

Erie Non-Potable Water Master Plan

Presented at the Rocky Mountain Water Reuse Workshop

August 14, 2014

Presented by Matt Bliss, DiNatale Water Consultants



Introduction

- Erie was incorporated in 1874 - coal mining town
- Erie's population grew 1,258 to 18,135 from 1990 to 2010 (US Census Data)
- Erie's Comprehensive Planning Area encompasses more than 40 square miles
- Several active developments in Erie today



Map from coloradodirectory.com

Acknowledgments

- Valuable information, data, insight, edits and suggestions provided by Town of Erie staff:
 - Gary Behlen (Director of Public Works)
 - Russell Pennington (Deputy Director of Public Works)
 - Wendi Palmer (Civil Engineer)
 - Jodi Lambert (Operations and Maintenance Director)
 - Jon Mays (Water and Wastewater Operations Manager)
 - Paul Reed (Assistant Parks Superintendent)
 - Paul Zilis (Erie's water attorney)



Goals and Objectives

- DiNatale Water Consultants (DWC) Updated the 2007 Non-Potable Water Master Plan
- Goals and Objectives of the updated Plan
 1. Update water supply portfolio and quantify availability of non-potable water
 2. Quantify demands of areas that could reasonably be developed and served by non-potable water in short- to mid-term planning horizons
 3. Develop an infrastructure layout
 4. Model system operations
 5. Provide estimate of cost

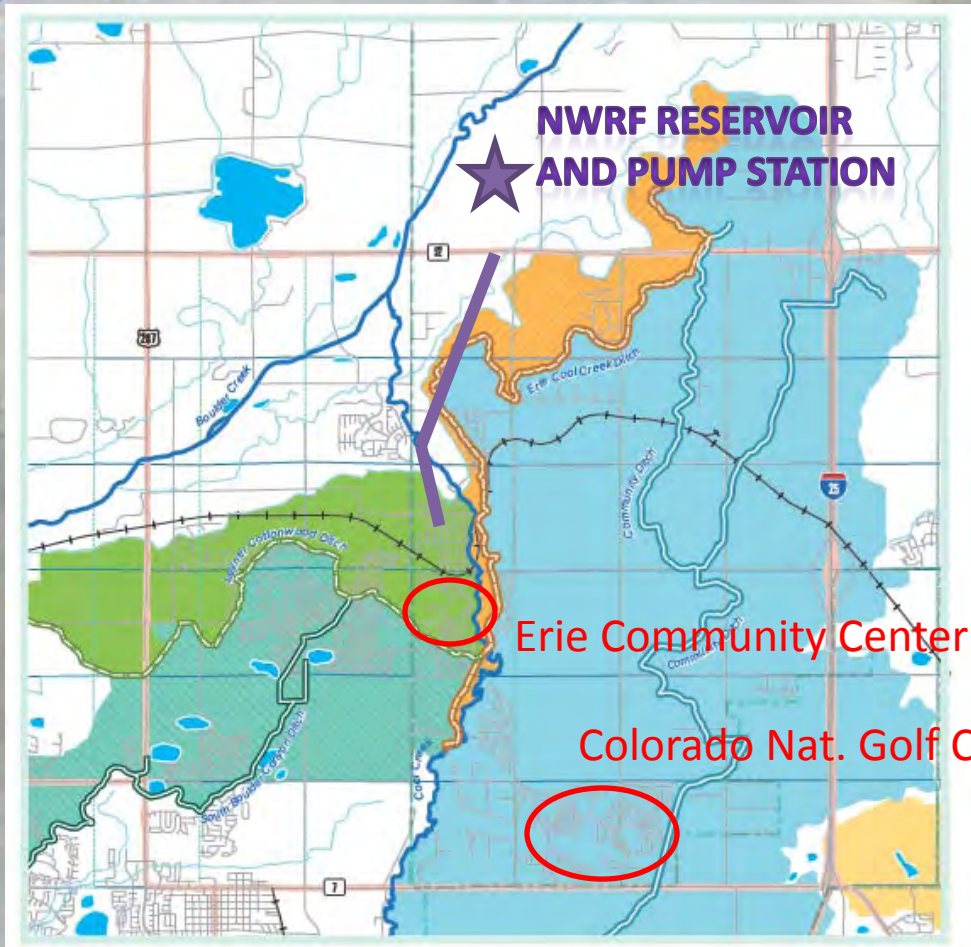
Current System



- North Water Reclamation Facility Reg 84 reclamation facility
- 1,000 AF reclaimed reservoir
- Reuse pump station and pipeline constructed
- Pipeline currently ends near Historic Erie
- Has not yet been used to deliver reuse water



Current System



- Several irrigation ditches run through Erie – Erie owns shares in four of them
- Ditch water currently used to irrigate Erie Community Park
- Colorado National Golf Course irrigates by using Erie's consumable effluent by exchange on Coal Creek
- Average use 400 AFY
- Most parks use potable water

Non-Potable Water Availability

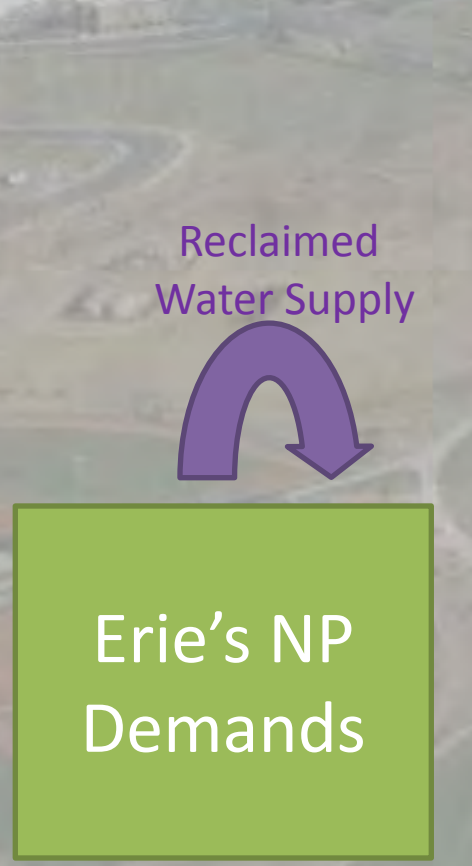
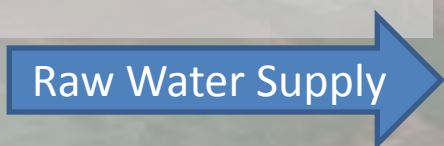
Water Source	Avg. Yield (AF)	Non-Potable Use	Reuse
C-BT	5,200	Yes	No
Windy Gap	1,400	Yes	Yes
NISP	6,500 (future)	Yes	Partial
Irrig. Ditches	1,300	Yes	Partial

- Use of Windy Gap supplies primarily in the winter, can reclaim nearly 95% of Windy Gap supplies
- C-BT supplies cannot be re-used – first use only
- NISP has a reusable component and a first-use only component
- Ditch water can be used on historically irrigated lands without water rights change. Some shares have been changed and CU can be reused

Non-Potable Water Availability

Water Supply Variability

- C-BT and Ditch supplies are highly variable by year
 - Use raw water for non-potable demands in above-average years
- Use reclaimed water in below average years



Benefits

- Raw water can flush accumulated salts from use of reclaimed water
- Built-in redundancy for non-potable system with two water sources

Non-Potable Demands

Aerial view of landscaped rights-of-way in Erie (Arapahoe Ridge)

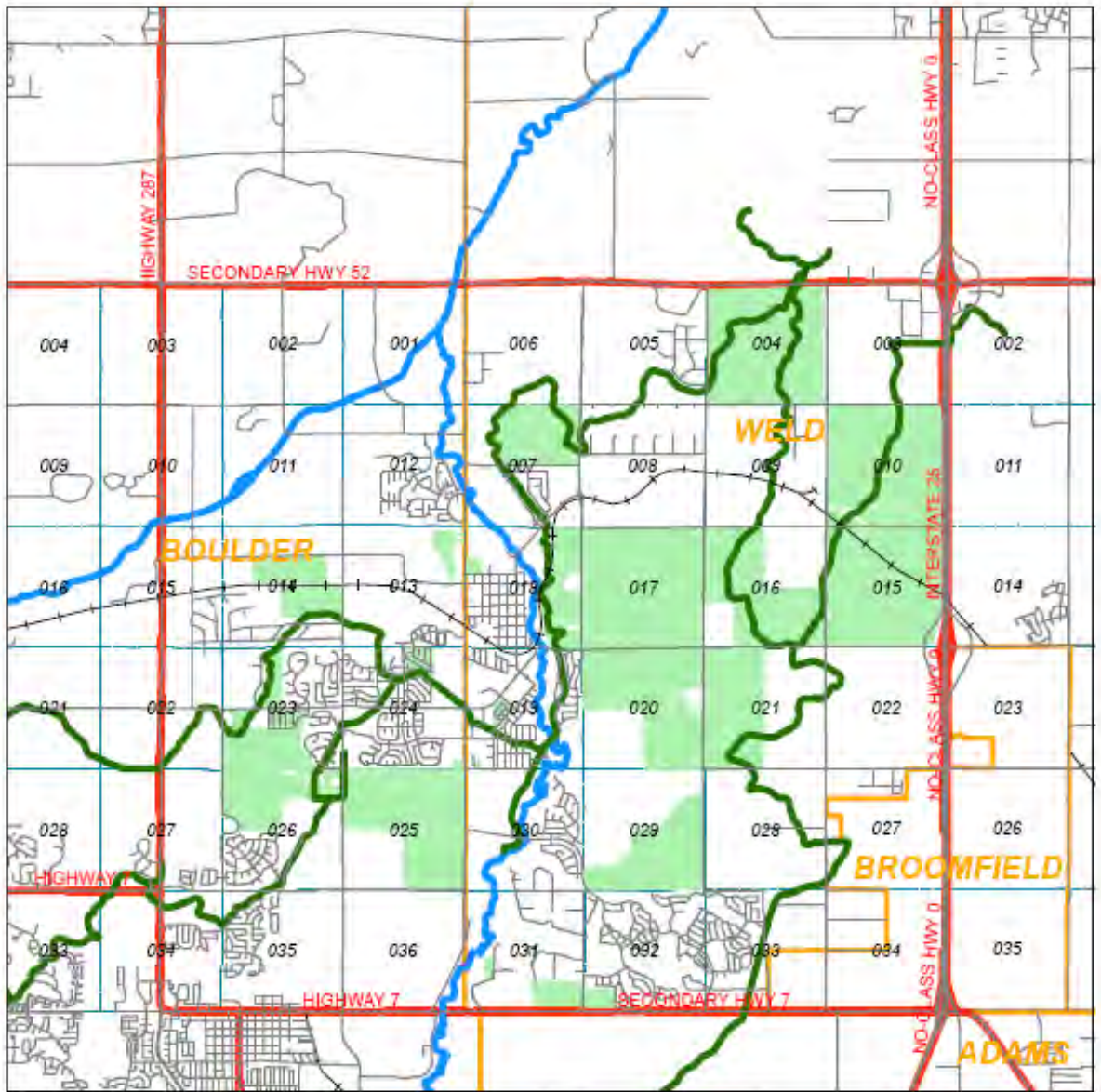


- Current potable and non-potable use on parks and golf course quantified
- Future demands estimated from Unified Development Code (UDC) and existing Erie rights-of-way

- UDC and existing rights-of-way analysis resulted in **0.23 AF** of non-potable demand *per raw acre of developed land*
- Dual-use system on individual lots not considered for short and mid-term planning horizons

Non-Potable Demands

- Planned future development areas identified with Erie Staff
- Non-potable demands estimated based on the 0.23 AF per acre of development
- Additional 25% added for additional NP customers
- **Near to Mid Term NP Demand: 2,100 AFY**

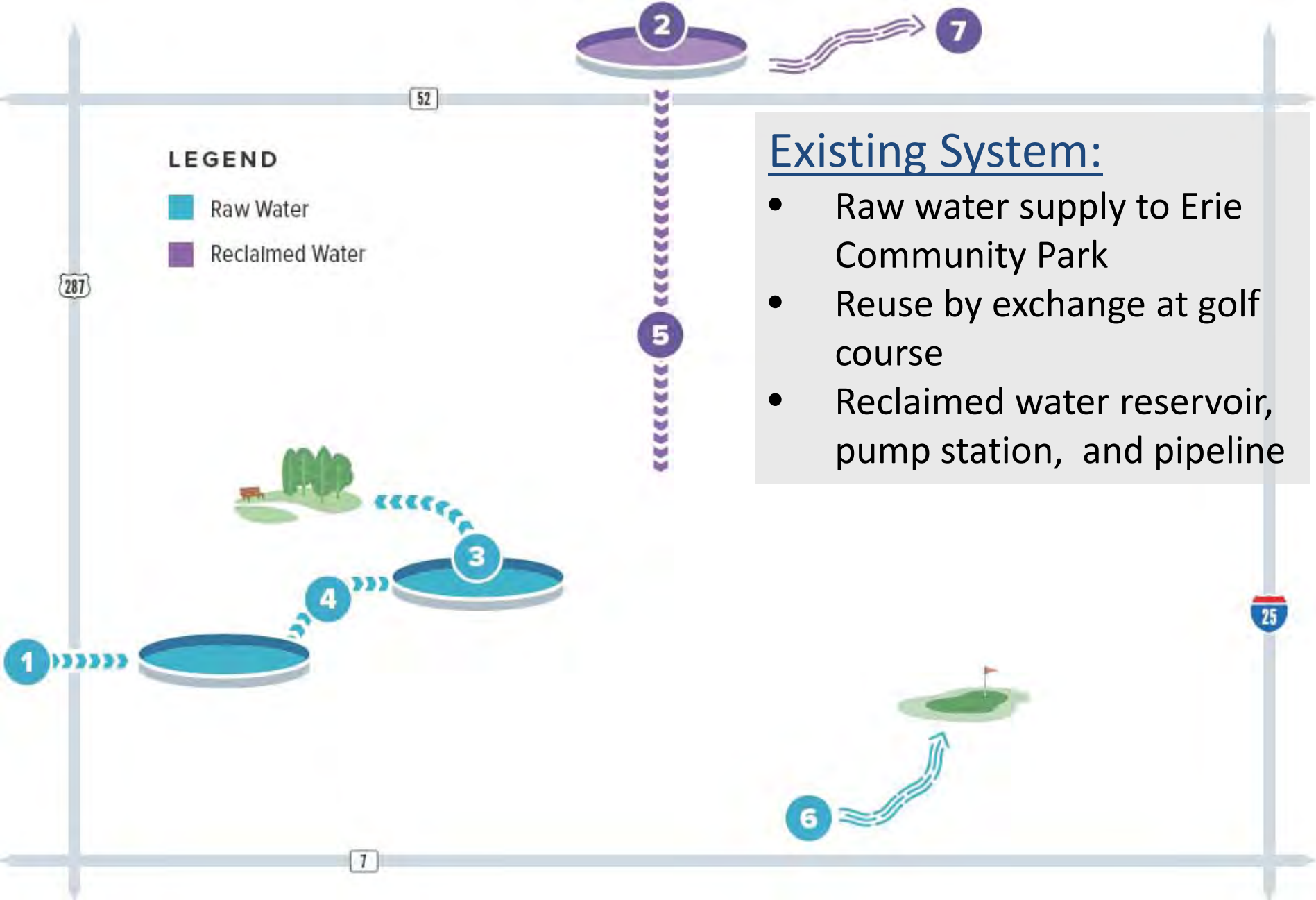


Infrastructure Plan

5-Phase Infrastructure Plan:

1. Low-hanging fruit - parks and developments near existing line and new larger development (Collier's Hill)
2. North line – serves northern service area and I-25 corridor
3. Southern extension with connection to current irrigation pond for Erie Community Park and direct connect to Colorado National Golf Course
4. Interconnection of reclaimed system with raw water system near existing water treatment plant
5. Loop system with Northern Line and Collier's Hill line

Infrastructure Schematic (Existing)



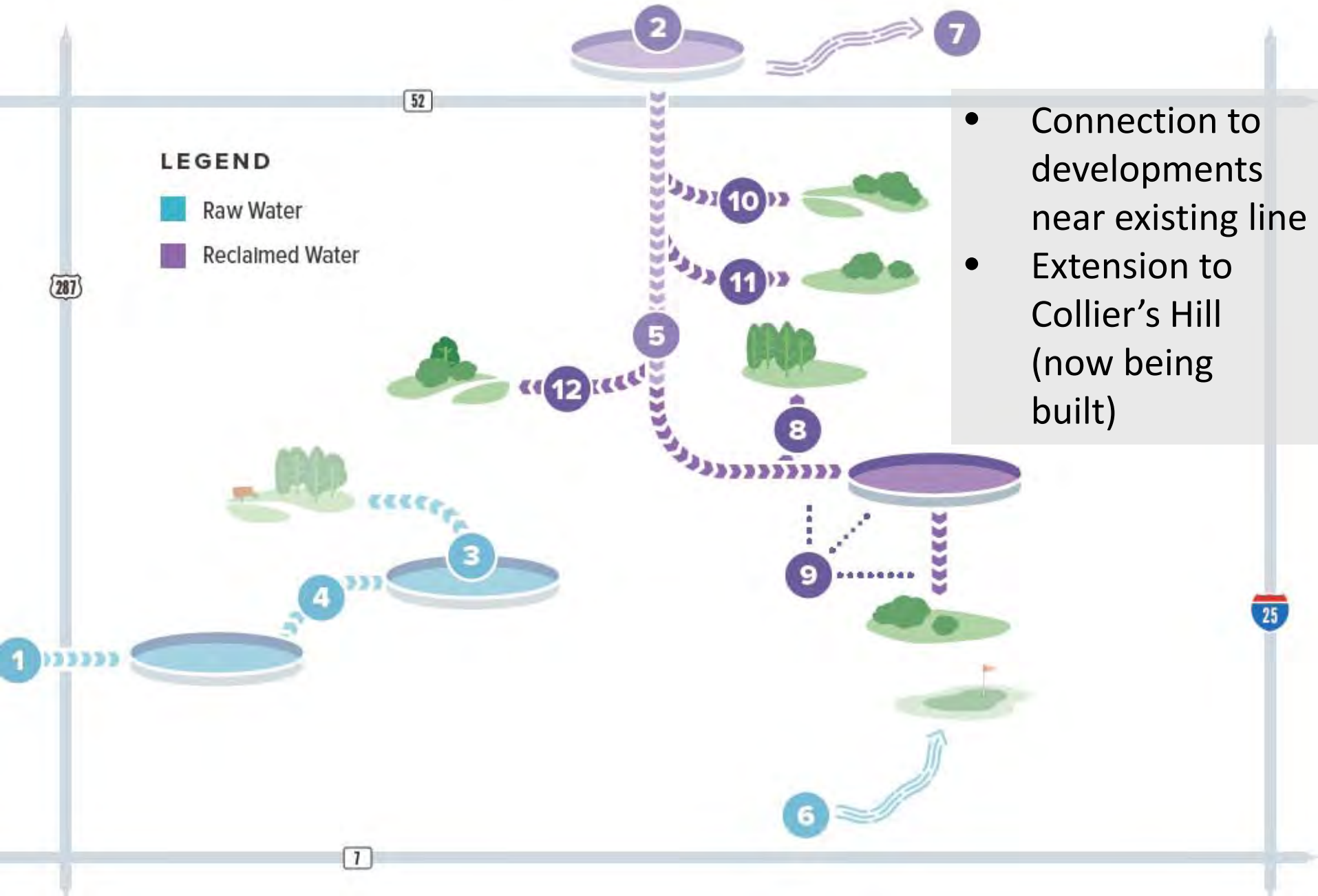
LEGEND

- Raw Water
- Reclaimed Water

Existing System:

- Raw water supply to Erie Community Park
- Reuse by exchange at golf course
- Reclaimed water reservoir, pump station, and pipeline

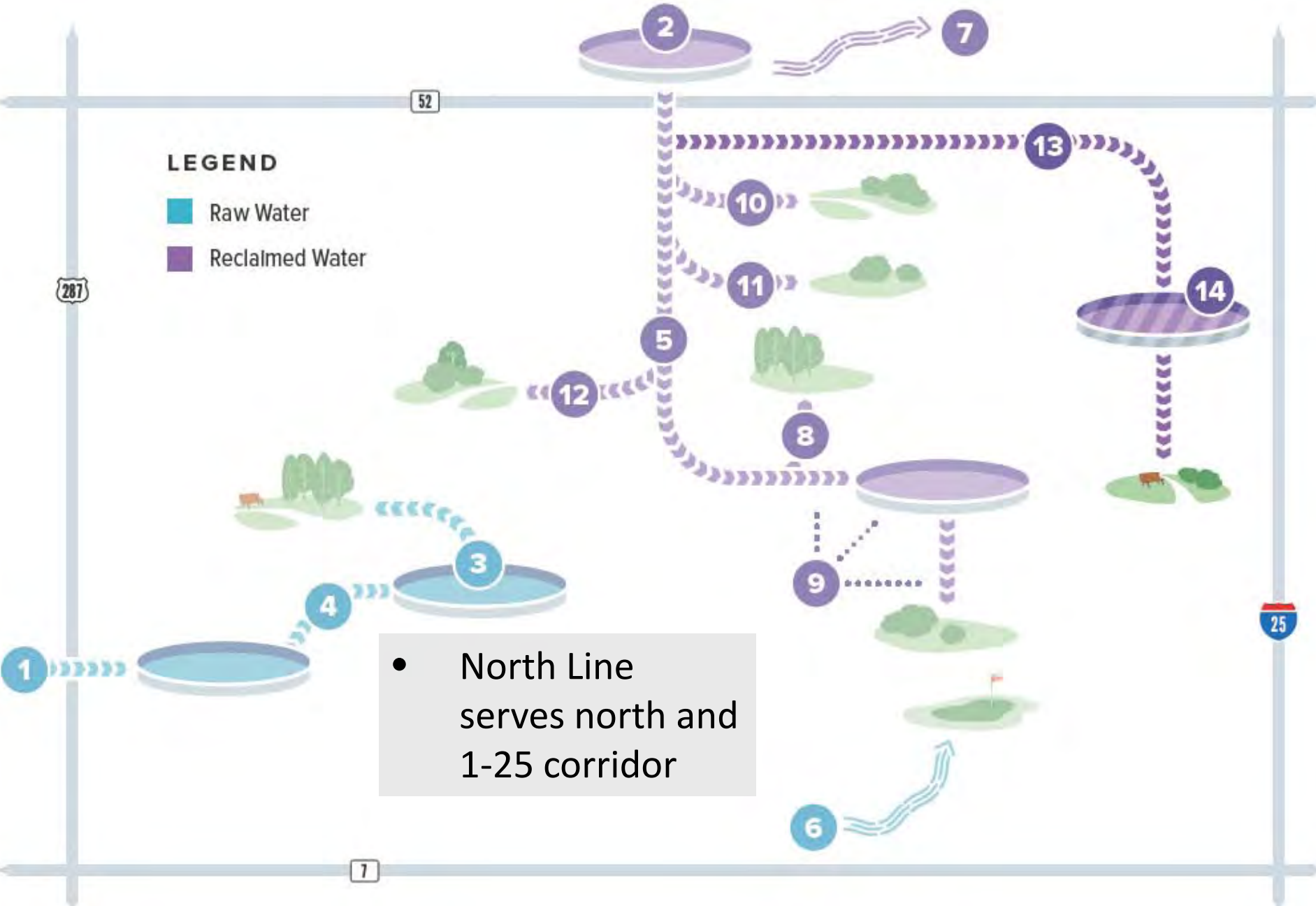
Infrastructure Schematic (Through Phase 1)



Infrastructure Schematic (Through Phase 2)

LEGEND

- Raw Water
- Reclaimed Water

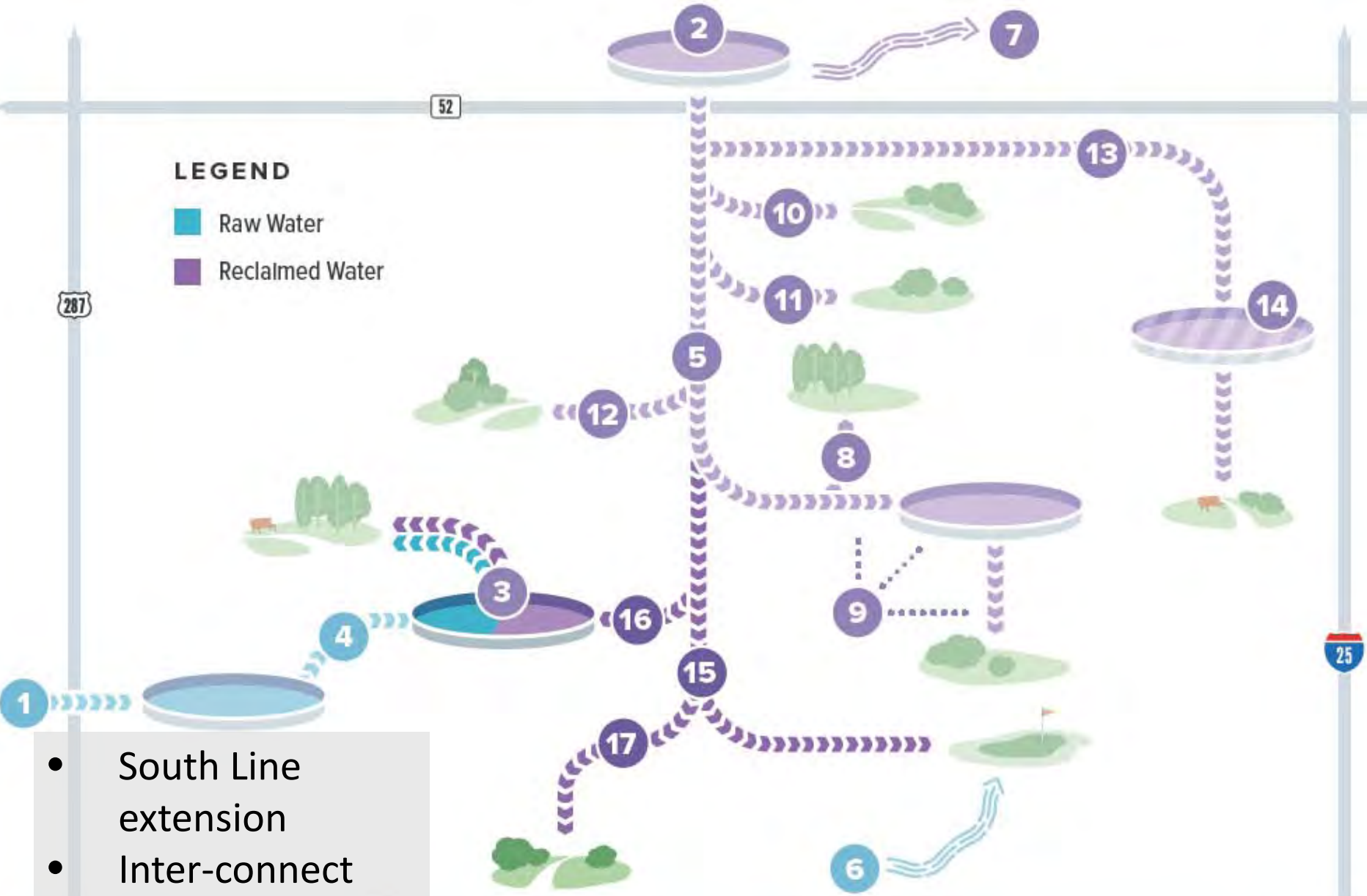


- North Line serves north and 1-25 corridor

Infrastructure Schematic (Through Phase 3)

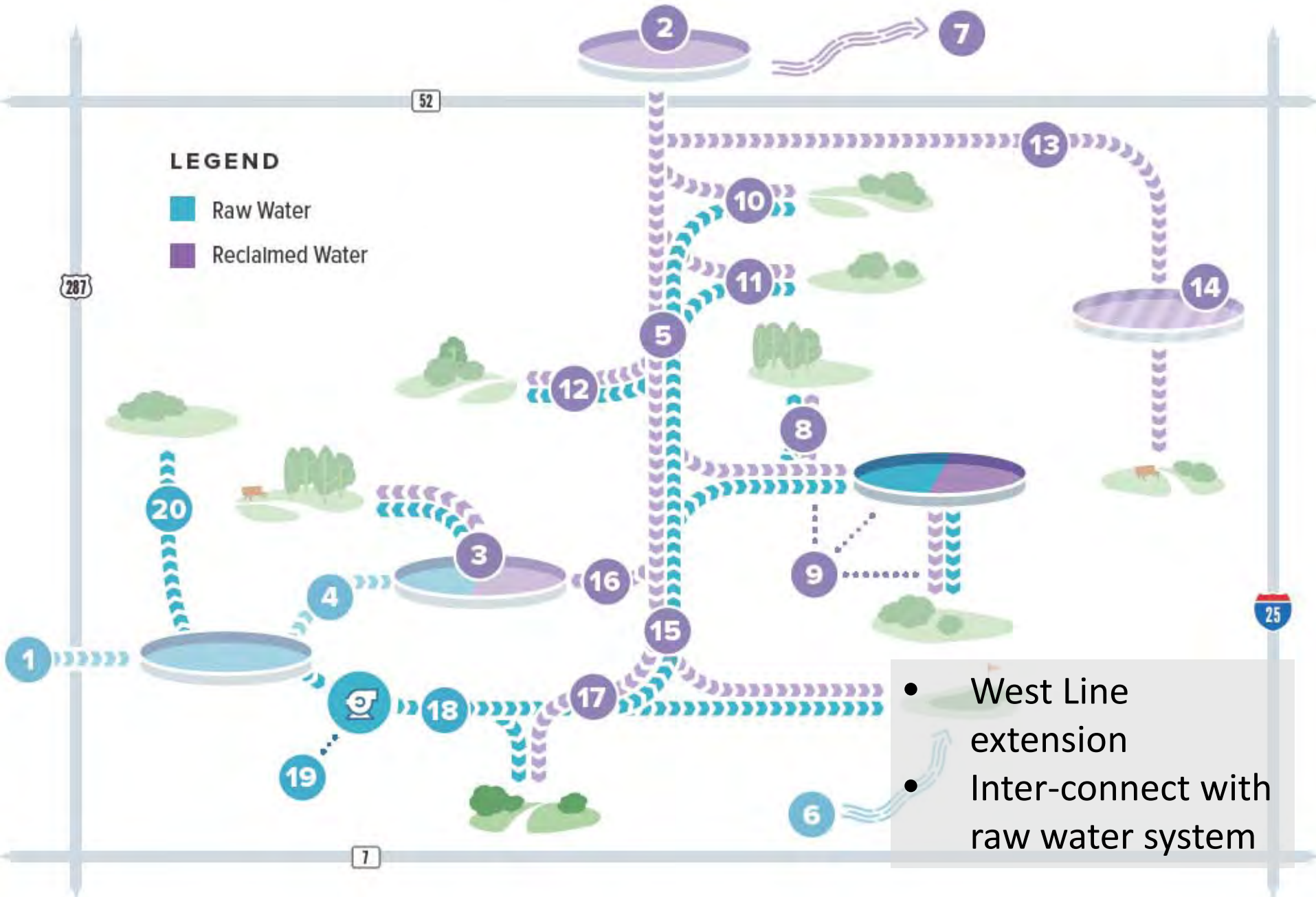
LEGEND

- Raw Water
- Reclaimed Water



- South Line extension
- Inter-connect with ECC pond⁷

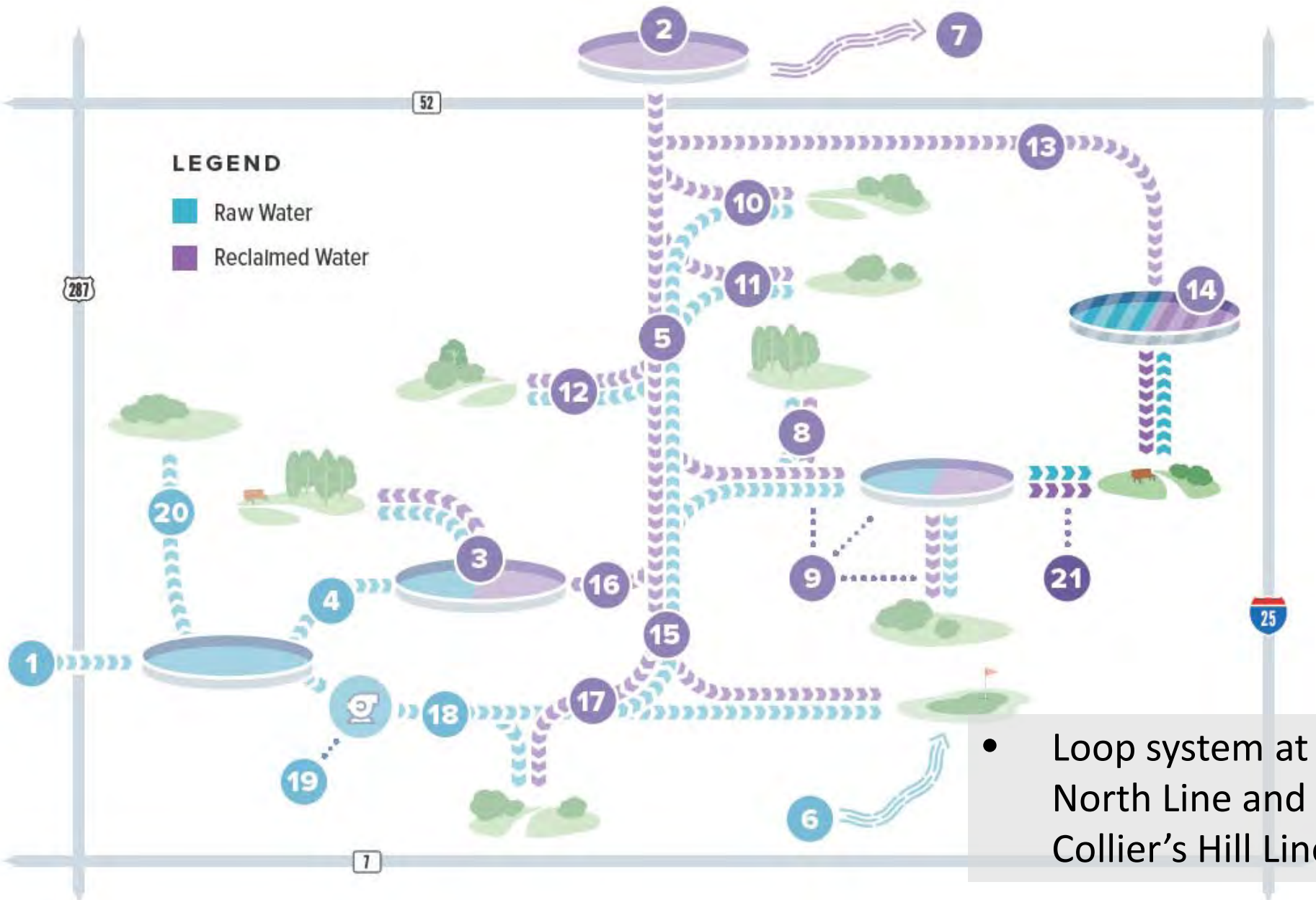
Infrastructure Schematic (Through Phase 4)



Infrastructure Schematic (Through Phase 5)

LEGEND

- Raw Water
- Reclaimed Water



- Loop system at North Line and Collier's Hill Line

Design Considerations

Direct Connection
to Irrigation System



- Irrigate 10 hours per day (e.g. 10pm to 8am)
- Utilizes 42% of system capacity

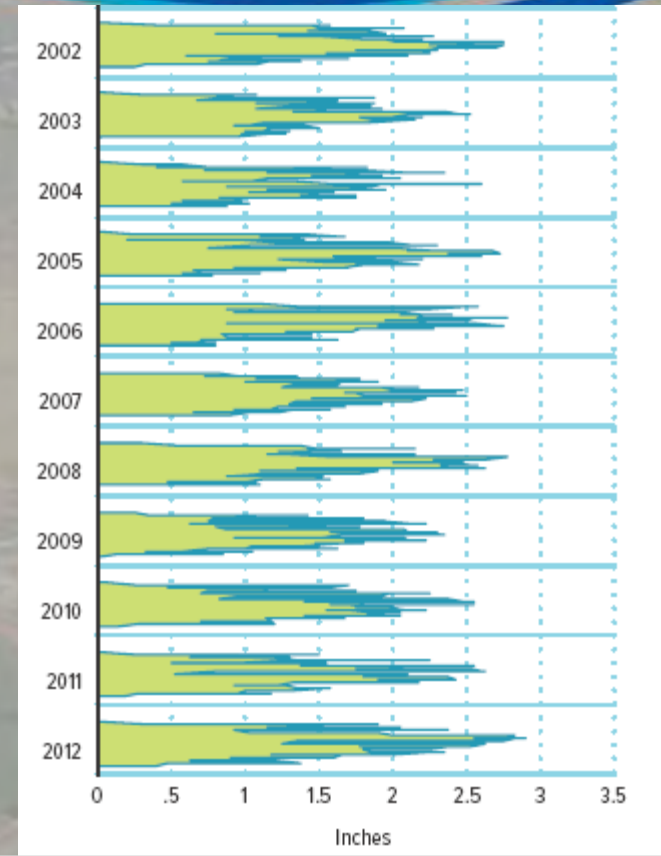
Storage Ponds that
fill during the day



- Fill ponds during the day, irrigate at night
- Utilizes 100% of system capacity

Design Considerations

- Peak-Week demand estimated from turf-grass ET rates and 60% application efficiency
 - 10% of annual demand
 - 3 inches for turf
- Reservoir model used to size smaller storage distribution ponds
- Pipe sizes based on meeting peak-week demand with mix of direct-connect and pond-connected customers



7-day water demand for bluegrass from NCWCD climate data (inches)

Design Considerations

- System not designed for all users to turn on at once
- User rules and regulation must be implemented, including scheduled irrigation times by customer and volumetric limits
- SCADA system can provide Erie operators with central control of valves, pumps, irrigation schedules etc...
- Real-time remote monitoring of non-potable meters can provide quick feedback into user behavior and assist with scheduling compliance

System Layout



For each phase:

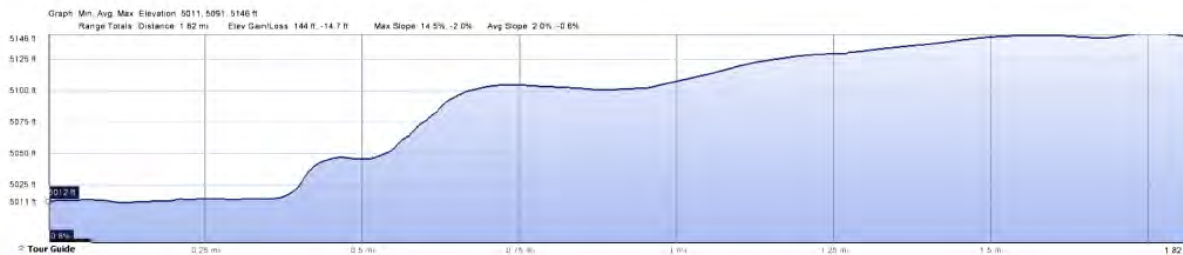
- Pipe size
- Conceptual alignment
- Identification of subdivision(s) served
- Pipe size
- Storage ponds and sizes
- Pump locations

System Layout

Elevation profiles along conceptual pipe alignments to guide final design of infrastructure

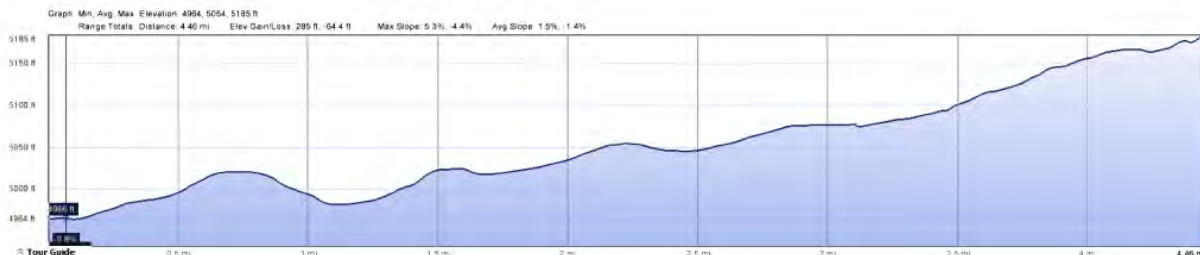
For each development area or subdivision

- Details on phasing
- Water supply type (ditch use, raw supply, reclaimed supply, or both)
- other supply or layout options



SWRF

Bridgewater Pond No. 2



SWRF

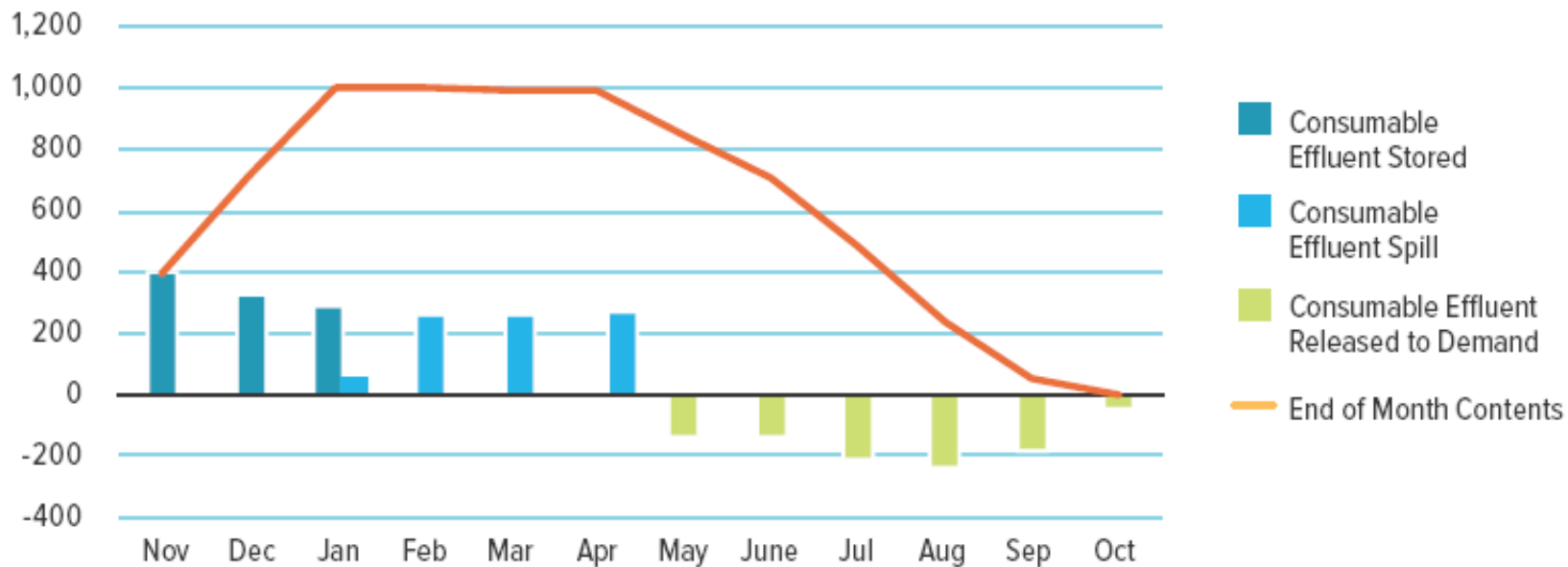
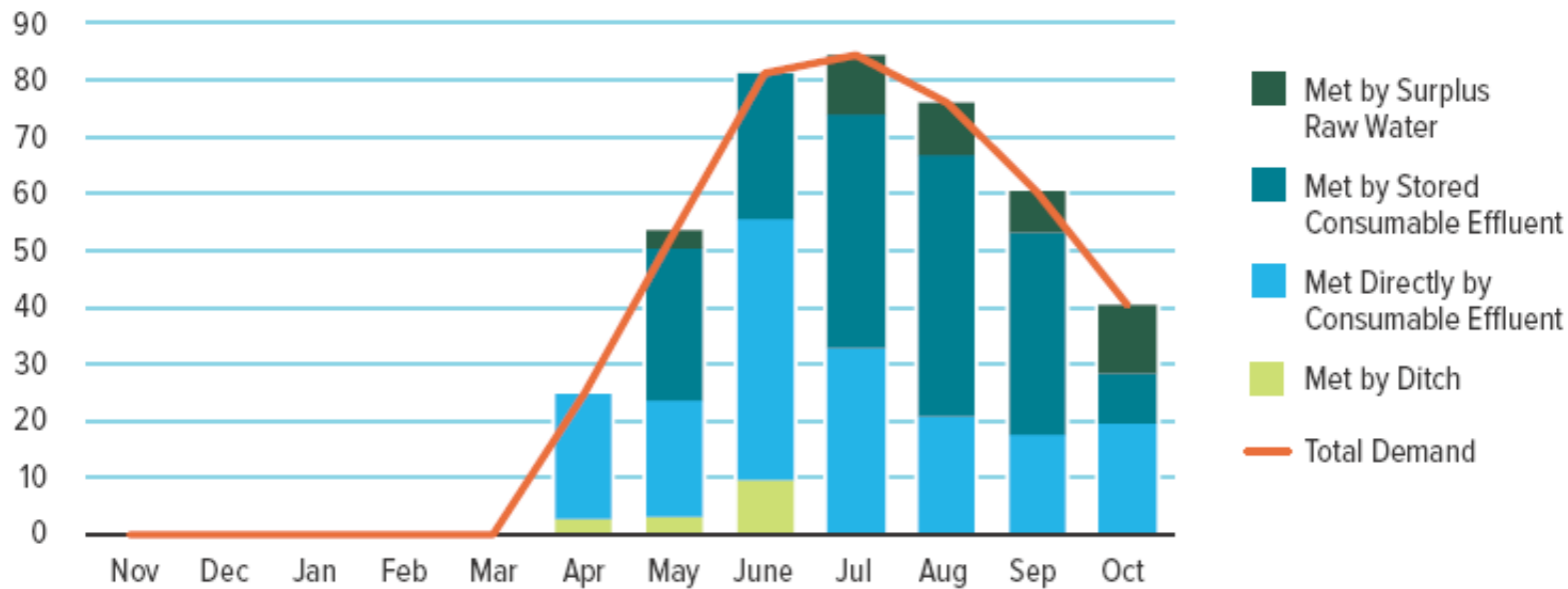
WCR 5 and middle of Section 15

Operational Modeling

Spreadsheet model developed to assess:

- Timing and amount of non-potable water availability
- Timing and amount of non-potable demand
- Reclaimed reservoir operations
- Multiple water supply scenarios modeled (current and future system, normal and drought years)
- Outputs demonstrate how demand is met and how to optimize supply
- Flexible modeling tool that can be used to simulate a variety of potential future conditions or test different infrastructure configurations

Future system, dry years



Cost Estimate

Phase	Description	Capital Cost
1	Extension of existing line to Collier's Hill, storage pond, connection to nearby parks and developments	\$2,250,000
2	North Line to service north area and I-25 Corridor	\$4,100,000
3	South extension to Vista Ridge area	\$3,500,000
4	Interconnect with raw water system	\$3,300,000
5	Loop North Line with Collier's Hill line	\$800,000
Total		\$13,950,000

1,700 to 2,100 AF of demand: \$6,700 to \$8,200 per AF
Compare to \$20,000+ per AF of new supply

Thank you!

Questions?