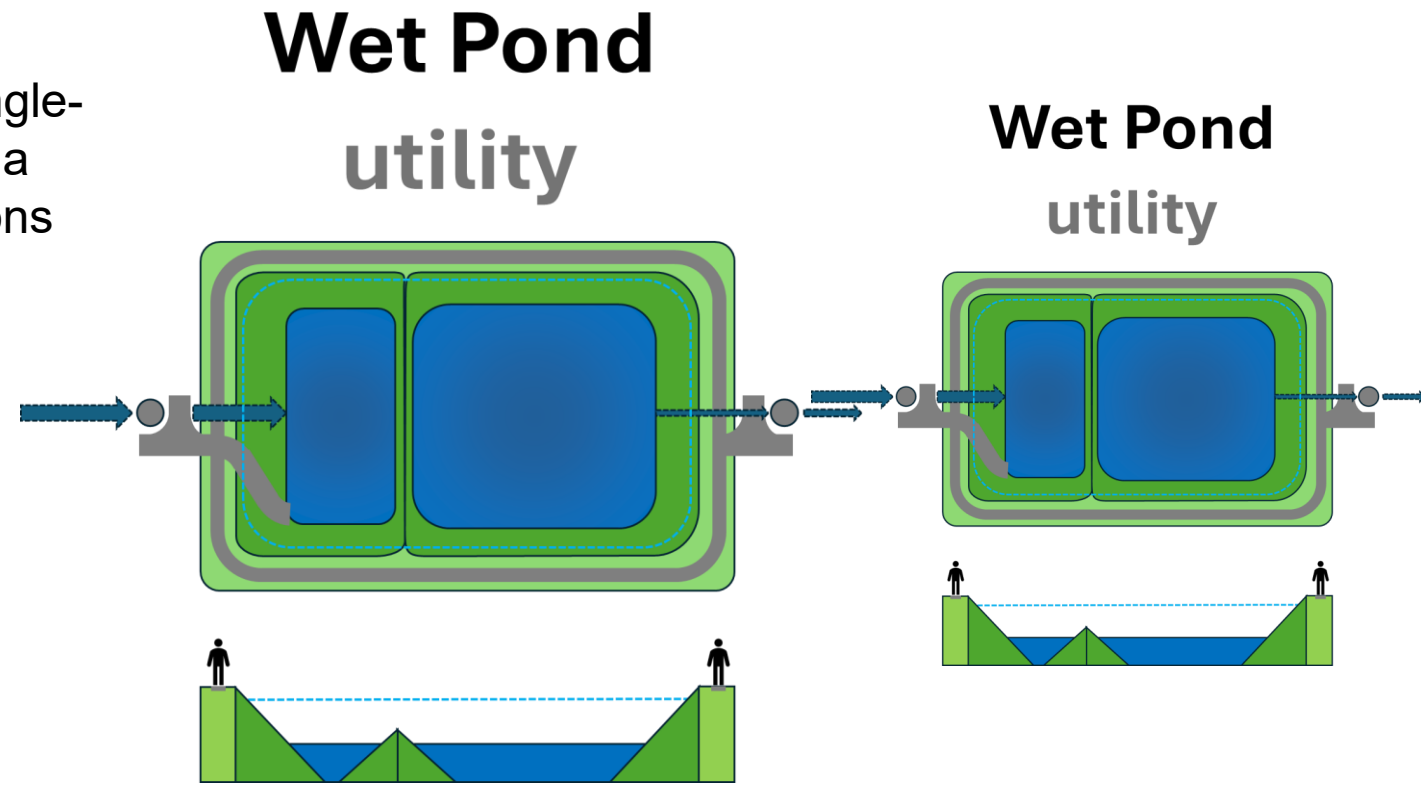
- If building for tomorrow, **every parcel of land needs to be evaluated from a multi-benefit perspective**

- Balance of programmable park space, environmental reserves, and stormwater management facilities

https://www.dreiseitlconsulting.com/tanner-springs-park

Introducing the Continuum

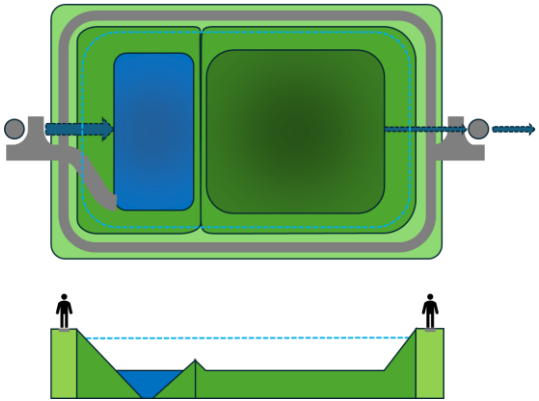
Transition from single-purpose basins to a continuum of options



Introducing the Continuum

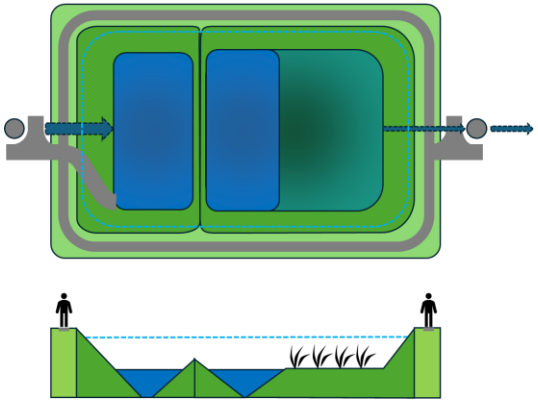
Dry Pond

utility



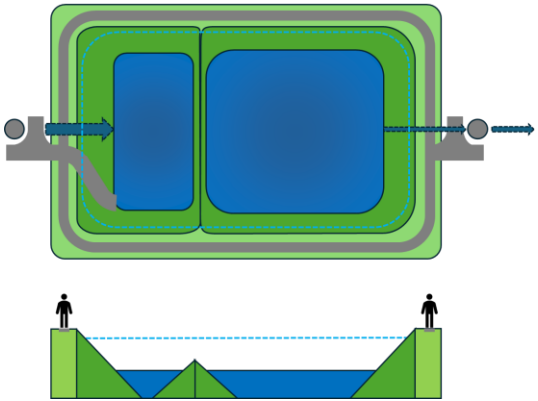
Wetland

utility

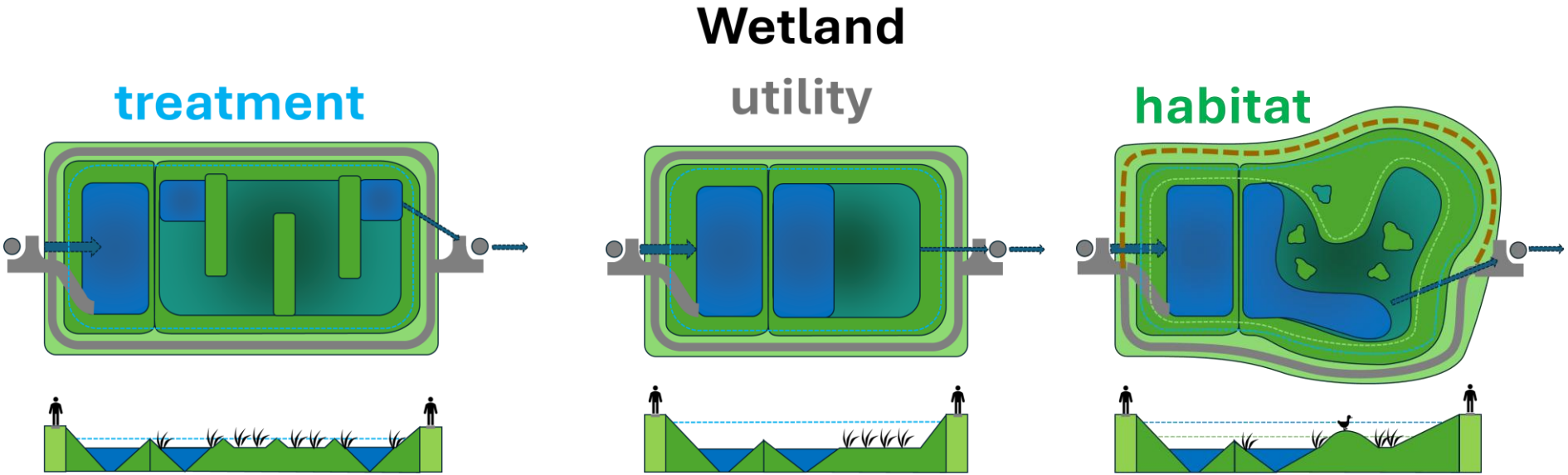


Wet Pond

utility



Constructed Wetlands

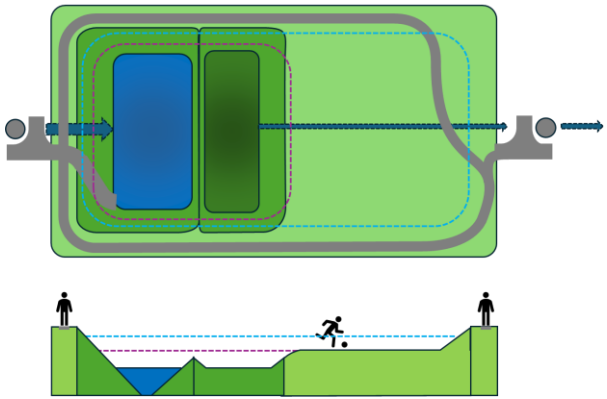


Make sure to consider natural and modified natural wetlands

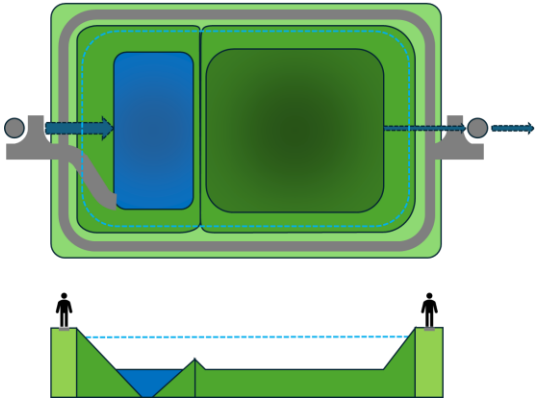
Dry Ponds

Dry Pond

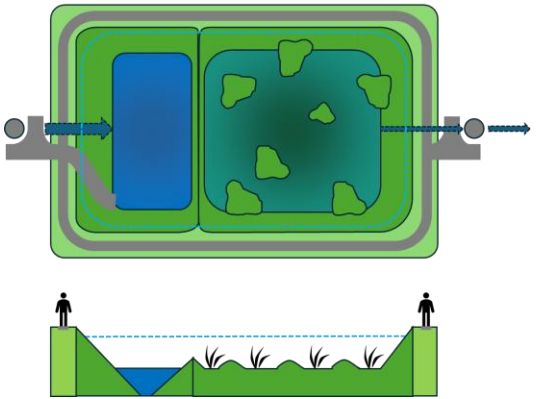
amenity



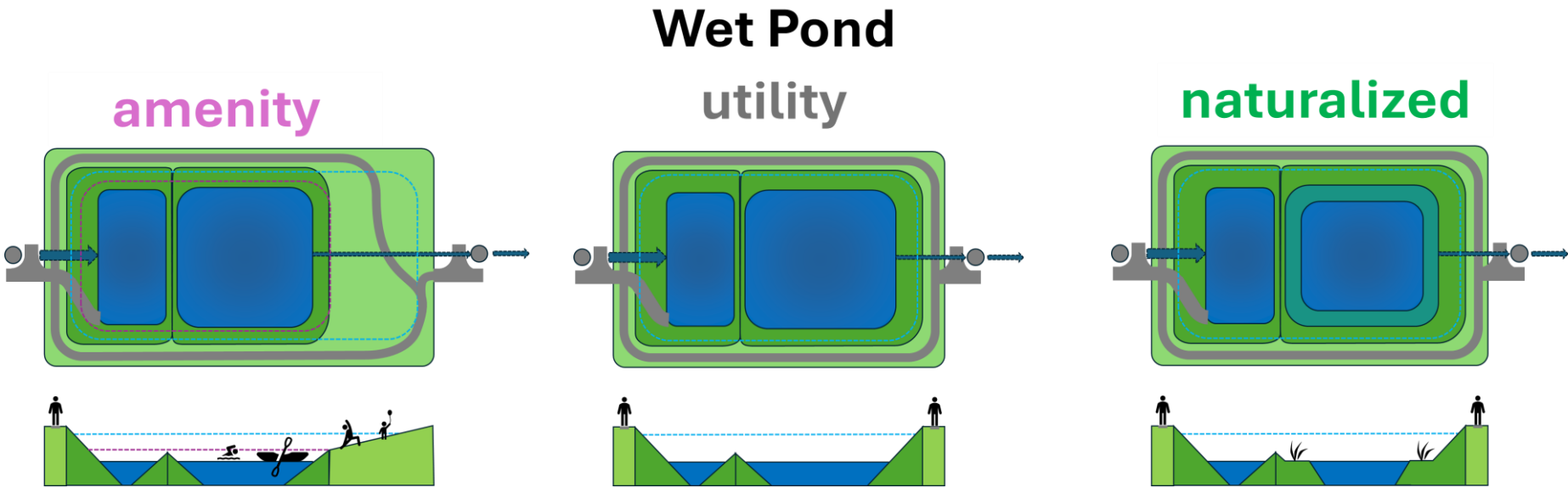
utility



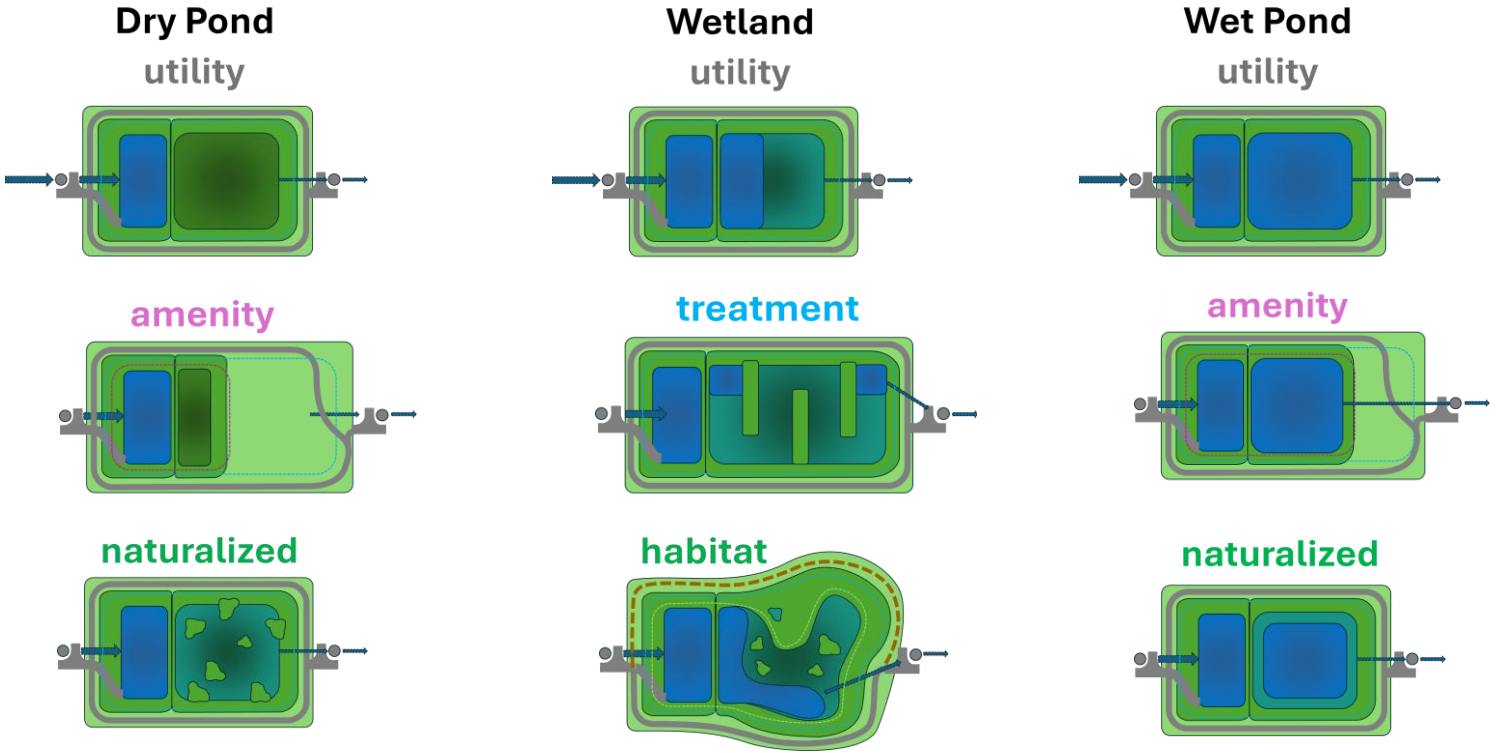
naturalized



Wet Ponds

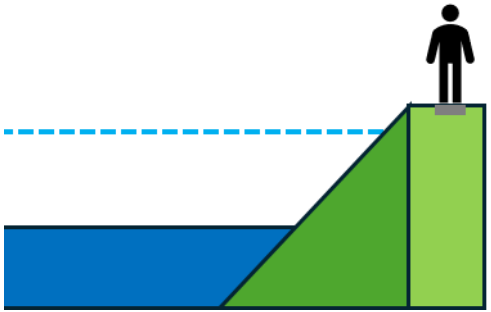


Constructed Facilities



Design Levers Across the Gradient

- Open Water Pool(s) - % coverage (0-100), depth, perimeter complexity, water quality
- Side Slope – rise/run, terraced or not, surface treatment, vegetation type
- Active Use Area(s) (pathways, play areas, etc) – inundation duration and frequency (e.g. never – frequent), intended use, safety consideration, contact recreation water quality
- Active Storage – depth : footprint ratio, inundation patterns, depth in relation to user – child, adult, wildlife (nesting and denning)



Compatibility & Trade-Offs

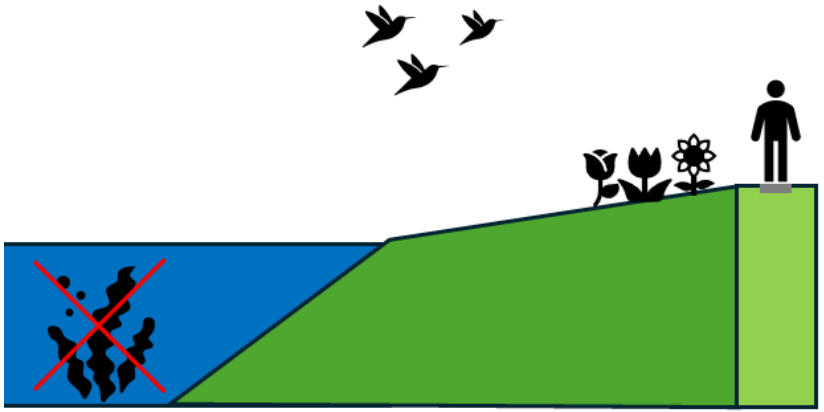
	Play Space/ Active Recreation	Water-based Use	Visual Amenity	Wetland Habitat	Hydroperiod regulation	Climate Resilience	Biodiversity Gains
Removal & Storage of Sediment	⊘	⊘	⊘	⊘	⊘	⊘	⚖
High Flow Energy Dissipation	⊘	⊘	⚖	⊘	⊘	⊘	⊘
Discharge Rate Control	⊘	✓	⚖	⚖	✓	✓	⚖
Pollutant Removal	⊘	✓	⚖	✓	✓	✓	✓
Detention/ Storage Volume Optimization	⚖	⚖	✓	⚖	⚖	✓	⚖
Thermal Mitigation	✓	✓	⚖	✓	⚖	✓	⚖

✓ Compatible ⚖ It depends ⊘ Not compatible

Cultural Sustainability

- Aesthetics & acceptance → infrastructure longevity
- Landscapes valued for beauty persist longer in human-dominated environments

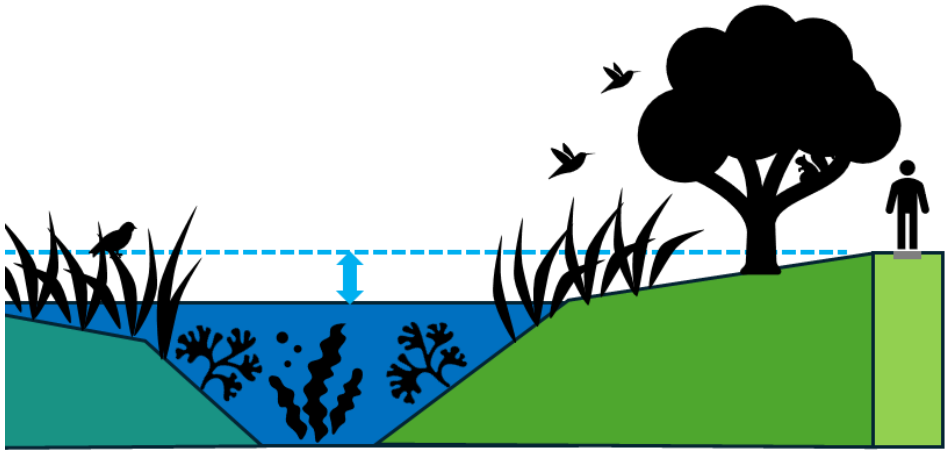
- “Charismatic” wildlife (e.g. birds)
- Visible care (e.g. mowing)
- Vividly flowering plants
- Visible clear blue water
- Not tall grasses and shrubs
- Not vegetated shorelines
- Not dynamic water levels
- Not aquatic vegetation



Environmental Value

- SWMFs act as ecological stepping stones and provide connectivity benefits
- May have rich biodiversity but different from natural ponds and wetlands
- May pose a threat to wildlife through ecological traps mainly due to pollution

- Clean water
- Gentle slopes
- Varied vegetation
- Natural(ized) Hydroperiod
- Shallow and deep pools
- Aquatic vegetation

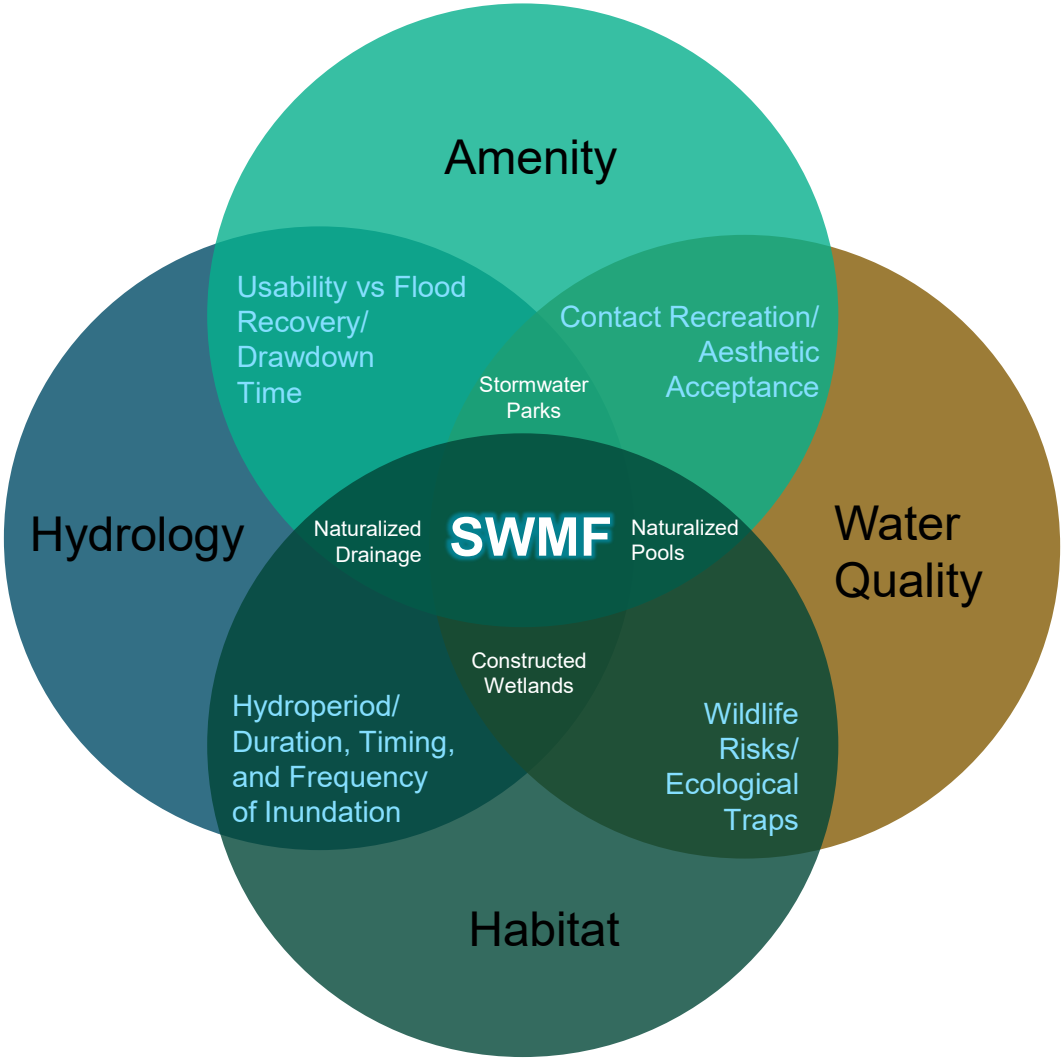


Maintenance Realities

- Multiple stormwater management facilities are coming to 20-25 year mark since construction and are in need of maintenance
- Sediment removal poses a costly challenge – ability to isolate and dewater sediment storage areas can be key
- Surprising outcomes – navigating disturbance of what now could be considered habitat for sensitive species
- With additional complexity of function, additional maintenance will be required
- Natural(ized) ≠ maintenance-free

Implementation Considerations

- ***Blue-Green Infrastructure:*** translate lessons learned with other programs (e.g. LID)
- ***Developer/Municipality Interface:*** greenfield applications require clarity on construction and final handover sign-offs and maintenance agreements
- ***Regulatory:*** alignment and opportunities with compatible policy goals – wetland policy, land use considerations


Amenity
Usability vs Flood Recovery/ Drawdown Time
Contact Recreation/ Aesthetic Acceptance
Stormwater Parks
Hydrology
Naturalized Drainage
SWMF
Naturalized Pools
Water Quality
Constructed Wetlands
Hydroperiod/ Duration, Timing, and Frequency of Inundation
Wildlife Risks/ Ecological Traps
Habitat

The Continuum in Practice

Key takeaways:

- Continuum = framework for integration and context-sensitive design.
- Let’s design & build stormwater infrastructure we’re proud to visit, not just inspect.

Questions?

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Reach out!