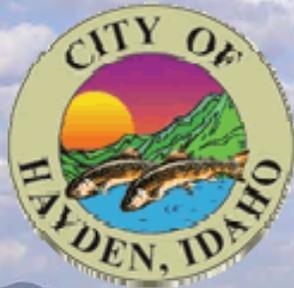


# Rathdrum Prairie Wastewater Master Plan

## *How Reuse Can Protect a Sensitive Resource Aquifer*

### *2009 Idaho Wastewater Reuse Conference*



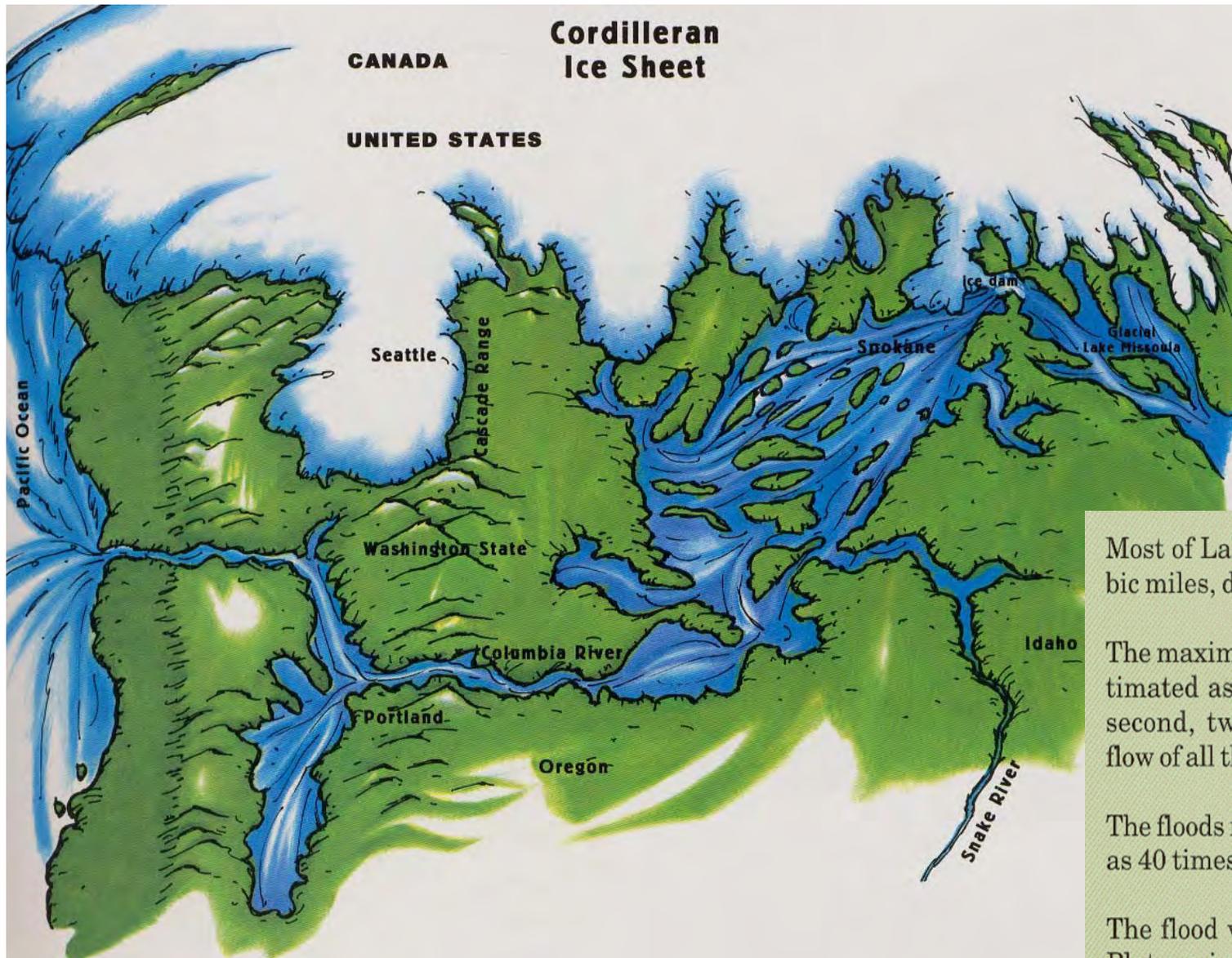
Presented by:

Paul Klatt, P.E.  
J-U-B ENGINEERS, Inc.  
[pklatt@jub.com](mailto:pklatt@jub.com)

May 14, 2009

# PRESENTATION HIGHLIGHTS

- Aquifer protection sets the stage
- Growth competes with open space
- Rathdrum Prairie Wastewater Master Plan
- Key implementation topics



Pacific northwest during the last ice age --  
15,000 to 12,000 years ago

Most of Lake Missoula, about 500 cubic miles, drained in a few days.

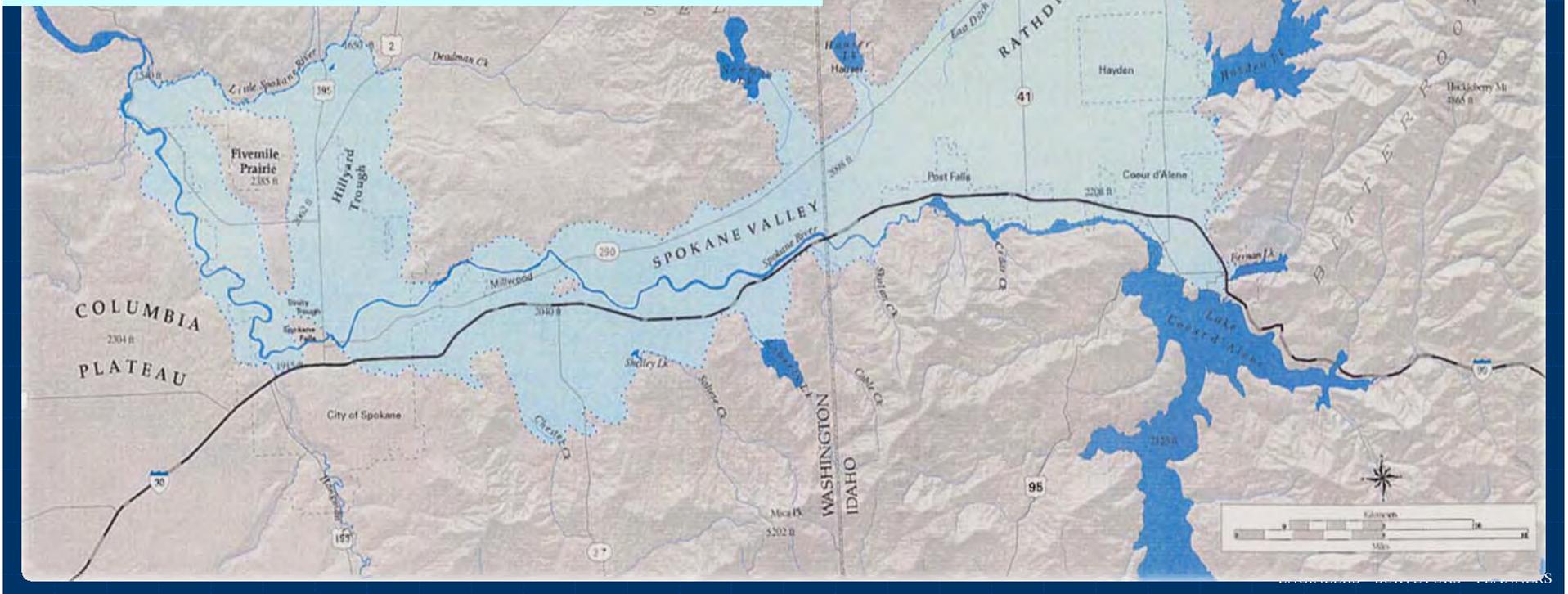
The maximum flood discharge was estimated as 750 million cubic feet per second, twenty times the combined flow of all the rivers in the world today.

The floods may have occurred as many as 40 times.

The flood velocity over the Columbia Plateau is estimated at 45 miles per hour.

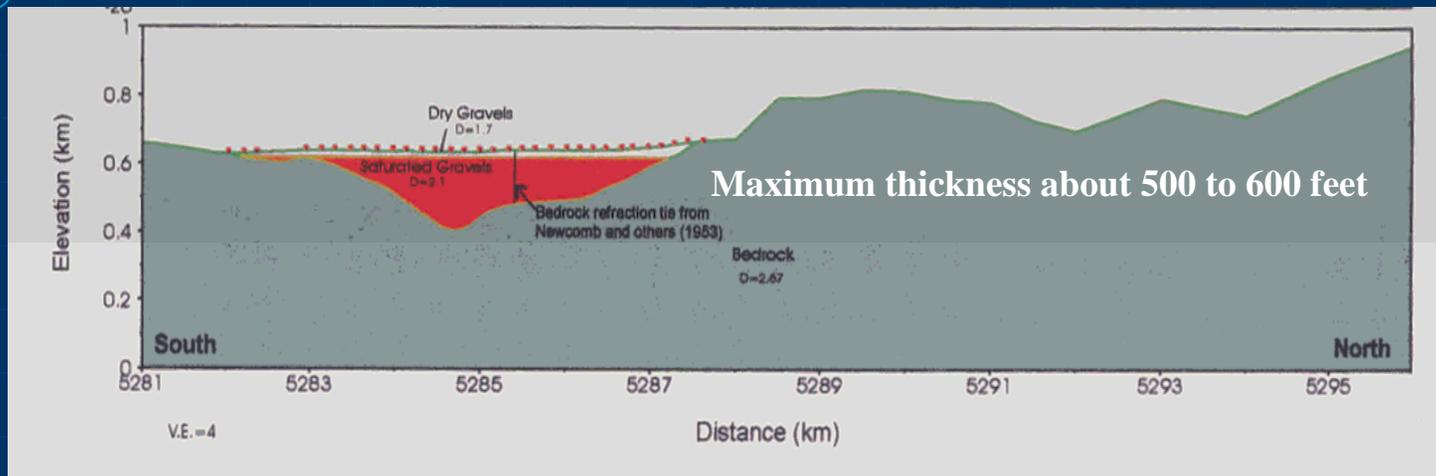
The flood carried boulders as large as 8 to 10 feet across to the Spokane Valley – Rathdrum Prairie region.

**THE AQUIFER GENERALLY FLOWS IN A SOUTHWESTERLY DIRECTION, ORIGINATING IN IDAHO AND FLOWING INTO WASHINGTON.**

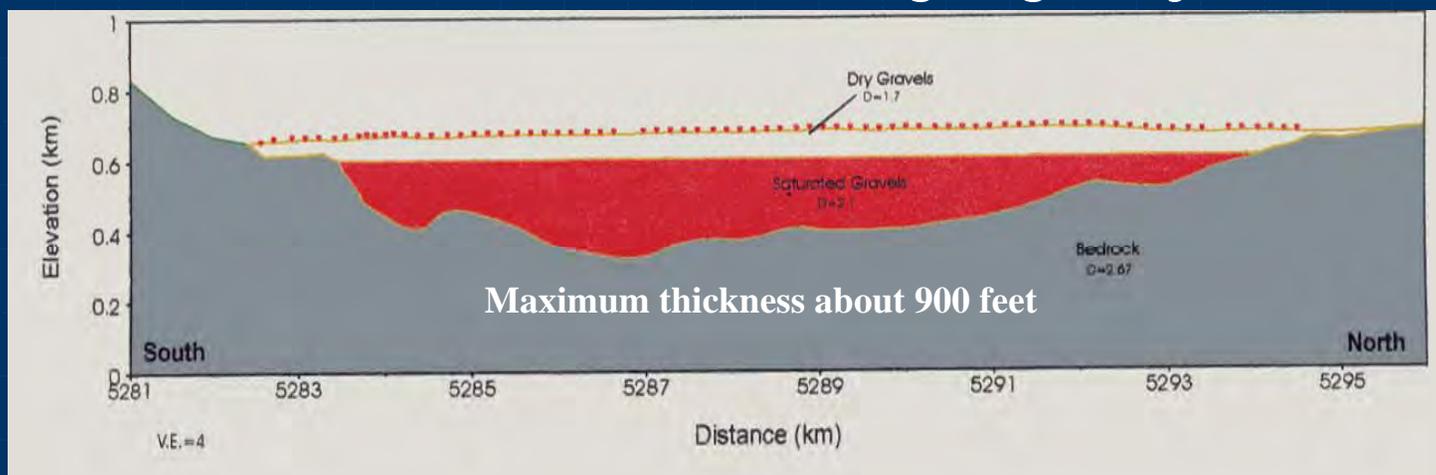


# GEOPHYSICAL SURVEYS OF THE AQUIFER

## North-South Cross Section near the State Line



## North-South Cross Section along Highway 41 to Rathdrum



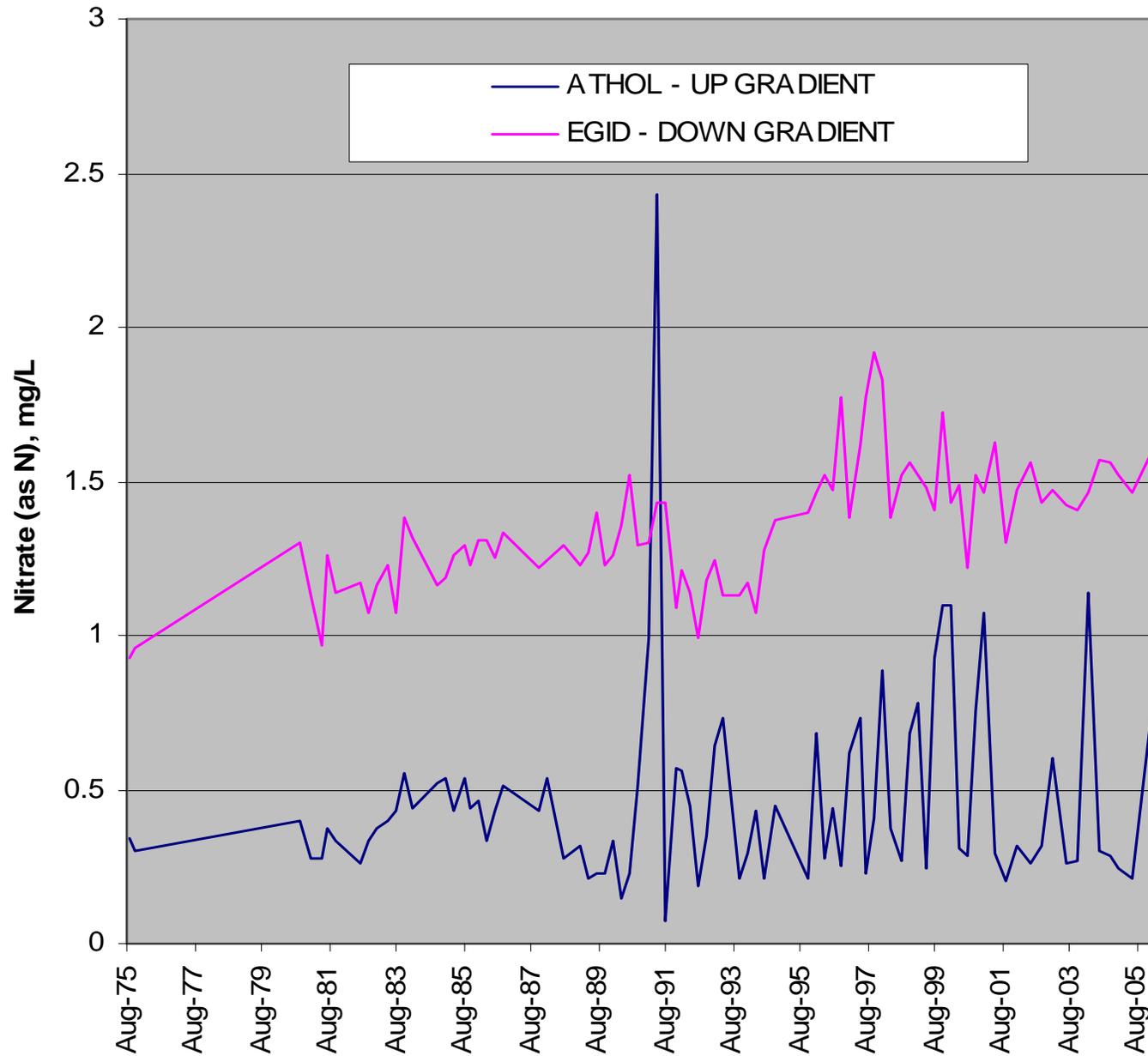
# SOCIO-ECONOMIC SETTING

- Our lakes, topography, water supply, and soils have been attractive for over 100 years
- 500,000 people rely on the Aquifer - up from 360,000 in 1980 (1.2% annual growth)
- 1977 recognition of Aquifer's quantity, quality, and vulnerability led to:
  - "5-acre rule"
  - EPA "Sole Source" designation
  - 1980 DEQ "Special Resource Aquifer" designation
  - 1997 "Sensitive Resource" designation – IDAPA 58.01.11.300 (non-degradation to beneficial uses)

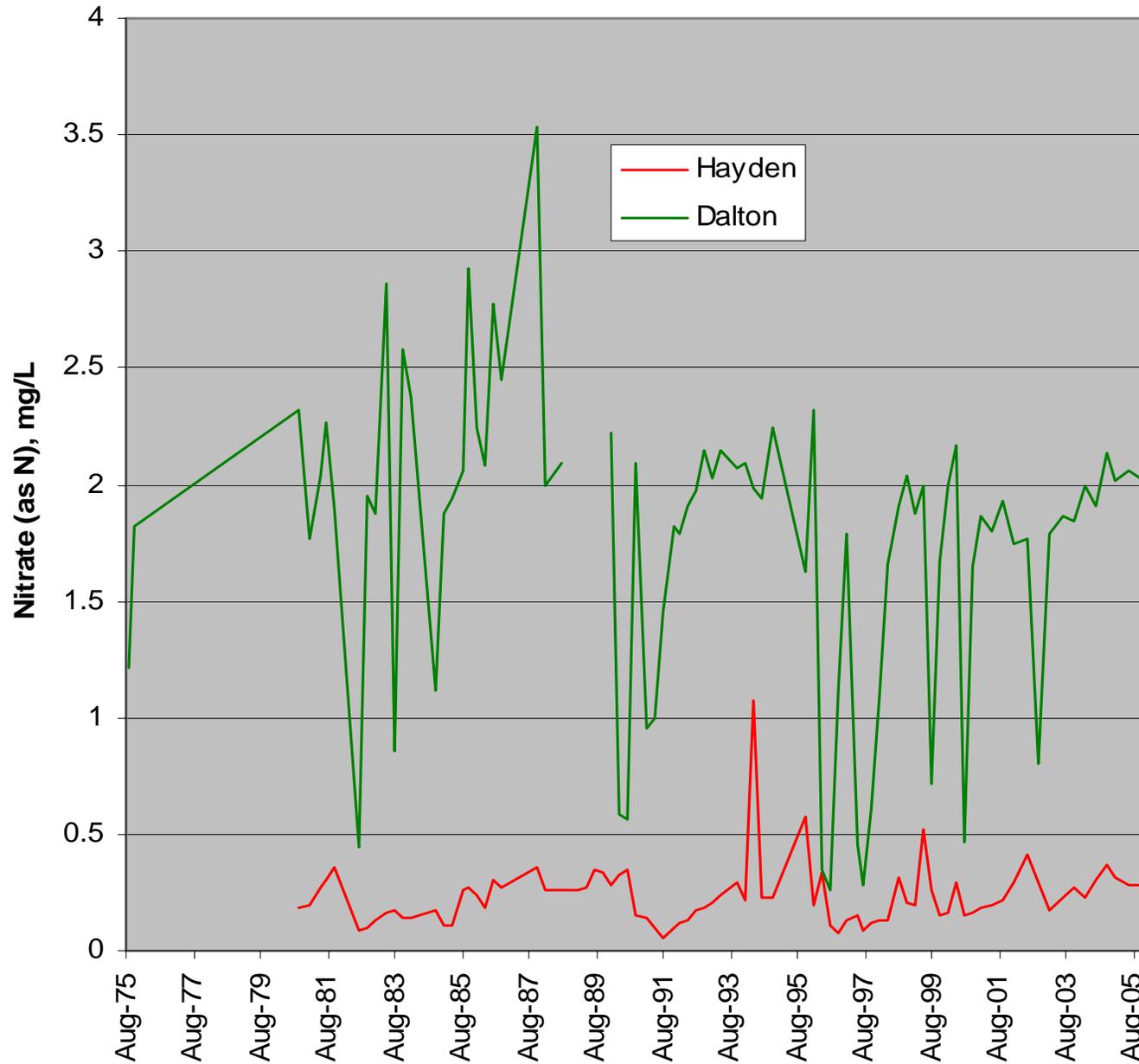
# AQUIFER–WASTEWATER CONNECTION

- Aquifer protection drove:
  - Sewer Management Agreements (SMAs) with surrounding unsewered communities
  - Sewering of Hayden, Post Falls, and Rathdrum
  - Post Falls WWTP construction in 1984
  - HARSB WWTP construction in 1987
- 1995 IDEQ “Special Supplemental Guidelines for Spokane Valley – Rathdrum Prairie Aquifer Wastewater Land Application”

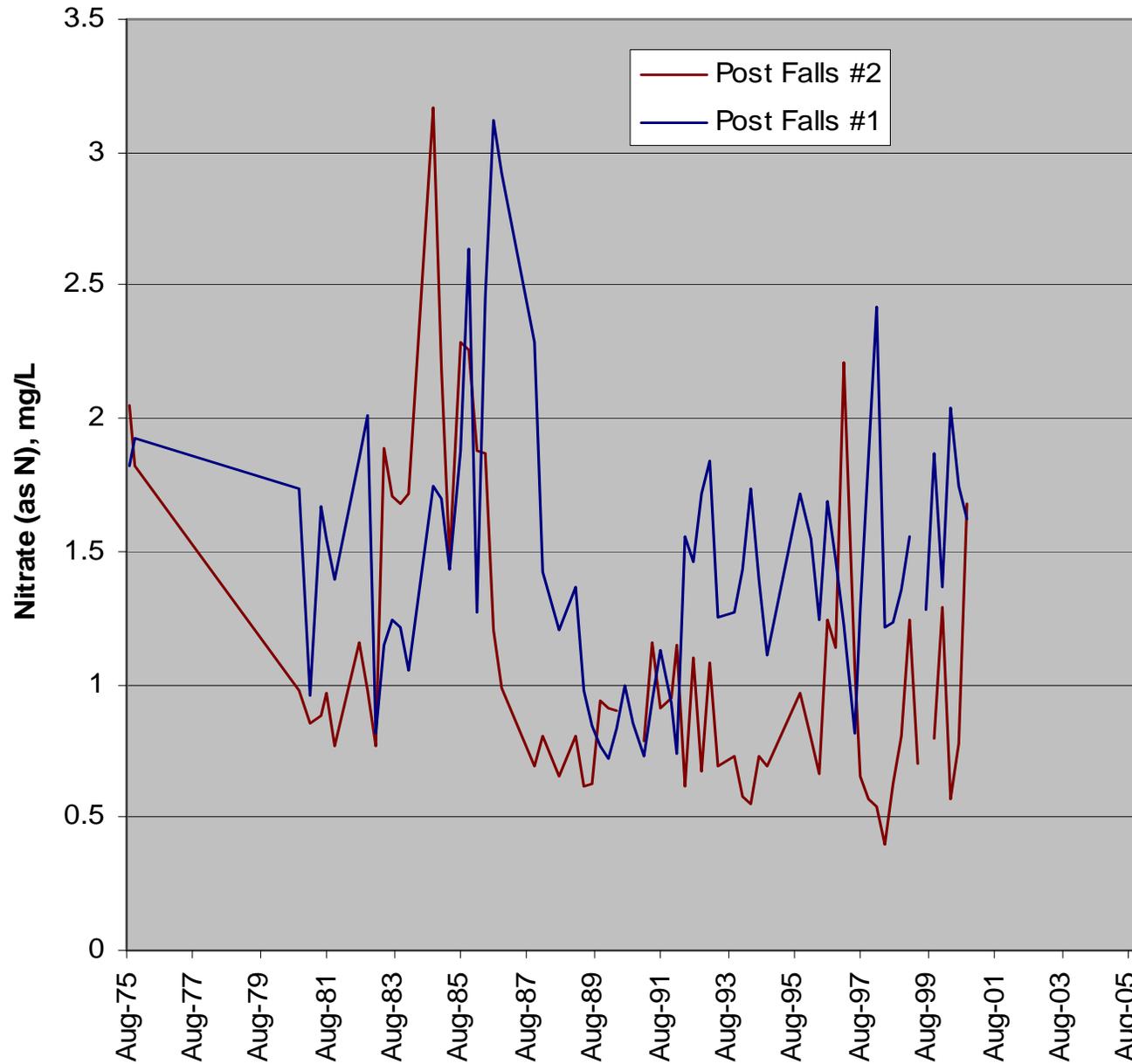
## Rathdrum Prairie Aquifer Nitrate Trends



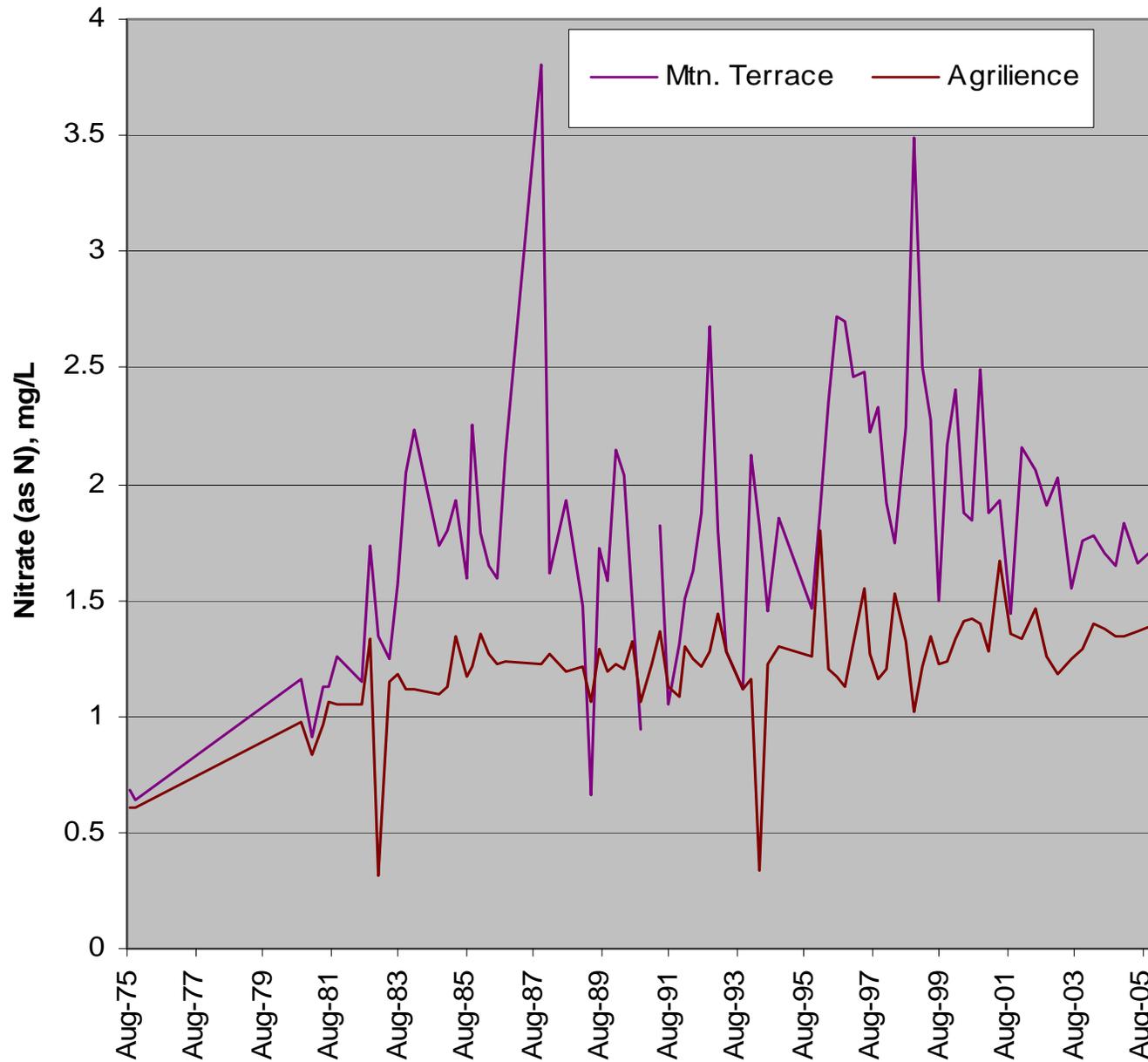
## Rathdrum Prairie Aquifer Nitrate Trends



## Rathdrum Prairie Aquifer Nitrate Trends



## Rathdrum Prairie Aquifer Nitrate Trends



# CONTROVERSY INCREASES PUBLIC SUPPORT FOR AQUIFER PLANNING

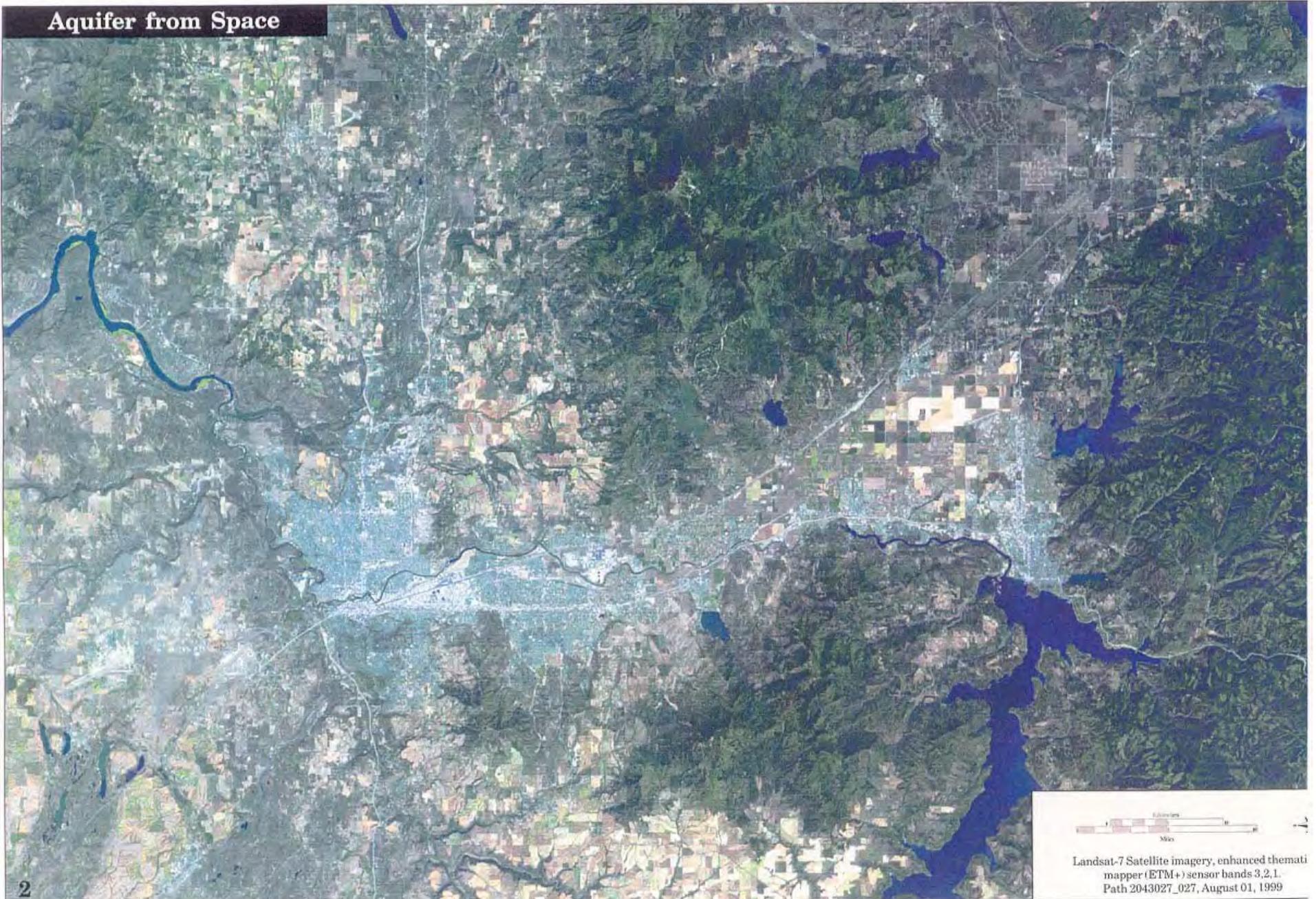
- 2000 controversial BNSF refueling depot
- 2001 controversial gas-fired power plants
- 2002 IDWR created "Rathdrum Prairie Groundwater Management Area"
- 2003-2007 "Bi-State Study" focused on quantity
- 2006 voters approved Aquifer Protection District
- North Idaho Adjudication began in 2008

# COMPETING OBJECTIVES

- Growth – we continue to attract people/business
- Open space is valued
  - Can we combine open space with reuse?
- Aquifer protection is mandatory
  - Non-degradation - reuse must protect aquifer
- River discharge restrictions tightening
  - Lake Spokane identified as impaired and Spokane WWTP phosphorus reduction since 1970's
  - 1989 Spokane River Phosphorus Management Plan
    - ✓ CDA and Post Falls >75% removal
    - ✓ HARSB to reuse when River < 2,000 cfs
  - 2007 Draft NPDES Permits required state-of-the-art phosphorus limits March through October

# WA STATE LINE – INVISIBLE YET DOMINANT

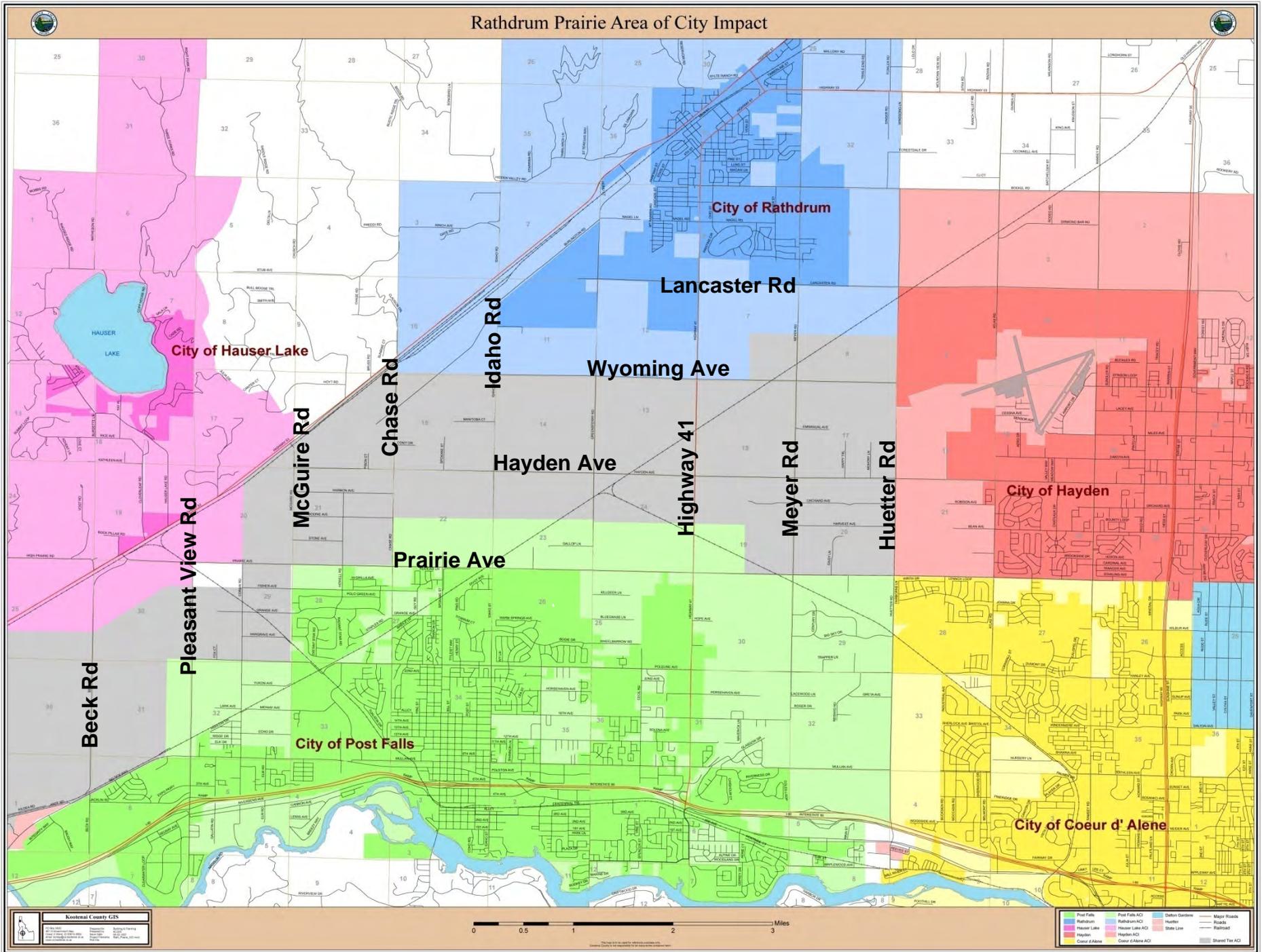
Aquifer from Space



# RATHDRUM PRAIRIE LAND PLANNING

- 1995 – Areas of City Impact (ACIs) established for Hayden, Post Falls, and Rathdrum
  - Growth pressure to develop outside the ACIs
  - About 1,000 acres/year subdivided 1993-2003
  - Steering Committee highlighted need to protect 10,000 acres undeveloped Prairie remaining
- 2004 – KC Ordinances No. 339 and No. 340
  - Created 2 Tiers: Exclusive Tier for each City's ACI and Shared Tier beyond their ACIs on the Prairie
  - Interim ACI boundaries adjusted
  - No re-zoning allowed in Shared Tier
  - 5 years to allow for completion of the Wastewater Master Plan

# Rathdrum Prairie Area of City Impact



**Kootenai County GIS**

2018 Data  
 2018 Data  
 2018 Data  
 2018 Data

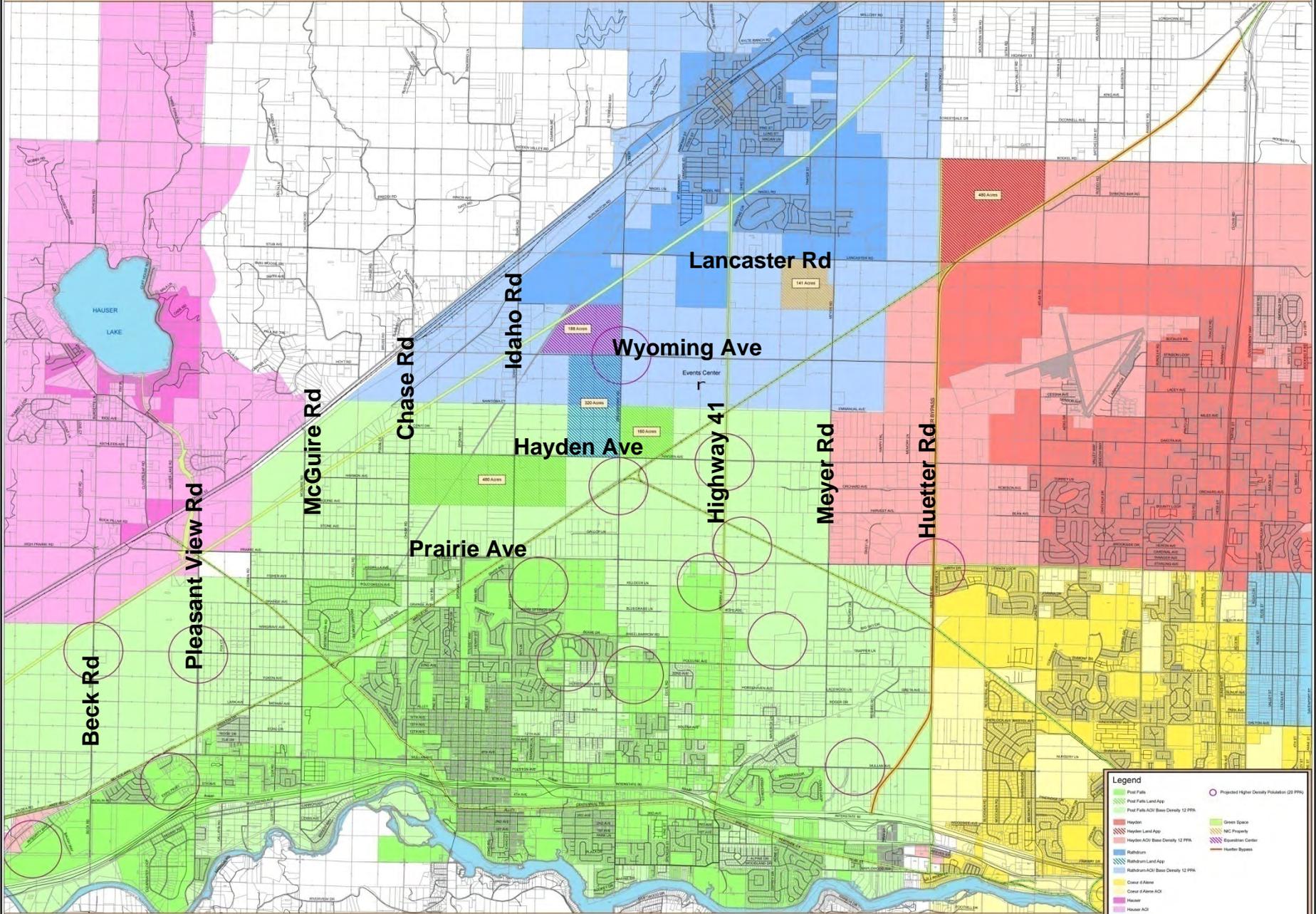


■ Post Falls  
■ Rathdrum  
■ Hauser Lake  
■ Hayden  
■ Coeur d'Alene  
■ Post Falls ACI  
■ Rathdrum ACI  
■ Hauser Lake ACI  
■ Hayden ACI  
■ Coeur d'Alene ACI  
■ Clifton Gardens  
■ Huetter  
■ State Line  
■ Shared Tier ACI  
— Major Roads  
— Road  
— Railroad  
— State Line  
— Shared Tier ACI

# WASTEWATER PLANNING GOALS

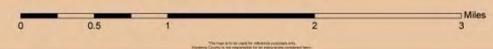
- Generate a consistent, flexible, and viable approach for:
  - Collection
  - Treatment
  - Discharge
  - Reuse
- Define logical future ACIs within Shared Tier
  - Approx. 18.6 square miles (11,900 acres)
  - 1,400 acres reuse and 1,600 acres mining exist
- April 2007 meeting set potential ACI & intensity
  - 12 equivalent people per acre (about 4 residences)
  - 20 equivalent people per acre (urban / commercial)

# Rathdrum Prairie



**Kootenai County GIS**

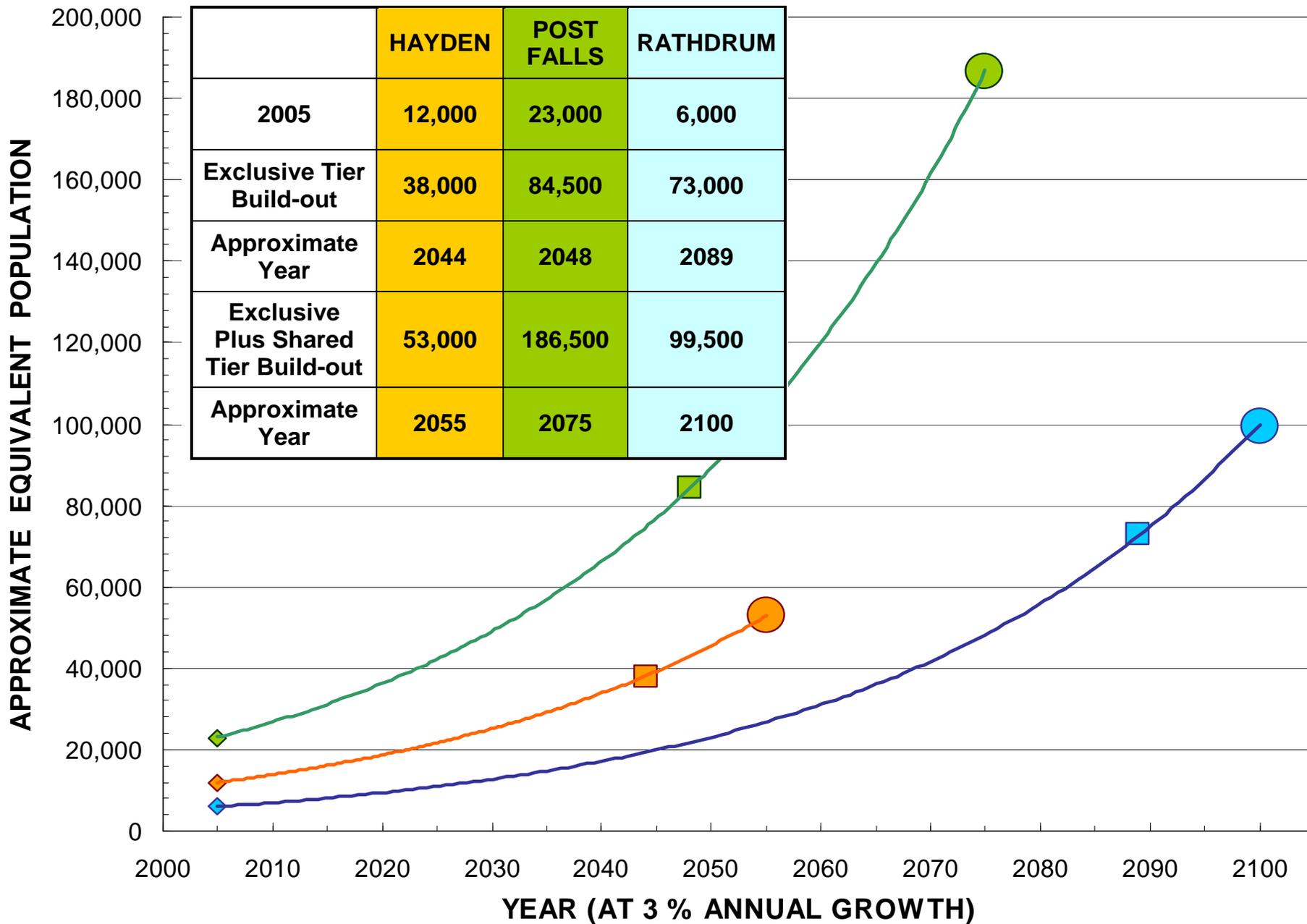
2010-2011  
 2012-2013  
 2014-2015  
 2016-2017  
 2018-2019  
 2020-2021



**Legend**

- Prud'Homme
- Prud'Homme Land App
- Prud'Homme ACI Base Density 12 PPA
- Hayden
- Hayden Land App
- Hayden ACI Base Density 12 PPA
- Rathdrum
- Rathdrum Land App
- Rathdrum ACI Base Density 12 PPA
- Center of Abene
- Center of Abene ACI
- Hauser
- Hauser ACI
- Hauser Lake
- Events Center
- Hauser
- State Line
- Green Space
- MC Property
- Equation Center
- Hauser Bypass
- Projected Higher Density Population (20 PPA)

# PROJECTED MAXIMUM BUILD-OUT



**RATHDRUM PRAIRIE  
WASTEWATER MASTER PLAN  
DRAFT**

February, 2008

GRAVITY SEWER 

FORCE MAIN 

MISCELLANEOUS

FLOW TO ENTITY 

WWTP LOCATION  
AND FLOW 

**JUB**

Engineers - Surveyors - Planners

**POTENTIAL SATELLITE WWTP**

**RATHDRUM  
RP-R-MAJOR OUTFALL  
HYDRA PEAK FLOW - 4.72 CFS  
OUTFALL TO POST FALLS GRAVITY**

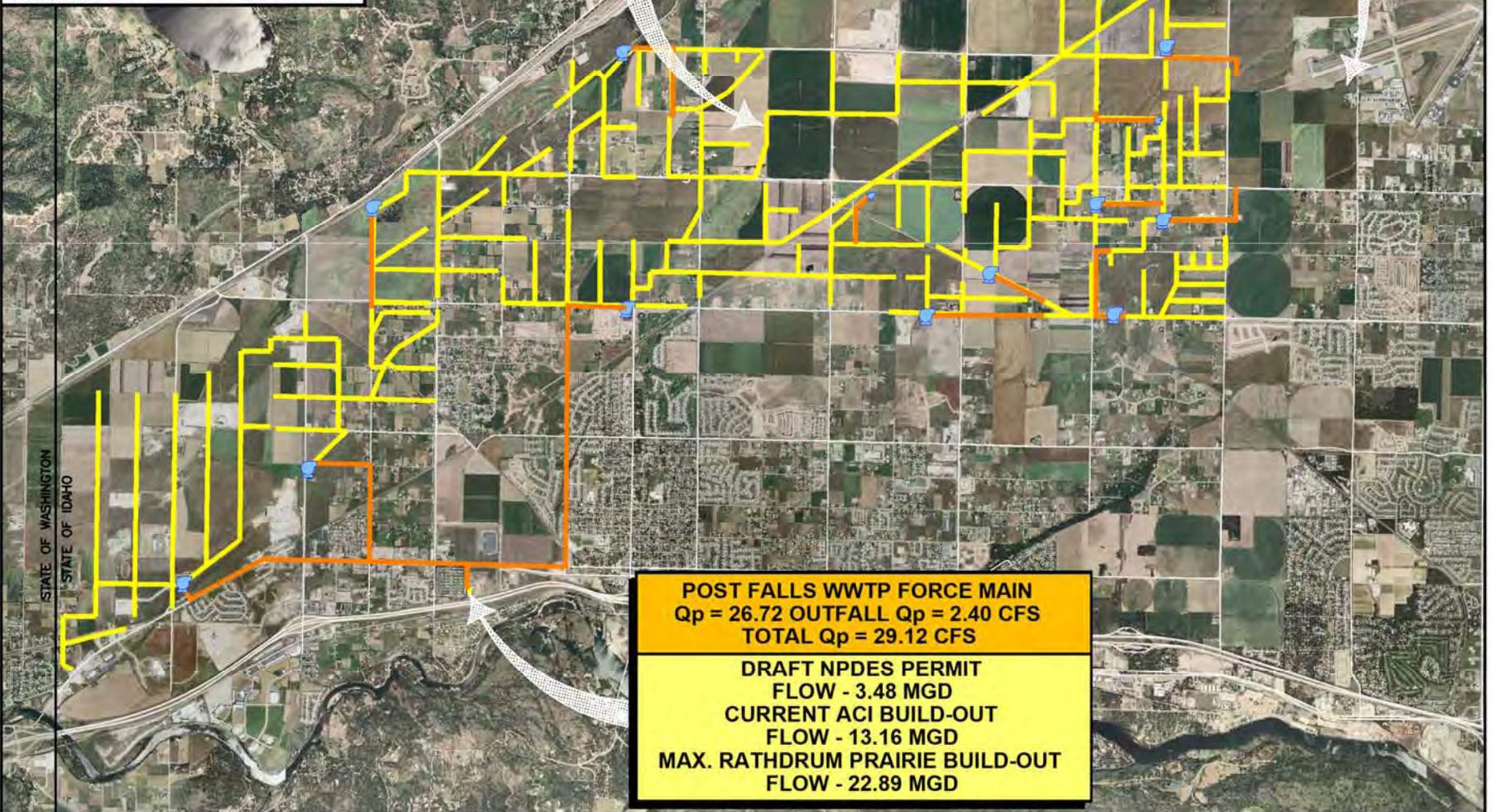
**EXISTING RATHDRUM ACI  
BUILD-OUT - 3.87 MGD  
MAX. RATHDRUM PRAIRIE FLOW  
FOR RATHDRUM - 1.95 MGD**

**HAYDEN SHARED TIER  
STUDY AREA  $Q_p = 4.12$  CFS**

**H.A.R.S.B. WWTP DRAFT NPDES PERMIT  
FLOW - 1.65 MGD  
CURRENT ACI BUILD-OUT FLOW - 3.48 MGD  
MAX. RATHDRUM PRAIRIE BUILD-OUT  
FLOW 4.61 MGD**

**POST FALLS WWTP FORCE MAIN  
 $Q_p = 26.72$  OUTFALL  $Q_p = 2.40$  CFS  
TOTAL  $Q_p = 29.12$  CFS**

**DRAFT NPDES PERMIT  
FLOW - 3.48 MGD  
CURRENT ACI BUILD-OUT  
FLOW - 13.16 MGD  
MAX. RATHDRUM PRAIRIE BUILD-OUT  
FLOW - 22.89 MGD**



# Rathdrum

(FLOWS TO POST FALLS)

EXISTING FLOW	0.4+ MGD
ACI FLOW	3.87 MGD
MAX BUILD-OUT FLOW	5.82 MGD

## Rathdrum Prairie Shared Tier Study Area



# HARSB / Hayden

CAPACITY	2.40 MGD
EXISTING FLOW	1.20 MGD
ACI FLOW	3.48 MGD
MAX BUILD-OUT FLOW	4.61 MGD

# Post Falls

CAPACITY	3.1 MGD
EXISTING FLOW	2.5 MGD
ACI FLOW	13.16 MGD
MAX BUILD-OUT FLOW	22.89 MGD

# Coeur d'Alene

CAPACITY	6.0 MGD
AVG. FLOW	3.5 MGD

# LAKE SPOKANE REGULATIONS DRIVE TREATMENT

- Washington State set dissolved oxygen standard
- Upstream state (Idaho) not allowed to cause violation of EPA-approved Washington water quality standard
- Lake Spokane oxygen sags below 8.0 ppm standard
- Caused by reservoir stratification & aquatic growth
- EPA model showed reducing phosphorus improves impoundment to near “natural” conditions
- Stratified reservoir oxygen will never meet standard so 0.2 ppm sag allowed below “natural” conditions

# 4 TREATMENT SCENARIOS: MAX BUILD-OUT TO <50% IN SHARED TIER

FLOW SCENARIOS	HARSB w/HAYDEN		POST FALLS w/RATHDRUM	
	WWTP Flow (mgd)	Additional Land Requirement (acres)	WWTP Flow (mgd)	Additional Land Requirement (acres)
Discharge Permit	1.65	NONE	3.5	NONE
Existing ACI Build-out	3.5	340 – 440	13.2	870 - 1,875
Complete Shared Tier Build-out	4.0 – 4.6	535 - 765	17.8 - 22.9	2,430 - 4,700

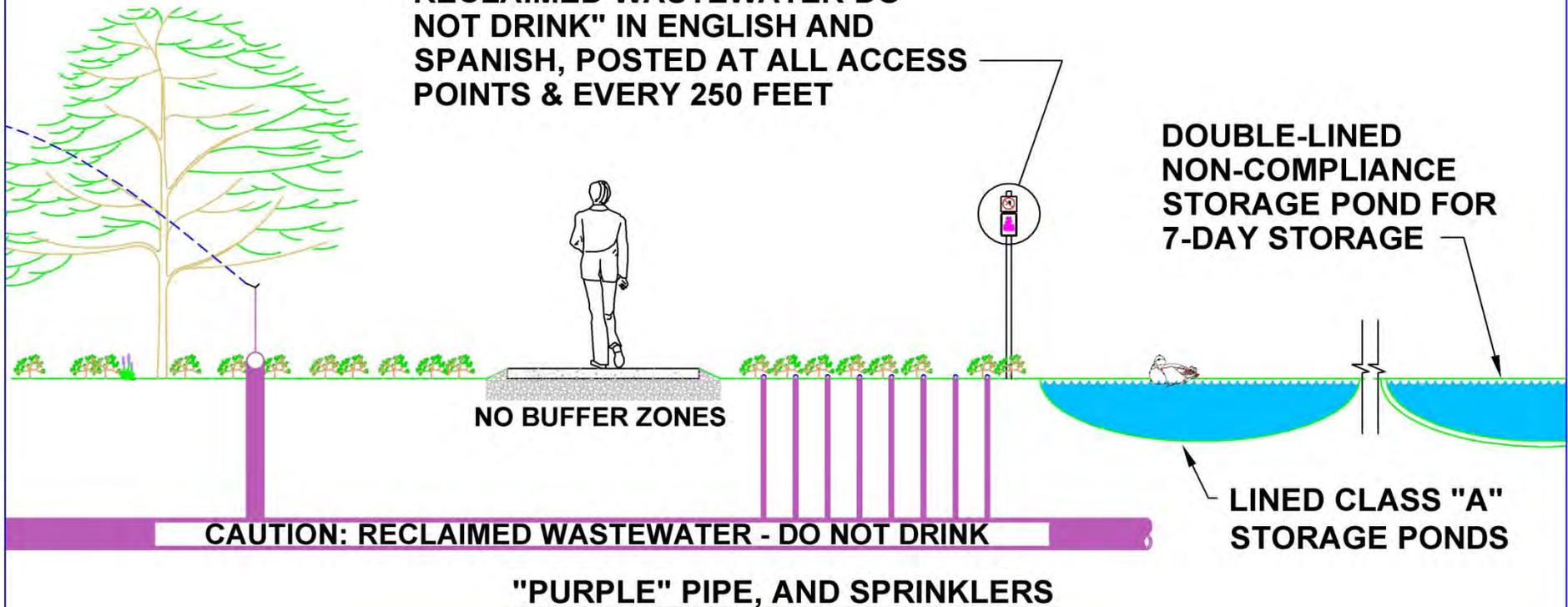
## RECOMMENDED – SCENARIO 3

- Never serve any reuse or mining land
- Scenarios 1 and 2 simply require too much additional land for reuse
- Scenario 4 is too optimistic – assumes permitted loading will remain fixed and technology will improve to capture the “delta”
  - No technology proven for 24/7/365 operation to achieve < 25 parts per billion total phosphorus
  - 2007 Draft Permits withdrawn and environmental groups pushing for lower TP limits
  - New permits and TMDL due in 2009

**CLASS A WASTEWATER RECLAMATION & REUSE REQUIREMENTS**  
**(IDAPA 58.01.17)**

- **STRINGENT TREATMENT REQUIREMENTS INCLUDING FILTRATION**
- **STRINGENT WATER QUALITY REQUIREMENTS APPROACHING DRINKING WATER STANDARDS**
- **STRINGENT DESIGN STANDARDS INCLUDING COMPLETE REDUNDANCY**
- **BROAD RANGE OF USES ALLOWED**
  - PARK, GOLF COURSE, SCHOOL YARD IRRIGATION
  - GRAZING AND FODDER CROPS
  - EDIBLE FOOD CROPS
  - FIRE SUPPRESSION STORAGE & INDUSTRIAL

**SIGNS READ "WARNING RECLAIMED WASTEWATER-DO NOT DRINK" IN ENGLISH AND SPANISH, POSTED AT ALL ACCESS POINTS & EVERY 250 FEET**



# UPDATE TO 1995 SUPPLEMENT

## Cascade Earth Science

- Soil analysis, cropping, irrigation, and nutrient management from the surface of the ground through the root zone

## Golder Associates Inc.

- Hydrogeology of the unsaturated zone below the root zone down into the upper levels of the Aquifer

## Goals of IDEQ supplemental study

- Study will refine the procedure for evaluating wastewater reuse and treatment levels over the Aquifer for non-degradation

## Impact of the study

- Will update the science and approach for evaluating reuse opportunities over sole source aquifers



# INTERIM DATA - CASCADE EARTH SCIENCE

- 1993 Pilot Study and 1995 Land Application Supplement excellent framework
- HARSB site operated successfully for 13+ years
- HARSB site carefully controlled and monitored compared to typical agricultural sites – tends to “starve” crops for nutrients
- Soil moisture monitoring for control is crucial
- Updated irrigation practices will assist in control
- Thinning surface soils toward state line increase the challenges but are still viable for reuse



HARSB: [www.usbr.gov/pn/agrimet/agrimetmap/rthida.html](http://www.usbr.gov/pn/agrimet/agrimetmap/rthida.html)





ENGINEERS • SURVEYORS • PLANNERS

# INTERIM DATA – GOLDER ASSOCIATES

HARSB well sampling–pump assembly versus thief bailer

- Seven days apart
- Nine “discrete” intervals from aquifer surface to 35 feet into Aquifer
- Pump more consistent sample results for alkalinity, TDS, Ca, Cl, K, MG, Na, TP, SO<sub>4</sub>
- Bailer showed lower alkalinity, TDS, MG, SO<sub>4</sub> in uppermost 9 feet compared to pump
- Bailer showed higher Cl, Na, TKN and Mn in uppermost 9 feet compared to pump
- Both sampling methods showed a nitrate “bulge”



Down Gradient  
Property Boundary

Up Gradient  
Property Boundary

Down Gradient  
Monitoring Well

Up Gradient  
Monitoring Well

Land Surface

Land Activity

Potential  
Leachate/Discharge

Unsaturated Soil

Point of  
Compliance

Rathdrum Prairie  
Sensitive Resource Aquifer

Ground Water Flow Direction

Not to Scale

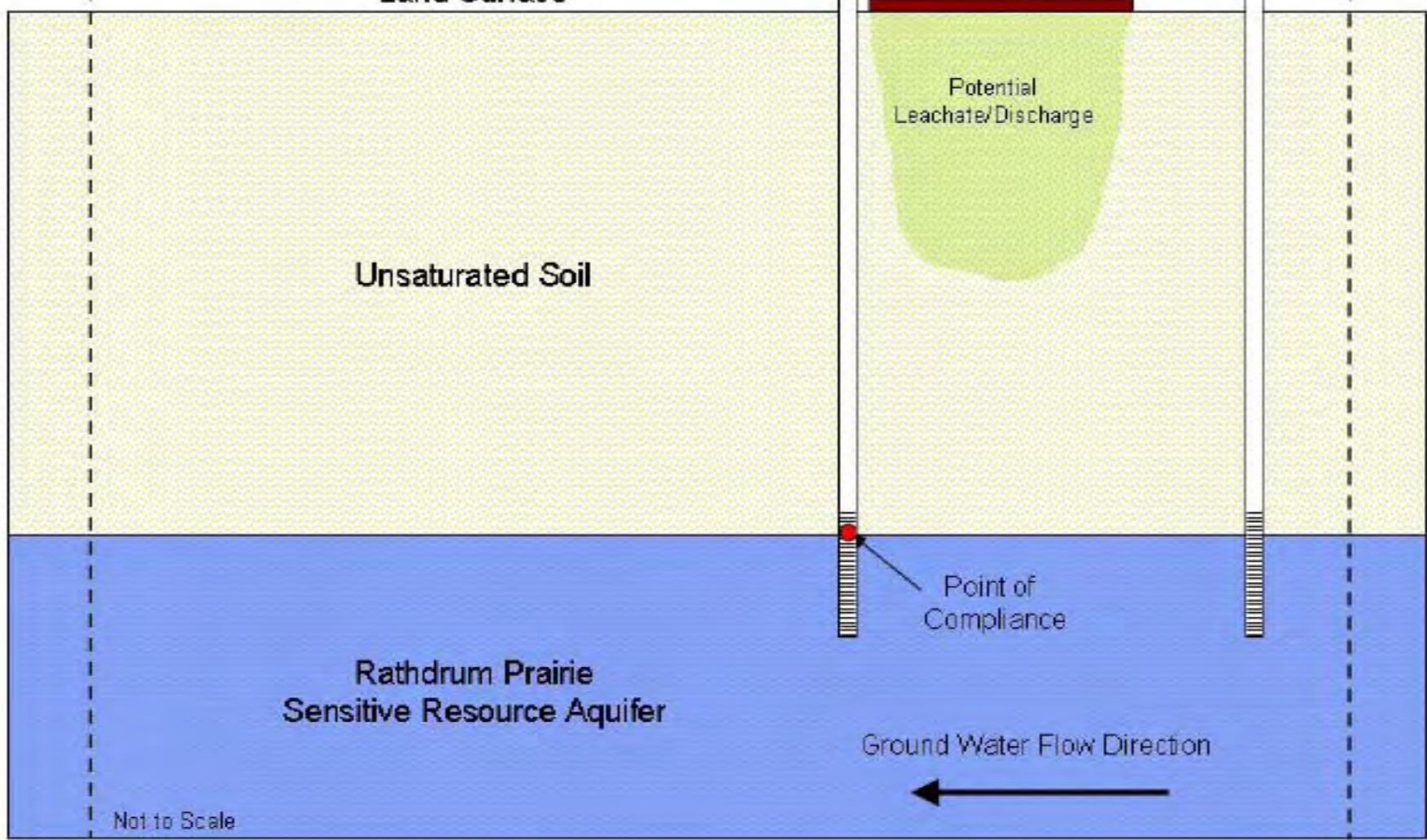
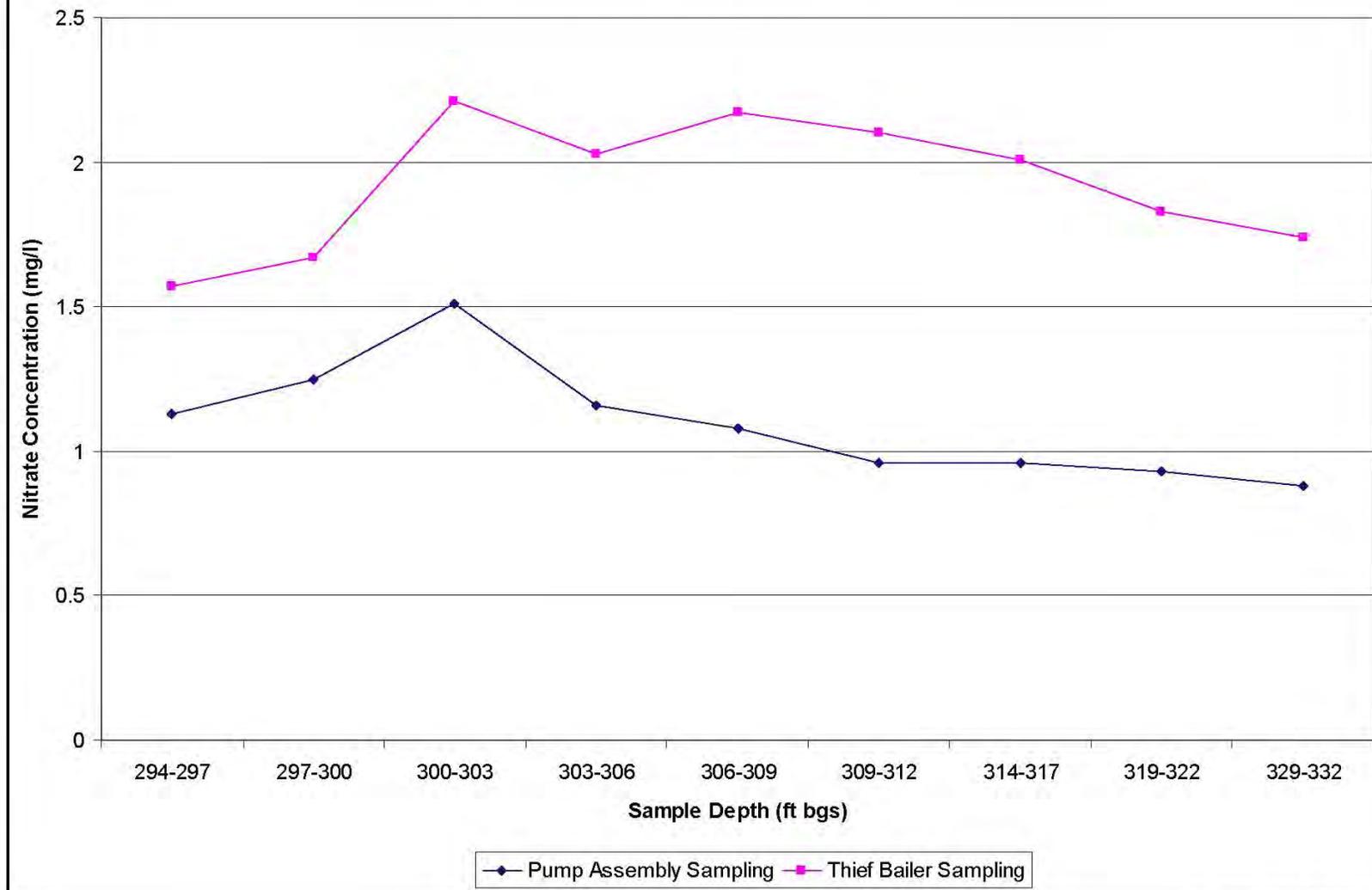


Figure 3. HARSB Nitrate Concentrations

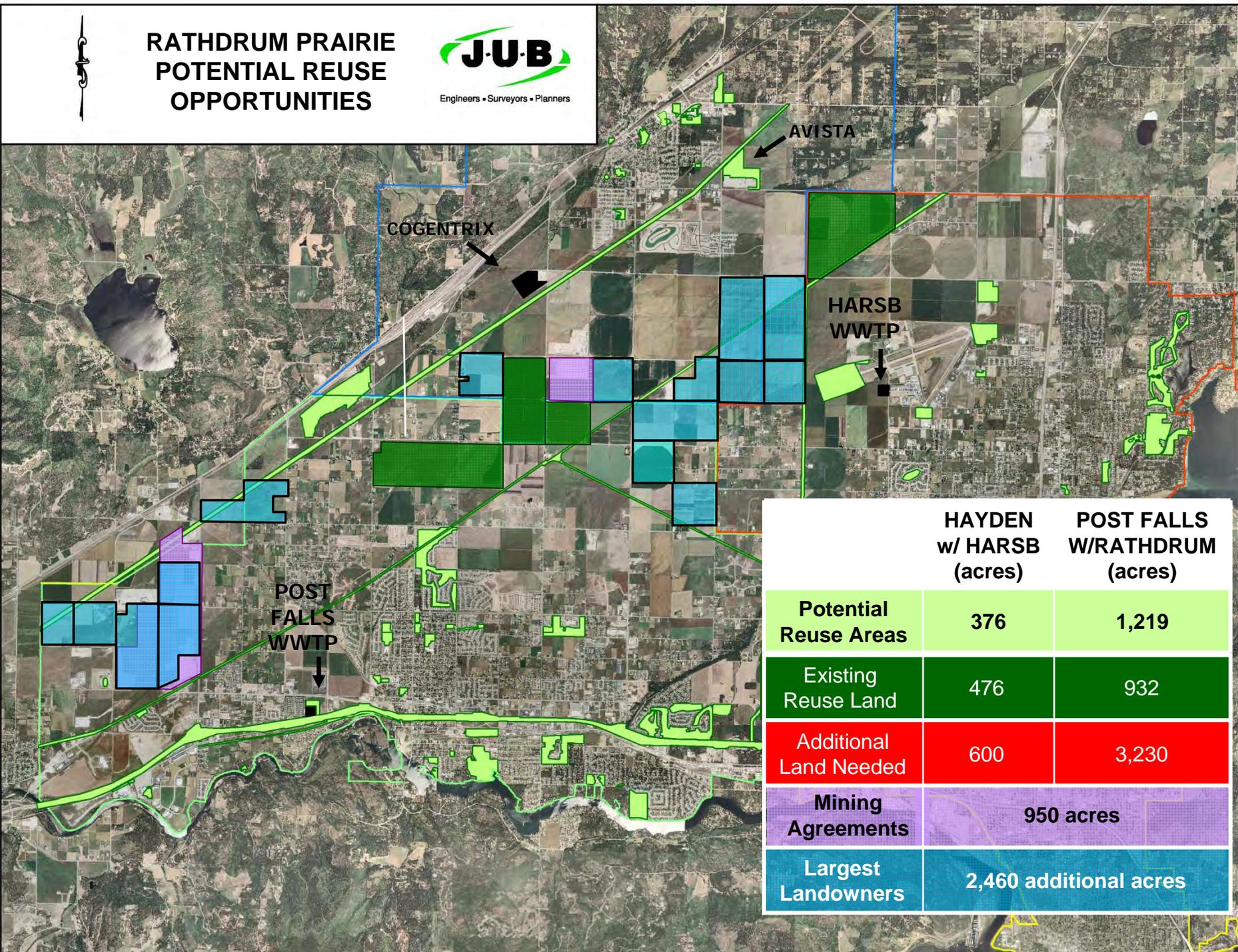


Golder Associates

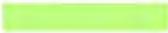


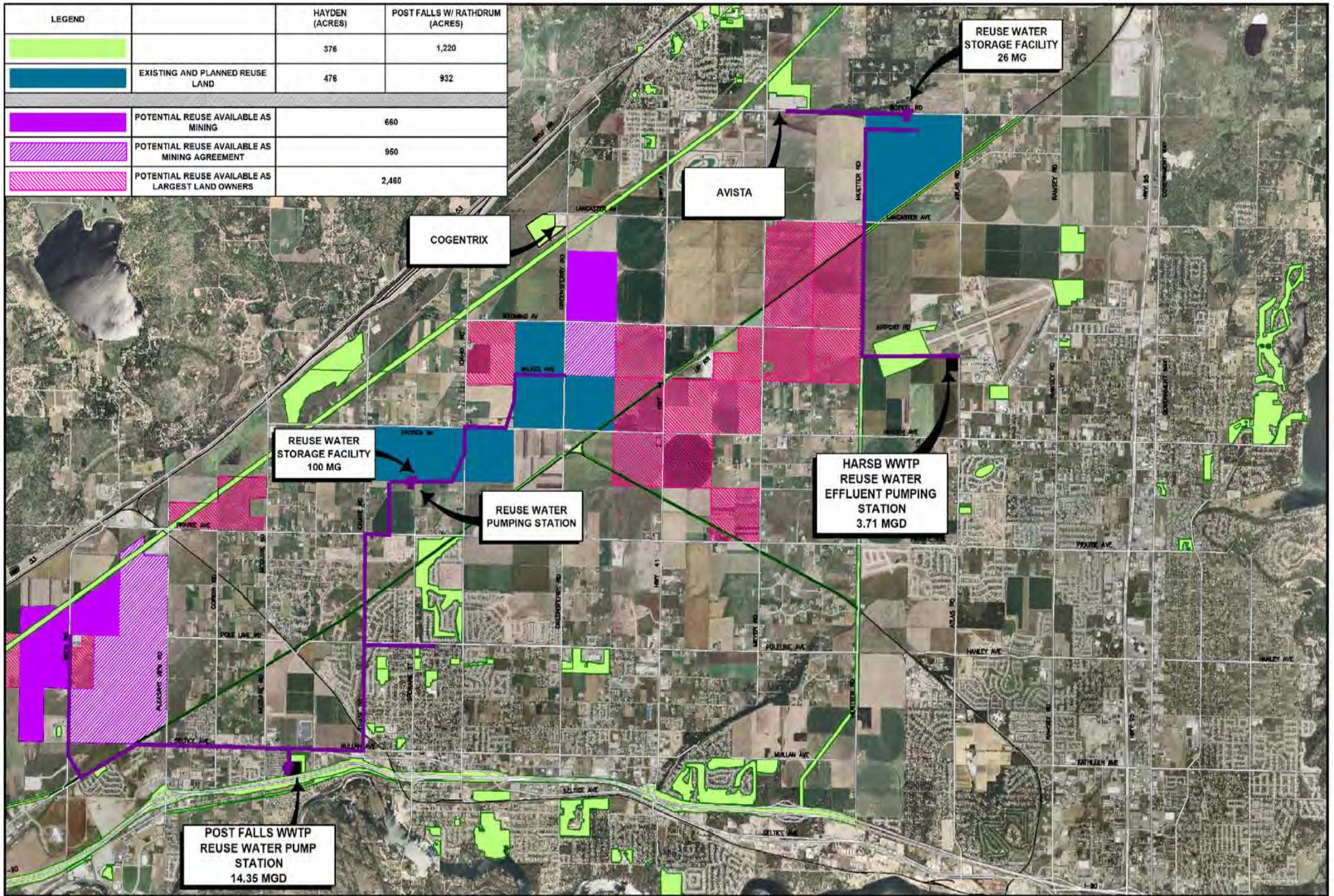
ENGINEERS • SURVEYORS • PLANNERS

# RATHDRUM PRAIRIE POTENTIAL REUSE OPPORTUNITIES



	HAYDEN w/ HARSB (acres)	POST FALLS W/RATHDRUM (acres)
Potential Reuse Areas	376	1,219
Existing Reuse Land	476	932
Additional Land Needed	600	3,230
Mining Agreements	950 acres	
Largest Landowners	2,460 additional acres	

LEGEND		HAYDEN (ACRES)	POST FALLS W/ RATHDRUM (ACRES)
		376	1,220
	EXISTING AND PLANNED REUSE LAND	478	932
	POTENTIAL REUSE AVAILABLE AS MINING		660
	POTENTIAL REUSE AVAILABLE AS MINING AGREEMENT		950
	POTENTIAL REUSE AVAILABLE AS LARGEST LAND OWNERS		2,480



Engineering • Construction • Programs

# TOTAL CIP COST SUMMARY

	HARSB w/HAYDEN	POST FALLS w/RATHDRUM
Collection *	\$ 6.5 million	\$ 43.6 million
Treatment *	\$ 41.9 million	\$ 152.5 million
Reuse, Transmission, & Irrigation *	\$ 11.1 million	\$ 44.6 million
Land Acquisition for Land Application *	\$ 18 million	\$ 96.9 million
<b>TOTAL *</b>	<b>\$ 77.5 million</b>	<b>\$ 337.6 million</b>

\* ALL IN 2008 COSTS. NO FINANCING COSTS INCLUDED (SAME AS EXISTING). EXCLUSIVE TIER COLLECTION SYSTEM PREVIOUSLY PLANNED IMPROVEMENTS NOT INCLUDED.

# INCREMENTAL CIP COST SUMMARY

	Hayden (\$/gpd)	Post Falls (\$/gpd)	Rathdrum (\$/gpd)
Collection System <sup>1</sup>	\$ 11.54	\$ 8.78 <sup>2</sup>	\$ 14.31 <sup>3</sup>
Treatment	\$ 14.52	\$ 10.37	\$ 10.37
Reuse: Transmission, Storage, & Irrigation	\$ 5.46	\$ 3.11	\$ 3.11
Reuse: Land Acquisition	\$ 8.70	\$ 8.70	\$ 8.70
<b>TOTAL</b>	<b>\$ 40.22</b>	<b>\$ 30.96</b>	<b>\$ 36.49</b>
EXISTING (OCTOBER) FEE	\$ 37.19	\$ 25.65	\$ 33.61

1. COMMON COLLECTORS ≥ 12-INCH, LIFT STATIONS, & FORCE MAINS. INCLUDES REQUIRED UPSIZING WITHIN EXISTING OR PLANNED COLLECTION SYSTEMS REQUIRED TO SERVE SHARED TIER.
2. UTILIZE HIGHER OF TWO COSTS DERIVED FROM MEYER/HWY 41 UPSIZING (AND COMMON IMPROVEMENTS).
3. COMMON BASIN IMPROVEMENTS PLUS RATHDRUM-SPECIFIC IMPROVEMENTS

# KEY IMPLEMENTATION TOPICS

- Land Use and Annexation Topics
  - Priority outward from existing limits to shared tier
  - Fully develop 60% of current non-reuse/non-mining land (5,550 acres developed vs 3,830 acres additional reuse)
  - Aggregate & connect reuse property wherever possible
  - Encourage continued agriculture and silviculture
  - Strategic fiscal management and planning

# KEY IMPLEMENTATION TOPICS

- River Discharge Regulations
  - Plan anticipates “all known \$ reasonable technology” AKART
  - Catalogue potential phosphorus offsets (septics, storm, etc.)
  - Continue work with EPA & WDOE toward attainable and meaningful water quality standards (UAA? or SSC?)
  - Continue work with regulators and stakeholders to define Avista Utility’s role in achieving appropriate standards
  - Continue work with Legislators for appropriate rules

# KEY IMPLEMENTATION TOPICS

- Reuse Regulations
  - Stay engaged with IDEQ to further define appropriate reuse practices over the RPA. Are state-wide rules protective?
  - Improve groundwater monitoring with added wells at HARSB and pre-reuse monitoring at Post Falls
  - Establish Reuse Permits for Post Falls/Rathdrum
  - Work with mining owners to establish future reclamation
  - Work with IDWR to solidify reuse water rights
  - Work with existing water purveyors for service area agmts.
  - Stay engaged with generation facility owners
  - Assist in public awareness of reuse and protections

# HARSB Reuse Success since 1995



# Post Falls' & Other Future Reuse Sites



# CHALLENGES AND OPPORTUNITIES

- Sewer rates are going up from 1990's level of <\$20/month to >\$30/month and heading upward
- Capacity fees are going up from <\$2,000/ER in 1990's to >\$4,000/ER and heading upward
- Development pressure & cost escalation are combining with regulations to "Close the Loop"
- We need to maintain a balance
- What are the opportunities?

# Discussion

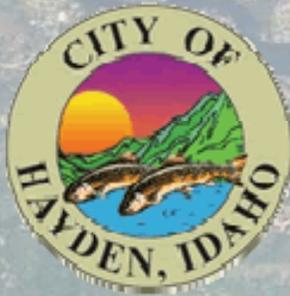
Wastewater  
Treatment  
and  
Reuse

IDEQ

Water Supply  
and  
Quality



WDOE



# HARSB Reuse Success since 1995

