Idaho's First Citywide Water Reuse Program

PNWS-AWWA Annual Conference

Clint Dolsby	Assistant City Engineer
Roxanne Holland	Staff Engineer
David Keil	HDR Engineering, Inc.
Haley Falconer	HDR Engineering, Inc.

Boise, ID
May 6, 2011

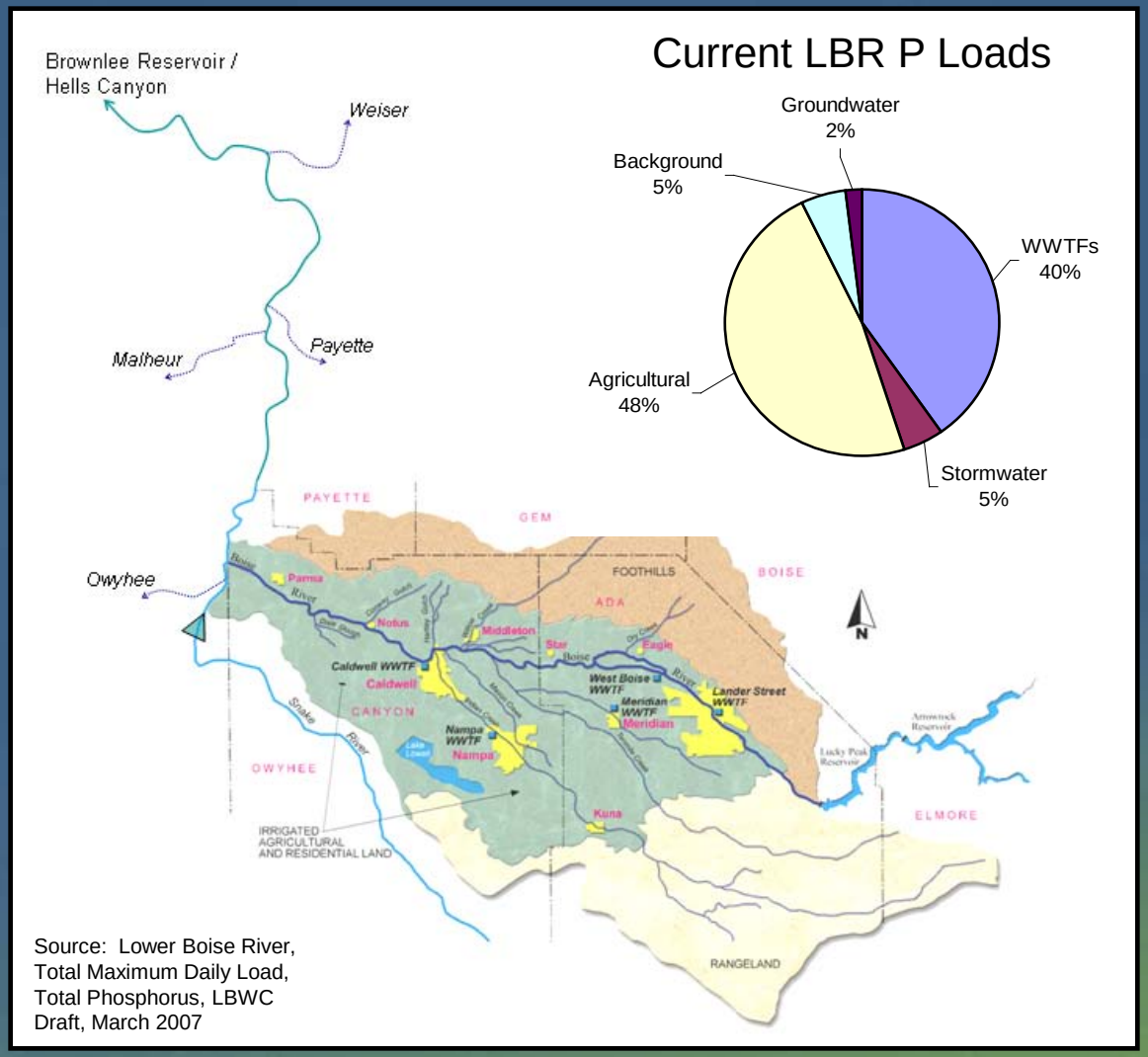
Presentation Outline

- Why Reclaimed Water in Meridian?
- Program History
  - Heroes Park Demonstration Project
  - “Citywide” Permit
  - Booster Station and Reservoir Project
- Master Plan/Business Plan
- Recent Changes
  - Ten Mile Backbone
  - Fast Eddy’s Car Wash
  - WWTP site
- Vision of the Future

WHY REUSE?

Why Reuse?

Surface Water Quality Regulations

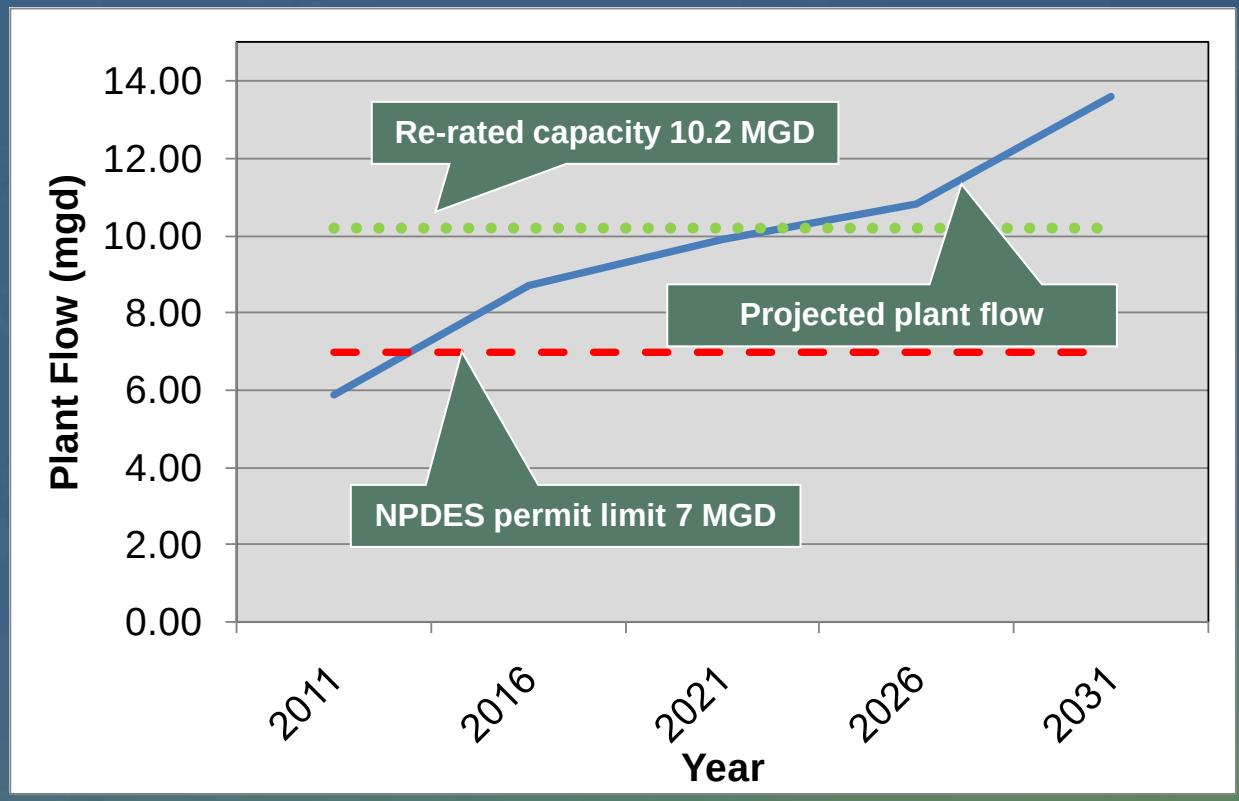


Source: Lower Boise River, Total Maximum Daily Load, Total Phosphorus, LBWC Draft, March 2007

- **Existing Boise River TMDL:**
  - Sediment
  - Bacteria
  - Temperature
- **Proposed Phosphorus Load Allocations**
  - LBR Contributes 8% of SR-HC Load
  - 80% Reduction in 1 Permit Cycle
  - 98% Reduction in 2 Permit Cycles

Why Reuse?
NPDES Flow Limits

- **EPA NPDES Permits:**
  - Meridian Plant is Flow Restricted under NPDES
  - EPA Continues to Delay Renewal of NPDES Permits
  - Operating Under 1999 Flow Limits (7 MGD)
  - Applied in 2004
  - No Action by EPA
- **Plant Capacity:**
  - IDEQ-Approved Re-rating at 10.2 MGD



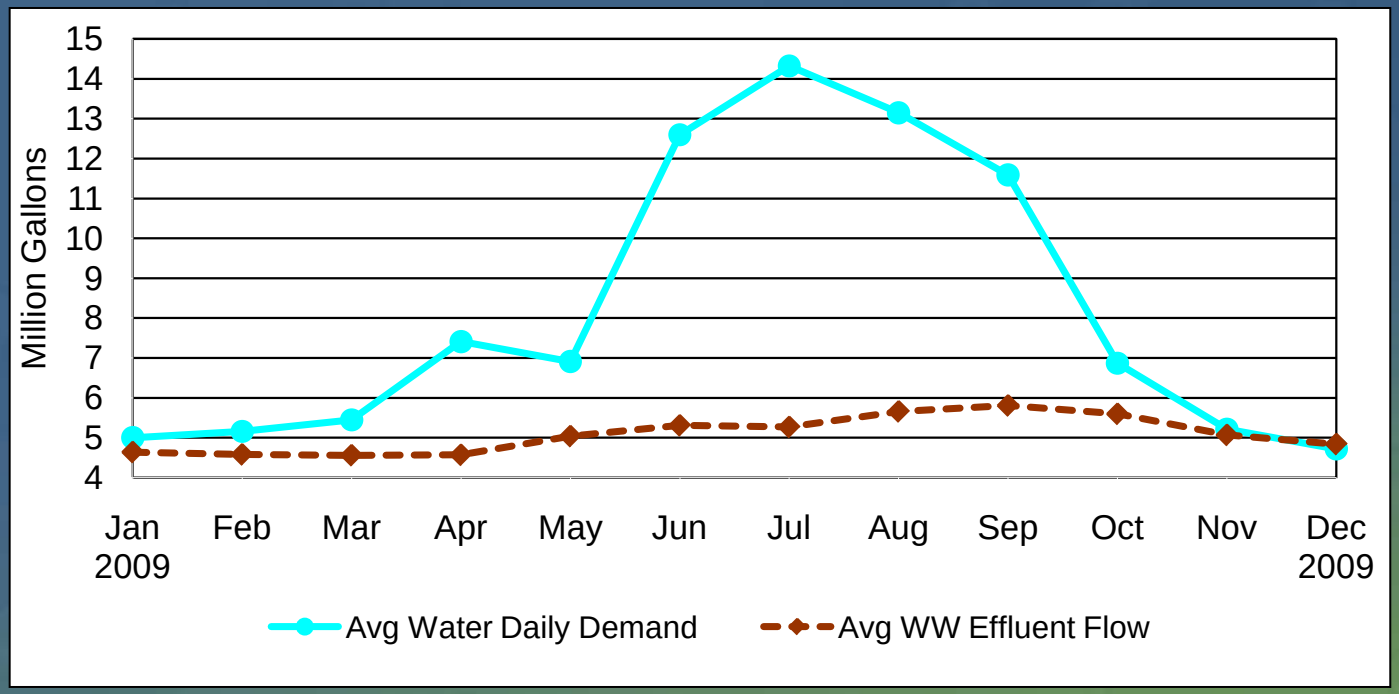
Why Reuse?
Domestic Well Impacts

- **Meridian Potable Water Consumption**
  - Winter Average = 148 million gallons/month
  - Summer Average = 318 million gallons/month
- **Summer Irrigation Activity Increases Demand by 170 million gallons/month**
  - Potential Conservation of 1.2 billion gallons per year through reuse in Old Town

Sensible and Safe Approach

Sensible

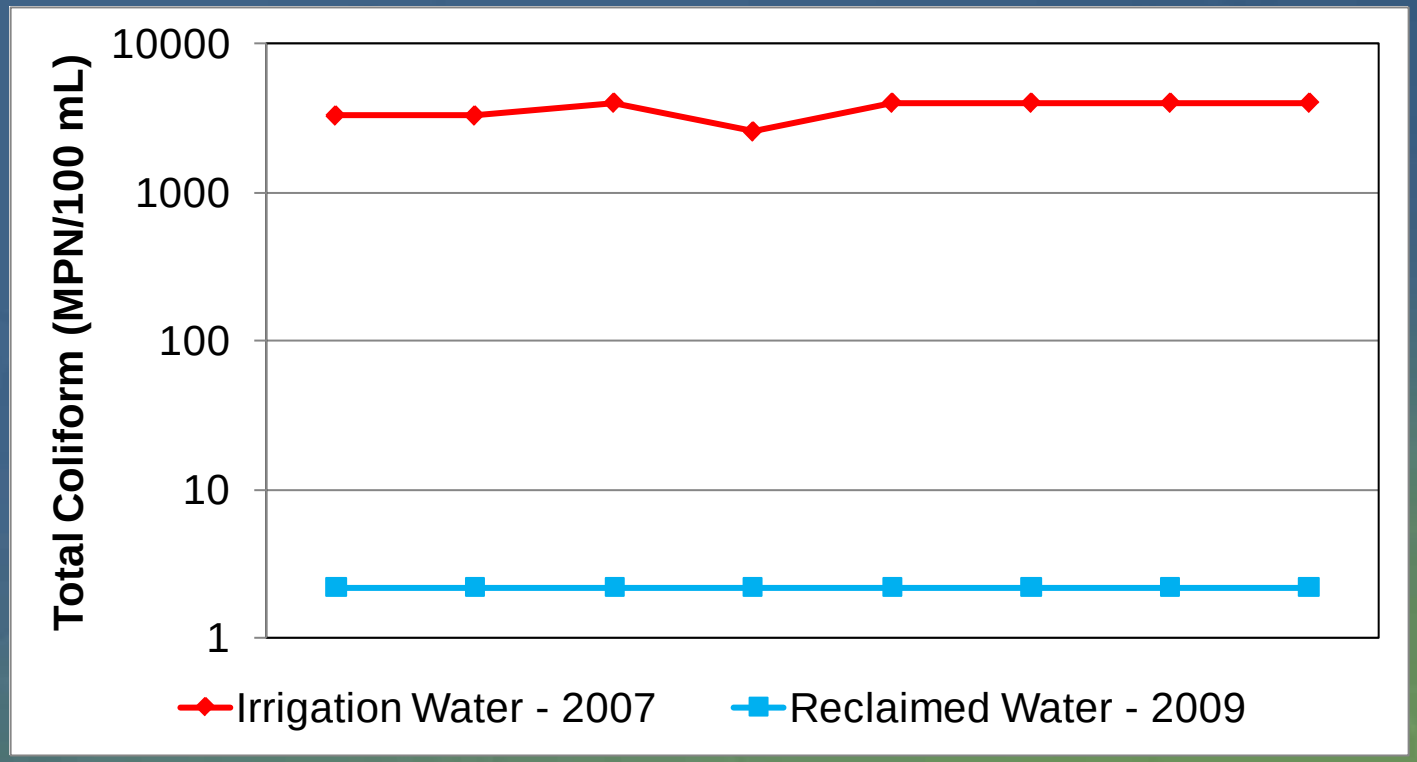
- Supplies meet increasing demands
- Greatest demand is in summer when irrigation can double, even triple, water consumption
- Can be desirable for irrigation



Sensible and Safe Approach

Safe

- Meets Class A Reclaimed Water Standards (Idaho DEQ)
- Highly disinfected
- Allowed for almost any use, except drinking
- Continually monitored and tested



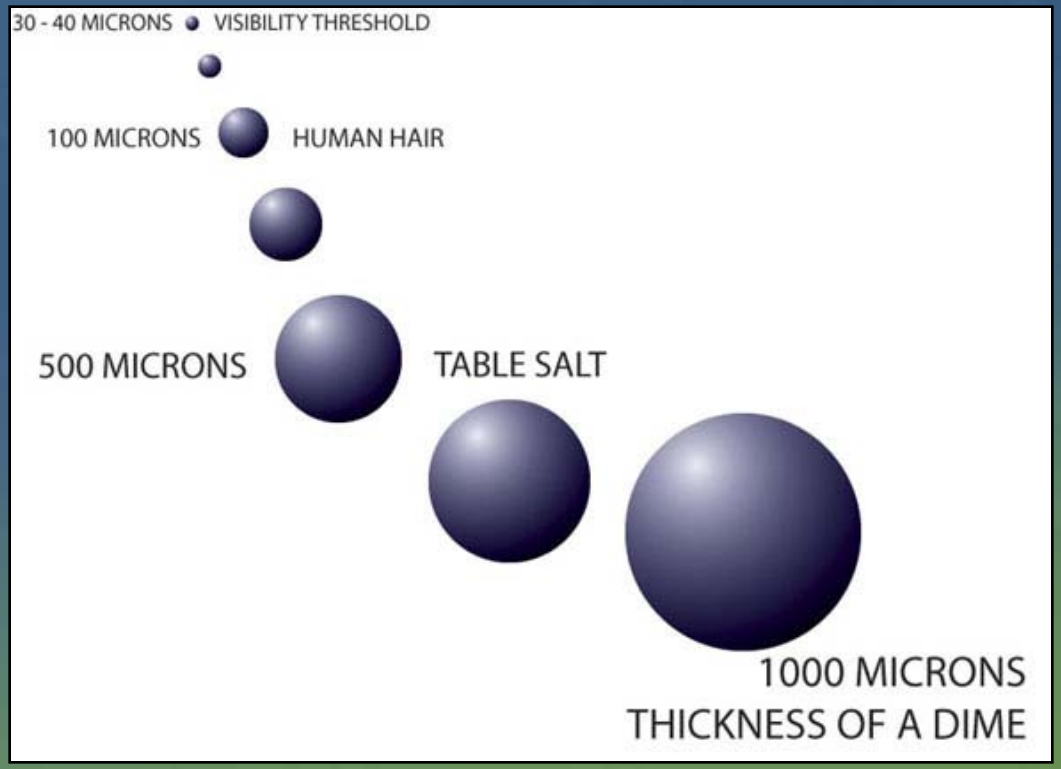
PROGRAM HISTORY

The Liquid Treatment Process

Meridian Wastewater Treatment Plant

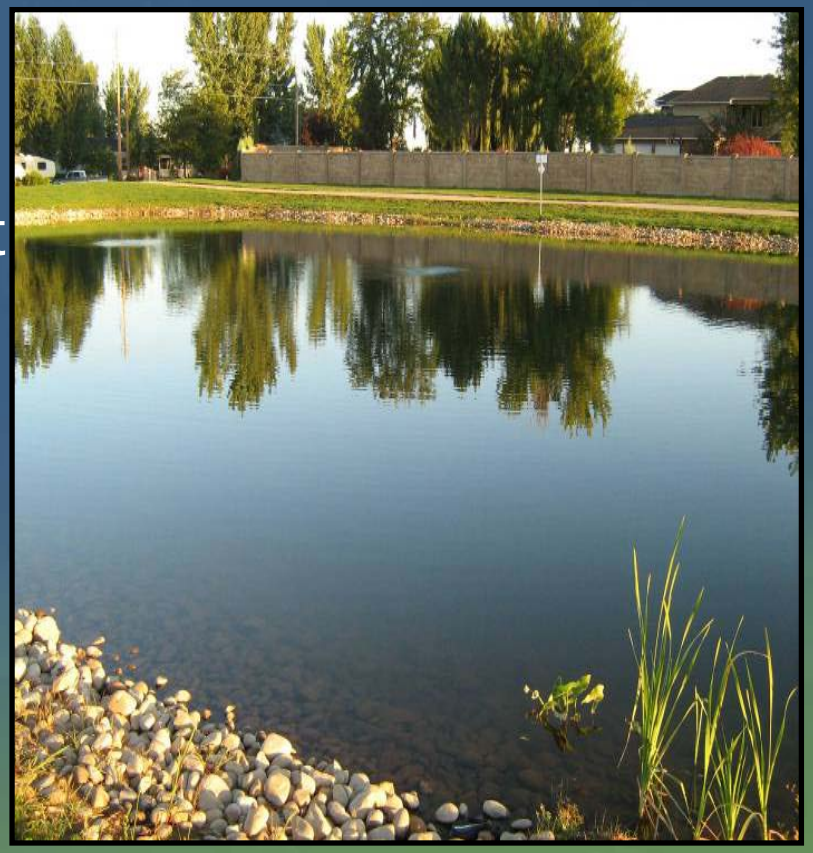
Cloth Media Filtration

- Meets or exceeds California Title 22 wastewater reuse criteria
- Filter Media consists of fabric with 10 micron pore size
- Flow continuously monitored before and after filtration to assure adequate treatment



First Class A Reclaimed Water Permit Issued To A City At Heroes Park - 2008

- Overcame Challenges:
  - Educated and Built Support
    - Elected Officials
    - Parks Staff
- Obtained a Project Site Permit First
- Overcame Technical Obstacles:
  - Effluent Quality
  - Nitrogen Content
  - Soil Loadings
  - Disinfection
  - Overspray (Park Amenities)
  - Seepage Tests
  - Production Demand & Redundancy
- Supplied in Summer of 2009



Lessons Learned/Challenges

- (Nutrient rich water) + (Shallow open pond) =

  Undesirable Impacts to Aesthetics and Aquatic Life

  - Moved to a Pressurized System
- Point of compliance drives monitoring equipment needs

Testing the Water

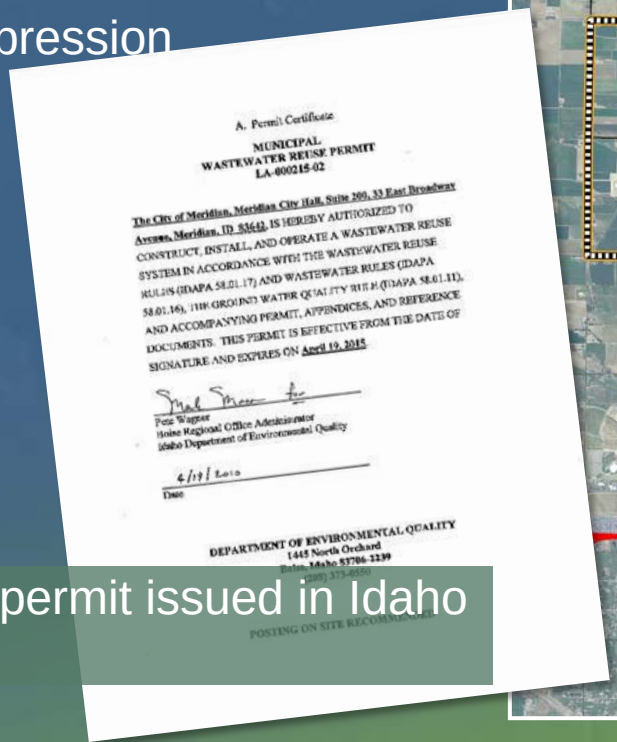
Develop Partnerships and Leverage Resources

- Build Community Support With Tangibles
  - Community Park Improvements

  <u>Park Features</u>:
  - Reclaimed Water Interpretive Plaza and Fountain
  - Reuse Sourced Restrooms
  - Heroes Plaza Educational Planters
  - Interpretive Pathways with Drought Tolerant Vegetation and Landscapes
  - Water-wise Demonstration Site

“Citywide” Permit

- 5-year Permit Cycle
- Allowable Uses
  - Irrigation
  - Car Wash
  - Toilet Flushing
  - Dust Suppression
  - Sewer Flushing
  - Fire Suppression
- Compliance Activities
  - Plans of Operation
  - Runoff Management



A. Permit Certificate

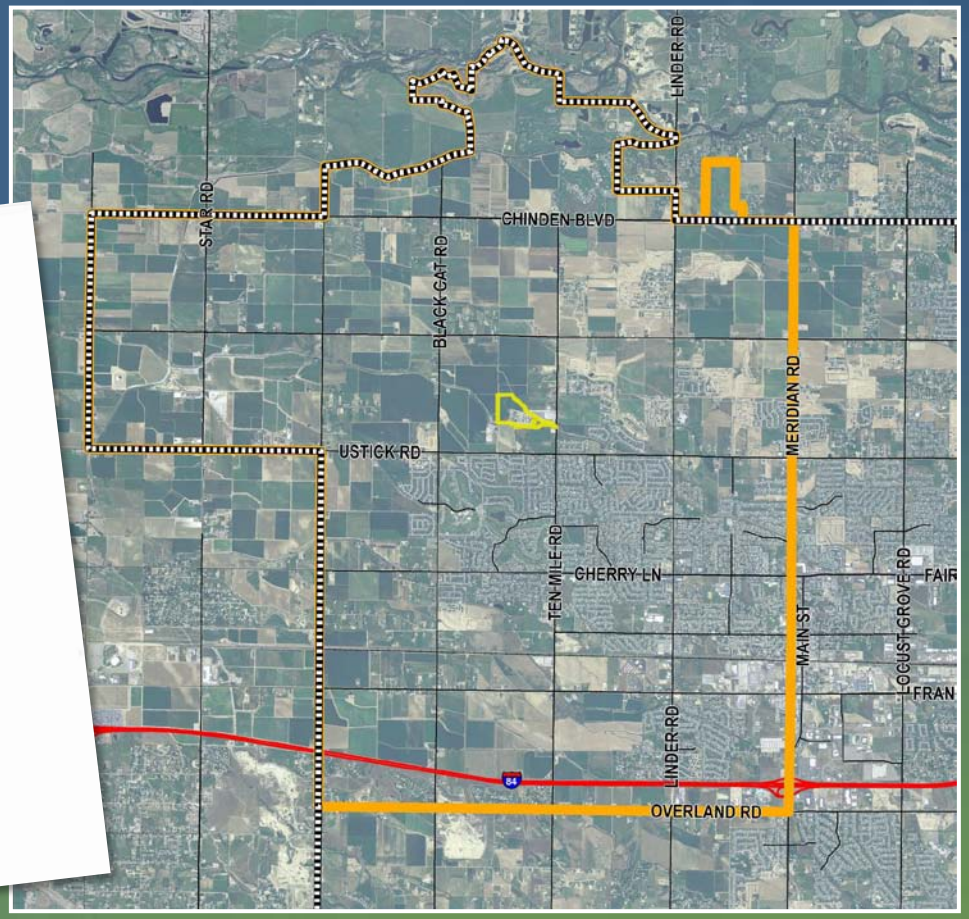
MUNICIPAL
WASTEWATER REUSE PERMIT
LA-000215-02

The City of Meridian, Meridian City Hall, Suite 200, 33 East Broadway Avenue, Meridian, ID 83642, IS HEREBY AUTHORIZED TO CONSTRUCT, INSTALL, AND OPERATE A WASTEWATER REUSE SYSTEM IN ACCORDANCE WITH THE WASTEWATER REUSE RULES (IDAPA 58.01.17) AND WASTEWATER RULES (IDAPA 58.01.16), THE GROUND WATER QUALITY RULE (IDAPA 58.01.11), AND ACCOMPANYING PERMIT, APPENDICES, AND REFERENCE DOCUMENTS. THIS PERMIT IS EFFECTIVE FROM THE DATE OF SIGNATURE AND EXPIRES ON April 19, 2015

Pete Wagner
Boise Regional Office Administrator
Idaho Department of Environmental Quality

4/19/2010
Date

DEPARTMENT OF ENVIRONMENTAL QUALITY
1445 North Orchard
Boise, Idaho 83706-2239



First “Citywide” permit issued in Idaho (April 19, 2010)

Timeline

2012

Ten Mile corridor piping projects

Ten Mile corridor piping projects
Fast Eddy's Car Wash *(first commercial user of municipal recycled water in ID)*
WWTP site

2011

Final class A "citywide" permit issued by IDEQ

Booster station/reservoir design-build operational

2010

2009

Final "citywide" permit application submitted to IDEQ

First use of reclaimed water at Heroes Park

2008

Final class A permit for Heroes Park issued by IDEQ

2007

Phase 1 cloth media filters installed

Pressure/leak test of BRO pipeline

Final Heroes Park permit application submitted to IDEQ

2006

Design of NaOCl booster and connection of BRO pipeline to Heroes Park pond

2005

City recognizes upcoming challenges with TP TMDL and water rights

RECLAIMED WATER MASTER PLAN

Reclaimed Water Master Planning: Developing the Framework for Program Development

Activities Currently Underway

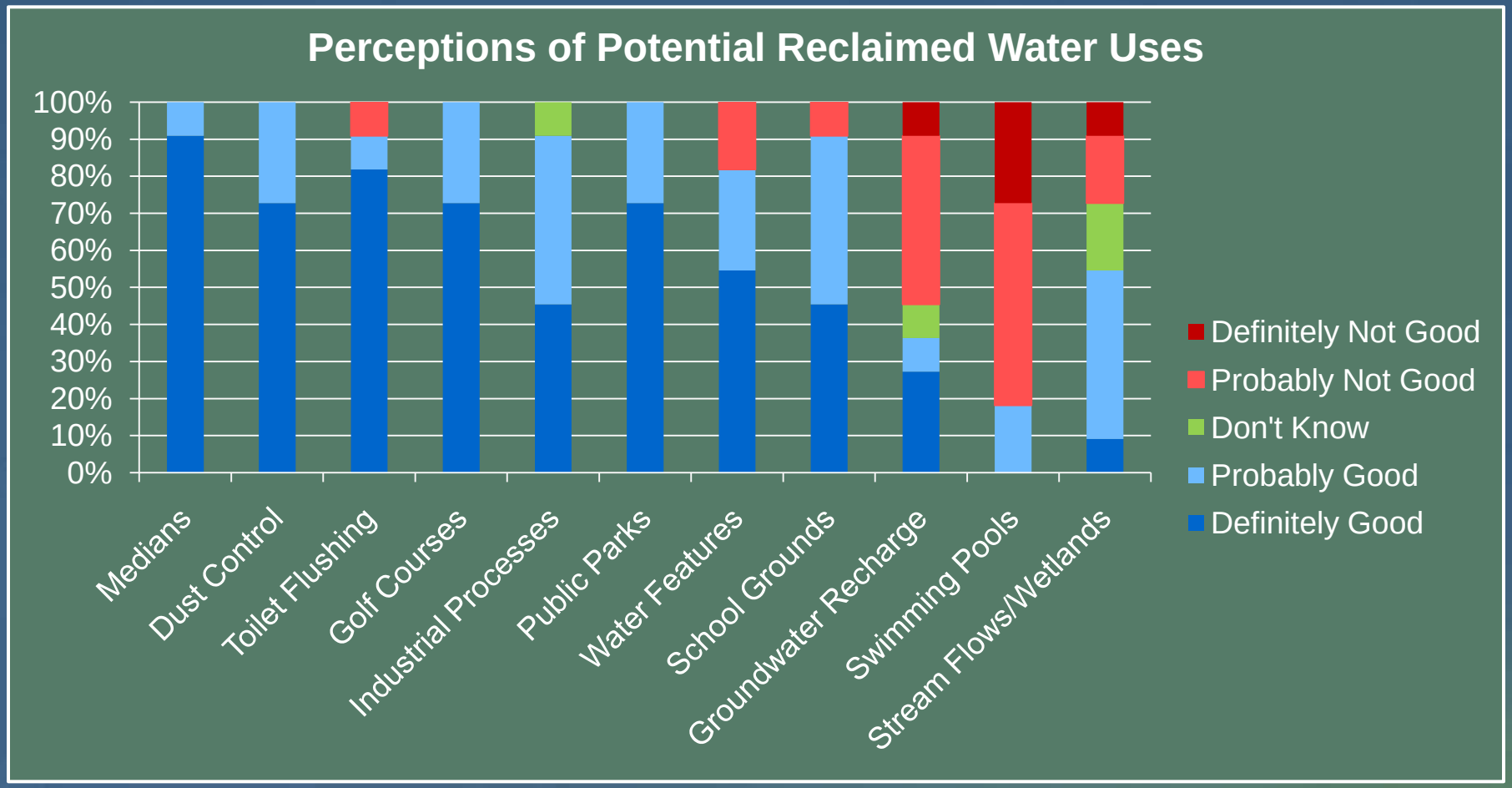
Market Analysis
- User Category
- Use sites
- Customer demands

Infrastructure
- Distribution network
- Storage
- Pumping

Implementation Strategy
- Funding and financing strategies
- Organizational and administrative arrangements

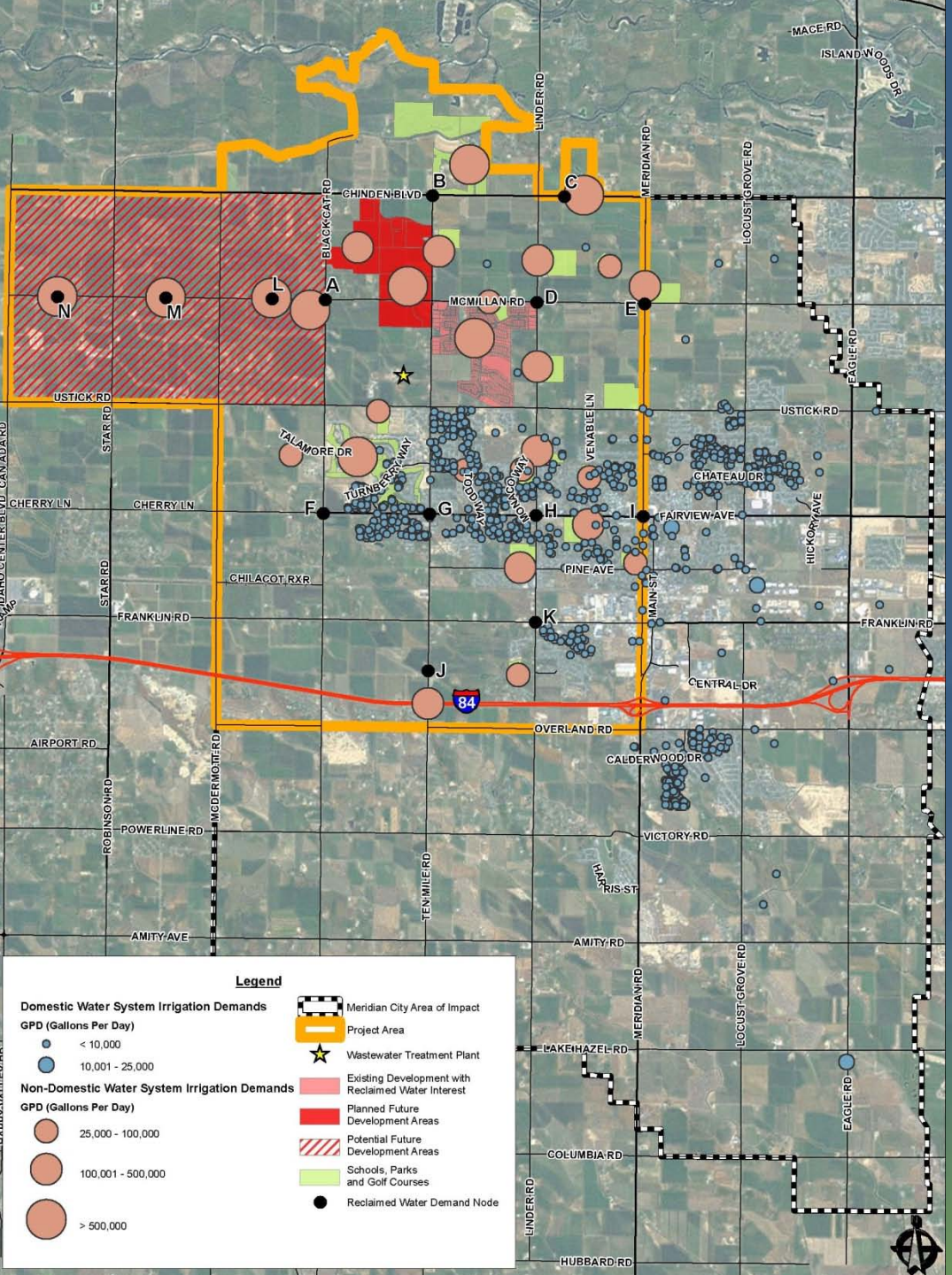
Focus Group Meeting

Ratings of Potential Reclaimed Water Uses

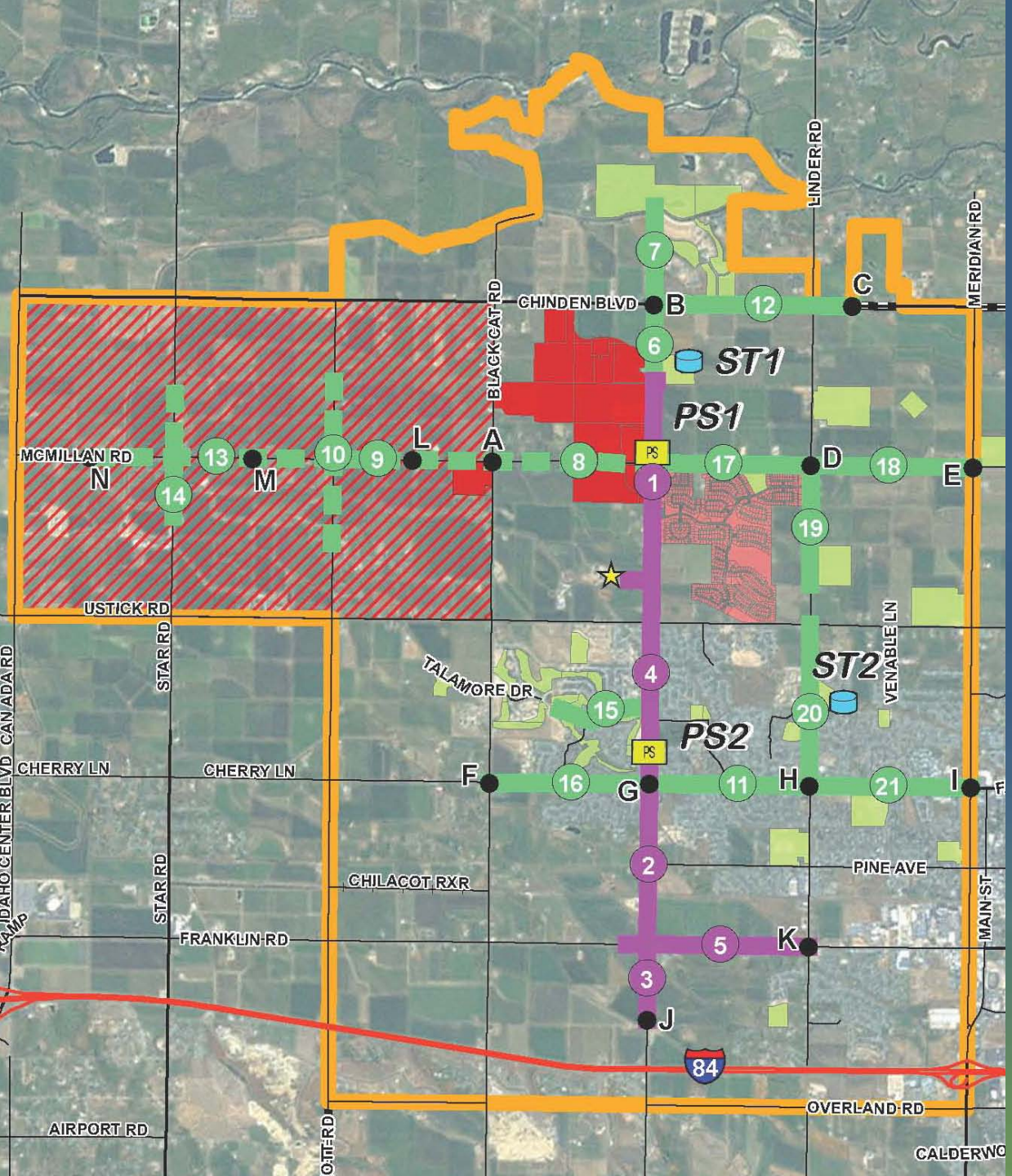


- 10 survey respondents
- Cross-section of potential customers
- Good understanding of reclaimed water benefits
- Supportive of City's program

Potential Use Sites



- Focus on Nearby Irrigation Opportunities
  - Golf Courses
  - Parks & Open Spaces
  - Ten Mile Interchange Area
  - WWTP Site
- Accommodate Growing Areas
  - New Subdivisions - DAs
- Retrofit Existing Areas
  - Older Subdivisions
- Commercial
  - Car Wash



City Provided Infrastructure Needs

Pumping:

- Completed (2010)
  1,600 gpm
- Future (2040) need
  9,000 gpm

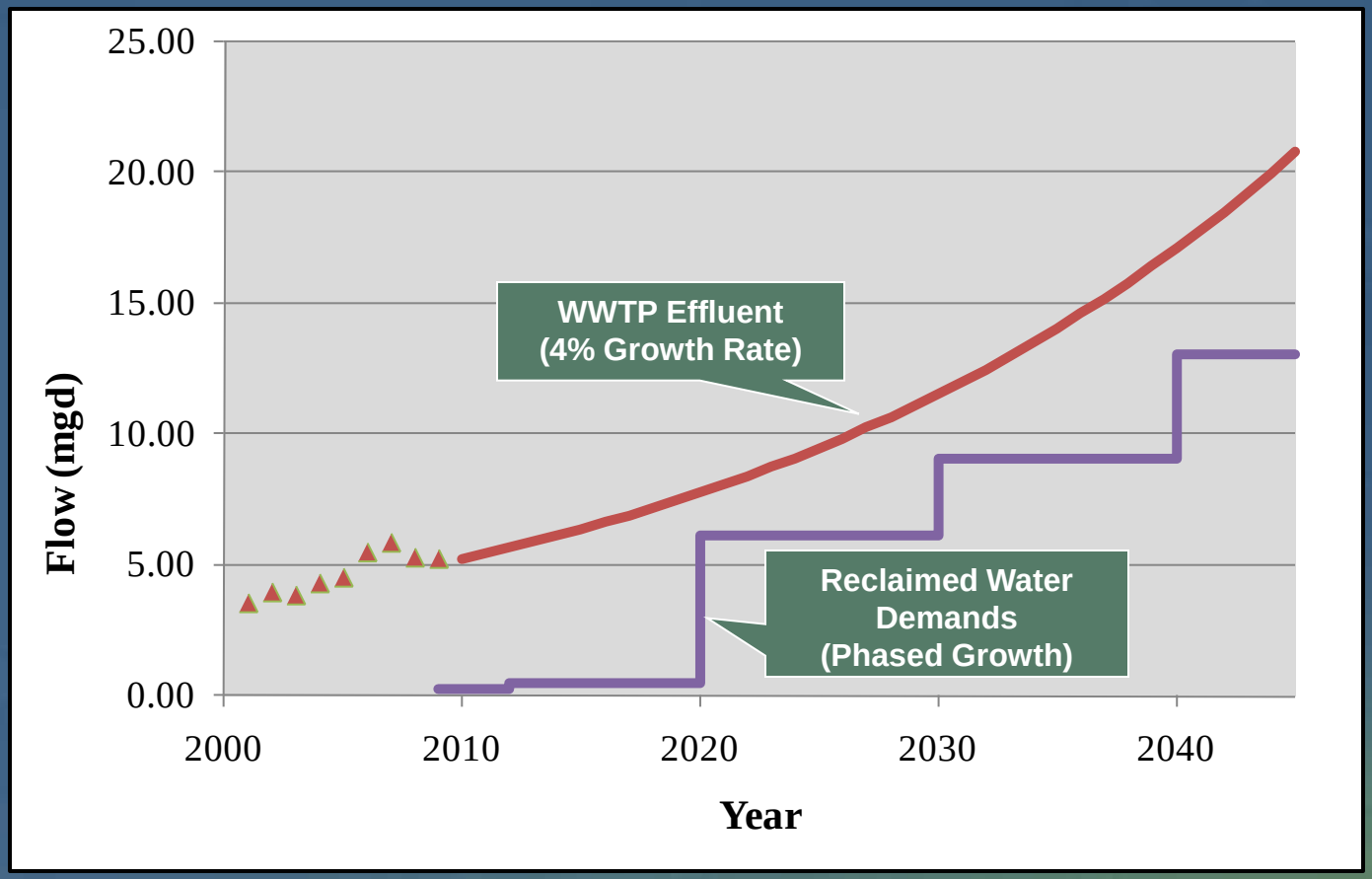
Piping:

- Existing/under construction
  27,000 LF
- Potential future (2040)
  51,000 LF

Storage:

- Completed (2010)
  1.0 MG
- Future (2040) need
  3.0 MG

Potential Reclaimed Water Demands



- Phased approach to program development
- Current use < 0.5 mgd
- Projected irrigation use in NW Meridian > 11 mgd

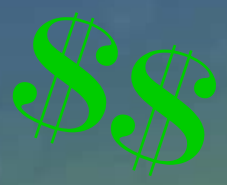
Near-term Activities (Phase 2)

- NPDES permit negotiations
- Next large potential user – golf course
- Planned design and construction activities will continue
- Development of internal City implementation elements
  - Management framework
  - Standard Operating Procedures
- Financing framework

Implementation Considerations

Financial Program

- Capital Funding Options
  - External funding (grants)
  - Revenue from rates and assessment fees
  - Debt service
- Reclaimed Water Financial Management
  - Self-supporting utility
  - Supported through other utilities
  - Other



Organization / Management of Program

- New utility or contained within existing?
- Operations and maintenance responsibilities?

Customer Development

- User agreements
- Cost-sharing arrangement for customer-side improvements

Public Outreach

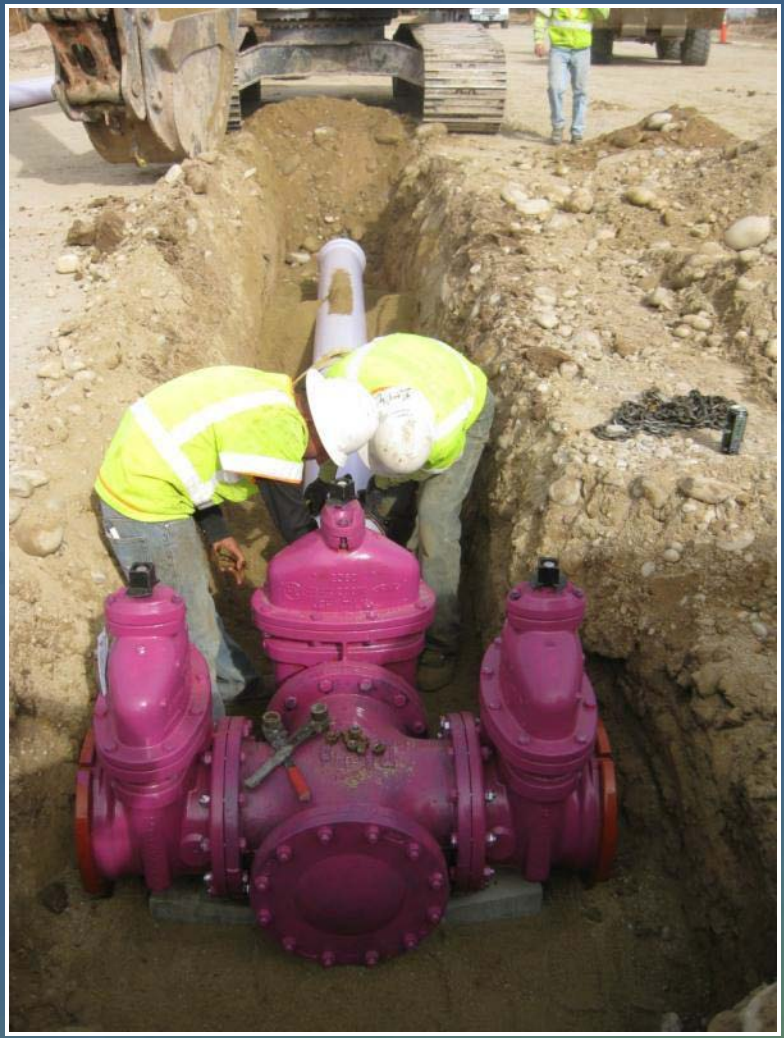
- Demonstration projects
- Focus group meetings

RECENT CHANGES

Recent Reclaimed Water Projects

- Booster Pump Station and Reservoir Design-Build Project
- Pipeline Projects

Distribution System Piping



- Ten Mile
  - Franklin to Interchange
    - Sprinklers for landscape irrigation being installed
  - Cherry to Franklin
    - Complete
  - Cherry to Ustick
    - Under construction
- Franklin (or RR Corridor)
  - Ten Mile to Linder
    - Construction planned for summer 2012

VISION OF THE FUTURE

Flow Projections, Permit Limits and Treatment Phasing

	2010		2021		2031
Q-Total	5.9 mgd		8.7 mgd	9.9 mgd	10.8 mgd	13.6 mgd
Q-5 Mile	5.6 mgd		5.5 mgd	3.2 mgd	2.2 mgd	2.7 mgd
Q-Reuse/ Recharge	0.3 mgd	2.0 mgd	3.4 mgd	6.6 mgd	8.6 mgd	10.8 mgd
Total Nitrogen	15.5 mg/L Reclaimed Water			3.0 mg/L Groundwater Recharge		
Total Phosphorus: Permit Mass Limit (lb/d)*	N/A	178	42.5	6.0	6.3	7.9
Total Phosphorus: Average Discharge Conc (mg/L)	N/A	4.9	0.93	0.22	0.34	0.35
Temperature: Mass (Mkcal/d)	13.5		13.4	10.8	9.7	10.2
Temperature: Temperature (°C)	19.6		19.6	19.9	20.2	22.6
Micro Constituents	No Anticipated Limits		Limits Possible for Some Constituents	Limits Likely for Some Constituents →		
City Funded Infrastructure	To meet reclaimed water flow of 6.6 mgd by 2020 • 2-500,000 gallon and 1-1,000,000 gallon storage tanks at the treatment plant • 3,500 gpm booster pumping at the treatment plant • 28,700 feet of distribution system piping • 1 million gallons of distribution system storage • Additional developer-funded infrastructure is required to serve the northwest area			To meet reclaimed water flow of 10.9 mgd by 2030 • Additional 3,400 gpm booster pumping at the treatment plant • 8,000 gpm of distribution system booster pumping • Additional 14,400 feet of distribution system piping • Installation of bulk chlorine system • 1 million gallons of distribution system storage • Additional developer-funded infrastructure is required to serve the northwest area	Approximate Costs • Reclaimed Water Infrastructure by 2030 = $13M to $26M
Planning Year	2010		2021		2031

Vision for Sustainability

"Our Wastewater Treatment Plant, by the year 2030, will be self-sustaining – utilizing closed-looped systems to recycle and/or reuse 80% of the waste stream via water reclamation, co-generation, and nutrient recycling strategies."

- **Strategies Include:**
  - Nutrient recovery
  - Composting
  - Energy efficiency
  - Renewable energy
  - Reclaimed water use
  - Economic Development Advantage

Discussion

RECLAIMED WATER
The Right Water for the Right Use
WE ARE USING
WATER WISELY
MERIDIAN
IDAHO
DO NOT DRINK
FROM THE IRRIGATION SYSTEM

Acknowledgements

Thomas Barry	Public Works Director
Rich Dees	Deputy Public Works Director/ Utility Operations Manager
Warren Stewart	Engineering Manager
Clint Dolsby	Assistant City Engineer
Roxanne Holland	Staff Engineer
Mollie Mangerich	Environmental Programs Manager
Tracy Crane	Wastewater Superintendent
Gail Hammond	Assistant Wastewater Superintendent
David Keil	HDR Engineering, Inc
Jeff Hansen	HDR Engineering, Inc
Haley Falconer	HDR Engineering, Inc
Steve Ogle	IDEQ (former)
Mark Mason	IDEQ (former)
Valerie Greer	IDEQ

Projected 2030 Plant Flows and Reclaimed Water Demands

Anticipated Permit Limits (Mass based limits – design flow)

		2011	2016	2021	2026	2031
Total Nitrogen		15.5 mg/L Reclaimed Water		3.0 mg/L Groundwater Recharge		
Total Phosphorus	Permit Mass Limit (lb/d)*	N/A / 190	17.0	6.0	6.3	7.9
	Average Discharge Conc (mg/L)	N/A / 4.1	0.37	0.22	0.34	0.35
Temperature	Mass (Mkcal/d)	13.5	13.4	10.8	9.7	10.2
	Temperature (°C)	19.6	19.6	19.9	20.2	22.6
Micro Constituents		No Anticipated Limits	Limits Possible for Some Constituents		Limits Likely for Some Constituents →	
		Phase I	Phase II		Phase III	

*Assumes concentrations of 0.07mg/L multiplied by design flow of 10.2 mgd with design flow increasing through Phase III. This load is then allocated to all Phases.

Required Treatment to Meet Permit Limits

Treatment

To meet TP = 17.0 lbs/d by 2016
- Existing process plus chemical addition, UFAT, WASSTRIP, and sidestream P removal
- Nutrient trading development
- Reclaimed water program
- Groundwater Recharge site specific pilot study

To Meet T = 19.6°C by 2016
- Cooling

To meet TP = 6.0 lbs/d by 2021
- Trading and reclaimed water
- Tertiary filtration with chemical addition (only if necessary)
- Obtain Groundwater Recharge Permit and design/construct groundwater recharge system

To Meet TN = 3.0 mg/L by 2021
- IFAS and post-aerobic digestion (or sidestream N removal) with groundwater recharge

To meet TP = 7.9 lbs/d by 2030
- Trading and reclaimed water
- Groundwater Recharge

Approximate Costs
- TP(2030)= 7.9 lbs/d =$5M to $10M
- TN= 3.0 mg/L =$25M to $30M
- Reclaimed water (City-developed) =$20M to $27M
- Temperature =$1M to $10M

NPDES Permit Year

2011 — 2016 — 2021 — 2026 — 2031

Phase I | Phase II | Phase III