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Introduction

What is a stormwater pond?

Stormwater ponds collect and store runoff from snow melt and rain, enhancing water quality and preventing flooding downstream.

Why is the Next Generation of Stormwater Ponds necessary?

- ❖ **Safety:** Accidents occur from improper use, leading to injury. Opportunities for safe interaction should be explored.
- ❖ **Climate challenges:** Change demands flexible water management.
- ❖ **General concerns:** Odor, pests, and aesthetics complaints from citizens lead to costly maintenance requirements.

Project Statement:

The City of Calgary aims to develop the next generation of storm ponds that will become multi-functional community assets.



Fig. 1. Currently, stormwater ponds host many hazards[1].

Methodology

- ❖ Evaluated three trial ponds through a qualitative decision matrix
- ❖ Used parameters from a base scenario pond to calculate storage capacity and total suspended solids (TSS) removal, and ensure the design met applicable guidelines [2]
- ❖ Discussed with stakeholders to ensure the proposed pond was an innovative, feasible, and effective solution
- ❖ Researched constraints of trial pond components and iterated their design through a triple-bottom-line evaluation process

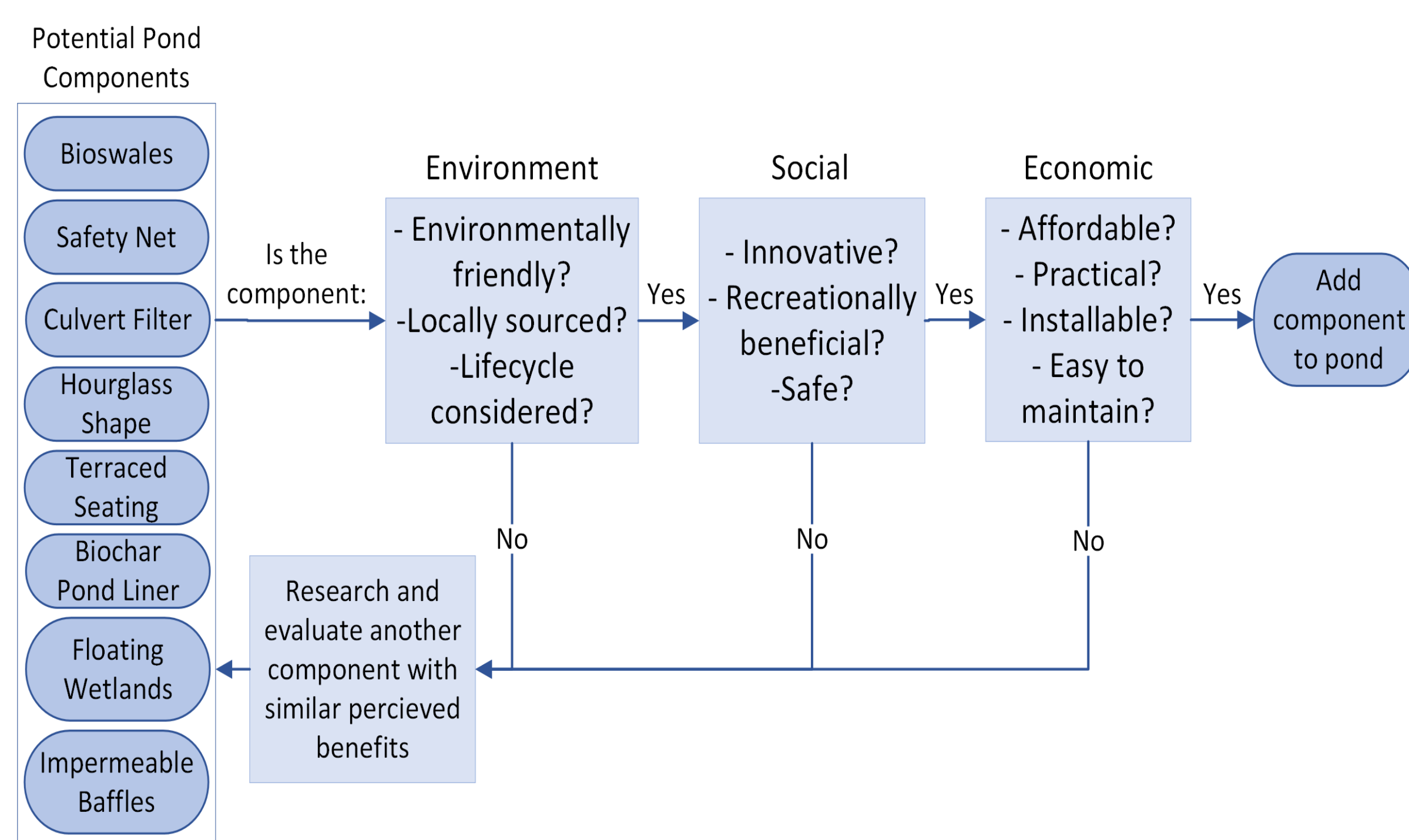


Fig. 2. Iterative decision flowchart for potential pond components.

Design Concept

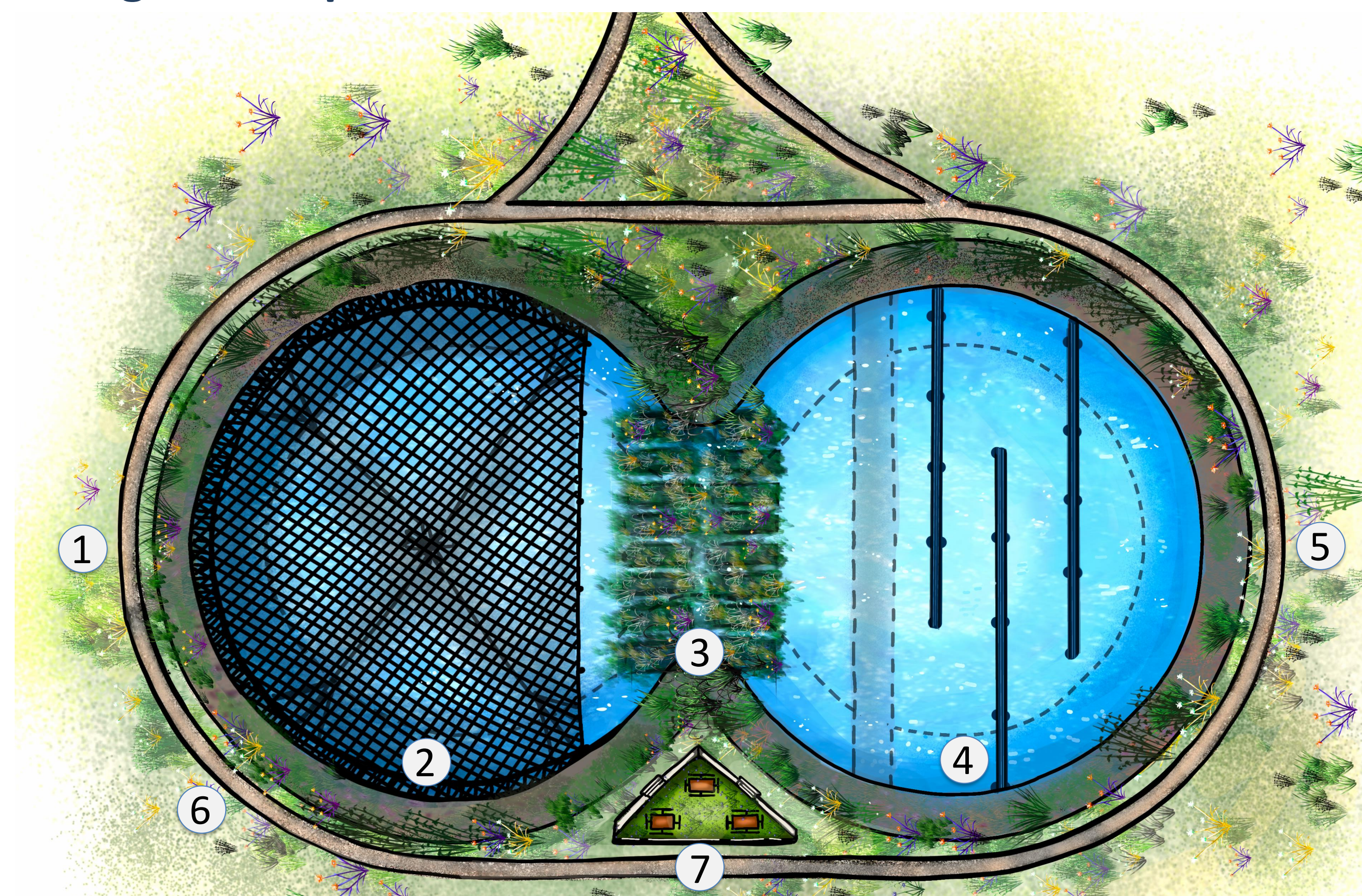


Fig. 3. Conceptual drawing of proposed pond.

Enhanced Design Features:

- Hourglass Shape:** Provides a visually striking and functional outline
- Safety Net:** Mitigates drowning risks to enable safe recreational interaction
- Floating Wetlands:** Remove nutrients like phosphorus and nitrogen, decreasing algal blooms and odor, and further improving water quality
- Baffles:** Slow down water flow, extending treatment duration
- Recreational Opportunities:** Innovative safety and treatment components enhance water quality, enabling non-contact activities like skating
- Visual Appeal:** Vegetation placed strategically to improve aesthetics and act as a natural access barrier, ensuring safety during all seasons
- Terraced Seating:** Seating area to encourage community congregation

Simulation Results

TABLE I
POND STORAGE CAPACITY SIMULATION RESULTS

Simulation	Max. Depth of Event (m)	Max. Volume of Event (m ³)	Total Volume of Pond (m ³)
24 Hour, 1:100 Year Event	4.1	54,555	61,992
Continuous Event	4.4	58,157	61,992

At the Normal Water Level (NWL), the pond is 2.5 m deep, 210 m long, and 105 m wide. The overall surface area at the NWL is about 1.3 ha. Model results show the design pond has the capacity to store the 24-hour 1:100 year and the continuous design rainstorm events.

TABLE II
TOTAL SUSPENDED SOLIDS (TSS) TREATMENT SIMULATION RESULTS

Particle Size (μm)	Washoff (kg)	Discharged (kg)	Treatment (%)
< 10	1,043,661	5,096.36	99.51%
10-20	408,397	191.05	99.95%
20-50	589,891	3.48	~100%
50-150	1,043,661	0.00	100%
> 150	1,452,058	0.00	100%

Currently, city guidelines only require the removal of at least 85% TSS for particle sizes greater or equal to 50 μm [2]. The proposed pond adds components like baffles and floating wetlands that target much more, including nutrient and microbial pollutant removal.

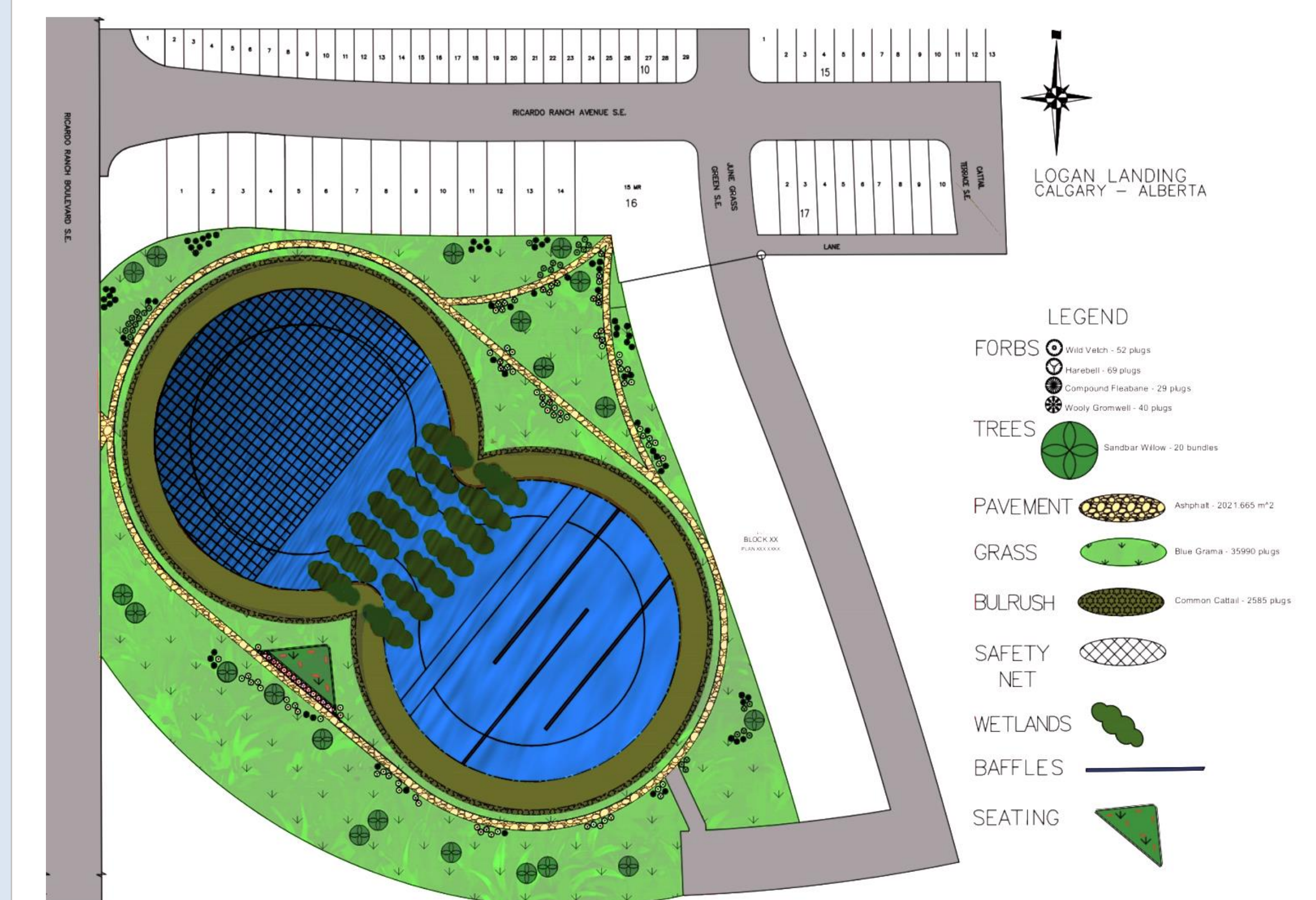


Fig. 4. Construction drawing of the final pond design.

Conclusion and Recommendations

What's Different? The team's proposed Next Generation of Stormwater Ponds optimizes and innovates pond elements, thus enhancing the recreational use of ponds, improving runoff water treatment, and ensuring they are a strong community asset.

Next Steps and Recommendations:

- ❖ **Pilot Project:** Test & monitor the safety net durability and effectiveness in fall prevention, especially through the seasons.
- ❖ **3D Component Simulation:** Model the components suggested for future stormwater ponds in a 3D simulation to test water treatment effectiveness.
- ❖ **Guideline Updates:** Implement proposed updates to the 2011 City of Calgary Stormwater Management & Design Manual [2].

References

- [1] The City of Calgary. (2024). *Stay Safe, Stay Off Storm Ponds* [Online]. Available: <https://www.calgary.ca/water/stormwater/storm-ponds1.html>
- [2] The City of Calgary Water Resources, *Stormwater Management & Design Manual*, The City of Calgary, 2011.

Acknowledgments

Dr. Wendy Huang, The City of Calgary (Bert van Duin, Alexa Baker, Stacey Zhao, and Sarah Kemmers), Urban Systems (Phil Nottveit), Genesis Land Development (Arnie Stefaniuk), PCSWMM Masters (Hanan Ulusow, Charlize Navratil), Vernon Finstad, and many more!