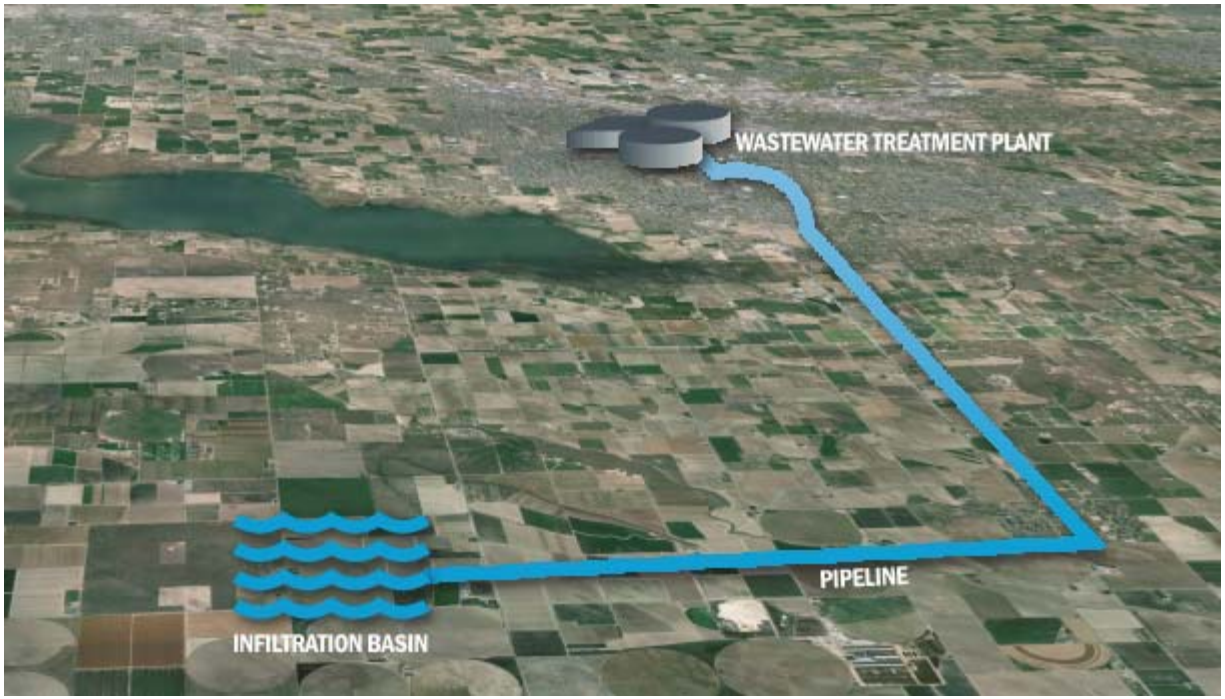
2016 PNWS-AWWA Conference

Justifying Aquifer Recharge in the Absence of Traditional Drivers

May 6| 2016



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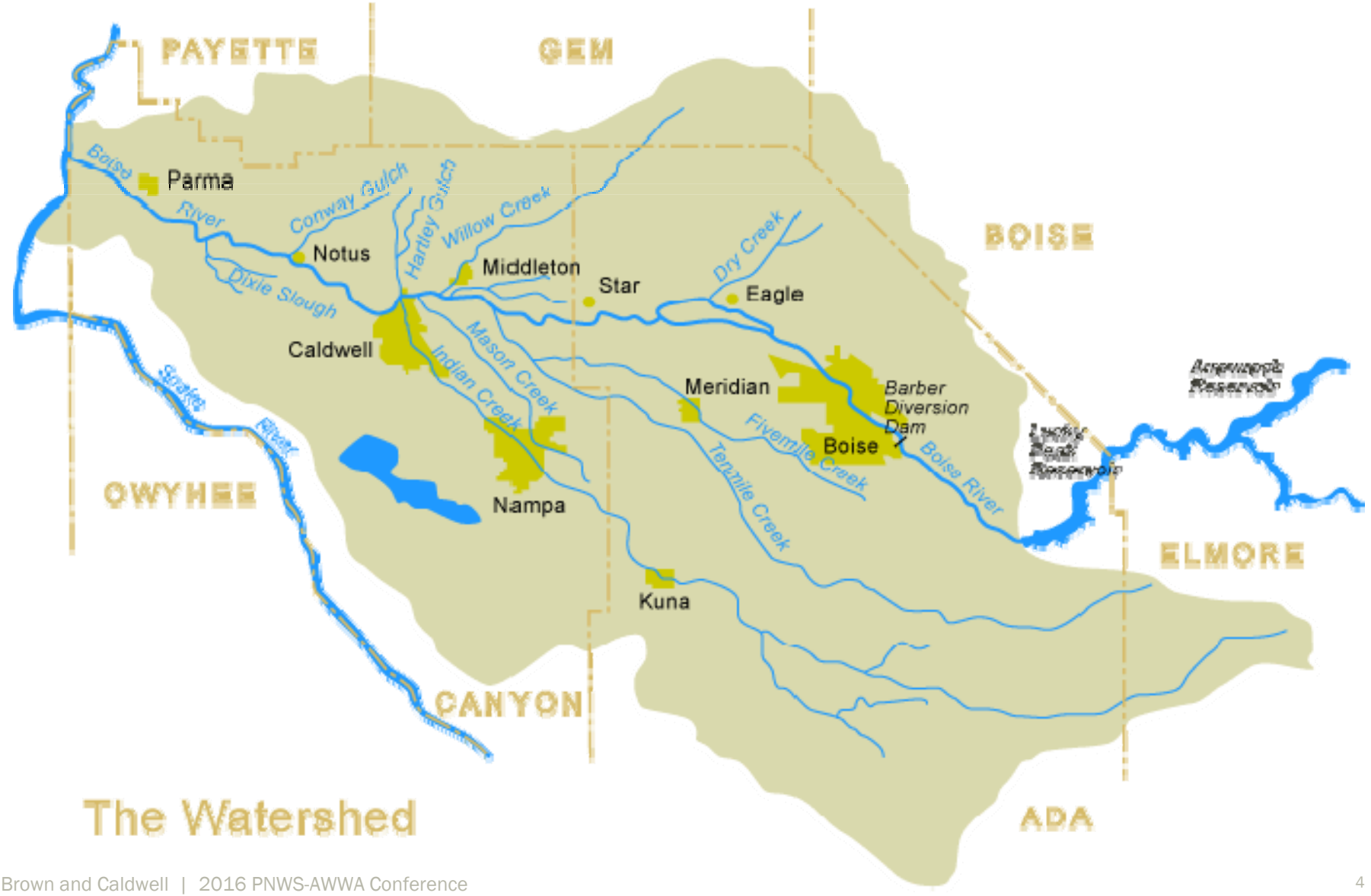
Agenda

- Background
- Non-Traditional Drivers
- Case Studies
  - City of Nampa
  - City of Boise
- Conclusions

Background

Treasure Valley Regulatory Environment

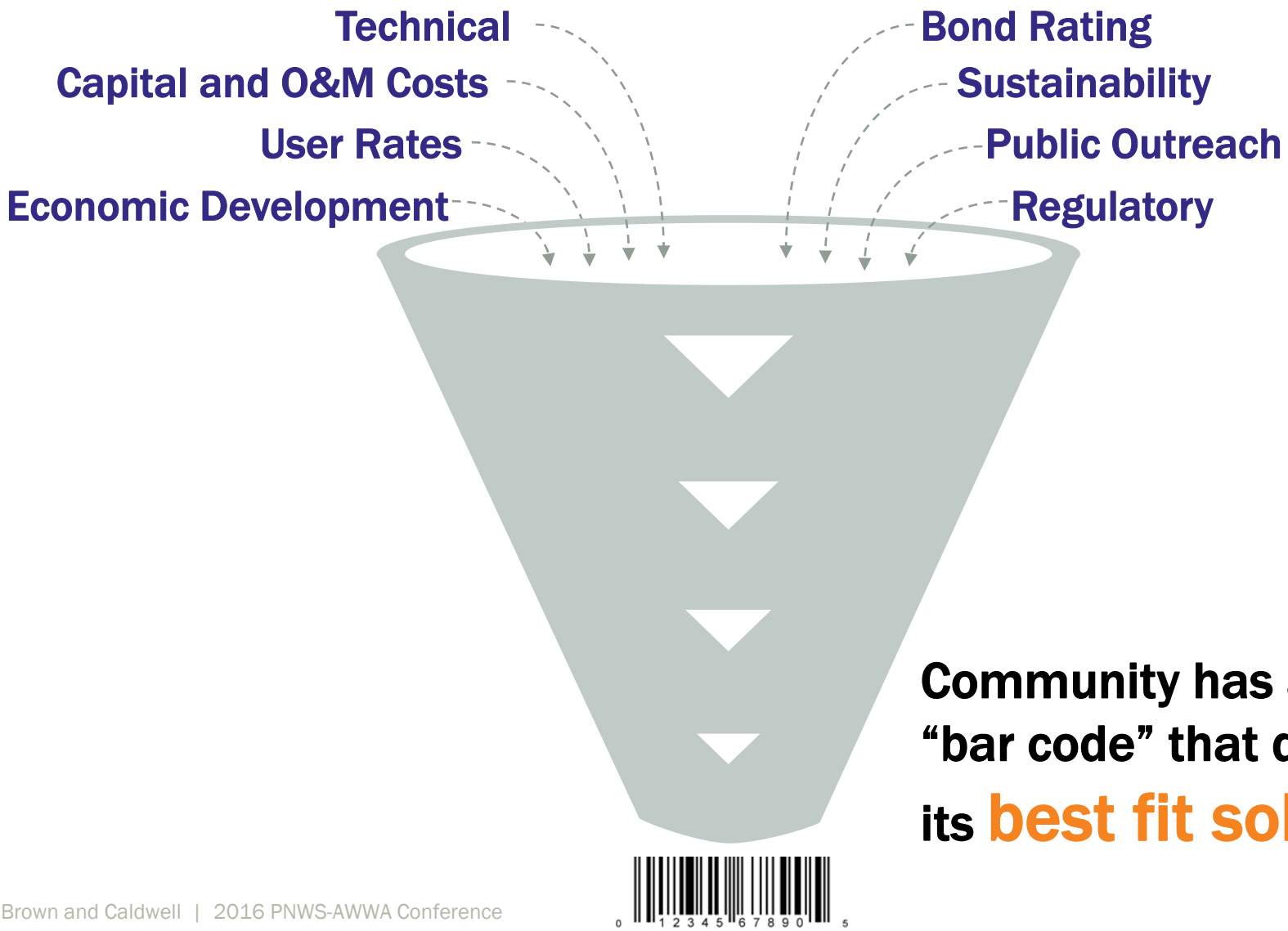


Treasure Valley Regulatory Environment

- Communities anticipating renewed NPDES permits with stringent discharge limits
  - Total phosphorus
  - Temperature

Nearly $500M in total investment in wastewater treatment infrastructure expected for Treasure Valley communities

Finding the Best Fit for a Community



Community has a unique "bar code" that defines its best fit solution

Identify Levels of Service

- Ex. What car do you own?
  - Why? (Typically values-based)
  - How do you know you're satisfied?
  - How do you measure your satisfaction?
  - What are you willing to pay more for?

Developing Capital, O&M, Risk, and Benefit Costs

- Data collected on all costs
  - Capital, Operation and Maintenance, Risks, and Benefits Costs
- Why account for risk and benefit costs?
  - More conservative approach
  - Better long-term decision making
  - Provides apples-to-apples comparison
  - Reduces subjectivity of evaluation
  - Consider car insurance rates

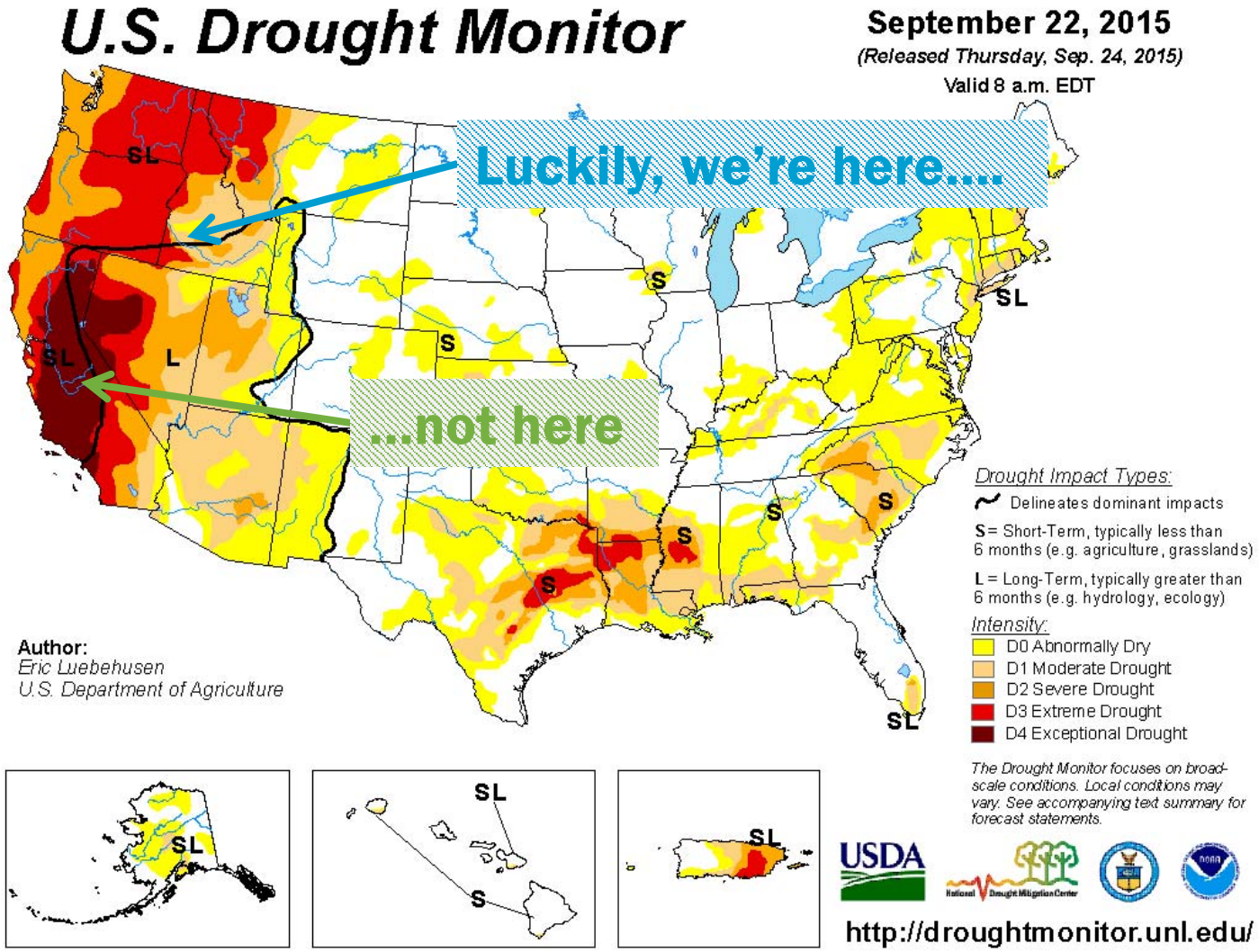
We should be Outcome Agnostic™ . . .
It's about the process

Non-Traditional Water Reuse Drivers

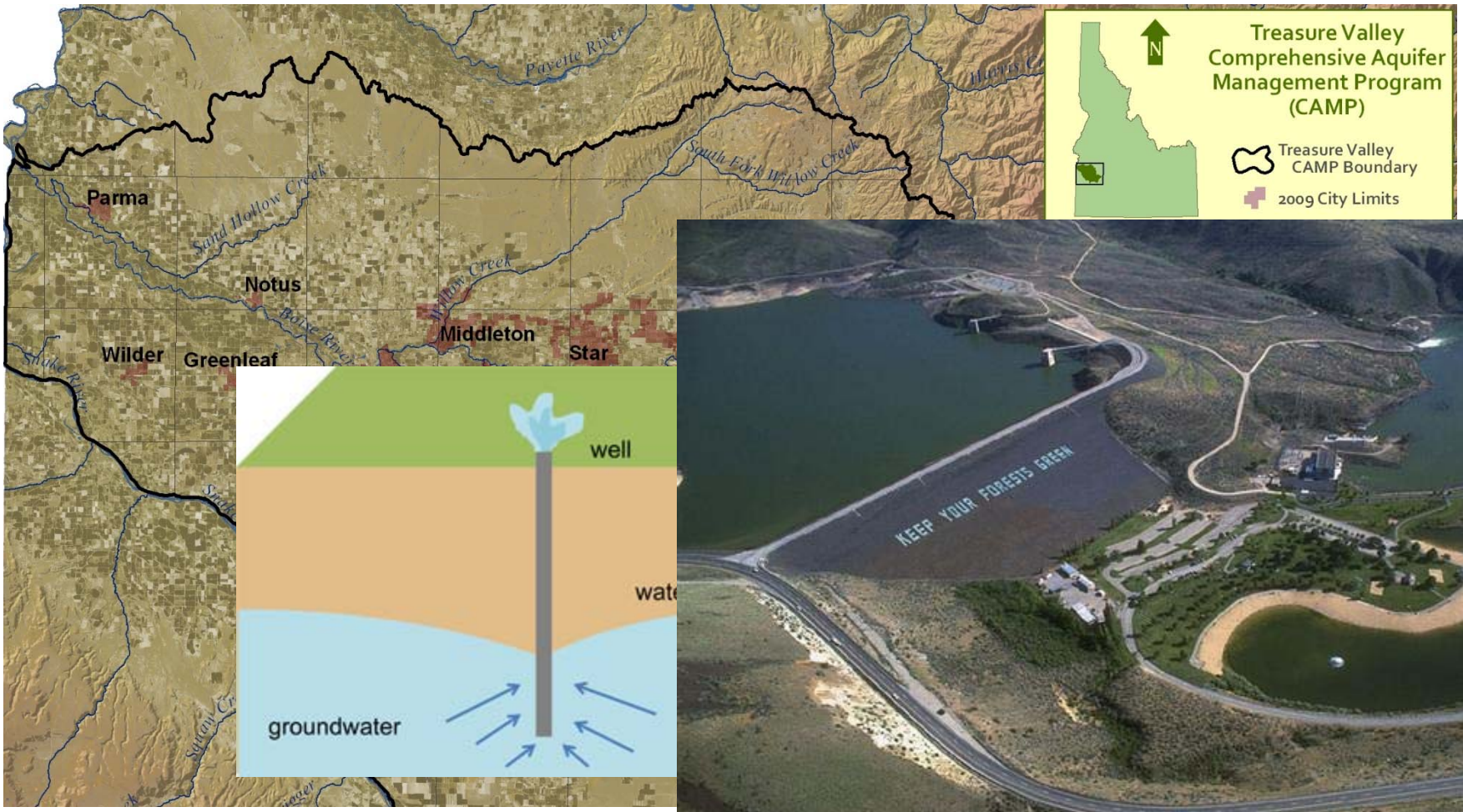
Beyond Sustainability and Water Supply

Traditional Water Reuse Drivers

Traditional Water Reuse Drivers



Sufficient Long-Term Water Supply



Traditional Water Reuse Drivers

Nampa's Strategic Goals

"Be the community of choice in Idaho for industries and businesses"

"Consider economic ramifications to environmental actions and encourage economically sustainable decision making"

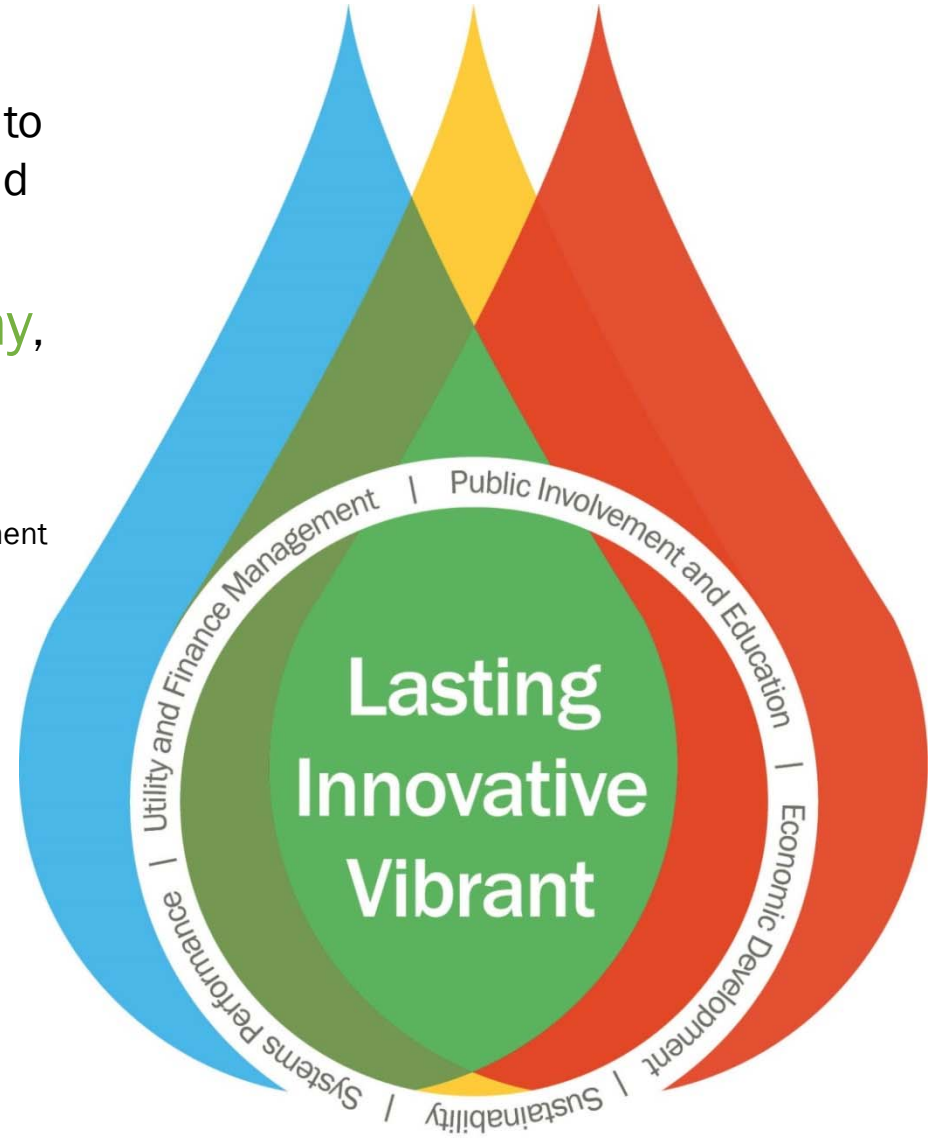
City of Nampa
Strategic Plan
Adopted December 19, 2011

NAMPA
IDAHO

Boise's Level of Service Goals

"We are a dynamic Western city committed to providing exceptional municipal services and partnering to promote a healthy environment and a strong economy, ensuring Boise remains a safe and vibrant community."

-City of Boise Mission Statement

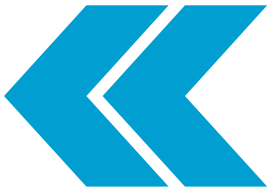


Aligning Decisions with Strategic Plan

Consider **economic ramifications** of environment actions

Consider long-term **regulatory risk**

Include **economic development impacts** of decisions



Innovative enterprises - **Strong economy**

The City of Nampa

Aquifer Recharge

Class A recycled water pumped to infiltration site and discharged to infiltration basins (year-round)

✓ Major Benefits

- Economic Development
- Water Quality Credits
- 100% Water Reuse
  (offset for Total Dissolved Solids)

⚠ Major Risks

- Background Water Quality
  (Total Dissolved Solids)
- Regulation of Additional GW Constituents
- Private Well Discharge Water Rights

Surface Water Discharge

Upgrade WWTP and continue discharging to Indian Creek

✓ Major Benefits

- None identified

⚠ Major Risks

- Regulation of Additional Surface Water Constituents
- Year-round total phosphorus limits below 0.35 mg/L

The Traditional Approach

Alternative	Capital Cost	Annual O&M Cost	Net Present Value
1 – Aquifer Recharge	$82,294,000	$2,402,000	$99,466,000
2 – Surface Water Discharge	$64,464,000	$3,981,000	$96,329,000

[1] *Costs presented in 2012 dollars*

- Capital costs favor Surface Water Discharge
- O&M costs favor Aquifer Recharge
- Overall NPV within ~3%

The Traditional Approach

Water supply

- Current value of water in region is $17/acre-foot
- Value of reuse water is approximately $145K annually

Sustainability

- Both alternatives include significant power usage
- No significant difference in carbon footprint

Long-Term Regulatory Risk

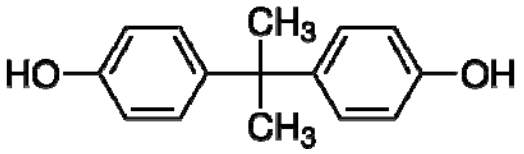
"Consider economic ramifications to environmental actions and encourage economically sustainable decision making"

- Permit limits getting more stringent with each permit cycle

- Consider the indicator species for each discharge location

Example: Technical Risk Cost

- Future NPDES regulations of microconstituents
  - Pharmaceuticals
  - UV blockers (sunscreen)
  - Fragrance materials
  - Polycarbonates
  - Plasticizers



Risk	Approx. Capital Cost	Annual O&M Costs	Probability of Occurrence	Annual Risk Cost (Capital)	Annual Risk Cost (O&M)
Microconstituent Limits	$45M	$3.6M	5% (2018) 15% (2023) 25% (2028)	$2.25M (2018) $6.75M (2023) $11.25M (2028)	$180K (2018) $540K (2023) $900K (2028)

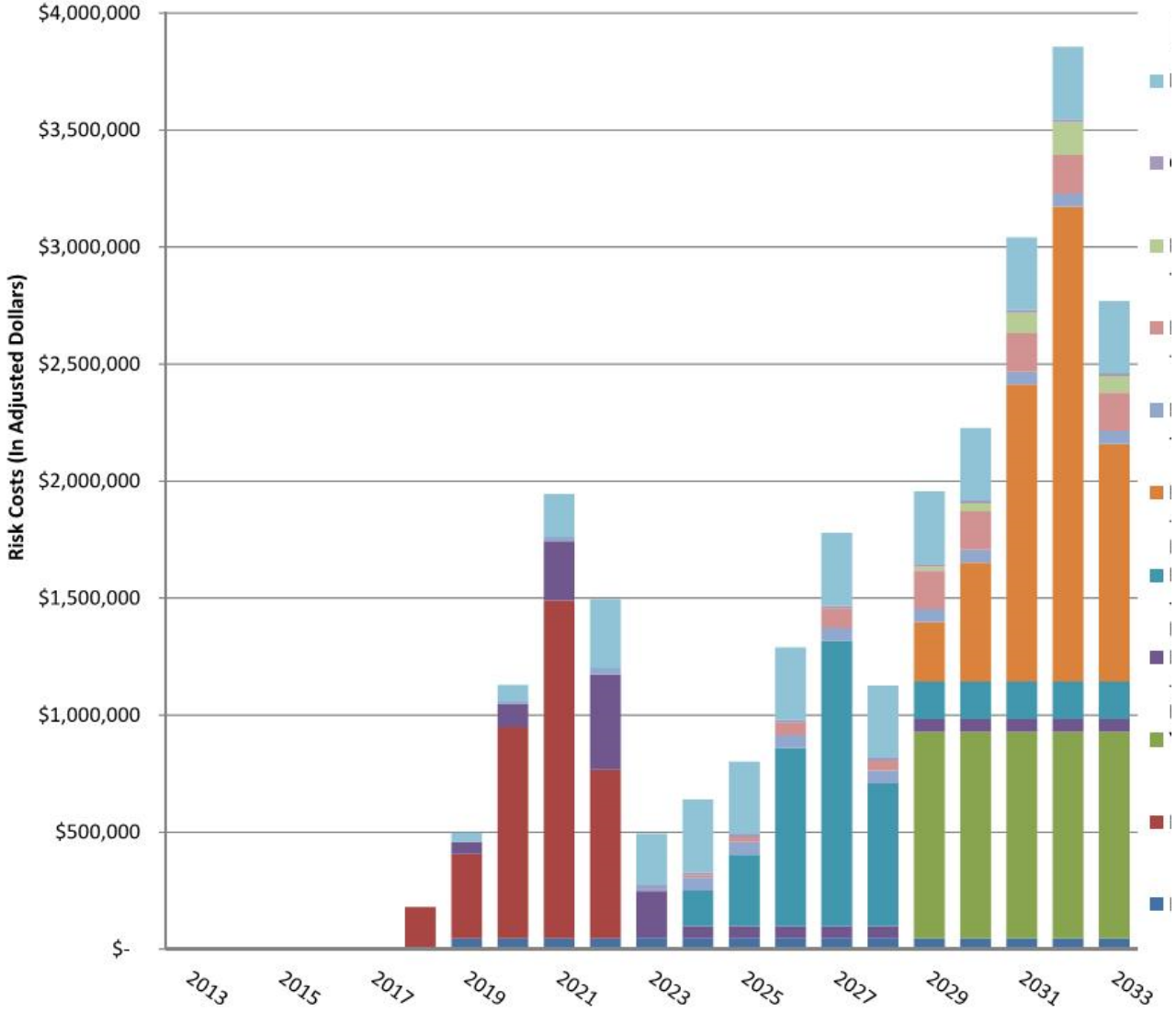
Long-Term Regulatory Risk

Alternative	Capital + O&M NPV	Risk Costs	Net Present Value
1 – Aquifer Recharge	$99,466,000	$1,056,639	$100,522,590
2 – Surface Water Discharge	$96,329,000	$18,367,373	$114,694,951

- Aquifer recharge risks are front-loaded and related to design and permitting uncertainty

- Surface water discharge has more long-term risk associated with changing permit conditions

Long-Term Regulatory Risk – Surface Water



But that's not the final answer…

- Continually updating costs based on new information
  - Temperature limits become a reality – but not at the level projected in 2012
  - Pipeline aquifer recharge basins longer than expected
  - Winter TP limits require additional capital upgrades
  - Need for additional levels of treatment (i.e. reverse osmosis) to reduce total dissolved solids

Alternative	Capital Cost	Annual O&M Cost	Net Present Value
1 – Aquifer Recharge	$134,140,000	$4,054,000	($189,411,000)
2 – Surface Water Discharge	$92,936,000	$4,175,000	($154,908,000)

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WATER REUSE

Justifying ~~Aquifer Recharge~~ in the Absence of Traditional Drivers

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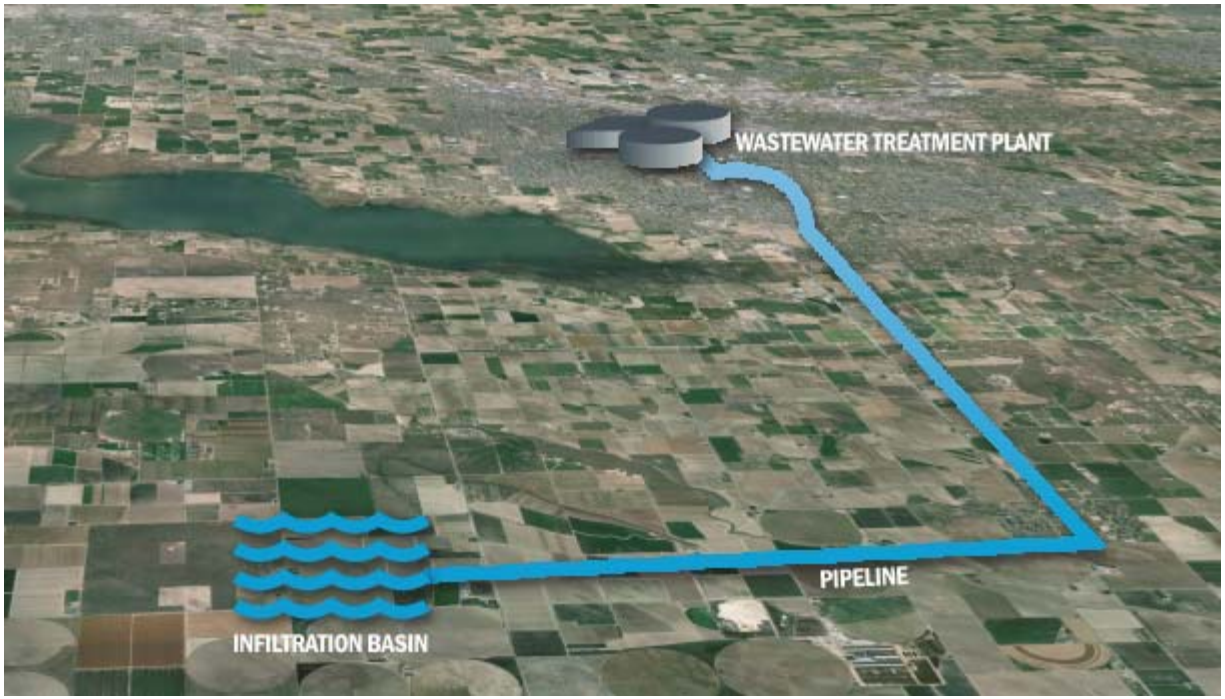

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Nampa's Strategic Goals

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"Consider economic ramifications to environmental actions and encourage economically sustainable decision making"

Surface Water Discharge with Class A Reuse

Upgrade WWTP, discharge to Indian Creek and provide Class A reuse water to industries

✓ Major Benefits

- Economic Development
- Water Quality Credits

⚠ Major Risks

- Regulation of Additional Surface Water Constituents
- Year-round total phosphorus limits below 0.35 mg/L

Industrial Reuse

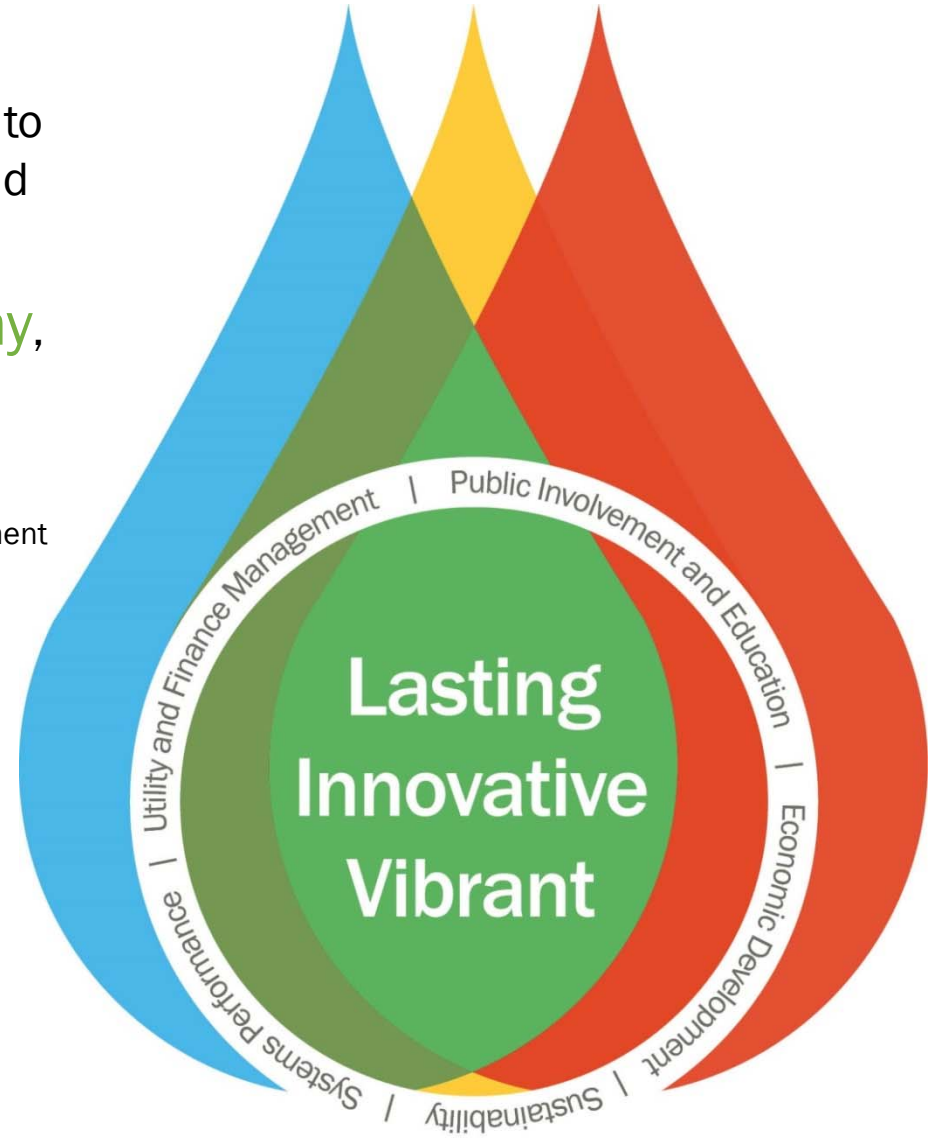
- Local industries located in close proximity to WWTP
- Industrial reuse program still achieves City's priorities
- Infrastructure can be used as a starting point for water reuse program

The City of Boise

Boise's Level of Service Goals

"We are a dynamic Western city committed to providing exceptional municipal services and partnering to promote a healthy environment and a strong economy, ensuring Boise remains a safe and vibrant community."

-City of Boise Mission Statement



Aquifer Recharge

Upgrade WWTP, discharge to infiltration basins and provide Class A reuse water to industries

✓ Major Benefits

- Economic Development

⚠ Major Risks

- Regulation of Additional Ground Water Constituents
- Public Perception

Lander Street Evaluation

Lander Street WWTF \ West Boise WWTF	River//River	Reuse//River	Infiltration// River	Reuse// Infiltration	Infiltration// Infiltration	River// Infiltration
River//River	Alt #1	Alt #2	Alt #3	Alt #4	Alt #5	Alt #6
Reuse//River	Alt #7	Alt #8	Alt #9	Alt #10	Alt #11	Alt #12
Infiltration// River	Alt #13	Alt #14	Alt #15	Alt #16	Alt #17	Alt #18
Reuse// Infiltration	Alt #19	Alt #20	Alt #21	Alt #22	Alt #23	Alt #24
Infiltration// Infiltration	Alt #25	Alt #26	Alt #27	Alt #28	Alt #29	Alt #30
River// Infiltration	Alt #31	Alt #32	Alt #33	Alt #34	Alt #35	Alt #36
Consolidation	Alt #37	Alt #38	Alt #39	Alt #40	Alt #41	Alt #42

Keep Lander Street

Consolidate at West Boise

The Traditional Approach

Alternative	Capital Cost	O&M Cost	Net Present Value
1 – River Discharge	$143,000,000	$78,000,000	$297,000,000
25 – Lander Infiltration / West Boise River	$212,000,000	$86,000,000	$341,000,000

[1] *Costs presented in 2015 dollars*

- Capital, O&M, and NPV costs all favor River Discharge

Economic Development through Industrial Reuse

"Support industrial and commercial users"
"Protect the Lower Boise River and other environmental assets to support economic development"

- Consider the impacts none, one, or two industries relocating to the Boise area

Economic Development through Industrial Reuse

Company Type	Jobs Added	Annual Economic Impact	Annual Tax Revenue
Food Processing	150	$88,425,000	$934,000
Food Processing	270	$163,509,000	$1,728,000
Paper Products Manufacturing	347	$266,325,000	$3,340,000

Source: ECONorthwest's application of the IMPLAN economic impact modeling software

- Industrial reuse program achieves City's LOS goals
- Infrastructure can be used as a starting point for water reuse program

Economic Development through Industrial Reuse

	Alternative #1 River Discharge	Alternative #25 Lander Infiltration // WB River Discharge	% Difference
NPV (30%)	$297,000,000	$341,000,000	13.7%
NPV (100%)	$297,000,000	$303,000,000	2%
NPV (200%)	$297,000,000	$247,000,000	18.4%

Economic Development through Industrial Reuse

Lander Street WWTF	West Boise WWTF: River//River	Reuse//River	Infiltration// River	Reuse// Infiltration	Infiltration// Infiltration	River// Infiltration
River//River	$297M	$271M	Alt #3	$384M	$334M	Alt #6
Reuse//River	$285M	$255M	Alt #9	**$312** ~~$368M~~	**$262** ~~$318M~~	Alt #12
Infiltration// River	Alt #13	Alt #14	Alt #15	Alt #16	Alt #17	Alt #18
Reuse// Infiltration	$323M	**$237** ~~$292M~~	Alt #21	**$405** ~~$461M~~	**$356** ~~$411M~~	Alt #24
Infiltration// Infiltration	**$247** ~~$303M~~	**$217** ~~$273M~~	Alt #27	**$386** ~~$442M~~	**$336** ~~$392M~~	Alt #30
River// Infiltration	Alt #31	Alt #32	Alt #33	Alt #34	Alt #35	Alt #36
Consolidation	$327M	$276M	Alt #39	**$391** ~~$446M~~	**$317** ~~$372M~~	Alt #42

100% probability (one industry relocating), 200% probability (two industries relocating)

Conclusions


The future is here: The future is clear.
Imagine a water industry that doesn't react to each emergency as it happens; an industry that thinks outside of siloes and sees the whole water picture; an industry that is prepared for a new era of constant change. Imagine a future that works–and even better–a future that might just already be here. We are at a crossroads where traditional paths are joining to pave new frontiers in integrated water management–a new normal that encompasses every part of the water cycle.
OCEAN
SEAWATER DESALINATION
1 WATER TREATMENT
2 WASTEWATER TREATMENT
3 ADVANCED TREATMENT
NEIGHBORING COMMUNITY
GROUNDWATER
SURFACE WATER
RESERVOIR
AGRICULTURE
INDUSTRIAL
DOMESTIC
COMMERCIAL
DIRECT POTABLE REUSE
IRRIGATION REUSE
SURFACE WATER AUGMENTATION
INJECTION OR SPREADING BASINS
INDUSTRIAL REUSE
RIVER DISCHARGE
COMMERCIAL POTABLE REUSE
1Water
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Some closing thoughts…

- There are many drivers for and many paths to water reuse
- Every community has their own drivers…we should understand and include these in the decision making process while acknowledging that they can evolve
- Non-traditional drivers may resonate better with stakeholders and decision-makers

Thank You

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