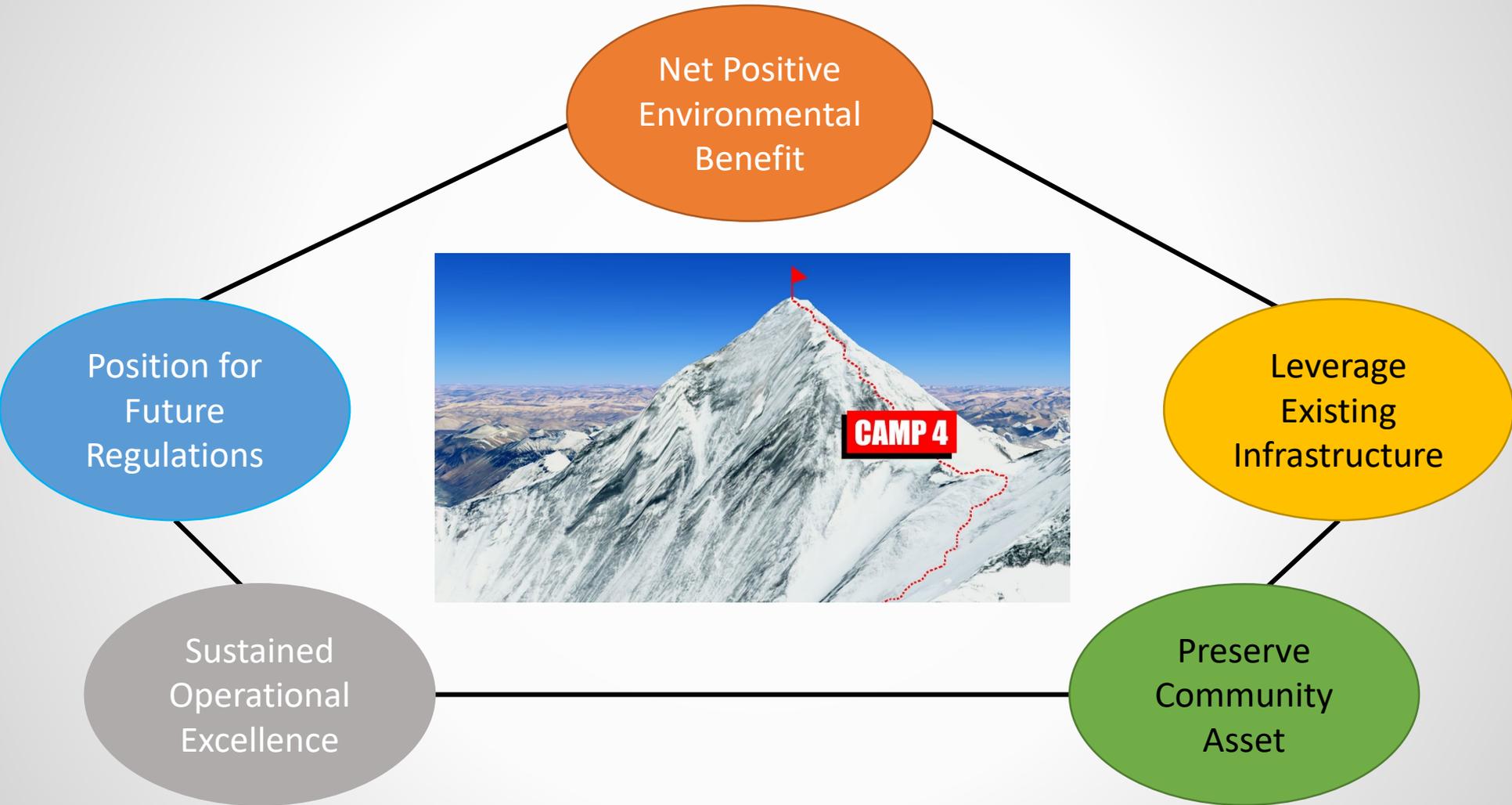




# Background Related Strategic Operation Plan

Council Study Session  
September 25 & 26, 2017

# SOP - Trail map to Everest





# Capacity Presentation Goals

Defining Capacity

Regional Perspectives

Leveraging the Investment

Rethinking Capacity



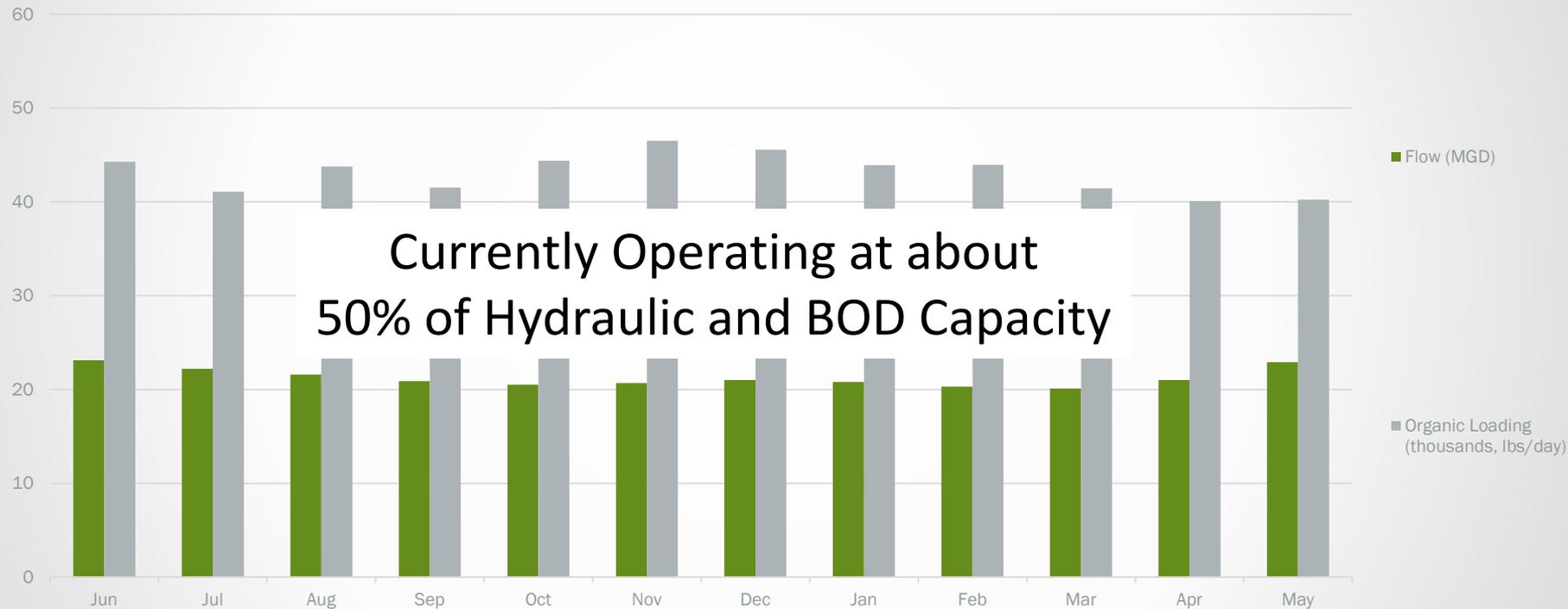
# Defining Capacity

Reg. 22 - "DESIGN CAPACITY": Capability of treatment plant at which it can meet the Preliminary Effluent Limitations (permit limits) assigned by the Division. Comprised of hydraulic capacity and organic loading capacity.

- Hydraulic capacity (MGD)
- Organic Loading Capacity (tons of 5-day Biochemical Oxygen Demand per day)
- Expressed as a max monthly average



# Defining Capacity



Current Flow and BOD Loading



# Defining Capacity

- **The Clean Water Act** (40 CFR Section 130.6) requires states to develop regional water quality management plans that provide direction for Wastewater Utilities.

## Predicting Flows and Loads:

Common assumptions are general and can result in conservative predictions.

State expects that utilities use these common assumptions to predict future flows and loads.



# Defining Capacity

**Regulations\*** require action to increase capacity as you approach design limits, basically setting aside a reserve buffer.

80%

**At 80% of capacity**  
(40 MGD,  
75,060 lbs.. BOD5/day) **must**  
**initiate engineering and**  
**financial planning for**  
**expansion.**

95%

**At 95% of capacity**  
(47.5 MGD,  
89,134 lbs. BOD5/day)  
**must initiate**  
**construction.**

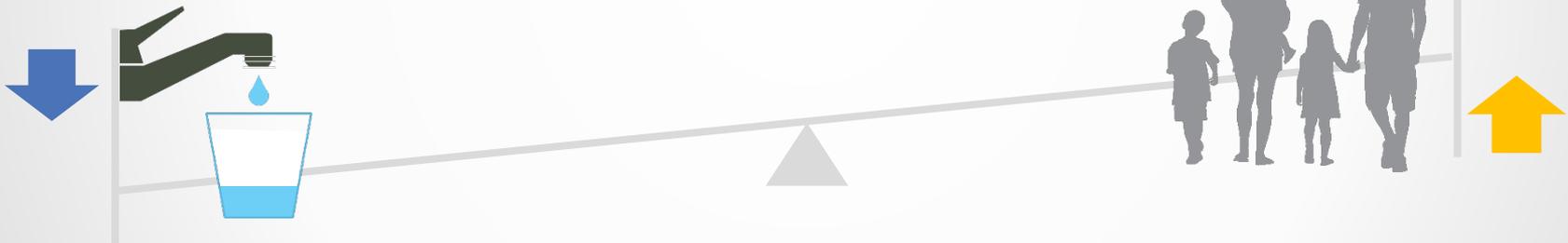


# Defining Capacity

## Flow Versus Load

**Decreased water use** as a result of the latest drought **has resulted in lower than predicted flows to WWTPs** across the West.

The amount of waste in the flows coming to the plant didn't change and will continue to increase with population growth.





# Regional Perspective

## Metro Wastewater Reclamation District

- Diverse Service Area
  - 22 Member Municipalities
  - 38 Sanitation Districts
- Special Purpose District
  - 36 Member Board
  - Created by State Statute
- 145 MGD Operating
- 220 MGD Permitted
- 66% of Capacity

## City of Boulder

- Serve City Only
  - No Sanitation Districts
- City Department
  - City Council Governance
  - City Purchasing Policies
- 10 MGD Operating
- 20 MGD Permitted
- 50% of Capacity



# Regional Perspective

Metro  
Reclam

## Littleton/Englewood WWTP

der

- Diver
- 21
- 38
- Spec
- 30
- C
- 145 M
- 220 M
- 66%

- Diverse Service Area
  - 2 Municipalities (25%)
  - 19 Sanitation Districts
- Supervisory Committee
  - 2 Administrators from each City
  - Appointed by City Managers
- 25 MGD Operating
- 50 MGD Permitted
- 50% of Capacity

- Only
- tation Districts
- rtment
- uncil Governance
- rchasing Policies
- Operating
- Permitted
- pacity



# Regional Perspective



## Regulator's Perspective

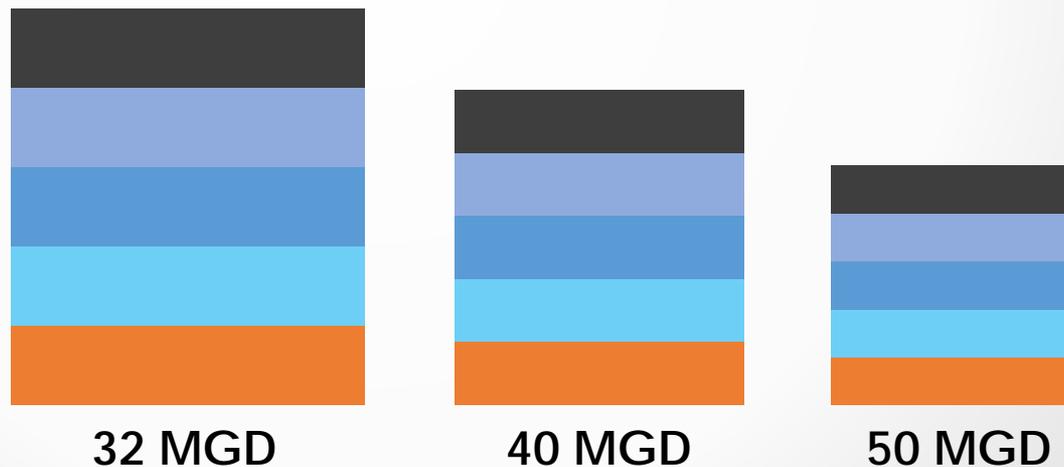
- Apply **conservative assumptions**.
- Assume **worst case scenario** to be very **protective of the environment**.
- Require **buffer to make sure plants can maintain treatment as populations grow** along the Front Range.
- Focus on **permit compliance** versus affordability or sustainability.
- Don't allow infrastructure to be the "throttle"



# Leveraging the Investment

Tiered limits allows for higher (less stringent) limits at lower flows.

## Load per MGD

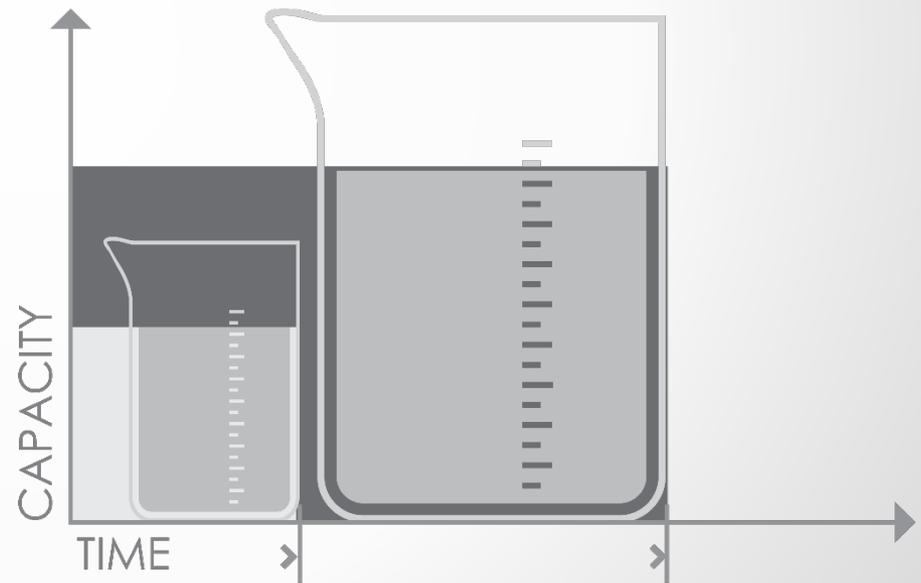




# Leveraging the Investment

Able to better respond to and maintain compliance during storm events or high load events.

- The true capacity of the plant is limited by the maximum treatment rate in certain processes.
- Flexibility provided by additional capacity allows for more time or space to effectively treat the wastewater.
- Only spend money on treating the flow that is coming in, not spending money on chemicals or energy to treat entire design capacity.
- Allows for lower risk Innovation Evaluations



# Rethinking Capacity



**Incentive Policy (2018-2027)**

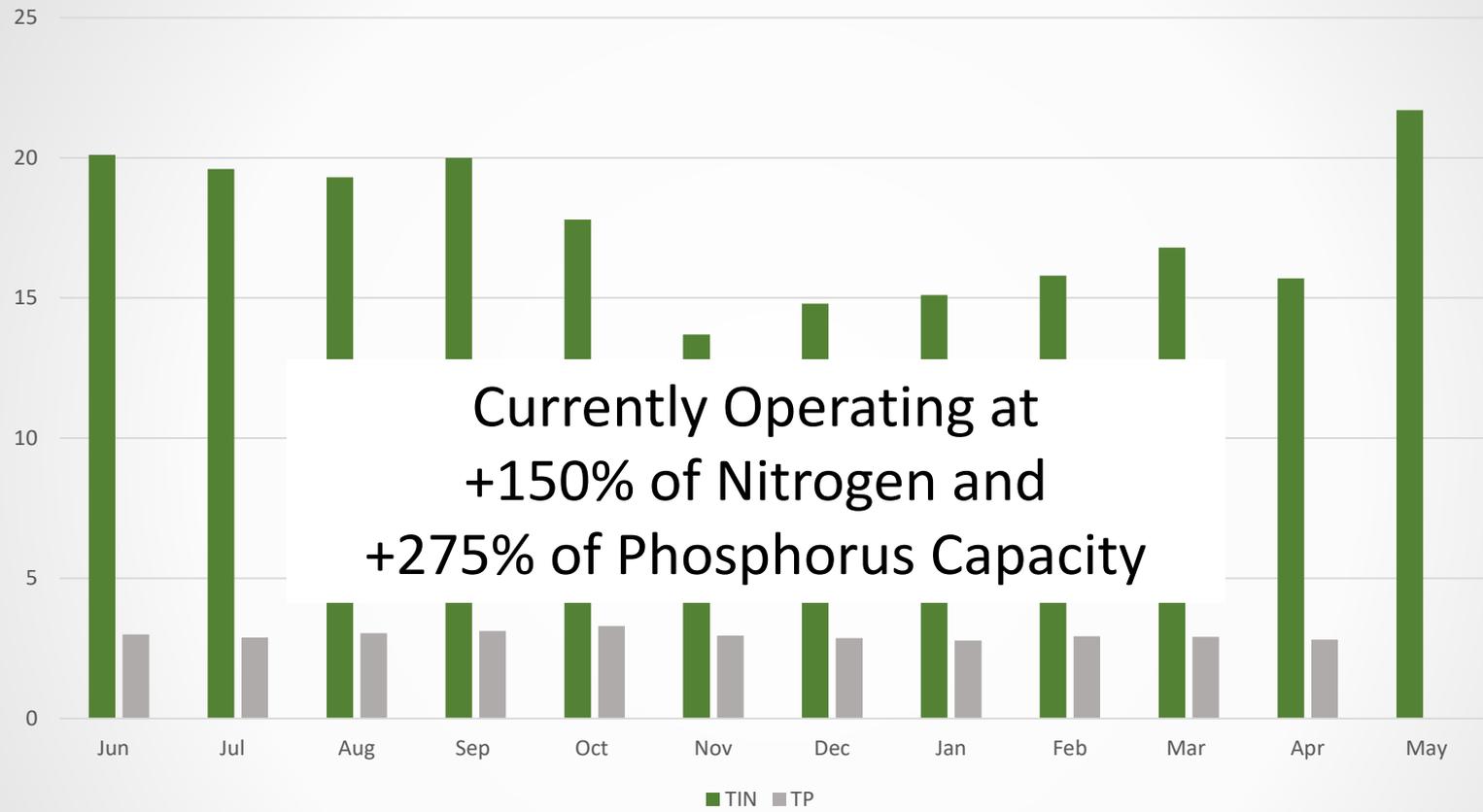
- Provides time to collect water quality data and evaluate appropriate water quality standards
- Allows plant to optimize operations

**Permit w/ Extended Compliance Schedule**

- Incentive program adds up to 10 years to comply with Regulation No. 31
- Delays capital projects
- Allows more time for technological advancements



# Rethinking Capacity



## Nitrogen and Phosphorus

# Rethinking Capacity



L/E TP Load % to Barr Lake = 48.2%

L/E TP Load % to Milton Reservoir = 4.7%

Table 3.1 Loads to Barr and Milton  
(Based on the SWAT-WASP Model)

Source	Discharge Average Conc. (ug/L)	Barr Lake Load (kg/yr)	% of External Load	% of Total Load	Milton Reservoir Load (kg/yr)	% of External Load	% of Total Load
<b>EXTERNAL LOAD</b>							
<b>Point Sources within Datashed</b>							
Lochbuie WWTP <sup>1,2</sup>	3000	-	-	-	22	0.06%	0.06%
Hudson WWTP <sup>1,2</sup>	3000	-	-	-	29	0.08%	0.07%
Fort Lupton WWTP <sup>1,2</sup>	3000	-	-	-	494	1.3%	1.3%
Brighton WWTP <sup>1,2</sup>	3000	-	-	-	491	1.3%	1.3%
South Adams WWTP <sup>1</sup>	4537	-	-	-	1,102	3.0%	2.8%
RWHTF <sup>1</sup>	2750	-	-	-	28,529	77.8%	73.0%
Aurora WWTP <sup>1</sup>	172	-	-	-	28	0.08%	0.07%
Centennial WWTP	683	1,194	1.8%	1.7%	65	0.18%	0.17%
Pump Works	2750	26,075	39.3%	37.1%	54	0.15%	0.14%
Littleton and Englewood WWTP	2900	33,893	51.1%	48.2%	1,840	5.0%	4.7%
MS4 Regulated Areas	463-598	2,189	3.3%	3.1%	452	1.2%	1.2%
<b>Point Source Total</b>	-	<b>63,350</b>	<b>95.4%</b>	<b>90.0%</b>	<b>33,106</b>	<b>90.3%</b>	<b>84.7%</b>
<b>Other Sources<sup>3</sup></b>							
Clear Creek <sup>1</sup>	218-371	-	-	-	919	2.5%	2.4%
Big Dry Creek <sup>1</sup>	1155-1320	-	-	-	2,301	6.3%	5.9%
Cherry Creek Reservoir	68-110	596	0.9%	0.8%	56	0.2%	0.1%
Bear Creek Reservoir	32-80	1,091	1.6%	1.6%	76	0.2%	0.2%
Chatfield Reservoir	31-42	1,338	2.0%	1.9%	122	0.3%	0.3%
All other subwatersheds <sup>1</sup>	1046	-	-	-	70	0.2%	0.2%
<b>Other Source Total</b>	-	<b>3,025</b>	<b>4.6%</b>	<b>4.3%</b>	<b>3,543</b>	<b>9.7%</b>	<b>9.1%</b>
<b>External Load Total</b>	-	<b>66,375</b>	<b>100.0%</b>	-	<b>36,649</b>	<b>100.0%</b>	-
<b>INTERNAL LOAD</b>							
Benthic TP Load from Barr	-	4,000	-	5.7%	2,000	-	5.1%
Benthic TP Load from Milton <sup>1</sup>	-	-	-	-	419	-	1.1%
<b>Total Load (all sources)</b>	-	<b>70,375</b>	-	<b>100.0%</b>	<b>39,068</b>	-	<b>100.0%</b>

Notes: SWAT-WASP used for partitioning, but total loads were estimated as described in Section 3.0.

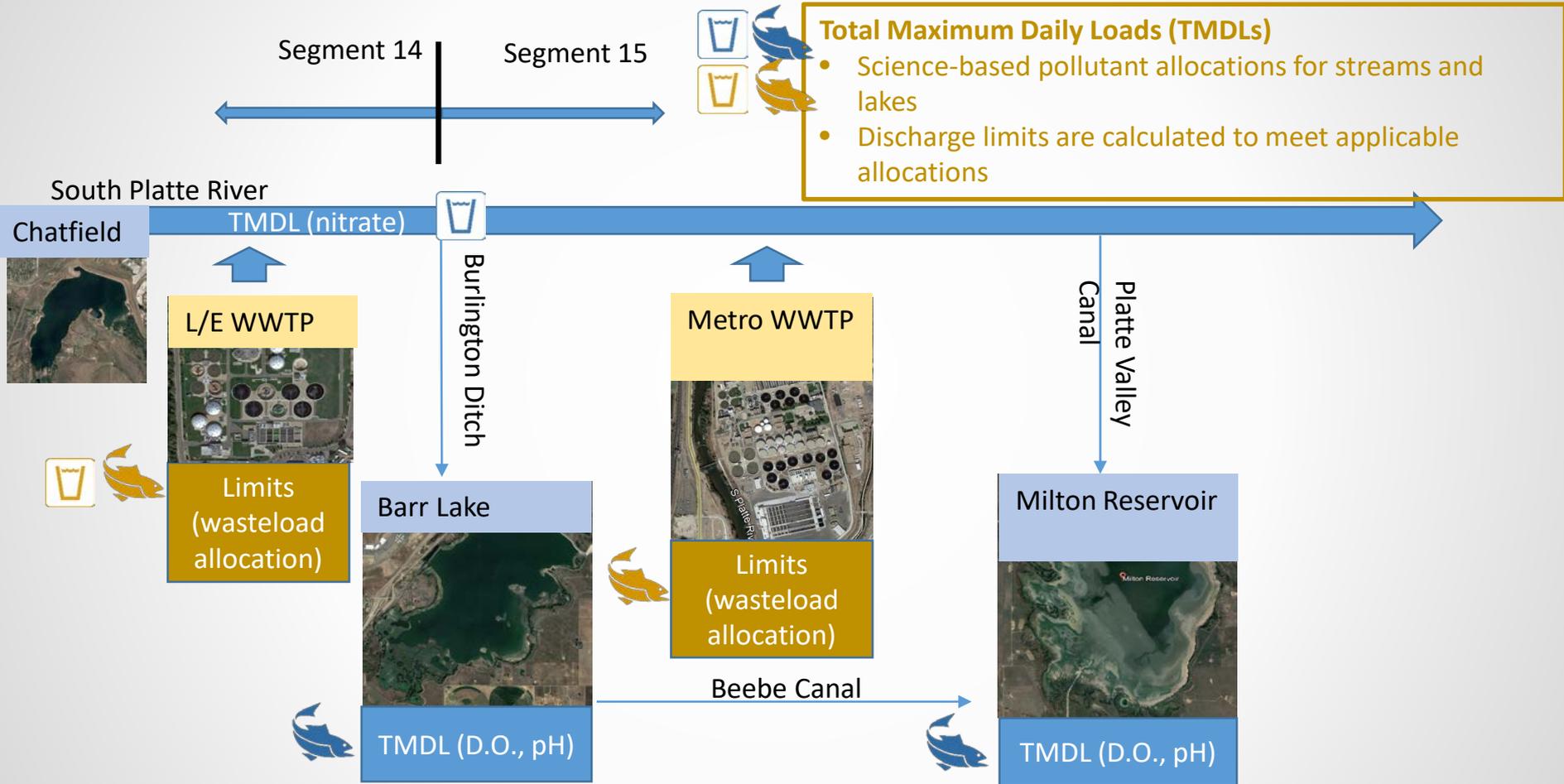
1. Source is downstream of Barr and therefore does not contribute TP Loads to the water body.

2. No effluent TP is monitored at the smaller WWTPs. Effluent TP concentrations are based on WWTP staff opinion and treatment expectations, not actual data.

3. Includes watershed and some point sources outside the datashed and additional non-point sources within the datashed



# Rethinking Capacity



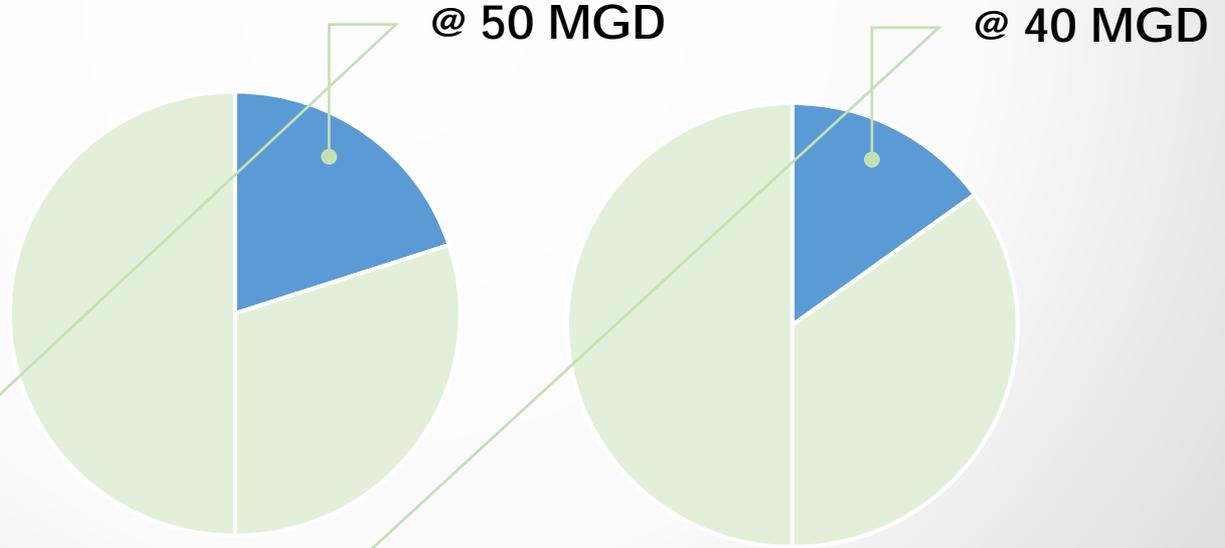


# Rethinking Capacity

Capacity is Regional Currency

## Available Loading to South Platte River

**More capacity means LE gets a bigger piece of the pie.**





# Capacity Summary

Capacity is a **ubiquitous term** that needs thoughtful definition

## In terms of Hydraulic and BOD Capacity:

- Tiered limits allows for higher (less stringent) limits at lower flows.
- Ensures we are Only spend money on treating the flow that is coming in, not spending money on chemicals or energy to treat entire design capacity.
- Provides Operational flexibility in treatment with the plant on a day to day basis because there is more time and space to treat.
- Able to better respond to and maintain compliance during storm events or high load events.
- Allows testing of innovative processes with less risk

## In terms of Nutrient Capacity

- For TMDL Driven Discharges - Capacity is Regional Currency
- By Leveraging Innovation - Hydraulic and BOD capacity can be repurposed for Nutrients

# Strategic Operations Plan



- Identified in 2017 Budget
  - “Regulation 85 (Nutrients) Project”
  - Phosphorus and Nitrogen permit requirements
  
- Planning needed beyond just Regulation 85
  - Challenges and new opportunities
  - Holistic approach

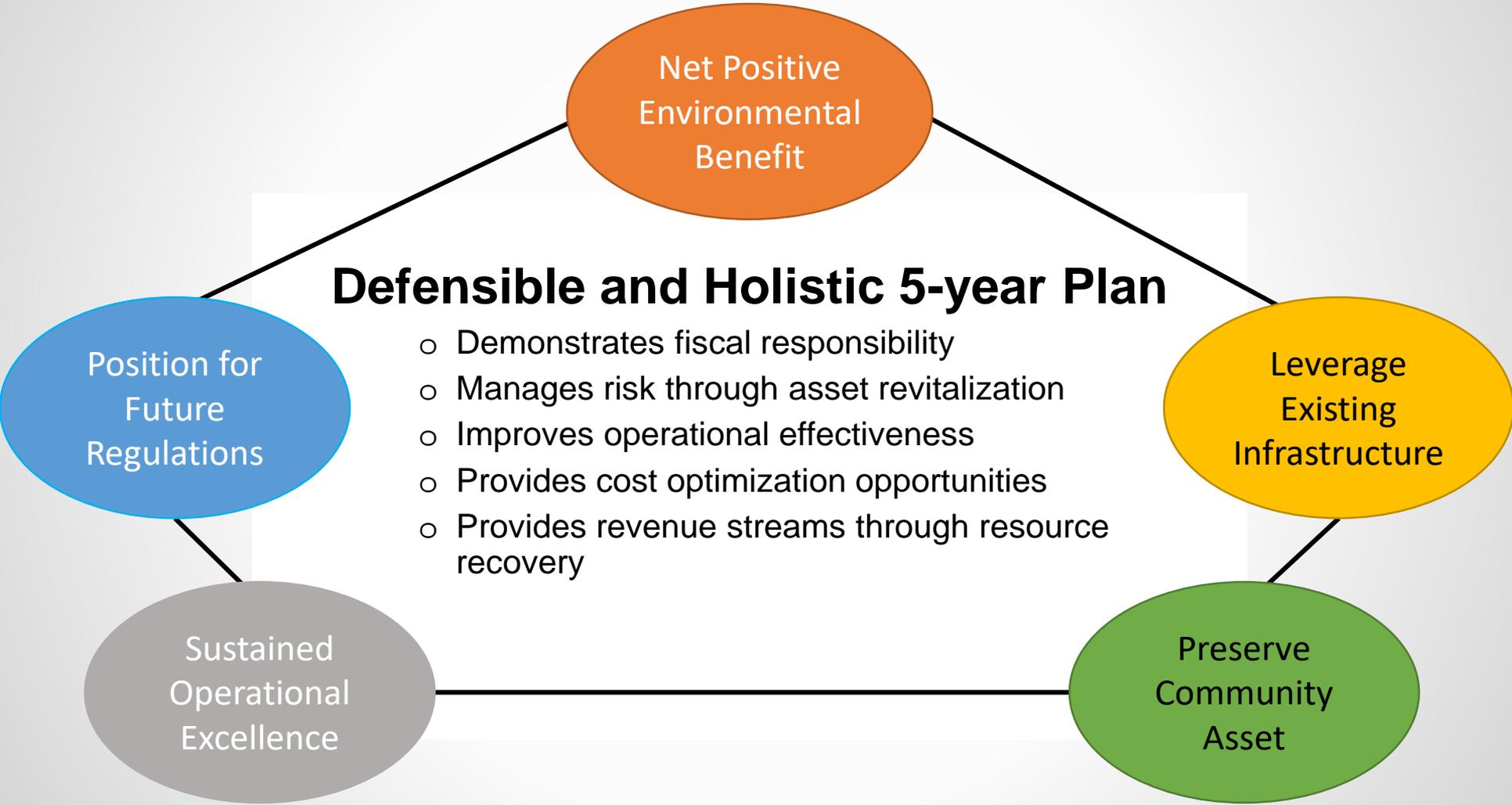


# Project Deliverables

- Project phasing and implementable 5-year capital improvement plan
- Efficient alternatives analysis and selection
- Defined solutions with business case support
- Risk analysis and mitigation of unintended consequences
- Clear definition of timing and schedule for execution of projects



# Road Map





# Schedule

- 2018 – Complete SOP
  - Identify project definitions, schedules and budget forecasts
  - Identify funding
  - Technology evaluation and Pilot studies
- 2019 – Design and Project Bidding
  - Site application
  - Engineer selection
- 2020/2022 – Construction
  - Contract award
  - Commissioning





# Questions?