210-6043

Received By OWEB
OCT 19 2009

A] 'N

Type in the information for Sections I and II.

Name of project: Walla Walla Basin Aquifer Replenishment and Stream Restoration Program (ARSRP)

OWEB funds requested: 479,755 **Total cost of project**: 841,115

Project location: Walla Walla Watershed

This project occurs at (check one): ☐ **A single site** ☒ **Multiple sites**

Walla Walla River **Watershed(s)**	Umatilla/Walla Walla **County or counties**	6N35E, 34E (Oregon Sites) **Township, Range, Section(s) (e.g., T1N, R5E, S12)**
Longitude, Latitude (e.g., -123.789, 45.613)		N/A **Subbasin(s) – Please note the 10-digit hydrological unit code, previously 5th Field HUC**

Applicant	**Project Manager**
Name: Brian Wolcott	**Name:**Wendy Harris
Organization:WWBWC	**Organization:**WWBWC
Address:810 South Main Str	**Address:**810 South Main Stree
Milton-Freewater, Oregon 97862	Milton-Freewater, Oregon 97862
Phone:541-938-2170	**Phone:**541-938-2170
Fax:same	**Fax:**same
Email: Brian.Wolcott@wwbwc.org	**Email:** Wendy.Harris@wwbwc.org

Fiscal Agent	**Landowner(s)**
Name: Wendy Harris	☒ **Public: Agency:**ODOT-WWBWC and HBDIC
Organization:WWBWC	☐ **Private: Name(s):**
Address:810 South Main Str	
Milton-Freewater, Oregon 97862	
Phone:541-938-2170	
Fax:same	
Email: same	

CERTIFICATION:

I certify that this application is a true and accurate representation of the proposed work for watershed restoration and that I am authorized to sign as the Applicant or Co-Applicant. By the following signature, the Applicant certifies that they are aware of the requirements (*see **Application Instructions***) of an OWEB grant and are prepared to implement the project if awarded.

Applicant Signature: [signature] Date: 10/19/09

Print Name: Brian Wolcott Title: Executive Director

Co-Applicant Signature: [signature] Date: 10/19/09

Print Name: John Zerba, WWBWC (HBDIC) Agency: WWBWC/HBDIC

Section II
PROJECT INFORMATION

1. **Abstract.** In approximately 200 words, 1) identify the project location, 2) state the watershed issue or problem to be addressed, 3) the proposed solution including the area or other measurable units to be treated, 4) any proposed effectiveness monitoring, and 5) how OWEB funds will be used.
The bistate Walla Walla River basin hosts more than 50 spring-creeks that historically provided year-round cool baseflow and habitat for salmonids. Through various human-induced changes the underlying shallow aquifer is in decline. This decline directly jeopardizes both the spring contributions as well as the in-channel groundwater returns that maintain river baseflows. Further complicating this situation are recent efforts to 'save' water through piping-only projects that have the unintended effect of further skewing the aquifer's recharge-discharge balance. Starting in 2003 the WWBWC and its partners began testing aquifer recharge as a water management tool in the basin. OWEB, BPA and WDOE have committed funding to these efforts that have proven effective at recharging the aquifer and restoring flows to springs. Starting in 2007 the Watershed Management Initiative (WMI) Program funded a wide range of preliminary applied research intended to lay the ground work for a programmatic solution to this dire situation. Work included establishing a surface-groundwater effectiveness monitoring network, a surface-groundwater management model (OSU) and complete stratigraphy maps of the shallow aquifer. This application requests OWEB funding to match already committed BPA and WDOE funding to build a program that will effectively address this dire situation. OWEB funds will be primarily focused on recharge site construction, effectiveness monitoring , and Bistate programmatic development. The urgency of this situation demands a bistate programmatic response that the WWBWC and is partners are best situated to develop and implement.

2. **Has this project, or any element of this project, ever been submitted in a previous application(s) to OWEB?** ☒ Yes ☐ No
If yes, what was the application number(s)? **203-259, 204-244, 206-934**

3. **Is this project, or any element of this project, a continuation of a previously funded OWEB restoration project(s)?** ☒ Yes ☐ No
If yes, what was the grant number(s)? **203-259, 204-244, 206-934**

4. **Is this project a result of a previously funded OWEB Technical Assistance project(s)?** ☒ Yes ☐ No
If yes, what was the grant number(s)? **203-259**

5. **Project Partners.** Show all anticipated funding sources, and indicate the dollar value for cash or in-kind contributions. Be sure to provide a dollar value for each funding source. If the funding source is providing in-kind contributions, briefly describe the nature of the contribution in the Funding Source Column. Check the appropriate box to denote if the funding status is secured or pending. In the Amount/Value Column, provide a total dollar amount or value for each funding source.

Funding Source **Name the Partner and what their contribution is.**	**Cash**	**In-Kind**	**Secured (x)**	**Pending (x)**	**Amount/Value**
OWEB	$479,756	$0	☐	☐	$479,756
WDOE - (Capital for WA Recharge Sites/Some Cost share for Bistate ARSR Program Costs (2009-2011)	$807,000	$0	X	☐	$807,000
BPA – Capital for OR OWEB Match + Other sites) (2009-2010)	$122,514	$0	X	☐	$122,514
BPA – Capital for OR OWEB Match + New Sites) (2010-2012)	$500,000	0	☐	X	$500,000
ODOT Recharge Sites (Lease/Mitigation Land Exchange)	$0	$ 52,000	☐	X	$52,000
	$	$	☐	☐	$
Total Estimated Funds (add all amounts in the far-right Column):					*$1,909,270

*The total should equal the total cost of the project on page 1 of the application.

6. **Have any conditions been placed on other funds that may affect project completion?**
☐ Yes ☒ No

If yes, explain:

7. **Are you requesting OWEB funds for Effectiveness Monitoring?**

☒ **Yes** ☐ **No** **If you check "Yes", follow the Instructions in Question R16**

8. **Attachments — Complete and attach to the back of your application.**

► **See Application Instructions for assembling multiple maps/designs/photos.**

☒ *Project Maps: On a topographic or aerial backdrop, draw the extent of your project area(s) and note the center of the project area with the latitude, longitude coordinate (e.g., -123.789, 45.613). If the project has multiple sites, provide an additional map for each project area. Go to http://www.oregon.gov/OWEB/GRANTS/projectlocationguidance.shtml for a suggested online tool for creating your map and coordinate information. **Provide maps on 8½" x 11" pages** and include a legend.

☒ *Preliminary Project Designs: Provide sufficient detail to allow a reasonable evaluation of the proposal and of the effect of the project on the site. The preliminary design should include reference to appropriate standards and guidelines.

8. **Attachments – continued from page 2**

☒ *Photographs: Provide photographs to aid in understanding the situation. If color photos are necessary to convey information important for application review, supply 20 copies of each photo. Note: **If your project is funded, pre-project photos will be required in the final project completion report.**

☒ Letters of Support from key partners or others, as appropriate.

Section III
SPECIFIC RESTORATION PROJECT ACTIVITY

These essay questions and their answers are designed to step you and reviewers through a logical process of understanding and identifying the problem to "fixing" the problem and measuring for success. **Refer to the Application Instructions for clarification and helpful examples.**

You may use the application form to respond to the questions, using additional sheets of paper as necessary **OR** answer the questions on separate pages. Be sure to include the question numbers and text of the questions before you begin typing your answers to assist the reviewers in evaluating your application. Please use 8½" x 11" paper. All pages must be single spaced, single-sided, numbered and unbound except for sets of maps/photos/designs (see Page 2 of the application instructions). Use a 12 pt type size to answer the questions and a 10-pt type size for the tables. Use bullets where appropriate. Use **bold face** and *italics* for emphasis only. If the project involves multiple sites, be specific for each.

R1. Contextual Overview

Provide the location and significance of the project including why that location was chosen, what watershed functions are to be addressed in the project and a brief explanation of the history of the issues leading to the project. Describe the project in the context of the landscape including the key water quality, water quantity, species, habitat, land use and resource management issues (physical or social) that are proposed to be addressed in that watershed. **See the Application Instructions for clarification.**

See attached.

R2. Problems to be Addressed

Provide information specific to the project: a) The specific problem(s) you are addressing; and b) the *root* cause(s) of the problem(s). This description should explain the watershed process or ecosystem function your project proposes to address. **DO NOT describe the project here; you will do so in question #R3.** You may add narrative in addition to the table.

See attached.

R3. Project Description

Using the table below, provide a description of the project that describes the restoration activities to occur (e.g., direct flow, remove 36" culvert, construct free spanning bridge, place 12 three log clusters between RM 44 and 52, etc.), including a description of the methodologies (e.g., juniper – burning or cutting; tree release – manual or herbicide; etc.) and the equipment planned for use. In addition, describe any Project Management functions/ activities necessary to implement the project (e.g., acquire permits or landowner approval; solicit bids, award contracts, etc.). The degree of detail should match the project complexity and technical difficulty to allow for full evaluation of technical viability. For projects involving multiple sites, be sure to identify and describe them separately, as appropriate. **<u>This is not the place to describe the benefits of the project</u>, but rather the specific elements of the proposed project.** You may add narrative in addition to the table.

See attached.

R4. Watershed Benefits

What are the proposed project watershed benefits? While many projects benefit forest or agricultural production, OWEB funding is for fish and wildlife habitat protection and enhancement. Briefly describe how the project will affect watershed functions or ecosystem processes.

See attached.

R5. Project Objectives

What are the proposed project objectives? Provide specific objectives based on the location, size and significance of the project and provide information on how the objectives could be evaluated. The measurements should be able to be reported to document successful implementation. **See the Application Instructions for the distinction between project objectives and achievement of goals.**

See attached.

R6. Project Design

a) Provide a list of qualifications and experience you will require for the project designer. If a project design has been completed, identify the designer and what qualifications and experience they have.

b) Describe the design criteria used or proposed and how those criteria take into consideration natural events and conditions (e.g., culvert design to 100-year flood event, wood placement to readjust with higher than bankfull flows, cultivation to retain at least 75% stubble, 4-strand fence to allow for wildlife passage, etc.).

See attached.

R7. Design Alternatives

Were alternative designs or solutions considered? ☒ **Yes** ☒ **No**

If yes, explain why the design or approach proposed was chosen. If no, explain why alternative approaches were not explored.

See attached.

R8. Project Schedule

Use the table below to show the anticipated schedule for the project. Add or change the list of project elements to fit your project. **See the Application Instructions for clarification and an example.**

See attached.

R9. Salmon/Steelhead Populations Targeted and Expected Benefits to Salmon/Steelhead

The information provided will be used to by OWEB to better meet federal and state reporting requirements. Completion of this section is required but will not be used to evaluate this application for funding.

See attached.

☐ This project is **NOT** specifically designed to benefit salmon or steelhead.

► **If you check this box, STOP here and GO TO Question R10.**

Targeted Salmon/Steelhead Populations: Select one or more of the salmon ESUs (Evolutionary Significant Unit) or steelhead DPSs (Distinct Population Segment) that the project will address/benefit For species where the ESU/DPS name is not known or determined, use the species name with unidentified ESU (e.g., Chinook salmon – unidentified ESU). Additional information on the designation and location of the salmon/steelhead populations can be found at http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Maps/Index.cfm.

Chinook Salmon (*Oncorhynchus tshawytscha*)		**Coho Salmon** (*O. kisutch*)	
☐	Deschutes River summer/fall-run ESU	☐	Lower Columbia River ESU
☐	Lower Columbia River ESU	☐	Oregon Coast ESU
☐	Mid-Columbia River spring-run ESU	☐	Southern Oregon/Northern California ESU
☐	Oregon Coast ESU	☐	unidentified ESU
☐	Snake River Fall-run ESU	**Steelhead** (*O. mykiss*)	
☐	Snake River Spring/Summer-run ESU	☐	Klamath Mountains Province DPS
☐	Southern Oregon and Northern California Coastal ESU	☐	Lower Columbia River DPS
☐	Upper Klamath-Trinity Rivers ESU	☒	Middle Columbia River DPS
☐	Upper Willamette River ESU	☐	Oregon Coast DPS
☒	unidentified ESU	☐	Snake River Basin DPS
Chum Salmon (*O. keta*)		☐	Washington Coast DPS (SW Washington)
☐	Columbia River ESU	☐	Upper Willamette River DPS
☐	Pacific Coast ESU	☐	Steelhead/Trout unidentified DPS
☐	unidentified ESU		

Expected Benefits: Write a brief description of the goals and purpose of the project and how it is expected to benefit salmon/steelhead or salmon/steelhead habitat. **See Application Instructions for helpful examples.**
The development of the Watershed Management Iniative to generated innovative solutions to solve water availability for salmon and farms is this regions current focal priority. The ESA listing of Bull Trout, Steelhead and the CTUIR interest in a return-from-extinction of Chinook salmon have all acknowledged the need for additional instream flows. As the both groundwater and surface waters have been over allocated, the only option left for 'new water' is through storing water when it is available to replenish baseflows during the times of scarcity.

R10. Project Relationship to Regional Priorities

If the project specifically implements a plan or larger conservation effort, identify the effort and the specific role of this project. Explain whether the project implements a regional plan (e.g., ESA Recovery Plan, Coastal Coho Assessment, NWPCC Subbasin Plan, Groundwater Management Area). Specifically identify the relationship between the proposed project and the OWEB Basin Priorities. Priorities can be found on the OWEB website at: www.oregon.gov/OWEB/restoration_priorities.shtml. **(See the Application Instructions for helpful links to various regional plans.)**

See attached.

R11. Other Related Conservation Actions

a) Explain how the project complements other efforts under way or completed in the watershed. Identify other restoration, technical assistance, monitoring, assessment or education projects, conservation actions and ecological protection efforts in the watershed and explain how this project relates to those actions.

b) If the project is a continuation of previously completed activities, describe the results of the previous project(s) and identify what you have learned from the implementation of similar project(s).

See attached.

R12. Project Inspection

Identify who will inspect and sign off on the completed project.

See attached.

R13. Educational/Public Awareness Opportunities

Explain whether and how you will raise public awareness about the project (e.g., install a project partner or interpretive sign, write an article for the local paper, lead a site tour for local citizens). **See the Application Instructions for clarification of eligible education and outreach costs.**

See attached.

R14. Project Maintenance and Reporting

Use the table below to document how the project will be maintained over time. State who will maintain the project. Identify their affiliation and provide contact information. In addition, please indicate who will conduct Post-Implementation. Status Reporting following project completion.

See attached.

R15. Budget Development

There are a number of assumptions used to develop any budget. This does not mean you must provide a line by line description of costs. Use this response to provide a clear understanding of what the budget estimate was based on.

a) Explain how costs were determined for the budget elements. Describe if contractor conversations, past projects or other cost figures were used for each major element of the budget. This is particularly important for lump sum elements in the budget. For project management costs describe the time and activities that would be involved.

b) If there are any unusual cost factors, explain them. For example, if the fencing costs are unusually high because of steep, rocky terrain and unroaded access, this is the place to explain the cost elements on the budget page.

See attached.

Section III

SPECIFIC RESTORATION PROJECT ACTIVITY

R1. Contextual Overview

Provide the location and significance of the project including why that location was chosen, what watershed functions are to be addressed in the project and a brief explanation of the history of the issues leading to the project. Describe the project in the context of the landscape including the key water quality, water quantity, species, habitat, land use and resource management issues (physical or social) that are proposed to be addressed in that watershed. ***See the Application Instructions for clarification.***

The Walla Walla basin is located in Northeastern Oregon and Southeastern Washington (**Figure 1.** Map of Walla Walla basin) This bistate system's primary water supply comes from the Walla Walla River which originates in the Blue Mountains of Oregon and flows down through Washington to the Columbia River at Wallula Gap. This river is the Walla Walla watershed's primary passage and rearing corridor for ESA-listed steelhead and bull trout, and species of tribal restoration efforts such as chinook salmon and lamprey but also the main recharge mechanism for the underlying shallow aquifer system. The River also has had two completed which in Oregon (ODEQ-WWBWC) was for temperature and in Washington (WDOE) for soluble organic compounds, temperature and sediment.

The area of focus for this Aquifer Replenishment and Spring Restoration (ARSR) Program is the Walla Walla River Valley subbasin[1] where the mainstem flows out into this bi-state valley and historically became a distributary river system of mainstem branches; groundwater fed spring-creeks and, in the last century, further distributed out through an extensive system of lateral ditches (**Figure 2**). Early maps of the valley showed that this distributary and spring system was created and maintained over the top of a shallow and highly interconnected alluvial aquifer system. **(Figure 3A and 3B)**. With historically braided and meandering channels and native beaver populations helping to pond and slow water down, the *Walla Walla* or as the Cayuse Tribe defined it "*land of many small waters*" supported thriving salmon fisheries and miles of distributary habitat.

With the arrival of settlers the way in which water was redistributed and used began to change the hydrologic balance of the system. Naturally meandering rivers and creeks were straightened for flood control and agriculture, acting indirectly to speed up the flow of water through the system. This was offset to a degree by the valley's early flood and rill irrigation practices and the development of the lateral ditch system that acted to effectively 'slow' water down. While these changes to the aquifer's ability to be replenished (recharge) there were subsequent dramatic increases in groundwater use. **(Figure 4 A-D).** The dramatic increase in the number of wells for primary and supplemental irrigation rights acts to increase the amount of water coming out of groundwater storage. The net hydrologic impact of these changes was an aquifer-spring

[1] 2006-2010 Development of a Surface-groundwater model to use as a flow restoration and aquifer replenishment planning and management tool.

system was not storing as much water (recharge) as was leaving it (discharge) creating an overall decline in storage that manifests itself in a declining water table and spring flows. This aquifer provides the water that more than 50 valley springs in Oregon and Washington require to provide year round baseflow in the form of cool groundwater and off-channel habitat in these small order spring-creeks **(Figure 4E)**. The 240 square-mile aquifer also provides the direct in channel baseflow contributions that allow the Walla Walla River to flow during the summer rearing and passage season.

A series of events in the last 10 years have brought what was a fairly consistent historical downward trend in fish numbers to the forefront of salmon restoration efforts today. Starting with the ESA listing in 1998 and the 2000 Walla Walla River *American Rivers* listing as top-10 most endangered rivers list in 2000, federal fish agencies worked out an agreement with the three larger irrigation districts to divert less water to these distributary branches and ditches and leave more in the 'mainstem' Walla Walla River. This agreement re-watered this Oregon section of the river with 1/3 of summer-time baseflows for the first time in 100 years and was heralded nationally as a model of cooperation. Dramatic changes in water management in this Little Walla Walla river system along with the piping of leaky ditches to stretch less water further had both immediate and longer term consequences. The springs that had been providing some baseflow (although not at historical potential) back to the Walla Walla River dramatically declined to the point that by 2009 many are nearly dry year round **(Figure 5)**.

Through a series of public and WWBWC meetings, the WWBWC and its partners began to examine both the historic conditions of these streams as well as the connected alluvial aquifer from which they depend on for their flow. Starting in 2001, the WWBWC and partners started developing a monitoring network and series of on-the-ground aquifer recharge projects designed at directly affecting these compounding water management challenges. With the development of the Bi-state Watershed Management Initiative (WMI) Monitoring Program (2005 – present) an effectiveness monitoring network comprises of over 150 monitoring wells and 55 stream flow gauges that continuously monitors pre and post flow restoration conditions and provides the basis on which to build a programmatic solution **(Figure 6).** This program also funded a number of other technical activities from which to base the development of this program including; stratigraphy maps of the alluvial aquifer **(Figure 7),** a finite-element surface-groundwater numerical model (OSU) and various other field projects that help characterize the extend and properties of the shallow aquifer system.

Three main recharge projects have provided the basis upon which the WWBWC and its partners are now developing the Aquifer Replenishment and Spring Restoration (ARSR) Program **(Figure 2).** The Hudson Bay District Improvement Company's (HBDIC) aquifer recharge project was the first of its kind in Oregon and Washington in both its physical design and its water quality monitoring plan (co-developed with ODEQ and OWRD staff). Starting in 2004 this project has been shown[2] to have helped re-water the spring fed Johnson Creek which had been dry for over 25 years **(Figure 8)**.

[2] Petrides, Ari 2008, Oregon State University, Bower, et. al. 2007, 2008, WWBWC.

The HBDIC project site, a 7-acre area Northwest of Milton-Freewater, is entering the final phase of its three part expansion under this program and currently recharges approximately 3600-4400 acre-feet annually (6-7 square miles a foot deep of water) some of which goes to restoring seasonal spring flows with the remaining water going to storage in the unconfined aquifer system[3] **(Figure 9).** Currently there are two other recharge testing projects funded by Washington's Department of Ecology, one testing field flooding[4] as a mechanism for aquifer recharge with the other using a historic gravel pit to recharge winter-spring water into groundwater storage. All of the sites have been providing detailed information on the designs, operations, monitoring and permitting-planning needs.

The operations, analysis, and modeling of 3 testing recharge sites along with information gather from successful recharge programs from around the world provided the WMI program team the answers to critical questions about aquifer recharge for this basin that included;

1. Aquifer recharge has been shown to effectively transfer seasonally available surface water into shallow aquifer for the purposes of storage
2. Aquifer recharge has been shown to help restore flows in historical springs that are tributaries to steelhead and redband trout creeks
3. Source water used for aquifer recharge has been shown to be good and consistent quality
4. Aquifer properties have been measured and are able to store water for adequate periods thus providing a viable subsurface reservoir
5. Continued piping coupled with over-allocated well pumping without mitigation will result in continued spring declines and threatens to jeopardize instream flows throughout the system.

The information generated by this monitoring along with applied research conducted by the WWBWC and its partners has led to vast improvements in our understanding of groundwater conditions and characteristics such as groundwater movement **(Figure 10)** and the role that ditches have played in recharging the aquifer system propped up **(Figure 11**).

Complementing the science behind understanding the aquifer-springs problem and building recharge projects that can effect real change in the system, the WWBWC and its partners have also been moving forward on the policy side of developing the ARSR program. In 2009 the State of Washington passed legislation creating the Walla Walla Watershed Management Partnership[5] which is a public agency operating under RCW 90.92 (2SHB 1580, Chapter 183, Session Laws of 2009). The Partnership is charged with piloting local water management in the Walla Walla Basin. Efforts leading up to the formation of the Partnership were made up of community members including landowners, local governments, conservation groups, tribes, state and federal

[3] Groundwater storage is also used by shallow aquifer wells.
[4] Hall-Wentland farm fields recharge and the Locher Road historic gravel pit
[5] http://www.wallawallawatershed.org/

agencies, and many other entities working to develop local solutions to the unique water issues in the Walla Walla Basin. In Washington the Partnership integrates local water and watershed management with state oversight, providing a primary governance structure for improved water management and ensuring that local and statewide interests are protected.

In spring 2009, the WWBWC hosted a Bi-state Groundwater Status meeting where hydrogeologists representing both states (OWRD/WDOE) met with WWBWC technical staff and discussed the monitoring, aquifer trend status and regulatory and enforcement tools by which the system can be better managed. In Washington the shallow aquifer is closed to further irrigation appropriations and has recently restricted the amount of water new exempt wells can utilize. In Oregon the shallow aquifer is still officially open to new well applications, but these wells are going through more scrutiny because of the declining trend and the connection to surface water rights. The WWBWC is also working with Oregon and Washington Water Trusts to create a bi-state water banking system in order to create 'cap-n-trade' mechanism. By creating a water banking system we intend to create a revenue source where new wells are required to mitigate for their well use by purchasing mitigation credits through the Trusts. This system will help create a revenue by which to help support the implementation of the ARSR program.

On the Oregon side, the Umatilla Critical Groundwater Task Force[6] completed its 2050 plan[7] with the goal being:

"... ensure a coordinated, integrated response with maximum use of all water resources and to mitigate the effects of water declines impacting Umatilla County."(Umatilla County CGT, 2009)

This forward thinking plan includes creating water management districts, encouraging the construction and operations of aquifer recharge projects and working to create revenue streams with which to better manage and measure groundwater resources in Umatilla County. The ARSR goals for the Walla Walla Basin follow those of the Umatilla County plan and have support for further development at the county level.

Water management efforts in both states have been working together to come up with programmatic solutions to addressing what is a bi-state hydrologic, biologic and economic issue. The Walla Walla Basin Aquifer Replenishment and Spring Restoration Program intends to build on all of these efforts by creating a coordinated bistate approach to address the legal, designs, distribution, timing, habitat, water quality and quantity issues that are anticipated in creating an aquifer and river system that is managed in a truly sustainable yield fashion. The overall goal is to first *stabilize* the declining aquifer and the *recovery* storage that has been lost by recharge more water in than is discharged (**Figure 12**).

The goals of the ARSR program are to:

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[6] http://umatillacounty.net/planning/Groundwater.htm

[7] http://www.co.umatilla.or.us/planning/Groundwater.htm

1. Build adequate recharge capacity to firstly stabilize and then recovery shallow aquifer storage to historic levels
2. Whenever possible refine and enhance current management of surface and groundwater capacities to support goal #1 (e.g. better management of Little Walla Walla River during non-irrigation season)
3. Work with water conservation efforts to design and build water systems that conserve water during times of scarcity and recharge water during times of abundance
4. Education of general public on the complexity of surface-groundwater management in the Walla Walla Valley

This ambitious program will not be done *unless* the WWBWC and its partners pursue its creation and application. There are *no state or federal programs* that are set up to address this critical issue and without action now, the aquifer and related springs will continue to decline along with the fish and farms that depend on them. This program represents a clear and present need in the Walla Walla basin.

R2. Problems to be Addressed

Provide information specific to the project: a) The specific problem(s) you are addressing; and b) the root cause(s) of the problem(s). This description should explain the watershed process or ecosystem function your project proposes to address. ***DO NOT describe the project here; you will do so in question #R3.*** *You may add narrative in addition to the table.*

Watershed planning aimed at restoring salmon have a lot of parameters to examine and work to restore in order to be successful. In the Walla Walla basin, as in many through out the arid west, limited flow is the primary issue effecting fisheries recovery. When you consider flow (Q) it is best to consider in terms of its water budget or what component pieces contribute to that surface flow. These component pieces also need to be considered relative to other factors such as the time of year and where in the watershed it is being quantified.

In the Walla Walla basin, the vast majority of focus on instream flow restoration and salmon recovery efforts are in the Walla Walla River valley above the shallow aquifer system. Further examination of timing shows May through December where flow is most limited through irrigation diversions, well pumping and the lack of rainfall. Flow (**Q_{WWR}**) in the Walla Walla River in this area and period is comprised of:

$$Q_{WWR} = Q_{UP} + Q_{GR\text{-}SP} + P$$

where:

Q_{UP} = Flow entering valley from upstream headwaters.

$Q_{GR\text{-}SP}$ = flow from springs and groundwater entering river channel where water table has positive gradient to river. Water moves into aquifer where water table has negative gradient to river.

P = Precipitation. Irrigation Season rainfall is minimal.

The shallow aquifer's ability to supply water to the river can be defined in terms of shallow aquifer storage (ΔS_{GR}):

$$\Delta S_{GR} = Q_{IN} - Q_{OUT}$$

where;

Q_{IN} = water entering aquifer

Q_{OUT} = water leaving aquifer

In the Walla Walla basin a vast majority of the water entering or *recharging* the aquifer is primarily through infiltration from rivers-ditches channels and irrigation practices **(Figure 11).** Water leaves the aquifer by three primary methods; pumping of wells for domestic and irrigation uses, as discharge to springs and through groundwater exchange to the Walla Walla River and tributaries. This recharge-discharge balance changes not only seasonally but has shown to have changed historically as outlined earlier. What is key to point out in this relationship is that amount and timing of discharge is directly connected to the amount and timing of recharge to the aquifer.

A. Ecosystem Function Problems ARSRP Addresses

Specific Problem(s)	Root Cause(s) of the Problem
Declining shallow aquifer * *Negative change in storage* (ΔS_{GR})	• Piping and lining of ditch system for instream flow conservation • Historical over appropriation of groundwater through well pumping • Straightening of rivers-creeks and loss of flood-plain function • Loss of natural recharge functions through beaver eradication and allowing Walla Walla distributary system to flow freely
Declining year round spring flow and degradation of creek habitat * Negative change in (Q_{OUT})	• Declining net storage in shallow aquifer system. • Seasonal draw-down due to well pumping

Declining Walla Walla River baseflows Two issues: • *Negative change* (Q_{OUT}) • *Increased depth to water table potentially increases losing-reaches in channel*	• Decreases in net groundwater storage directly impacts timing and amount of aquifer discharge in the form of in-channel groundwater contributions to the main stem river.
Protection of instream flow savings	• Declining aquifer storage increases negative gradient between surface flows and water table potentially increasing areas and extent of channel bed losses
Surface and groundwater quality issues	• Declining aquifer storage can effect groundwater quality with increasing concentrations of contaminants such as Nitrates and legacy Pesticides • Reduced spring and groundwater contributions of year round cooler groundwater can further exacerbate high surface water temperatures

R3. Project Description

Using the table below, provide a description of the project that describes the restoration activities to occur (e.g., direct flow, remove 36" culvert, construct free spanning bridge, place 12 three log clusters between RM 44 and 52, etc.), including a description of the methodologies (e.g., juniper – burning or cutting; tree release – manual or herbicide; etc.) and the equipment planned for use. In addition, describe any Project Management functions/ activities necessary to implement the project (e.g., acquire permits or landowner approval; solicit bids, award contracts, etc.). The degree of detail should match the project complexity and technical difficulty to allow for full evaluation of technical viability. For projects involving multiple sites, be sure to identify and describe them separately, as appropriate. ***This is not the place to describe the benefits of the project, but rather the specific elements of the proposed project.*** *You may add narrative in addition to the table.*

This section of the grant will focus on the portion of the ARSR program where OWEB funds will be applied. In order to make this application clearer and shorter in length, recharge projects funded by other sources or in Washington were not described. WDOE funding for this program will focus on restoration actions in the Washington portion of the ARSR focal area. BPA funding will focus on restorative actions in both Washington and Oregon as will other funding sources as they are developed and secured.

Throughout the world, there exists many examples of managed aquifer recharge (MAR) being used as an effective water management tool. Orange County California's Water District (OCWD) that recharges up to 130 cfs from both natural run off as well as tertiary treated waste water in order to store and supply near 2.5 Million residents with municipal water. In the Netherlands aquifer recharge is used extensive to both treat waste water as well as keep salt water from the ocean from intruding into coastal fresh water aquifers.

There are several examples of successful MAR applications similar to the Walla Walla basin situation. In the States of Colorado and Nebraska, along the Lower Platte River, aquifer recharge has been used to mitigate for the effects of groundwater pumping on river flows. Since the 1970s the State of Colorado has been working with local irrigation districts, scientists and the legislature to create aquifer replenishment and water rights mitigation system that has had quantifiable results. More than 200 recharge projects have been installed along the Lower Platte that has been quantifiably shown with USGS instream gauges to help restore and protect baseflows in the Lower Platte River [8]. This program has a basic framework[9] by which the WWBWC and its partners intend to build the Walla Walla basin bi-state ARSR program.

To best understand this project (program) it is best to clarify the various components. The ARSR program has several main **PARTS** to its implementation that all need to happen concurrently which are:

- **Part 1: Restoration Action – On the Ground Recharge**
  - Designing
  - Permitting
  - Construction
  - Operations
  - Maintenance
- **Part 2: Effectiveness Monitoring:**
  - **Recharge Site Monitoring:** On site monitoring as required by Limited License requirements. This monitoring is specifically for operations.
  - **System-wide Monitoring:** Well and gauge monitoring network used to track aquifer recharge and other water resource changes (e.g. additional piping and conservation)
  - **IWFM 3-D Finite Element Modeling:** 2009 OSU-WWBWC model is used to place aquifer recharge, track system benefits of recharge and track recharge contributions to stabilizing and restoring aquifer while protecting instream flows. This model is also used by the
- **Part 3: Program Development and Bi-state Coordination:**
  - Bi-state water banking system development for program revenue support and system-wide water management
  - Bi-state water quality monitoring plan for recharge operations and monitoring

[8] Program Contacts: Jerry Kenny, USFWS Biologist, Jon Altenhofen, PE. Augmentation Recharge Accounting (ARA) Program, Northern Colorado Water Conservancy District.
[9] www.cwi.colostate.edu/publications/cr/144.pdf and www.ids.colostate.edu/index.html?/projects.splatte

- Bi-state recharge season flow allocation process where amount of recharge that can be we withdrawn from the river during high flows while protecting channel forming events is developed
- Bi-state groundwater management strategy development with state agencies
- Bi-state funding development from state, federal and other sources
- Bi-state development of innovative recharge designs (e.g. infiltration galleries) that can be implemented in either state

This OWEB application is requesting funds for all three of these activities that is, and will continue to be, matched with funding from Bonneville Power Administration, Washington Department of Ecology and other sources in order to implement the program. These next sections describe the specifics of each of the above restoration pieces.

Part 1: Restoration Action - Building program infrastructure

The construction of recharge projects throughout the focus area (area of declining aquifer and declining spring flows between Milton-Freewater and Stateline) will involve a number of steps. During each step recharge sites with willing landowners, good hydrogeologic and site conditions will be located and a project design and plan will be formulated. For the bistate program there are a number of recharge activities and sites including existing recharge sites (HBDIC, Locher Road), New WDOE sites (Gardena Dual-purpose sites, Wetland Recharge), and the new ODOT and HBDIC Dual-purpose recharge sites (**Figure 13 and 13A**.) This first phase of the ARSR program will have three primary recharge construction components. They are:

1. **HBDIC Site - Final Phase:** Site will be purchased from current landowner through BPA funds and placed into a public trust as a recharge site for public benefit. On site additional spreading basins will be installed to maximize both the total area of recharge as well as the total rate of recharge to the aquifer system. Additional on-site monitoring will also be installed for the long term operations and monitoring of the site. Operations manuals for HBDIC district staff will be developed for long term maintenance of the site. (See ATTACHMENT A-1)
2. **ODOT Mitigation Sites:** The WWBWC has been working with ODOT staff to transfer two ODOT surplus properties to the ARSR program. These sites will have spreading basins and on site monitoring (as required by permitting) installed. They will be operated as a part of the ARSR program. ODOT will work with WWBWC to receive mitigation credits for allowing the WWBWC to use these state lands for the good of aquifer replenishment, spring/wetland restoration, and fisheries habitat. (See ATTACHMENT A-2)
3. **Dual Purpose Recharge Sites (4):** Four infiltration Galleries will be incorporated into already piped ditch systems as prototypes for the dual

purpose water management systems. As piping has reduced the amount of recharge to the shallow aquifer these prototype sites will be developed to provide a dual use system: recharge water during non-irrigation season, conserve river water (piping) during irrigation system. Recharge goals will seek to offset influences of piping on the aquifer and springs as well as help to increase net recharge to aquifer. At the time of this grant more than 20 other sites for this model have been identified. Size of these galleries will be kept small and spatially distributed for economical, hydrological and social reasons. (See ATTACHMENT A-3)

Part 1: Program Element #1: HBDIC Recharge Site Expansion – Phase III of III

Project Element	Proposed Action
Expand recharge foot-print at HBDIC Recharge Site ***(Figure 14)***	**4 additional recharge basins will be incorporated into the current site operations.** Surface and groundwater monitoring devices at the site along with current infiltration gallery testing make this a logical site for increasing the volume of aquifer enhancement and documenting the increase in effectiveness. Designs for the spreading basins are being funded by BPA and will be completed by October 2009. Site designs are provided in ATTACHMENT A-1. No additional licenses or permits are needed for this final phase of the project.
Expand real time monitoring at the site	Additional real-time capabilities are required to effectively manage this project along with the others proposed in this program. An additional monitoring well, three surface gauges, as well as a water quality monitoring station will be linked to the WWBWC SCADA system so that operations can be coordinated with instream flows to maximize recharge amounts, monitor water quality conditions (turbidity), and also used as an education tool for the WWBWC, K-12, and a general public outreach program.
Project Management Activity: HBDIC Site Construction, Monitoring, Analysis and Generation of Annual Progress and Long-Term operations Guide	The HBDIC recharge project has a newly issued limited license for operations between March 2009 – March 2014. Water Quality plans have been upgraded several times since the projects inception in 2004 with ODEQ as project partners. The current limited license covers any new expansions at the site and can become a permanent water right following the reconvening of the Rules Advisory Committee (RAC). As required by the OWRD limited license annual reports will be supplied to OWRD, ODEQ, CTUIR, and the other project partners. At the end of this final phase of the HBDIC Recharge site development a final report will be generated to cover all facets of the projects development, operations and results. In addition an operations manual will be generated so that HBDIC staff will be able to effectively manage the site into the future.

Part 1: Program Element #2: ODOT Mitigation Sites – Recharge Development (Figures X and X)

Project Element	Proposed Action
Project Management Activity: Permitting, Construction, Monitoring, Analysis and Generation of Annual	Oregon Department of Transportation (ODOT) has agreed to work with the WWBWC in turning two of is surplus properties into aquifer recharge sites. In exchange the WWBWC will be working with ODOT staff to transfer these properties to the Aquifer Replenishment program while working with ODOT staff to provide their agency with mitigation credits for environmental benefits.

Progress reports ***Figures 15 and 16***	These two sites have designs already completed (ATTACHMENT A-2) but will also require that the WWBWC goes through the limited license process. A monitoring plan with water quality and tracking recharge operations will be required. Additional fencing and site improvements (planting native grasses) will also be included in the project development.

Part 1: Program Element #3: Dual Purpose Recharge Sites – Four Prototype locations

*** **Figures 17 – 27 (#20 mislabeled)** represent the conceptual progression of dual-purpose piping recharge systems. We used the Huffman Ditch along East Mud Creek to demonstration visually the reason behind and how we intend to proceed with these type of systems. Specific designs (OR PE stamped) for these 4 sites are found in Attachment A-3.

Project Element	Proposed Action
Development of integrated pipe-recharge function in OWEB/BPA funded HBDIC piping projects: Designs, Permits, Construction and Reporting	Infiltration gallery testing (2008-2009) at the HBDIC recharge projects has provided valuable information on building aquifer recharge capability into piping-for-river water conservation systems. The HBDIC and WWBWC have identified more than 20 small-scale locations along these three recently piped systems where a combination of recharge infiltration galleries, dry-wells and spreading basins can be used to offset the loss to aquifer recharge experienced when these former systems were piped. These first four prototype sites (Attachment A-3) will be permitted, installed and used as examples of their wide-spread applications. These small scale projects will be incorporated into the delivery system and operated during the winter-spring recharge season. Subsequently during the irrigation season, they will be shut down to maximize water savings for irrigation use while helping to protect the water conserved back to the river. OWRD has stated that only one permit will be required for a whole dual-purpose (one pipeline with many recharge galleries) making these easier to be installed and operate. The WWBWC will work with its partners at OWRD and ODEQ to secure the necessary permits to operate each of these systems as single-recharge entities (e.g. one water quality management plan and one limited licenses for each piped system). This element directly complements efforts/projects taking place in the Washington portion of the basin.
Recharge-piped Recharge System Monitoring: Wells, surface gauges and Real-time communications	Funding from OWEB, BPA, WDOE and BOR will be used to develop monitoring stations that will help quantify the success of these pipeline systems as well as prepare for Phase II of the Aquifer Replenishment Program Development where recharge sites in/near the City of Milton-Freewater and in the Walla Walla River Irrigation District will be developed. OWEB/WDOE funding has already invested in creating a system able to generally track these projects, however there still exists the need to upgrade some key surface and groundwater locations on the Oregon side of the basin. Partial funding for these upgrades will be cost-shared by BPA funding.

R4. Watershed Benefits

What are the proposed project watershed benefits? While many projects benefit forest or agricultural production, OWEB funding is for fish and wildlife habitat protection and enhancement. Briefly describe how the project will affect watershed functions or ecosystem processes.

Fish need flow. In the Walla Walla basin flow is the primary limiting factor to the recovery of ESA and salmon fisheries. Instream flow restoration above a declining and highly connected aquifer is difficult if not impossible to realize without significantly changing the irrigation-season storage of water in the system. (For example, even though water conservation work has left 25 cfs in the Walla Walla river all summer, approximately 30% to 40% of that new instream flow seeps through riverbed leaving only 10-15cfs flowing on the surface 2 miles downstream.)

Water can be stored above and below ground with both methods being explored in the Walla Walla basin. Further groundwater declines will further jeopardize water for all uses in the Walla Walla basin particularly as threat of climate changes looms. Stabilizing and restoring groundwater storage can equate to increased spring-creek flows, increased groundwater returns, increased cool water refugia for fish while protecting water uses for irrigation agriculture, human consumption and recreation.

Aquifer recharge has been identified in the WWBWC Action Plan, OWRD's Umatilla Basin Plan 1988 (this plan includes the Walla Walla Basin), Umatilla Critical Groundwater Taskforce 2050 Plan, Washington's Walla Walla Basin Partnership (WMI) and the CTUIR-USACE Walla Walla River Flow Enhancement Feasibility Study as a tool that is needed and necessary for the future of this watershed.

R5. Project Objectives

What are the proposed project objectives? Provide specific objectives based on the location, size and significance of the project and provide information on how the objectives could be evaluated. The measurements should be able to be reported to document successful implementation. ***See the Application Instructions for the distinction between project objectives and achievement of goals.***

The objective of the ARSR program is to build a bi-state programmatic response to declining water supply in the Walla Walla River shallow aquifer system by diverting excessive non-irrigation season flows out into the shallow aquifer. This aquifer provides the baseflow to the Walla Walla river that ESA and salmonid fish species rely on for their survival. The programmatic goals are to:

- Build adequate recharge capacity to firstly stabilize and then recovery shallow aquifer storage to historic levels
- Whenever possible refine and enhance current management of surface and groundwater capacities to support goal #1 (e.g. better management of Little Walla Walla River during non-irrigation season)

- Work with water conservation efforts to design and build water systems that conserve water during times of scarcity and recharge water during times of abundance
- Education of general public on the complexity of surface-groundwater management in the Walla Walla Valley

As the program is implemented it will be comprised of both on the restorative actions (e.g. MAR) as well bistate program development to implement water banking and a varity of other policy issues.

Setting goals for the quantity, spatial location and timing of recharge sites will be an ongoing process. In June 2010, the WMI monitoring team (OSU-WWBWC) will have a working IFWM surface-groundwater model which will be used to generate a spatial sensitivity analysis for where/when and how much recharge the ARSR program develops. This modeling work will be the management tool on which the ARSR program basis its short and long term goals. Coupled with the model will be other policy processes that will also help to direct the ARSR program like: a) winter flow allotment discussions, b) current groundwater appropriation management by OWRD and WDOE, c) operations of ditch and natural stream systems to maximize other mechanisms of aquifer recharge and, d) water quality concerns like turbidity during higher spring freshet flows.

Generating specific goals for aquifer recharge is difficult to due without the IWFM to base those estimates on. However the as an interim goal the WWBWC and its partners have been utilizing the changes to recharge that can be quantified and using those values. From the historic monitoring data from the 1930s until present we know that the aquifer has dropped between 15-30 feet throughout the system. The number of well deepening (e.g. chasing water) has steadily increased since the 1950s. Spring flows vary by spatial location with one of the worst systems, Dugger Springs dropped from 8-10 cfs (1933-34, USGS data) to nearly dry year round in 2008-2009. Estimates for total loss in shallow aquifer storage for this period ranges from 64,320 – 160,800 acre-feet. In order to recovery this lost storage the ARSR program will first need to stabilize (e.g. recharge = discharge) and then being to recharge more water than is discharge from the system (e.g. recharge > discharge) (**Figure 12**).

Looking at more recent changes to the system as a way of generating an interim goal we do know two activities that have directly impacted the shallow aquifer system. In 2007 the WWBWC was asked to estimate a interium goal for aquifer recharge while the model was being developed for planning purposes. The two main quantifiable components to this estimate are:

1. Little Walla Walla River used to run through non-irrigation season. The water infiltrating from the channel beds of that system and entering the shallow aquifer was estimated at approximate 3,971- 7,942 acre-feet per year (Bower, 2007[10]). Considering this was an estimate for just the

[10] Bower, 2007 *Estimating recharge volumes for stabilizing and replenishing the Walla Walla River Basin's Shallow Aquifer System*. WWBWC report generated for the USACE-CTUIR Feasibility study

Oregon portion of the basin we will use **8,000 acre-feet** as our interim goals.

2. The piping of surface systems (both manmade and natural) systems to "save water" which has acted to exacerbate the dropping aquifer can also be used as an interim mitigation goal. By using ditch losses estimates and miles of total piping the systems as follows:
    a. Hudson Bay District Improvement Company (OR) irrigation district has piped 10 miles of ditch equaling 5,949 acre-feet less in recharge annually.
    b. Walla Walla River Irrigation District (OR) irrigation district has piped 9.4 miles of ditch equaling 4,234 acre-feet less in recharge annually.
    c. Gardena Farms #13 irrigation district (WA) has piped 3.8 miles of ditch equaling 1,456 acre-feet less in recharge annually.

So by totaling up these recharge goals we come up with an interim recharge goal of (8,000 + 5949 + 4234 + 1456 =) **19,639 acre-feet** in non-irrigation season aquifer recharge.

Utilizing the November 1st through May 15th recharge season (194 days) we can calculate an interim goal for recharge as (19,639 acre/feet/196 days/1.983 acre feet/cfs =) **51 cfs of recharge** during the recharge season.

Setting goals for individual springs and stream flow will have be done after the IWFM model is completed due to the vast amount of complexity of the system. The total goal for the recharge projects in this phase of the ARSR program development is **32 cfs or 9,500 acre-feet** in aquifer recharge annually (see table below). This would be **approximately 50% of the interim goal** of mitigating for piping-only conservation and loss in natural recharge from Little Walla Walla River system.

Project Element	Specific Objectives	Measure for Evaluation
HBDIC Recharge Site (Final Development)	An onsite goal of 22 cfs or 6,000 acre-feet annually in aquifer recharge.	Annual tally of inflow at intake structure gauge
2 ODOT recharge sites	Combined onsite goal of 6 cfs or 2,000 acre-feet annually in aquifer recharge.	Annual tally of inflow at intake structure gauge
4 Prototype Dual-purpose recharge sites in HBDIC Piped system	Combined onsite goal of 4 cfs or 1500 acre-feet annual in aquifer recharge.	Annual tally of inflow at intake structure flow meters

R6. Project Design

a) Provide a list of qualifications and experience you will require for the project designer. If a project design has been completed, identify the designer and what qualifications and experience they have.

- Bob Bower, Senior Hydrologist/Project Management. WWBWC, Masters of Engineering, (OSU, Bioresource Engineering). Has been the lead for aquifer recharge development in the Walla Walla Basin since 2002. Member of Umatilla Critical Groundwater Taskforce 2005-2009.
- Brian Wolcott, Executive Director, WWBWC. Has helped lead the legal, political and funding development for aquifer recharge in the Walla Walla basin since 2002.
- Dr. John Selker, Ph.D. OSU, Has helped the WWBWC since 2000 develop a understanding of aquifer conditions, modeling and the development of aquifer recharge as a tool for water management.
- Dr. Kevin Lindsey, Ph.D., Principal Hydrogeologist, Groundwater Solutions Inc. Has helped the WWBWC and other partners develop aquifer recharge in the basin since 2002. The GSI team recently finished mapping the entire alluvial aquifer system.
- Bernie Hewes, P.E. in Oregon. Lead Engineer for the designs at HBDIC. Providing designs for ODOT properties as well as HBDIC final Phase construction.
- Kelly Cahill, P.E. in Oregon. Providing engineering for dual-purpose recharge designs
- Starting in 2005, the WWBWC formed a Watershed Management Iniative Technical Review Team (WMI TRT) to help develop and review the programs development. The list includes a wide variety of scientific and water policy experts from around the Pacific Northwest.
  - Dave Nazy, Hydrogeologist, WDOE
  - John Covert, Hydrogeologist, WDOE
  - Guy Gregory, Hydrogeologist, WDOE
  - Donn Miller, Hydrogeologist, OWRD
  - Mike Zwart, Hydrogeologist, OWRD
  - Kate Ely, Hydrogeologist, CTUIR
  - Bill Neve, Watermaster, WDOE
  - Tony Justus, Watermaster, OWRD
  - John Selker, Groundwater Hydrologist, OSU
  - Ari Petrides, Ph.D. Candidate, OSU
  - Richard Cuenca, Systems Analyst, OSU
  - Bob Carson, Geologist, Whitman College
  - Frank Nicholson, Engineer, City of Walla Walla
  - Jon Cole, Engineer/Environment, Walla Walla College
  - Mike Barber, Director, WSU Water Research Center, WSU
  - Stephen Hall, Hydrologist, P.E. USACE
  - Gerry Anhorn, Irrigation Specialist, WWCC
  - Glen Mendel, Fisheries Biologist, WDFW

- Paul LaRiviere, Fisheries Biologist, WDFW
- Darren Gallion, Lead Fisheries Biologist, USFWS
- Dave Morgan, Hydrologist, USGS
- Phil Richerson, Hydrogeologist, ODEQ
- Kevin Scribner, WMI SGM Rep., WEC/WWWA/WWBWC

b) Describe the design criteria used or proposed and how those criteria take into consideration natural events and conditions (e.g., culvert design to 100-year flood event, wood placement to readjust with higher than bankfull flows, cultivation to retain at least 75% stubble, 4-strand fence to allow for wildlife passage, etc.).

The ARSR program will work with its team to model and quantify the natural and unnatural events (e.g. climate change) that will work to effect the development and success of the ARSRP. As part of the winter flow discussions predictive tools will be developed to help build a flow forecasting tool with which to manage storage capabilities for water managers to use. Recharge site specific designs are based on a combination of our licensed engineers experience coupled with designs refined at the HBDIC, Locher Road and Hall-Wentland recharge sites. Information on aquifer recharge in other programs and areas of the world were also used to design these sites (ATTACHMENTS A-1, A-2 and A-3).

R7. Design Alternatives

*Were other alternatives designs or solutions considered? **Yes***

Other alternatives to subsurface (WWBWC's recharge) include:

1. **No Action:** water table, springs and river's baseflow allowed continue to decline. When enough senior water right holders are impacted, law suits and court action could force OWRD and WDOE to use critical groundwater area designation to begin to limited junior water users (e.g. Hermiston Area CGWA). How long and how bad the springs, aquifer and river needs to be before OWRD take these steps are is unknown. Allowing continue declines makes public funding of water right transactions and conserved water investments risky as water may not remain above ground to support instream flow enhancement goals.
2. **Purchase water rights:** Purchasing and/or acquisition of enough surface and groundwater rights to restore stabilize groundwater conditions. Mechanisms for this would be:
   a. Lawsuits
   b. Purchasing of large amount of water rights in the basin has opinion in community that it will take away from the economy by reducing productive farm ground and shrinking the tax base from production agriculture
   c. Critical groundwater designation by state and subsequent loss of junior well and surface water rights until aquifer stabilizes and river flows are restored. Also a moratorium for ALL new construction and new exempt wells would have to be enforced including a non-net growth policy.
3. **CTUIR-USACE Feasibility study:** Large federal project (1998-present) where water exchange from Columbia River ($550 Million) to irrigators to allow Walla Walla River to flow freely through Milton-Freewater and into Washington. Dropping aquifer makes this 'new water' susceptible to losses and appears to be difficult to protect on paper as it crosses state boundaries. Price tag and significant power costs make this project

questionable. Timeline puts implementation at approximately a decade out. Does not specifically work to address the overall water budget issues that support baseflows in the Walla Walla River. Federal budget over draughts are also problematic for price tag for project.

R8. Project Schedule

Use the table below to show the anticipated schedule for the project. Add or change the list of project elements to fit your project. ***See the Application Instructions for clarification and an example.***

Project Elements	Start Date	End Date	Description
Permit Applications/	5/1/2010	9/1/2010	Permits secured through ODEQ, OWRD, and our project partners. In order of priority 1) HBDIC Site completion, 2) ODOT sites and 3 Dual-purpose systems
Materials Acquisition	9/1/2010	10/1/2010	Once permits are issued, a work plan will outline sites and timeline for completion.
Bid Solicitation	9/1/2010	10/1/2010	Public bid process for materials
Contracting	9/1/2010	10/30/2010	For HBDIC related projects sites their staff will provide construction cost-share. For other projects and consultanting contracts will be secured.
Construction	11/1/2010	3/29/2011	Timed relative to system turn off (non irrigation season) and permit process results.
Project Operations: Recharge Season 1	11/1/2010	5/15/2011	State permit reviews and annual reports will be issued during project period.
Project Operations: Recharge Season 2	11/1/2010	5/15/2012	State permit reviews and annual reports will be issued during project period.
Post Project Implementation Review	11/1/2010	3/29/2011	Completed as final report in 2011. Final program report at the end of Phase II of II (2014).
Project Maintenance	11/1/2010	indefinite	ARSR program will build system of ownership and operation of sites.

R9. IN MAIN APPLICATION

R10. Other Related Conservation Actions

If the project specifically implements a plan or larger conservation effort, identify the effort and the specific role of this project. Explain whether the project implements a regional plan (e.g., ESA Recovery Plan, Coastal Coho Assessment, NWPCC Subbasin Plan, Groundwater Management Area). Specifically identify the relationship between the proposed project and the OWEB Basin Priorities. Priorities can be found on the OWEB website at: www.oregon.gov/OWEB/restoration_priorities.shtml. ***(See the Application Instructions for helpful links to various regional plans.)***

OWEB Basin priorities have not been finalized for the Walla Walla Basin

Consequently there are no other attempts in the Walla Walla basin to reverse the declining aquifer and spring flow conditions. However aquifer recharge has been identified in a number of local and regional plans as a restoration action in the Walla Walla basin. They are:

- The Mid Columbia Steelhead Recovery Plan identifies water conservation as a key action
- The USACE Walla Walla River Flow Feasibility Study identifies Shallow aquifer recharge as a necessary complementary action to irrigation water conveyance efficiency
- The NWPCC Walla Walla Subbasin plan identifies Shallow Aquifer Recharge as a water conservation tool, p. 171
- OWRD Umatilla Basin Plan,1988 recommends Aquifer Recharge, p. 121
- UCCGWT 2050 Groundwater Plan identifies aquifer recharge as one of the primary options to pursue in order to address county wide declines in groundwater storage

R11. Other Related Conservation Actions

a) Explain how the project complements other efforts under way or completed in the watershed. Identify other restoration, technical assistance, monitoring, assessment or education projects, conservation actions and ecological protection efforts in the watershed and explain how this project relates to those actions.

Section R1 describes many of the efforts that this program will complement. Additionally there is a CTUIR-USACE Feasibility study (Walla Walla Flow Enhancement Project) is currently reviewing preferred alternatives for also creating storage and/or piping additional water from the Columbia River to help restore instream flows for salmon. Numerous meetings have been held and recharge is also being considered (and likely included) in this program. This project will likely not begin construction for 5-15 years, depending on congressional approval and the difficult bistate water policy issue of protecting instream flows across the Stateline. As aquifer recharge has been identified this study as one of the actions the ARSR program will likely be used as local match to help cost share this large federal project.

b) If the project is a continuation of previously completed activities, describe the results of the previous project(s) and identify what you have learned from the implementation of similar project(s).

The HBDIC Recharge project along with three other recharge projects in the valley have helped to vastly improve our understanding of aquifer recharge, aquifer hydrogeologic characteristics and the policies and permits needed to develop an aquifer replenishment program. In Washington there remain some hurdles in the permitting process (e.g. no limited testing license process as with OWRD) that will be worked out with the new WMI legislative authorities given to the local basin managers.

R12. Project(s) Inspection

Name of Person & Agency/Organization	Telephone Number or Email Address	Project Element to be Inspected
Donn Miller, OWRD	(503) 986-0845 millerdw@wrd.state.or.us	Limited Testing Licenses Reviews
Tony Justus, OWRD	541-278-5456 justustg@wrd.state.or.us	Limited Testing License Reviews and operations with instream flows
Phil Richerson, ODEQ	541-276-4063 phil.richerson@state.or.us	Review and Develop Water Quality Plans (OR)
WMI Technical Review Team, WWBWC Board and Walla Walla Basin Partnership (WA)	WWBWC as contact	Review Program Development for Bistate ARSR program

R13. Educational/Public Awareness Opportunities

Explain whether and how you will raise public awareness about the project (e.g., install a project partner or interpretive sign, write an article for the local paper, lead a site tour for local citizens). ***See the Application Instructions for clarification of eligible education and outreach*** costs.

The WWBWC has been conducting K-12 and public education efforts for this programs development since 2003. WWBWC activities include:

- WWBWC K-12 education program
- Local, regional, national and international conferences and workshops
- Online outreach and education at www.wwbwc.org

R14. Project Maintenance and Reporting

Use the table below to document how the project will be maintained over time. State who will maintain the project. Identify their affiliation and provide contact information. In addition, please indicate who will conduct Post-Implementation. Status Reporting following project completion.

As required by the OWRD limited license permit annual reports for each of the projects are required by law to be submitted to the OWRD, ODEQ and other interested parties. In this report a tally of water quality monitoring results, total recharge water and any other operations and maintenance issues are to be reported.

WWBWC and its partners through the implementation of the ARSRP will develop a long term strategy for recharge site operations, maintenance and reporting. Many of the permits will for operations will require a long term plan and continued reporting to OWRD, ODEQ and other interested parties such as the CTUIR. Reports will be generated for OWEB, BPA, WDOE and other projects partners at a minimum of annually. HBDIC will maintain the sites per development of BPMs for recharge galleries, spreading basins and other methods of recharge.

R15. Budget Development

a) *Explain how costs were determined for the budget elements. Describe if contractor conversations, past projects or other cost figures were used for each major element of the budget. This is particularly important for lump sum elements in the budget. For project management costs describe the time and activities that would be involved.*

The WWBWC staff utilized known recharge program costs from our ongoing efforts to develop these costs. Subcontractors likely to be involved in this program development have been working on these efforts for a number of years so their costs are likely to be good estimates of need.

b) *If there are any unusual cost factors, explain them. For example, if the fencing costs are unusually high because of steep, rocky terrain and un-roaded access, this is the place to explain the cost elements on the budget page.*

There are no unusual situations with regards to program development costs.

Section I

EFFECTIVENESS MONITORING PROJECT INFORMATION

Complete questions 1 - 4.

1. **Is the project a part of an existing monitoring plan/strategy for the watershed?**

   ☒ **Yes** ☐ **No**

   If Yes, **provide name and date of the plan and reference sites(s) or elements of the plan related to the project and describe how the effectiveness monitoring supports an existing monitoring plan or strategy for monitoring.**

   Watershed Management Iniative Quality Assurance Project Plan - QAPP (2008, WWBWC)

2. **Report the stream miles and/or acres that will be monitored or assessed under this monitoring application.**

   More than 50 miles of springs/streams/rivers + 100+ square miles of alluvial aquifer.

3. **Identify the parameters that will be measured. Check all that apply.**

☐ Adult fish presence/absence/abundance/distribution survey(s)	☐ Riparian vegetation
☐ Juvenile fish presence/absence/abundance/distribution survey(s)	☐ Spawning surveys
☐ Instream habitat surveys	☐ Upland vegetation
☐ Macroinvertebrates	☒ Water quality
☐ Noxious weeds	☒ Water quantity
☒ Other: aquifer water quality and water levels	

If you checked Water Quality above, exactly which parameters will you be monitoring? Check all that apply.

☒ Bacteria	☒ pH	☒ Temperature
☒ Dissolved Oxygen	☒ Pesticides	☐ Toxics
☒ Nitrates	☒ Phosphorus	☒ Turbidity
☐ Heavy Metals (name):	☐ Nutrients (name):	
☒ Other (explain): specific conductivity		

If you checked Riparian or Upland Vegetation above, exactly which parameters will you be monitoring? Check all that apply.

☐ Canopy cover	☐ Invasive species presence/absence	☐ Plant survival
☐ Percent cover	☐ Other (explain):	

4. **What is the format in which the data will be stored? Check all that apply.**

☒ Spreadsheet	☒ Database	☒ GIS layers
☒ Other (name): WMI Geospatial database		

Section II

EFFECTIVENESS MONITORING ACTIVITY INFORMATION

These essay questions and their answers are designed to step you and reviewers through a logical process from understanding and identifying the problem to measuring for success. **Refer to the Instructions for clarification and helpful examples.**

You may use the application form to respond to the questions, using additional sheets of paper as necessary **OR** answer the questions on separate pages. Be sure to include the question numbers and text of the questions before you begin typing your answers to assist the reviewers in evaluating your application. Please use 8½" x 11" paper. All pages must be single spaced, single-sided, numbered and unbound except for sets of maps/photos/designs (see Page 3 of the application instructions). Use a 12 pt type size to answer the questions and a 10-pt type size for the tables. Use bullets where appropriate. Use **bold face** and *italics* for emphasis only. If the project involves multiple sites, be specific for each.

EM1 *What are the project's Effectiveness Monitoring objectives? The Effectiveness Monitoring activities must be directly related to your proposed restoration project. Tie the Effectiveness Monitoring objectives to the watershed restoration project objectives. Provide a specific hypothesis or monitoring question.*

There are three primary monitoring objectives to the Walla Walla Basin Aquifer Replenishment Program which are a) On-site operations monitoring as required by permit (e.g. water quality, quantities), b) On site monitoring to better refine aquifer recharge as a water management tool (e.g. infiltration rates, how temperature effects those rates, seasonal clogging, aquifer response in groundwater mounding, flow direction and storage, etc), c) monitoring system hydrologic dynamics to assess recharge efforts to achieve the short and long term restoration goals: stabilize-replenish aquifer water table and increase baseflows from springs to Walla Walla River.

This grant is requesting funds for both the onsite monitoring (a, b) and for effectiveness monitoring (c) for the period that this grant would extend PAST OWEB grant 208-5106 (Figure EM-1) . The effectiveness monitoring (c) can be broken into two primary subcategories:

1. Monitor aquifer replenishment program focal area (distal) groundwater and surface water conditions for net-short term effects of recharge projects on restoring hydrologic conditions (seasonal changes and responses).
2. Monitor existing established historic monitoring (distal) of focal area to assess over all programs successes relative to historic declines in spring flow and aquifer storage (decadal changes and responses).

EM2 *What are you proposing to do? Supply sufficient detail to match the Effectiveness Monitoring component's complexity and technical difficulty so that its technical viability can be evaluated.*

The monitoring outlined in the following section is activities, equipment and programmatic needs that are **not covered** by the WWBWC current OWEB # 208-5108 (see Figure EM-1).

1. **Recharge Site specific monitoring (on-site):** Monitoring for each recharge site or recharge project (each pipe-recharge system will likely be licensed and monitored under one plan) will involve the following components:
   a. Surface water monitoring – Quantity: This will include either totalizing and rate flow meter and/or intake structure measured with a stilling well and rated weir structure. Instrumentation for the intake structure will like be an *In-situ LT300* pressure transducer that will record stage during the operation of the recharge site. This information will be converted by staff hydrologist to flow and total recharge volume information that will be submitted as part of the permit/license process (annually) with OWRD/ODEQ. Each of these sites will also be set up for remote access and download (solar panel, SCADA radio transmitter) so that all sites can be monitored using the WWBWC SCADA system.
   b. Groundwater monitoring – aquifer levels: Each recharge site will have one of two types of groundwater monitoring sites a) monitoring well drilled and instrumented for assessing aquifer conditions into the local water table (typically 60-85 feet below ground surface (bgs)) or a piezometer which can be placed next to a smaller scale recharge site using a backhoe with a total depth of approximately 15 feet. The two ODOT sites will (permit dependent) need monitoring well at each with some additional piezometers depending on final design. The pipe-recharge systems will (permit dependent) need 1-2 monitoring wells along their lengths with a piezometer (as a minimum requirement) at each gallery/recharge site. Instrumentation for the wells and piezometers will likely be *In-site LT100s* with temperature, water level and pressure being recorded.
   c. Surface-groundwater monitoring – Quality: ODEQ and WWBWC have been developing the water quality testing plan for these projects since 2004. Currently the water quality testing involves a series (at least three separate samplings) surface and groundwater samples that are extracted by WWBWC personnel (trained by ODEQ) via a well pump (for groundwater) or surface bottle collection at the HBDIC and Hall-Wentland Recharge sites. The parameters typically measured are Soluble Organic Compounds (Pesticides, Herbicides, etc), Temperature, Specific Conductivity, TSS, TOC, Nitrates, Phosphorus, Fecal Coliforms, and Turbidity. Additional samples and/or parameters may be sampled to respond to any site specific issues that arise or to better understand the nature of the overall water conditions. The WWBWC has two laboratories it uses: a) the City of Walla Walla Water Quality Labs and b) Edge Analytical in Burlington, Washington. Both are accredited and approved to work with the WWBWC on this program.
2. **Surface-groundwater monitoring (distal)-** (Figure EM-1): Since 2001 the WWBWC with funding support from OWEB, WDOE, BPA, ODEQ, EPA and NRCS has been building a network of surface and groundwater monitoring sites throughout the Walla Walla River valley. We currently have over 100 shallow aquifer monitoring wells and another 60+ spring-creek sites. The establishment of this program was done with multipurpose in mind. Much of this network was set up at numerous historic surface-groundwater monitoring locations so that hydrologic trend information could be used to assess both the historic declines and change along with the response and recovery of the system as we build an aquifer replenishment program. These sites **were not** being measured by other public entities such as WDOE or OWRD except in the case of OWRD's 9 historic monitoring wells. The spring gauges provide us the direct aquifer related information needed to contrast and assess aquifer conditions as they relate to instream flow enhancement. This program would help support the specific effectiveness monitoring activities:

a. Maintain current Oregon **surface** monitoring sites. Includes replacing some dated *Trutrack Capacitance Rods (stage/water temp recorders)* with *In-situ LT100 pressure transducers.*
b. Maintain current Oregon **groundwater** monitoring sites. Includes replacing some dated *water level recorders* with *In-situ LT300 pressure transducers.*
c. Measure, analysis and input data for these sites into WWBWC Geospatial database (ArcGIS 9.2)
d. Collect water quality information including: Temperature, Specific Conductivity, TSS, TOC, Nitrates, Phosphorus, Fecal Coliforms and Turbidity. Soluble Organic Compounds (Pesticides, Herbicides, etc) are likely only required at each recharge site as part of the water quality monitoring plan.
e. The WWBWC intends to bring some of these sites into the real-time SCADA system but NOT with OWEB funding. This funding will likely come from BOR or BPA.
f. Conduct seasonal seepage runs (e.g. surface flow inventories) for the program focal area. Involves coordinating field staff from numerous agencies, use of flow meters, and other flow and water quality monitoring equipment. 4 seepage runs are anticipated during this projects timeline.

EM3 *Describe in detail and provide the citation for the protocols that will be used.*

The WMI QAPP report covers the basic monitoring protocols that are used by the ARSR program team. Generally USGS methods are used for flow measurements, hydrograph generate and gauge analysis. Water Quality monitoring plans determined by each state (WDOE/ODEQ) determine how and what we sample at each of the recharge projects. Generally we test to drinking water standards for Soluble Organic Compounds, general chemistry and fecal Coliforms. Supplementing our QAPP is the WWBWC QA/QC monitoring plan (approved in 2002) for the calibration/validation of temperature monitoring as well as field collection of water quality samples, etc.

EM4 *Describe in detail the sampling design used to choose your sampling locations.*

As this has been a 8-9 year process in development it would be difficult to cover all of this in this section. The final grant report to OWEB **(203-259, 204-244, 206-934)** provide the history of monitoring system design. Generally we found surface and groundwater locations where historical data had or was being collected (e.g. USGS 1933-4 wells or spring gauge locations) and set up new stations there to be able to compare historical to present conditions. The second order of priority for site selection was spatia location, make sure we were selecting both surface and groundwater locations that capture an area where no other information could be found.

EM5 *Select your monitoring design from the list below and place a check mark next to it.*

_X_ Before After Control Impact - A control site is evaluated over the same time period as the treatment site, thus the study is replicated in both time and space.

_X_ Before After - Data are collected both before and after treatment, so the study is replicated in time, not space.

___ Stratified Random - Dividing the population to be sampled into two or more subgroups before choosing what will be sampled.

___ Random Allocation of Treatment - Sites are randomly selected and each site has an equal chance of being selected.

_X_ Available Sites - Sites are being sampled solely based on what is available to be sampled.

___ Census - All units are sampled

_X_ Other: Explain. Statistical sampling does not work for the physical sciences. Location selection for aquifer recharge is based on nonrandom hydrogeologic conditions, distance to water table/river, gradient, etc. We are not sampling a population but using monitoring to understand a complicated surface-groundwater system.

EM6 *Describe how the information to be gathered augments existing available data.*

Data collected will augment existing information both no each recharge site as well as the system as a whole. Data will be verified by staff, uploaded to Geospatial database and then used to recalibrate and refine IWFM water management model. Data will provide ARSR program manager verification of rates of recharge and the impacts the projects are having on restoring and protecting instream flows.

EM7 *Describe the quality control/quality assurance program for the project and who will be collecting your data.*

Our QAPP and WWBWC QA/QC plan covers the protocols of data collection.

EM8 *What is the proposed schedule for the Effectiveness Monitoring activities? Include information on the sampling frequency and the duration of the monitoring proposed.*

Operation of the ARSR program monitoring system is a year-round project. Groundwater loggers record daily average water table depths, surface gauges record flow from hourly to 15-minute intervals. Water quality sampling varies by parameter and location. At recharge sites monitoring typically starts/ends during the November 1st through May 15 recharge season window.

EM9 *Describe the data analysis process. Include the timeline for analysis,* ***who will be responsible for the data analysis and report writing,*** *who will be doing the analysis, who will review it (peer reviewers), where it will be stored, who will receive the information and the format to be used.*

The Lead ARSRP Scientist will be responsible for data analysis and report writing unless it is a specific subcontractor activity like hydrogeology work. The ARSR program has a Technical Review Team made up of regional surface and groundwater experts that meet annually to review the annual reports, program accomplishments and help guide the development of the program. The main application of this grant has the list of those WMI TRT members.

EM10 *If activities will take place on other lands not identified under the restoration application (cite section/question #). Provide a detailed description of project location, including location(s) where monitoring will occur. Also, provide geographic coordinates and or river miles whenever possible.*

If your restoration project is funded,
you will be required to submit any water quality data to
DEQ's Volunteer Monitoring database
http://www.deq.state.or.us/lab/wqm/volmonitoring.htm
and any fish habitat and distribution data to
ODFW's Natural Resource Information Management Program
https://nrimp.dfw.state.or.us/DataClearinghouse/

Section III

EFFECTIVENESS MONITORING BUDGET

IMPORTANT: Read the application instructions. Attach additional lines, if necessary.

CAPITAL BUDGET ***Totals automatically round to the nearest dollar**

	A	B	C	D	E	F
Itemize projected costs under each of the following categories.	**Unit Number** (e.g., # of hours)	**Unit Cost** (e.g., hourly rate)	**In-Kind Match**	**Cash Match Funds**	**OWEB Funds**	**Total Costs** (add columns C, D, E)
PRE-IMPLEMENTATION. Must occur *after* the OWEB grant agreement has been fully executed, unless it is a city or county charge for processing the Land Use form. OWEB funds will be disbursed only upon receipt of all required permits and licenses.						
Establishment of surface-groundwater monitoring prior to recharge project operations (WWBWC - ARSR Tech 2)	250 hours/ year	$29/hour		7,250.00	7,250.00	14,500
SUBTOTAL (1)			0	7,250	7,250	14,500
PROJECT MANAGEMENT. Includes *staff or contractors* who coordinate project implementation. Line items should identify who will be responsible for project management and their affiliation.						
Recharge Site Monitoring Setup/Calibration and opeartions during recharge season (2 years) (WWBWC - ARSR Technican 1)	450 hours/year	$38/hour		17,100.00	17,100.00	34,200
Hydrogeology Analysis for Recharge Sites (GSI, Inc. - Licensed Hydrogeologist)	50 hours/year	$150/hour		7,500.00	7,500.00	15,000
						0
SUBTOTAL (2)			0	24,600	24,600	49,200
IN-HOUSE PERSONNEL. Includes *only* Applicant employee costs and the portion of their time devoted to this project.						
ARSR Program Technican (GIS/WQ - GIS geospatial database/water quality sampling and reporting for recharge sites)	400 hours/year	$38/hour		15,200.00	15,200.00	30,400
ARSR Program Technical 2 (Site monitoring downloads/monitoring)	400 hours/year	$29/hour		11,600.00	11,600.00	23,200
SUBTOTAL (3)			0	26,800	26,800	53,600
CONTRACTED SERVICES. Labor, supplies, and materials to be provided by non-*staff* for project implementation.						
Laboratory Costs: Water Quality	6 sites	$1500/site		4,500.00	4,500.00	9,000
SUBTOTAL (4)			0	4,500	4,500	9,000
TRAVEL. Mileage, per diem, lodging, etc. Must use current State of Oregon rate.						
Field Travel		$3,000		1,500.00	1,500.00	3,000
SUBTOTAL (5)			0	1,500	1,500	3,000
SUPPLIES/MATERIALS. Refers to items that typically are "used up" in the course of the project. Costs to OWEB must be directly related to on-the-ground work.						
Covered in Capital side of budget for recharge projects				0.00	0.00	0
SUBTOTAL (6)			0	0	0	0
CAPITAL EQUIPMENT. List equipment costing only **$250 or more per unit**. Useful life of *capital* equipment is for the duration of project and will be used only for this project **(see next page for Non-Capital Equipment).**						
Recharge Site Scada Transmitter	4	$500		1000	1000	2000
LT 100 Loggers	8	$450		1,800	1,800	3600
SUBTOTAL (7)			0	2,800	2,800	5,600
PRODUCTION COSTS. This only applies if you are conducting Effectiveness Monitoring (***see Application Instructions and R15***).						
Year 1 Production Costs	$600/yr			600.00	600.00	1,200
Year 2 Production Costs	$600/yr			600.00	600.00	1,200

SUBTOTAL (8)	0	600	600	1,200
CAPITAL SUBTOTAL [Add all subtotals, (1-8) above]	0	68,050	68,050	136,100

NON-CAPITAL BUDGET *Totals automatically round to the nearest dollar

EQUIPMENT. List equipment costing only **$250 or more per unit**. Refers to items with a useful life of generally 2 years or more.						
Field equipment (e.g. rubber boots, gloves, steel cable, measuring tapes, batteries, GPS, rite-in-rain paper)				1,400.00	1,400.00	2,800
SUBTOTAL (9)			0	1,400	1,400	2,800
NON-CAPITAL TOTAL [subtotal (9) above]			0	1,400	1,400	2,800

FISCAL ADMINISTRATION *Totals automatically round to the nearest dollar

Not to exceed 10% of the Capital Subtotal (1-8) and the Non-Capital Total (9). Refers to costs associated with accounting; auditing (fiscal management); contract management (complying with the terms and conditions of the grant agreement); and fiscal reporting expenses for the OWEB grant, including final report expenses for the grant.				
FISCAL ADMIN. Compute by adding the **Capital Subtotal** and **Non-Capital Total** and multiplying both by 0.10 or less.				
Effectiveness Monitoring Fiscal ADMIN			6,805.00	6,805
FISCAL ADMIN SUBTOTAL (10)	0	0	6,805	6,805
CAPITAL SUBTOTAL (1-8)	0	68,050	68,050	136,100
CAPITAL TOTAL [Add the Fiscal Admin Subtotal (10) to the Capital Subtotal from (1-8) above]	0	68,050	74,855	142,905

BUDGET TOTAL *Totals automatically round to the nearest dollar

[Add Non-Capital Total and Capital Total, from above] Effectiveness Monitoring BUDGET TOTAL **Insert this total in the EM Budget Subtotal(8) in the Restoration Application**	0	69,450	76,255	145,705

ATTACHMENT A

OWEB

MATCH FUNDING FORM

Document here the match funding shown on the budget page of your grant application

OWEB accepts all non-OWEB funds as match. An applicant may not use *another OWEB grant* to match an OWEB grant. However, an applicant who benefits from a pass-through OWEB agreement with another state agency, by receiving either staff expertise or a grant from that state agency, may use those benefits as match for an OWEB grant. (Example: A grantee may use as match the effort provided by ODFW restoration biologists because OWEB funding for those positions is the result of a pass-through agreement). At the time of application, match funding for OWEB funds requested does not have to be *secured*, but you must show that at least 25% of match funding has been *sought*. On this form, you do not necessarily need to show authorized signatures ("secured match"), but the more match that is secured, the stronger the application. Identify the type of match (cash or in-kind), the status of the match (secured or pending), and either a dollar amount or a dollar value (based on local market rates) of the in-kind contribution. In the table below, the match may be identified as either Effectiveness Monitoring (EM) or Other (OTHER) Dollar Value. **If you are not requesting funds from OWEB to support effectiveness monitoring, disregard the EM column and use only the OTHER column.**

EFFECTIVENESS MONITORING: If you are requesting more than $3,500 in OWEB funds to support Effectiveness Monitoring activities as part of a Watershed Restoration Grant Application and filling out information for Question R16, you must include matching funds which will be used as match for the effectiveness monitoring portion of the project. This is identified in the table below as EM Dollar Value.

If you have questions about whether your proposed match is eligible or not, visit our website at www.oregon.gov/OWEB/GRANTS/grant_app_materials.shtml, or contact your local OWEB regional program representative (contact information available in the instructions to this application).

Project Name: Walla Walla Basin Aquifer Replenishment -Stream Restoration Program Applicant: WWBWC

Match Funding Source	Type (√ one)	Status (√ one)**	EM Dollar Value	OTHER Dollar Value	Match Funding Source Signature/Date**
Washington Department of Ecology ARSR program funding 2009-2011- Washington Match (Awarded August 2009)	☒ cash ☐ in kind	☒ secured ☐ pending		$807,400.00	
Bonneville Power Adminstration (2009-2010) - Oregon Match	☒ cash ☐ in kind	☒ secured ☐ pending	30,000	$122,514.00	
Bonneville Power Adminstration (2010-2012) - Oregon Match	☒ cash ☐ in kind	☐ secured ☒ pending	39,450	$500,000.00	
ODOT Surplus Properties/Leases	☐ cash ☒ in kind	☐ secured ☒ pending		$52,000.00	
	☐ cash ☐ in kind	☐ secured ☐ pending			
	☐ cash ☐ in kind	☐ secured ☐ pending			
	☐ cash ☐ in kind	☐ secured ☐ pending			
	☐ cash ☐ in kind	☐ secured ☐ pending			

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

August 6, 2009

Bob Brower
Walla Walla Basin Watershed Foundation
P.O. Box 68
Milton-Freewater, OR 97862

RE: Watershed Implementation and Flow Achievement Grant

Dear Mr. Bower:

You applied for a Watershed Storage Feasibility Study Grant for the Water management initiative – Aquifer Replenishment Program – Phase III. There were 39 grant applications totaling over $18 million dollars competing for $4 million dollars of available grant funds. The final award was based on a combination of the technical merits of the application plus regional priority. The final award list and individual technical scoring can be found at http://www.ecy.wa.gov/watershed/09_11wscg.html.

Your application project has been approved in the amount of $807,920.

The next step in the process is to develop a detailed scope of work and budget for the final grant agreement.

If you have any questions please contact me at (360) 407-6094 or email *dbur461@ecy.wa.gov.*

Sincerely,

Dave Burdick
Contracts and Grants Coordinator

BONNEVILLE
POWER ADMINISTRATION

CONTRACT

Mail Invoice To:

F & W Invoices - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00035684
Release :
Page : 1

Vendor:
WALLA WALLA BASIN WATERSHED FOUNDATION
810 S MAIN STREET
MILTON-FREEWATER OR 97862

Please Direct Inquiries to:

BRENDA S. HEISTER
Title: CONTRACTING OFFICER
Phone: 503-230-3531
Fax : 503-230-4508

Attn: BRIAN WOLCOTT

Contract Title: 200739600 CAP RESTORE WALLA WALLA RIVER FLOW

Total Value : $1,531,000.00 **** NOT TO EXCEED ****
Pricing Method: COST, NO FEE Payment Terms: % Days Net 15
Performance Period: 09/01/07 - 08/31/10

B R Wolcott
Contractor Signature
BRIAN R. WOLCOTT
Printed Name/Title
8/19/09
Date Signed

Brenda S Heister
BPA Contracting Officer
August 13, 2009
Date Signed

This award contains the following - TEXT ATTACHED

CONTRACT TERMS AND CONDITIONS
Title : ADD SCOPE, ADD FUNDS, EXTEND TO 3-YEAR CONTRACT
Amendment: 002
Amended Performance Period: - 08/31/10
Amendment Value: $673,577.00
Pricing Method :

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
[illegible] Spokane, Washington 99205-1295 • (509)329-3400

11 May 2009

Oregon Watershed Enhancement Board
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem OR 97301-1290

RE: Letter of Support OWEB Application #210-6011: Walla Walla Basin Aquifer Replenishment and Spring Restoration Program

It is my pleasure to submit a letter of support for OWEB Application #210-6011; "Walla Walla Basin Aquifer Replenishment and Spring Restoration Program." Washington State Department of Ecology remains committed to supporting this bi-state endeavor and again has given this program high priority for continued funding and staff support. The Walla Walla Watershed is providing a unique "petri dish" to evaluate innovative solutions to challenging water conservation and management issues, and this program is a fundamental component.

Washington State Department of Ecology has recognized the Walla Walla Watershed as uniquely qualified to reinvent the way water is managed and has championed their effort to enhance flows for fish in cooperation with agricultural and other community interests through their pilot local water management program, the "Walla Walla Watershed Management Partnership." The multitude of planning and implementing entities in the basin, both in Oregon and Washington, have all contributed to the ability of this pilot program to get Washington legislative authorization. All recognize the vital nature of the work that the Walla Walla Basin Watershed Council is providing and the importance of managing surface water in connection with ground water.

Washington State is looking to the Walla Walla Watershed to provide valuable insight in how utilizing flexibility can lead to solutions that meet shared goals of improving habitat conditions for salmon while retaining a healthy agricultural community. Please strongly consider the "Walla Walla Basin Aquifer Replenishment and Spring Restoration Program" for continued funding and support.

Sincerely,

Mimi Wainwright
Watershed Lead

ATTACHMENT B

OWEB

LAND USE INFORMATION FORM

This information is needed to determine if the proposed project complies with statewide planning goals and is compatible with local comprehensive plans (ORS 197.180). The form must be submitted before OWEB releases project funds. OWEB will release project funds only if the project either is not regulated by, or is compatible with, the local comprehensive plan and zoning ordinance. If a project is regulated by the local comprehensive plan and zoning ordinance, OWEB will void grant agreements for projects the county determines to be incompatible with the local comprehensive plan and zoning ordinance. If the county requires additional local approvals for a project regulated by the local comprehensive plan and zoning ordinance, OWEB will not release project funds until these conditions are satisfied.

1. TO BE COMPLETED BY THE APPLICANT/GRANTEE

Applicant/Grantee Name: ______________________________

Project Name: ______________________________

2. TO BE COMPLETED BY CITY/COUNTY OR TRIBAL PLANNING OFFICIAL

Complete this section only <u>after</u> section ¹ ... ɘ, has been completed. Check the box below that applies:

☐ This project is not reg... mprehensive plan and zoning ordinance.

☐ This project h... ible with the local comprehensive plan and zoning ordinance.

☐ This projec... atible with the local comprehensive plan and zoning ordinance.

☐ Compatibility ... anning ordinance cannot be determined until the following local approvals ...

Please see cover letter

_____ Conditi... ...nit _____ Development Permit

_____ Plan Am... ...nt _____ Zone Change

_____ Other

An application has ____ has not ____ been made for the local approvals checked above.

______________________________ ______________________________

* Signature of Local Official Date

Print Name: ______________________ Phone: ______________________

Title: ______________________ Email: ______________________

Must be an authorized signature from your local City/County or Tribal Planning Department, regardless of which box is checked above.

ATTACHMENT C

OWEB

PUBLIC RECORD CERTIFICATION

Oregon Administrative Rule 695-005-0030(4) states that "All applications that involve physical changes or monitoring on private land must include certification from the applicant that the applicant has informed all landowners involved of the existence of the application and has also advised all landowners that all monitoring information obtained on their property is public record. If contact with all landowners was not possible at the time of application, explain why."

INSTRUCTIONS: **All applicants must complete Part One. In Part One, if you check the first box, skip Part Two and sign and date in the signature box below. If you check the second box, you must complete Part Two and sign and date in the signature box below.**

PART ONE

☒ Public land only (STOP: go to signature box and complete)

☐ Private land only, or a mix of public and private land (complete Part Two and sign and date in the signature box)

PART TWO

☐ I certify that I have informed all participating private landowners involved in the project of the existence of the application, and I have advised all of them that all monitoring information obtained on their property is public record. The following is a complete list of all participating private landowners. Add more lines if needed.

1.	5.
2.	6.
3.	7.
4.	8.

☐ I certify that contact with all participating private landowners was not possible at the time of application for the following reasons:

Furthermore, I understand that should this project be awarded, I will be required by the terms of the OWEB grant agreement to secure cooperative landowner agreements with all participating private landowners prior to expending Board funds on a property.

APPLICANT/CO-APPLICANT SIGNATURE

[signature]	10/19/9
Applicant Signature	Date
Robert J. Bower	Hydrologist
Print Name	Title
Co-Applicant Signature	Date
Print Name	Agency

ATTACHMENT D

RESTORATION METRICS FORM

OWEB

OWEB receives a portion of its funds from the federal government and is required to report how its grantees have used those funds. Complete both sections of the form below as they apply to your project. The information you provide is used for federal reporting purposes.

Section 1 - Project Overview

Answer all five questions below, even if you have answered a similar question in a previous section in the grant application.

1. **Land Use Setting: CHECK ONE BOX ONLY.**

☐ **Urban/Suburban/Exurban** *(Projects located within urban growth boundaries or rural residential areas)*	☒ **Rural** *(Projects located outside urban growth boundaries or rural residential areas.)*

2. **Dominant Watershed Setting: CHECK ONE BOX ONLY.** Example: Your project involves managing erosion in the upland area with some erosion control extended to the riparian area. Because most of the work is to occur in the upland area, you would check only the Upland box below.

☐ **Estuary** *(where freshwater meets and mixes with saltwater of ocean tides.)*	☐ **Riparian** *(adjacent to a water body, within the active floodplain.)*
☐ **Instream** *(below the ordinary high-water mark or within the active channel — includes fish passage.)*	☐ **Upland** *(above the floodplain.)*
	☒ **Groundwater** *(Projects that recharge groundwater or primarily affect the subsurface water table.)*
☐ **Wetland** *(areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.*	

3. **Total Acres Treated:** N/A **Total Stream Miles Treated:** 50+ miles *(**do not include** upstream stream miles made accessible to fish with passage improvements)*

4. **Project Priority Identification:** Name the primary watershed/subbasin plan or assessment in which this project type is identified as a priority. **See Application Section III, question #R10.**

5. **Project Monitoring:**

☒ Effectiveness monitoring will be conducted for this project (refer to definition of effectiveness monitoring in the Application Instructions under R16)

Identify the location for the monitoring activities planned. Check as many boxes as apply.

☒ Onsite	☒ Downstream	☒ Upstream	☒ Upslope

Identify monitoring activities planned. Check as many boxes as apply

☐ Adult Fish presence/absence/abundance/distribution survey(s)	☐ Riparian vegetation (Presence/Absence)
☐ Juvenile Fish presence/absence/abundance/distribution survey(s)	☐ Spawning surveys
☐ Instream Habitat surveys	☐ Upland vegetation (Presence/Absence)
☐ Macroinvertebrates	☒ Water quality
☐ Noxious weed (Presence/Absence)	☒ Water quantity
☐ Photo Points	☒ Other (explain): Groundwater: Quality, level, and computer modeling

Section 2 - Project Activities

Provide values for each Project Activity applicable to your application. ***Leave blank any Project Activity or metric line that is not appropriate to your application.*** *All data entered in this form should be what you* ***plan*** *to do with the project. Data about* ***completed*** *projects will be reported at the end of the project to the Oregon Watershed Restoration Inventory (OWRI). For each activity type where you enter metrics,* ***estimate*** *the percentage of the total cost of the project (shown on page 1 of this application) that applies to the activity. The total of all of the activity cost percentages should equal 100%. Please distribute all administrative, project management and other general project costs among the various project activities when estimating percentages.*

Example*: A project will remove a fish passage barrier, place large boulders instream, and plant a riparian buffer. You would enter the appropriate metrics into the Fish Passage, Instream Habitat, and Riparian Habitat activity sections of this form. Then, estimate the percentage of the total cost of the project for each activity. For instance: 20% towards Fish Passage activities, 25% towards Instream Habitat activities, and 55% towards Riparian Habitat activities.*

Fish Screening Projects: *Projects that result in the installation or improvement of screening systems that prevent fish from passing into areas that do not support fish survival, for example into irrigation diversion channels.*

____ Estimated percentage of total cost of the project applied to fish screening activities.

____ # of screens installed, replaced, repaired or modified.

Fish Passage Improvement Projects: *Projects that affect or provide fish migration.* Includes road crossings (e.g., culverts, bridges or fords), barriers (e.g., dams or log jams), and engineered fish barrier bypasses. *For partial barriers, include total miles made accessible by the project.* Check all proposed types of barrier that will be installed, removed or modified for fish passage.

☐ Fish ladder installed/improved	☐ Road Stream crossing(s) removed (not replaced)
☐ Engineered fish barrier bypass (other than fish ladders) installed/ improved (e.g., rock/boulder step pools, weirs, bedrock chutes)	Road Stream Crossing installed or improved/upgraded: ☐ Culvert(s) ☐ Bridge(s) ☐ Rocked ford(s)
☐ Fish passage blockage removed or modified (e.g., diversion dam, push-up dam, log-jam removed/modified)	☐ Tidegate alteration/removal
☐ Other (explain):	

____ Estimated percentage of total cost of the project applied to fish passage activities

____ Total stream miles in the main channel and tributaries where access is improved above project. [Note: Calculate distance furthest upstream likely to be used by fish.]

   ____ (Road stream-crossing(s) only): Miles of stream channel made accessible upstream by replaced/improved/removed crossing(s).

____ Total # of passage blockages, impediments or barriers removed or altered to allow passage (this includes road stream crossings).

   ____ # of culverts, installed, replaced, or improved to allow passage

Instream Flow Projects: *Projects that maintain and/or increase the instream flow of water.* If these activities do not have a value for the estimated increase in instream flows then the activities should be recorded under Upland – Agriculture Management Activities. Check all proposed activities.

☒ Irrigation practice improved to increase instream flows (e.g. install diversion headgate, replace open ditches with pipes)	☒ Water flow gauges installed to measure water use
☒ This project will dedicate instream flow.	☒ Other (explain): recovering aquifer protects and enhances instream flows

100% Estimated percentage of total cost of the project applied to instream flow activities.

50+ Miles of stream where increased flow is the result of decreased/eliminated water withdrawals.

N/A The estimated increase in flow of water in the stream as a result of conservation effort (cubic feet per second).

N/A mm/dd/yyyy of initial start date

N/A mm/dd/yyyy of final end date

Instream Habitat Projects: *Projects that increase or improve the physical conditions within the stream environment to provide needed habitat conditions.* Check all proposed activities.

☐ Channel reconfiguration and connectivity (e.g., creating instream pools, meanders, improving floodplain connectivity, off-channel habitat)	☐ Plant Removal/control (instream); list species ________
☐ Channel structure placement (e.g., boulders, large wood, engineered structures or deflectors, barbs, weir, etc.)	☐ Carcass or nutrient placement: ☐ salmonid carcass; ☐fish meal brick; ☐other nutrient
☐ Streambank stabilization	☐ Beaver introduction
☐ Spawning gravel placement	☐ Other (explain):

_____ Estimated percentage of total cost of the project applied to instream habitat activities.

_____ Total miles of stream to be treated with instream habitat treatments

Riparian Habitat Projects: *Projects above the ordinary high-water mark of the stream and within the floodplain of the stream.* Check all proposed activities.

☐ Riparian planting	☐ Conservation grazing management (e.g., rotation grazing)
☐ Riparian fencing	☐ Non-native/noxious plant control
☐ Livestock exclusion (by means other than fencing)	☐ Forestry practices/stand management
☐ Water gap development	☐ Other (explain):

_____ Estimated percentage of total cost of the project applied to riparian habitat activities

_____ Total riparian acres to be treated.

_____ Miles of riparian streambank to be treated. *Stream sides treated* ☐ one ☐ two (Do not double count miles if a second side was treated)

Upland Habitat Projects: *Projects implemented above the floodplain.* Check all proposed activities.

☐ Erosion control structures (e.g., sediment collection basins, WASCOBs)	☐ Upland Agriculture Management (e.g., no/low-till, irrigation/water management)
☐ Planting/seeding for erosion control (e.g., convert from crops to native vegetation, grassed waterways, windbreaks, filter strips)	☐ Livestock Manure Management (e.g., relocate/improve manure holding structures and manure piles to reduce/eliminate drainage into streams)
☐ Slope stabilization (e.g., grade stabilization, landslide reparation, terracing slopes)	☐ Upland Livestock Management (e.g., grazing plans, fencing, livestock water)
☐ Vegetation Management (e.g., juniper removal, noxious weed control, tree thinning, brush control, burning)	☐ Other (explain):

_____ Estimated percentage of total cost of the project applied to upland habitat activities.

_____ Total acres of upland habitat to be treated.

Road Projects: *Projects designed to improve road impacts to watersheds.* Check all proposed activities.

☐ Road drainage system improvements & reconstruction	☐ Road obliteration/decommissioning
☐ Other (explain):	

_____ Estimated percentage of total cost of the project applied to road activities.

Water Quality Projects: *Projects activities with a primary objective of improving water quality parameters.* Check all of the water quality related activities that will be used by this project:

☐ Sewage outfall clean-up	☒ Stormwater/wastewater modification or treatment
☐ Toxin reduction: ______________ name of each toxic species, element or material	☐ Return flow cooling
☐ Pesticide reduction : ______________ name of each pesticide	☐ Other urban impact reduction (explain):

_____ Estimated percentage of total cost of the project applied to water quality activities.

Check all of the water quality limiting factors addressed by the activities selected above. Do not select limiting factors addressed by other types of restoration activities:

☒ Bacteria	☒ Pesticides	☒ High Temperature
☒ Dissolved Oxygen	☐ Toxics	☒ Nutrients
☐ Heavy Metals	☐ Other (explain):	

Wetland Habitat Projects: *Projects designed to create or improve wetland areas.* Check all proposed activities.

☐ Wetland Planting	☐ Wetland improvement/restoration of existing or historic wetland (other than vegetation planting or removal)
☐ Wetland Plant Removal (e.g., non-native/noxious plant control)	☐ Artificial wetland area created from an area not formerly a wetland
☐ Other (explain):	

_____ Estimated percentage of total cost of the project applied to wetland habitat activities.
_____ Total acres of artificial wetland created
_____ Total acres of existing or historic wetland habitat treated

Estuarine Habitat Projects: *Projects that result in improvement or increase in the availability of estuarine habitat.* Check all proposed activities.

☐ Channel modification/creation (e.g., improve intertidal flow to existing estuarine habitat)	☐ Creation of new estuarine habitat where one did not exist previously
☐ Dike or berm modification/removal	☐ Non-native/noxious plant control
☐ Removal of existing fill material	☐ Other (explain):

_____ Estimated percentage of total cost of the project applied to estuarine habitat activities.
_____ Total estuarine acres to be treated /created.

Section IV
WATERSHED RESTORATION BUDGET
IMPORTANT: Read the application instructions. Attach additional lines, if necessary.

CAPITAL BUDGET ***Totals automatically round to the nearest dollar**

	A	B	C	D	E	F
Itemize projected costs under each of the following categories.	**Unit Number**	**Unit Cost**	**In-Kind Match**	**Cash Match Funds**	**OWEB Funds**	**Total Costs**
	(e.g., # of hours)	(e.g., hourly rate)				(add columns C, D, E)
PRE-IMPLEMENTATION. Must occur *after* the OWEB grant agreement has been fully executed, unless it is a city or county charge for processing the Land Use form. OWEB funds will be disbursed only upon receipt of all required permits and licenses.						
Recharge Project Management: Designs/Recharge and Well drilling Permits/Site specific WQ plans/site characterization (WWBWC - Project Manager)	2 years: OWEB 1/2 BPA 1/2	16,120		8,060.00	**8,060.00**	16,120
Bistate ARSR Program Development (e.g. water banking, water quality plan, winter flow plan, etc.) (WWBWC - Director/Lead Scientist)	2 years: OWEB 1/2 WDOE 1/2	49,920		24,960.00	**24,960.00**	49,920
		SUBTOTAL (1)	0	33,020	**33,020**	66,040
PROJECT MANAGEMENT. Includes *staff or contractors* who coordinate project implementation. Line items should identify who will be responsible for project management and their affiliation.						
Bid Processing/Construction timeline and coordinations (WWBWC - Project Manager)	2 years: OWEB 1/2 BPA 1/2	32,240		16,120.00	**16,120.00**	32,240
Recharge sites or systems: Monitoring Plan Development (WWBWC - Lead Scientist)	2 years: OWEB 1/2 WDOE 1/2	34,000		17,000.00	**17,000.00**	34,000
Annual Reporting (WWBWC - Lead Scientist)	2 years: OWEB 1/2 BPA 1/2	24,000		12,000.00	**12,000.00**	24,000
		SUBTOTAL (2)	0	45,120	**45,120**	90,240
IN-HOUSE PERSONNEL. Includes *only* Applicant employee costs and the portion of their time devoted to this project.						
ARSR program Modeler and Bi-state Techincal Leadership (WWBWC - Lead Scientist)	400 hours/ year	$47/hour		18,800.00	**18,800.00**	37,600
ARSR Data Entry/GIS Database (WWBWC -ARSRP Tech 1)	250 hours/year	$38/hour		9,500.00	**9,500.00**	19,000
		SUBTOTAL (3)	0	28,300	**28,300**	56,600
CONTRACTED SERVICES. Labor, supplies, and materials to be provided by non-*staff* for project implementation.						
Recharge Site Characterization (Groundwater Solutions Inc. - Licensed Hydrogeologist) - (BPA Match)	6 sites	$4000/site		12,000.00	**12,000.00**	24,000
Scada System Technican/Plan (BPA Match)	3 Sites	$1,240		1,860.00	**1,860.00**	3,720
Recharge Site Construction	6 Sites	Site Specific			**66,120.00**	66,120
Drilling of Observation Wells (Per Limited License Requirment) - BPA Match)	3 Sites	$4,000		6,000.00	**6,000.00**	12,000
IWFM Water Management Modeling (OSU) (3 x 0.5 fte) (BPA Match)	1 model	$105,000		52,500.00	**52,500.00**	105,000

Piezometers (Dual-purpose Sites) (BPA Match)	4 sites	$1,000		2,000.00	2,000.00	4,000
		SUBTOTAL (4)	0	74,360	140,480	214,840
TRAVEL. Mileage, per diem, lodging, etc. Must use current State of Oregon rate.						
WWBWC ARSR Program Field work		3,500		1,750.00	1,750.00	3,500
		SUBTOTAL (5)	0	1,750	1,750	3,500
SUPPLIES/MATERIALS. Refers to items that typically are "used up" in the course of the project. Costs to OWEB must be directly related to on-the-ground work.						
HBDIC Recharge site Expansion: piping, cement, fencing, sign board, native grass seed + costs in ATTACHMENT 1 (BPA Match)		$25,500		$12,750	$12,750	$25,500
ODOT Site #1 Recharge Supplies: fencing, cement, piping, intake structure, native grass seed + costs in ATTACHMENT 2		$5,000			$5,000	$5,000
ODOT Site #2 Recharge Supplies + Costs in ATTACHMENT 2		$7,000			$7,000	$7,000
4 Dual Purpose Prototype systems (Arzen/Preston/Trumble-W/Trumble) Site Supplies + Costs in ATTACHMENT 3 (BPA match)		$185,969		$92,985	$92,984	$185,969
		SUBTOTAL (6)	0	$105,735	$117,734	$223,469
CAPITAL EQUIPMENT. List equipment costing only **$250 or more per unit**. Useful life of *capital* equipment is for the duration of project and will be used only for this project **(see next page for Non-Capital Equipment).**						
HBDIC has Capital Equipment to build recharge projects.						
		SUBTOTAL (7)	0	0	0	0
EFFECTIVENESS MONITORING. This only applies if you are conducting Effectiveness Monitoring (***see Application Instructions and R15***).						
		EM Budget SUBTOTAL (8)		69,450	76,255	$145,705
		CAPITAL SUBTOTAL [Add all subtotals, (1-8) above]	0	357,735	442,659	800,394

NON-CAPITAL BUDGET ***Totals automatically round to the nearest dollar**						
EDUCATION/OUTREACH. Refers to informational and promotional activities associated with the project.						
ARSR Community Outreach and Education Materials (maps/flyers/etc) (WDOE/BPA Match)		$4,500		2,250.00	2,250.00	4,500
Regional/National Coferences/workshops and Workgroups (BPA match)		2,750		1,375.00	1,375.00	2,750
SUBTOTAL (9)			0	3,625	3,625	7,250
EQUIPMENT. List equipment costing only **$250 or more per unit**. Refers to items with a useful life of generally 2 years or more.						
HBDIC/WWBWC owns equipment needed for capital construction					0.00	0
SUBTOTAL (10)			0	0	0	0
NON-CAPITAL TOTAL [Add the two subtotals, (9-10) above]			0	3,625	3,625	7,250
FISCAL ADMINISTRATION ***Totals automatically round to the nearest dollar**						
Not to exceed 10% of the Capital Subtotal (1-8) and the Non-Capital Total (9-10). Refers to costs associated with accounting; auditing (fiscal management); contract management (complying with the terms and conditions of the grant agreement); and fiscal reporting expenses for the OWEB grant, including final report expenses for the grant.						
FISCAL ADMIN. Compute by adding the **Capital Subtotal** and **Non-Capital Total** and multiplying both by 0.10 or less.						
WWBWC Fiscal Management (7.5% ADMIN)			0.00		33,471.30	33,471
SUBTOTAL (11)			0	0	33,471	33,471
POST-IMPLEMENTATION STATUS REPORTING. Costs associated with annual reporting requirements typically required for each grant (*see Application Instructions*).						
ARSR Program will be build to address	/yr				0.00	0
SUBTOTAL (12)			0	0	0	0
CAPITAL SUBTOTAL (1-8)			0	357,735	442,659	800,394
CAPITAL TOTAL [Add the two Subtotals (11&12) to the Capital Subtotal from (1-8) above]			0	357,735	476,130	833,865
BUDGET TOTAL ***Totals automatically round to the nearest dollar**						
BUDGET TOTAL [Add Non-Capital Total and Capital Total, from above]			0	361,360	479,755	841,115

Figures

1-27

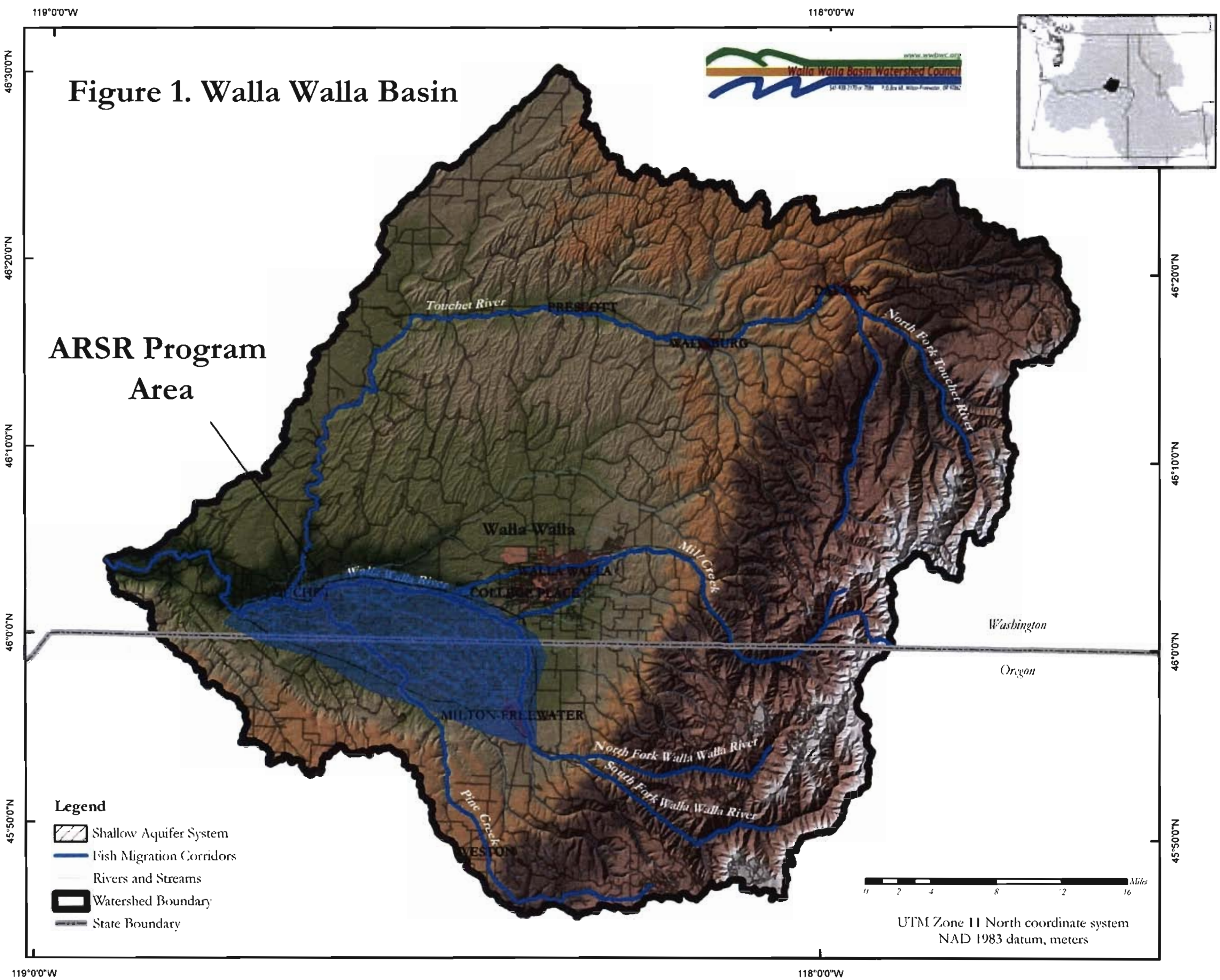


Figure 1. Walla Walla Basin
ARSR Program
Area
Walla Walla Basin Watershed Council
www.wwbwc.org
119°0'0"W
118°0'0"W
46°30'0"N
46°20'0"N
46°10'0"N
46°0'0"N
45°50'0"N
Touchet River
PRESCOTT
WAITSBURG
DAYTON
North Fork Touchet River
Walla Walla
WALLA WALLA
COLLEGE PLACE
Walla Walla River
Mill Creek
Washington
Oregon
MILTON-FREEWATER
North Fork Walla Walla River
South Fork Walla Walla River
Pine Creek
WESTON
Legend
Shallow Aquifer System
Fish Migration Corridors
Rivers and Streams
Watershed Boundary
State Boundary
Miles
UTM Zone 11 North coordinate system
NAD 1983 datum, meters

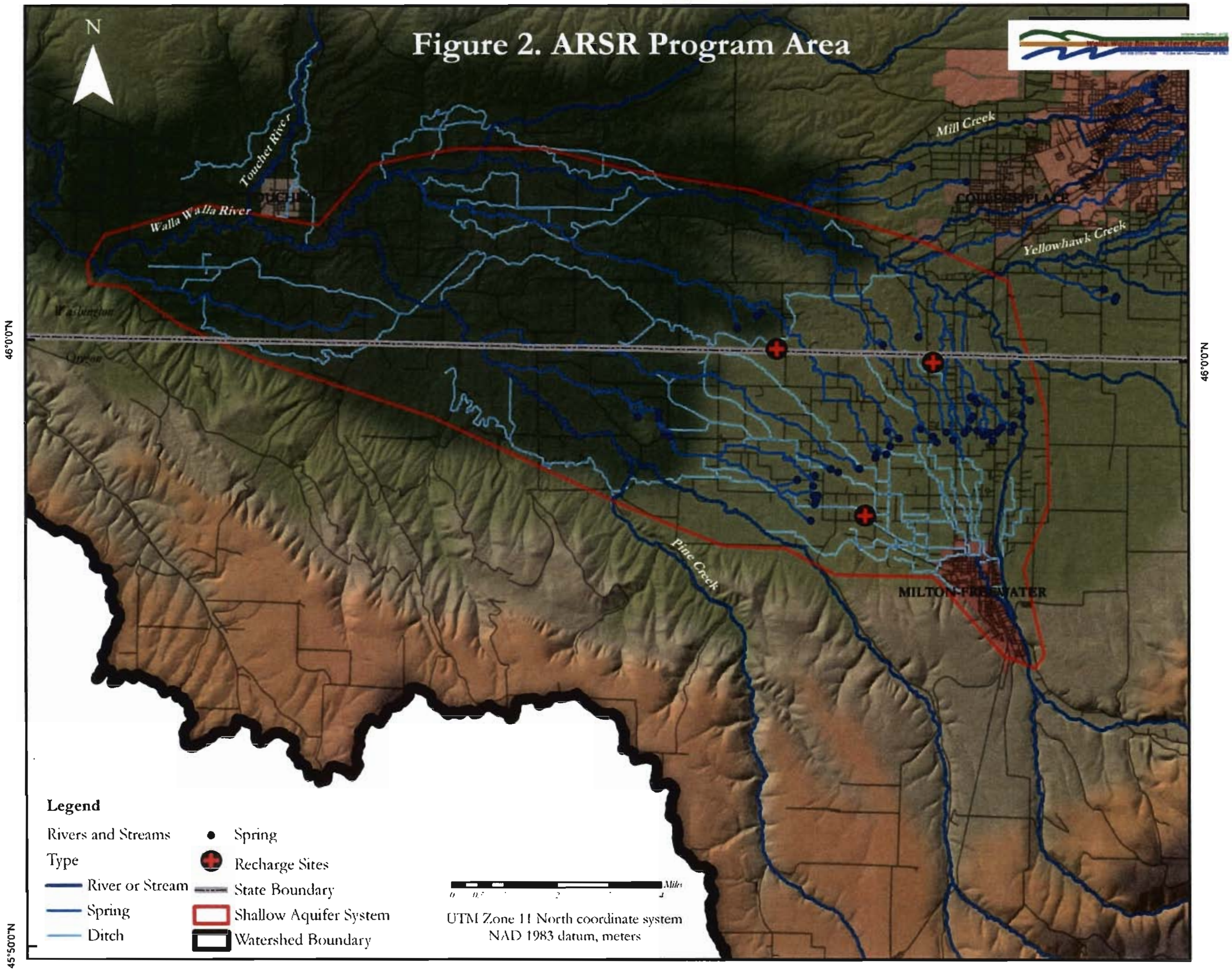
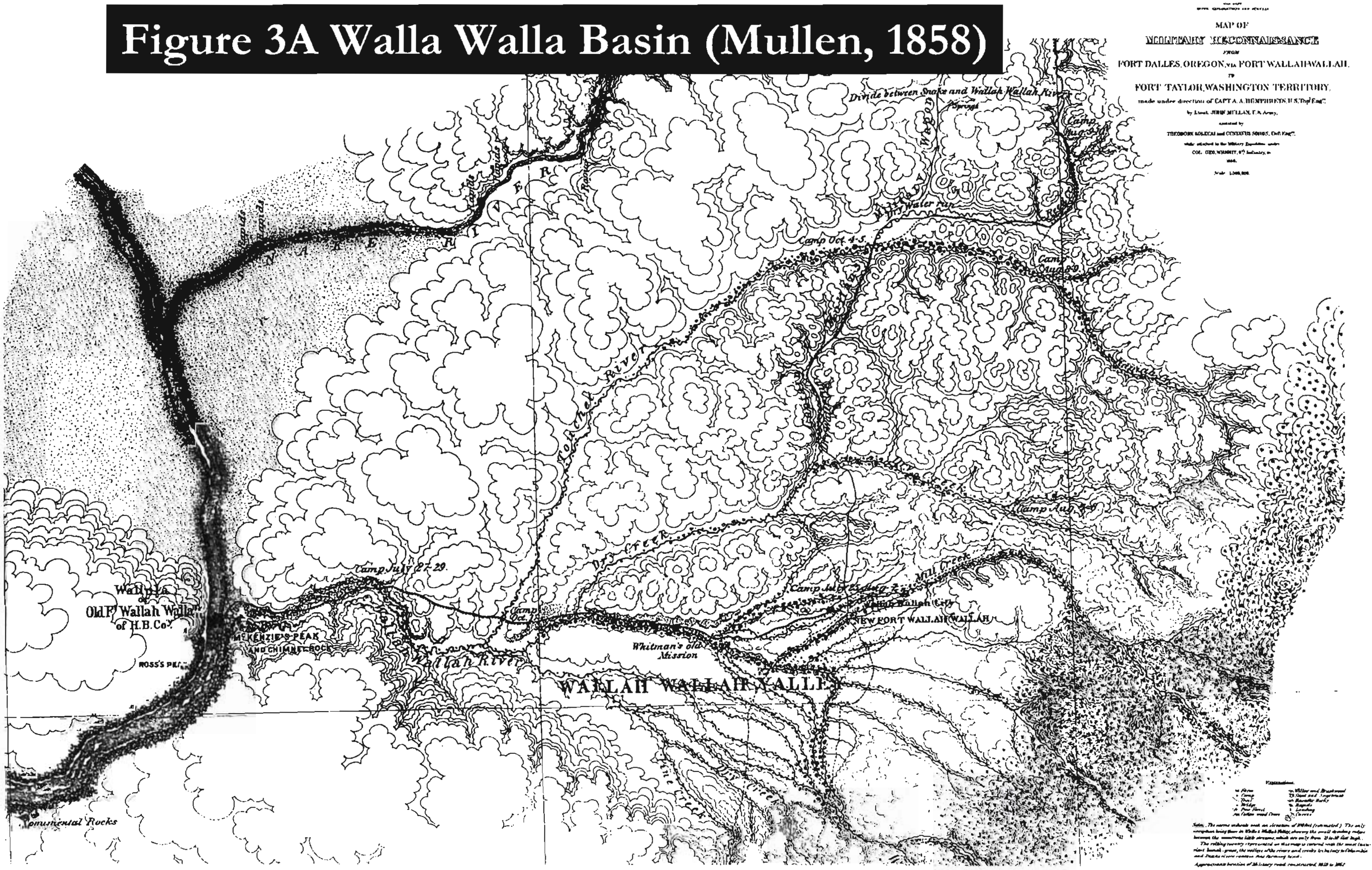
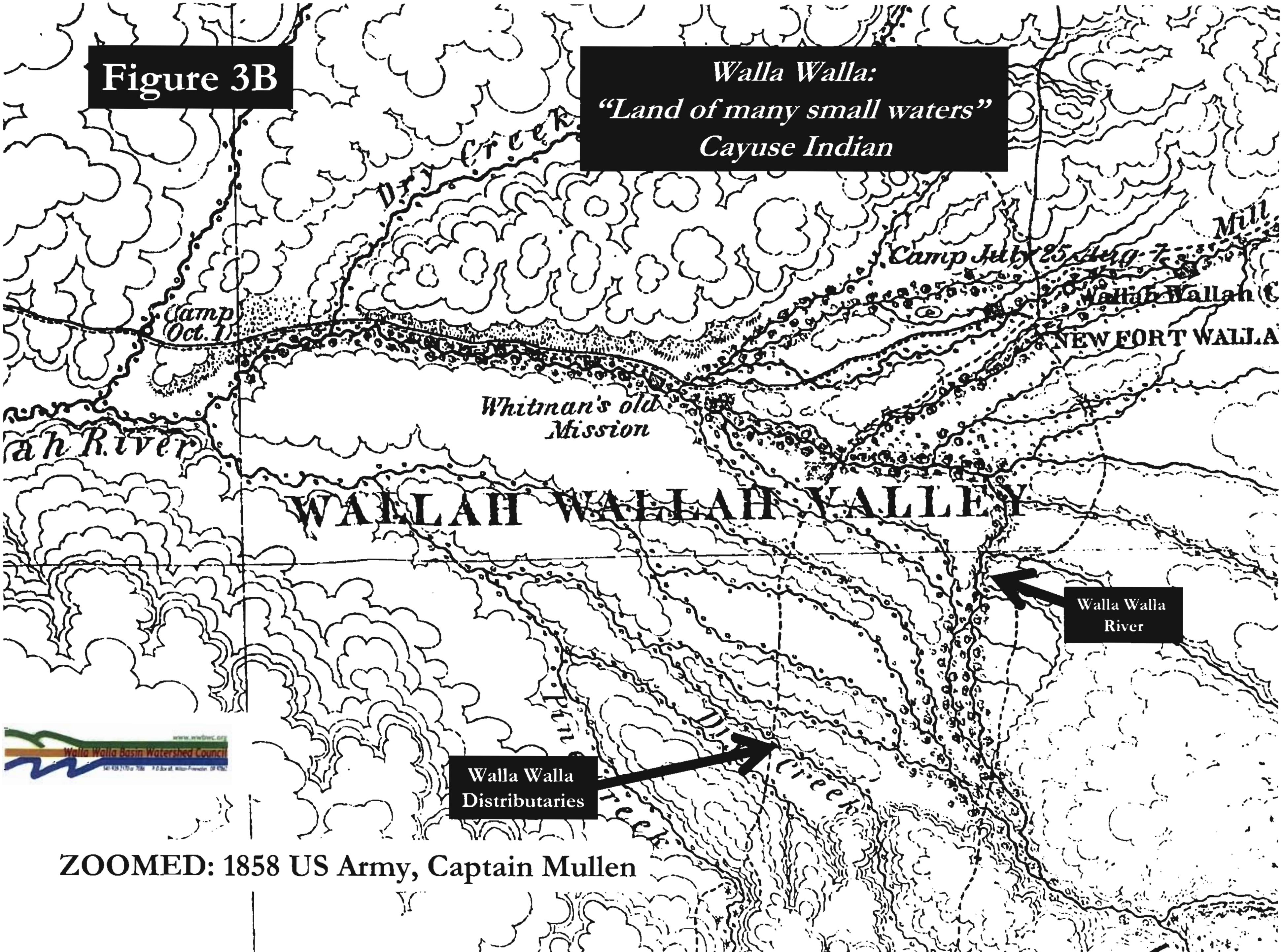


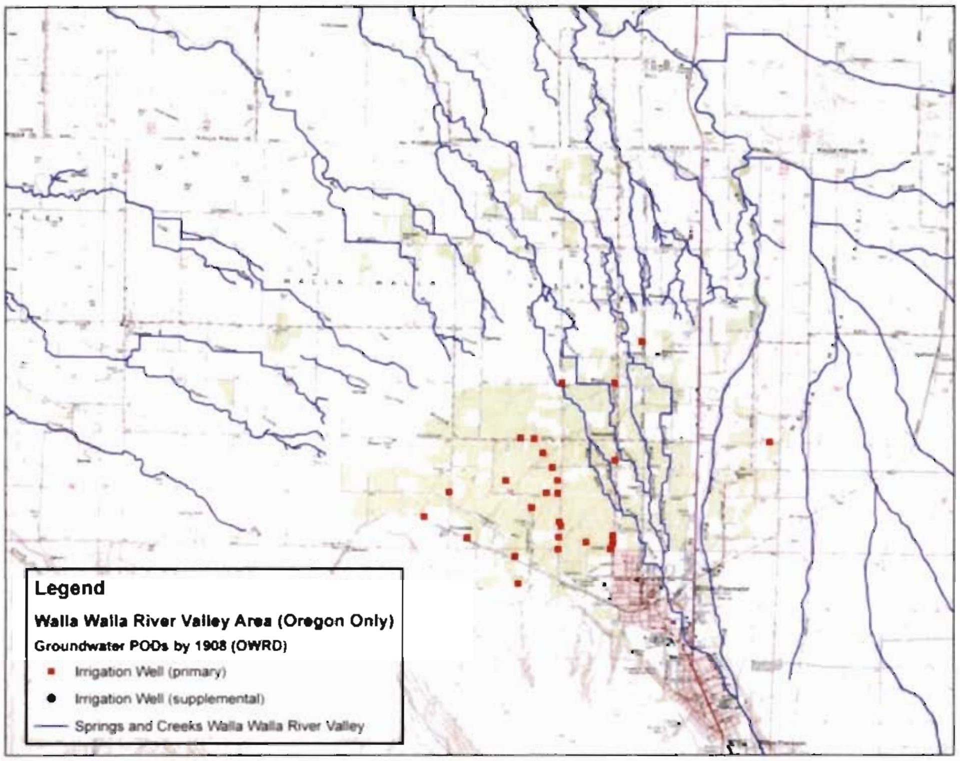
Figure 2. ARSR Program Area
N
Mill Creek
Yellowhawk Creek
Touchet River
Walla Walla River
Washington
Oregon
Pine Creek
MILTON-FREEWATER
46°0'0"N
46°0'0"N
45°50'0"N
Legend
Rivers and Streams
Type
River or Stream
Spring
Ditch
Spring
Recharge Sites
State Boundary
Shallow Aquifer System
Watershed Boundary
Miles
UTM Zone 11 North coordinate system
NAD 1983 datum, meters

Figure 3A Walla Walla Basin (Mullen, 1858)

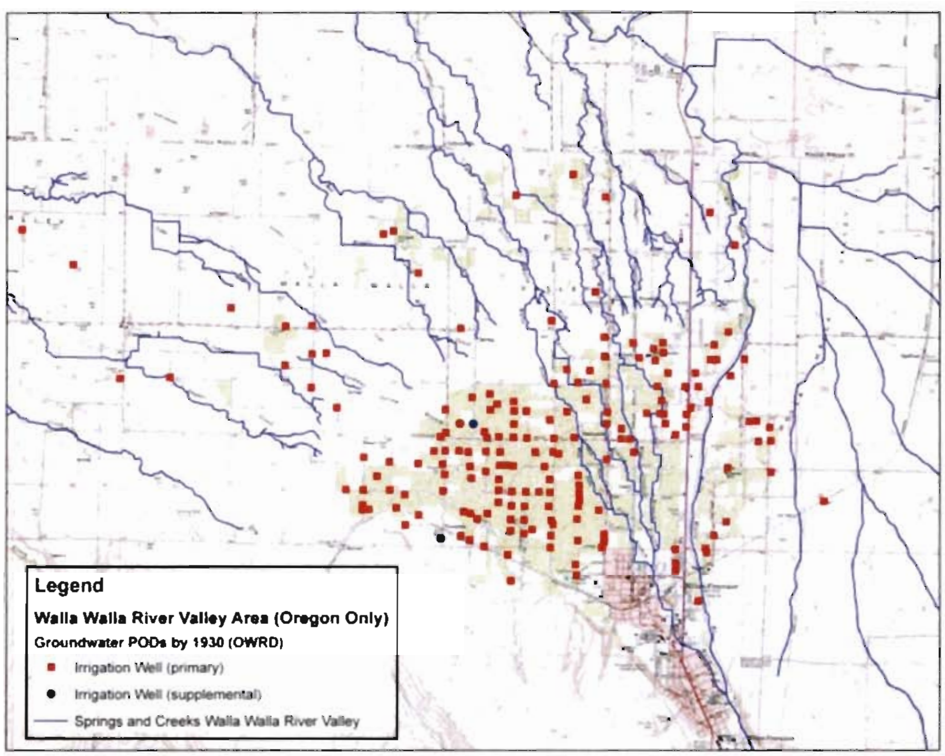




ZOOMED: 1858 US Army, Captain Mullen

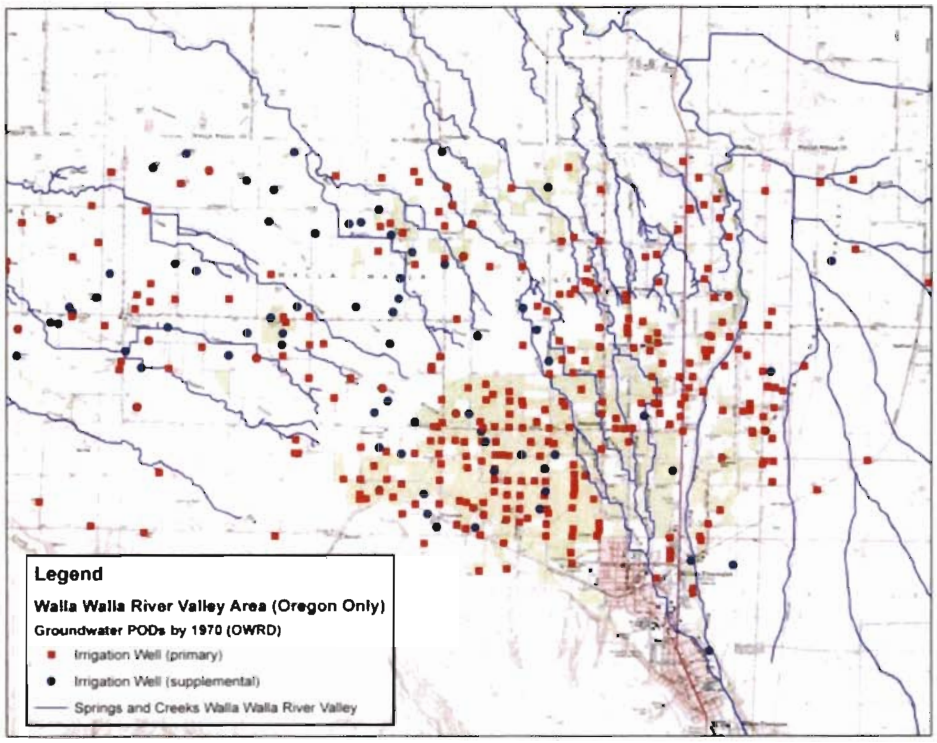


4A. 1908

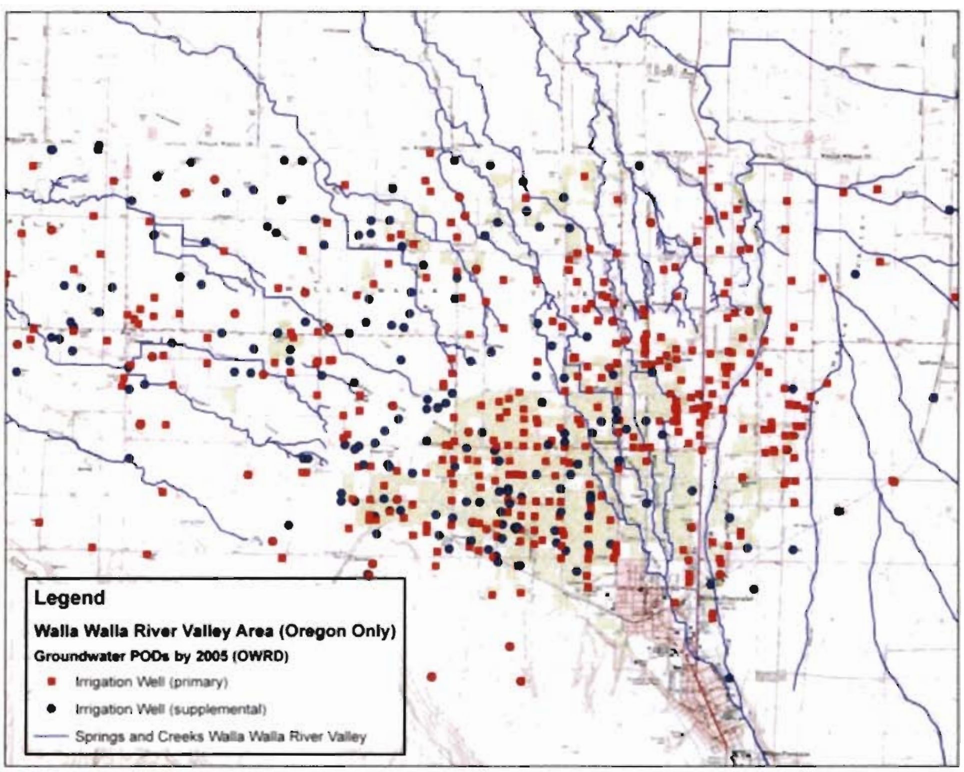


4B. 1930

Figure 4A- 4B Historical Progression of Groundwater Development in Oregon Portion of the Walla Walla River Valley: 1903-2005 (WRIS Data, 2006)



4C. 1970



4D. 2005

Figure 4C- 4D Historical Progression of Groundwater Development in Oregon Portion of the Walla Walla River Valley: 1903-2005 (WRIS Data, 2006)

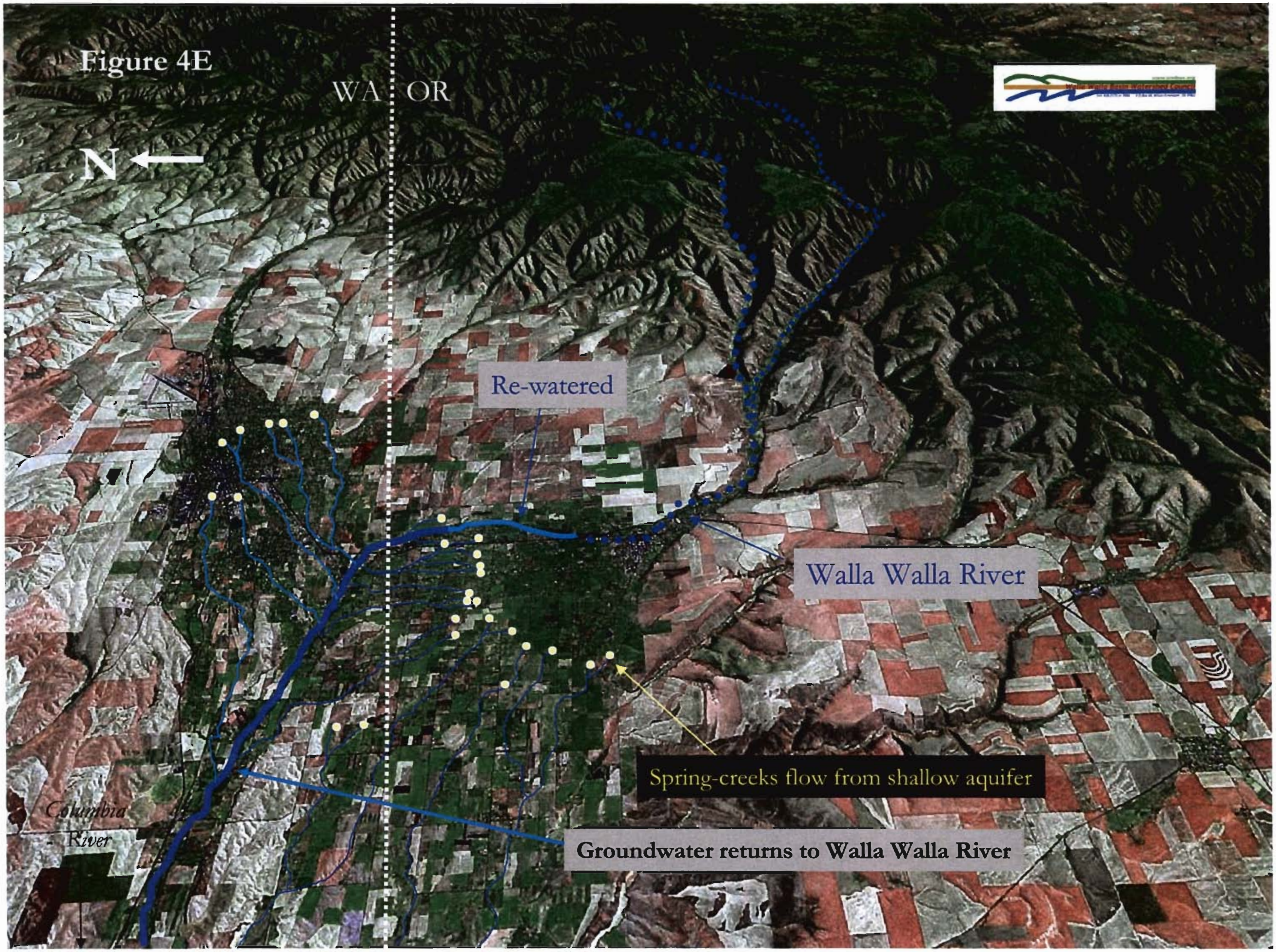
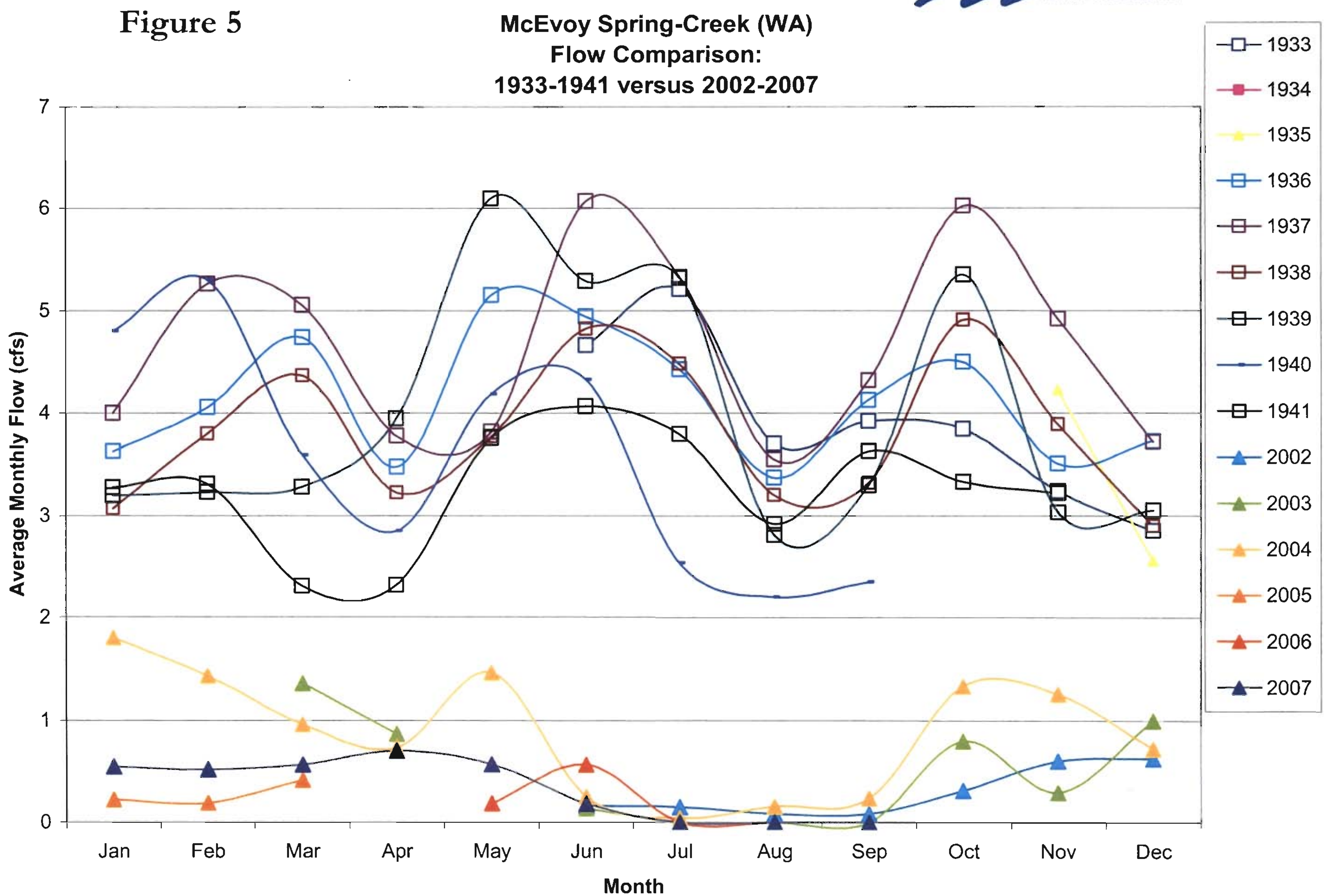


Figure 4E
WA
OR
N
Re-watered
Walla Walla River
Spring-creeks flow from shallow aquifer
Groundwater returns to Walla Walla River
Columbia River

Figure 5



In 2008 McEvoy Creek was dry nearly year round

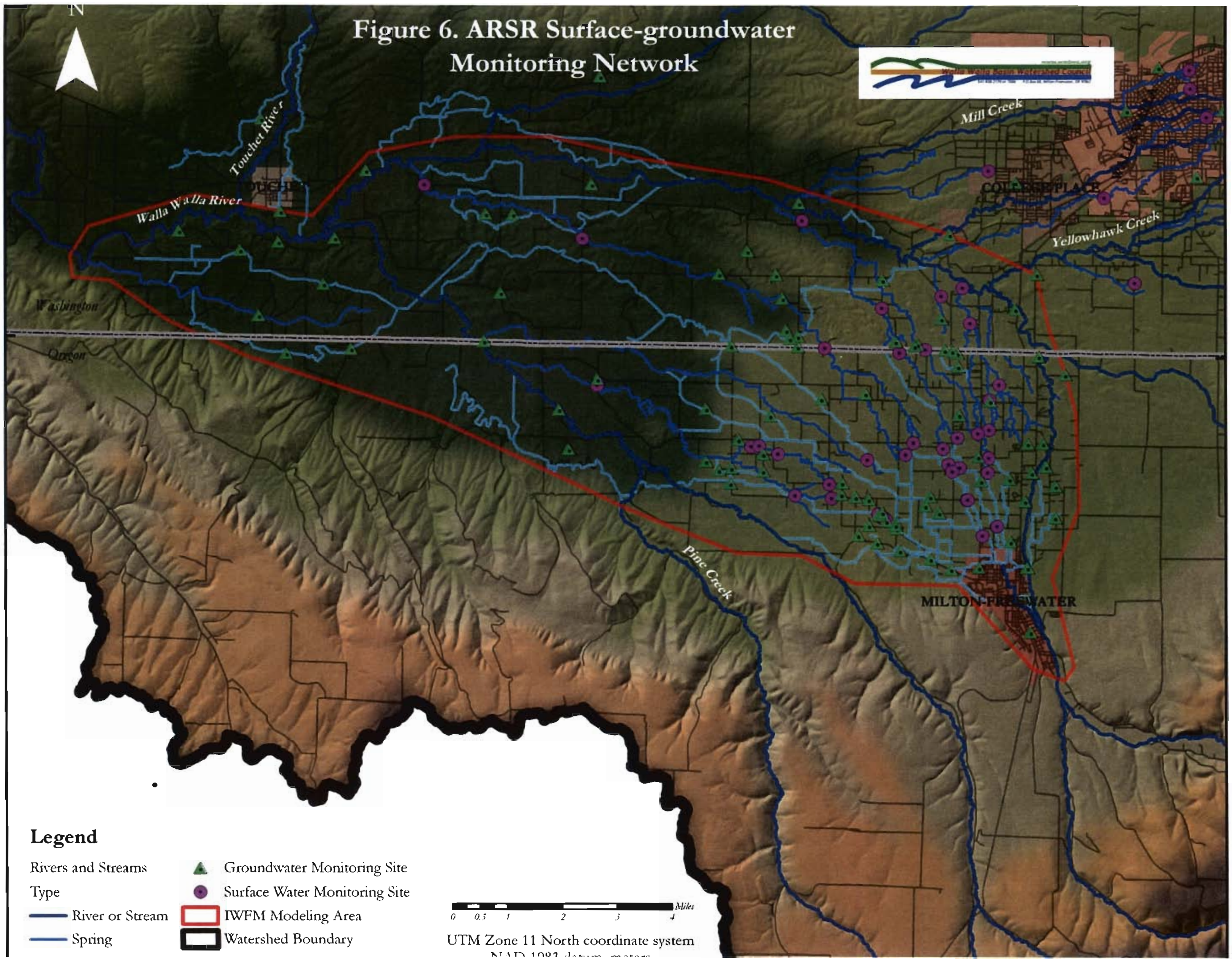


Figure 6. ARSR Surface-groundwater Monitoring Network
N
Touchet River
Walla Walla River
Mill Creek
College Place
Yellowhawk Creek
Washington
Oregon
Pine Creek
MILTON-FREEWATER
46°0'0"N
46°0'0"N
Legend
Rivers and Streams
Type
River or Stream
Spring
Groundwater Monitoring Site
Surface Water Monitoring Site
IWFM Modeling Area
Watershed Boundary
0 0.5 1 2 3 4 Miles
UTM Zone 11 North coordinate system

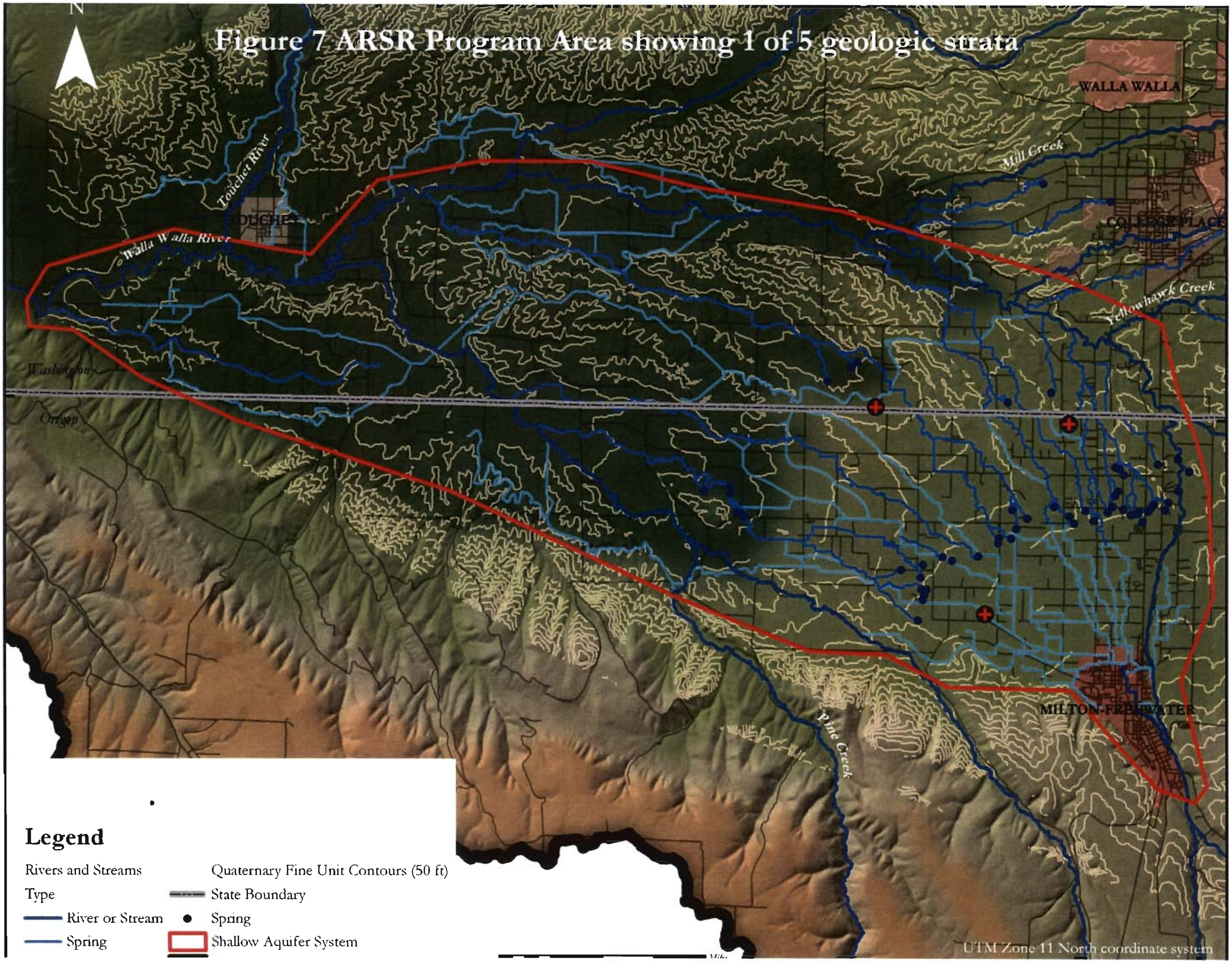
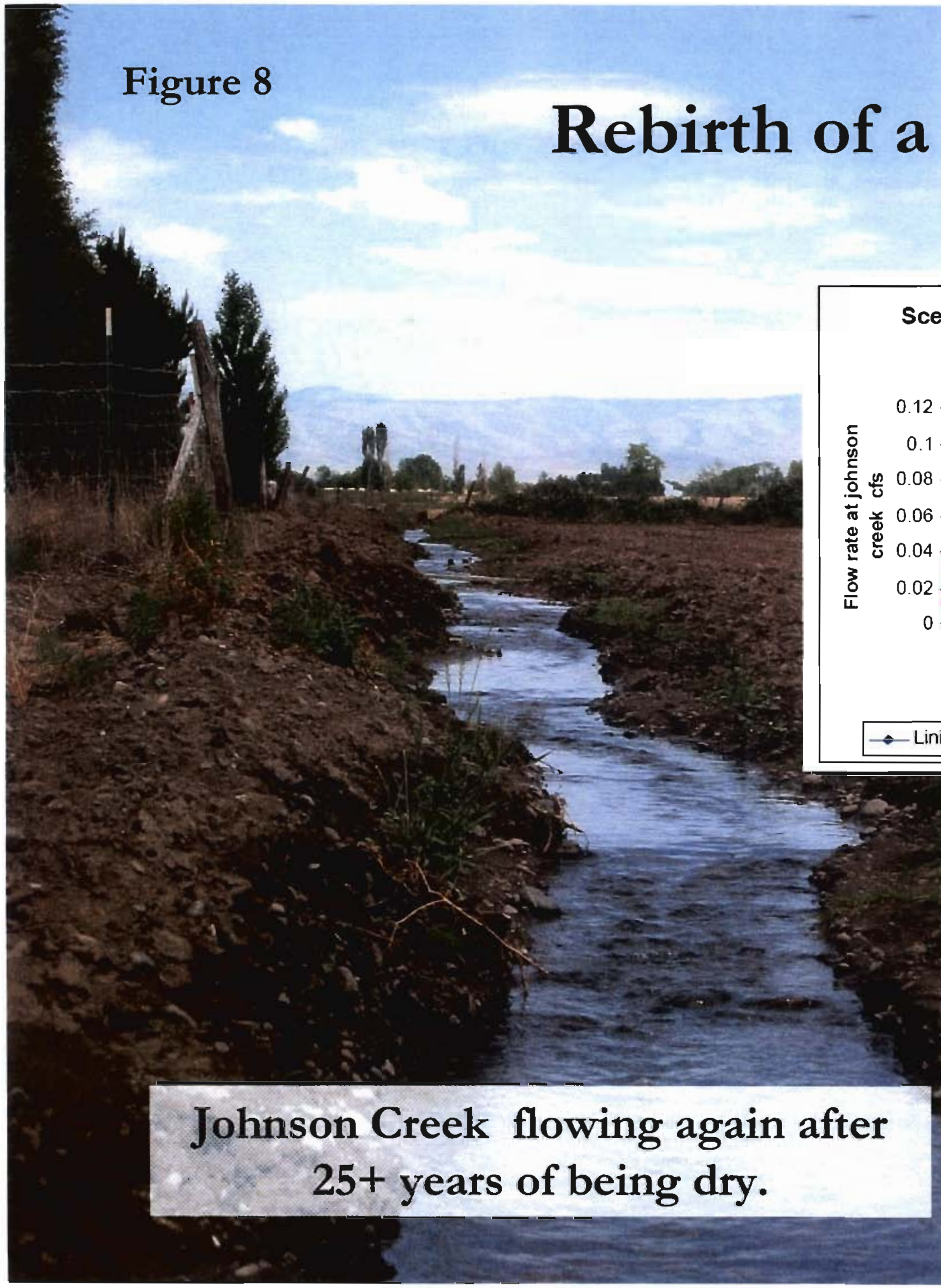


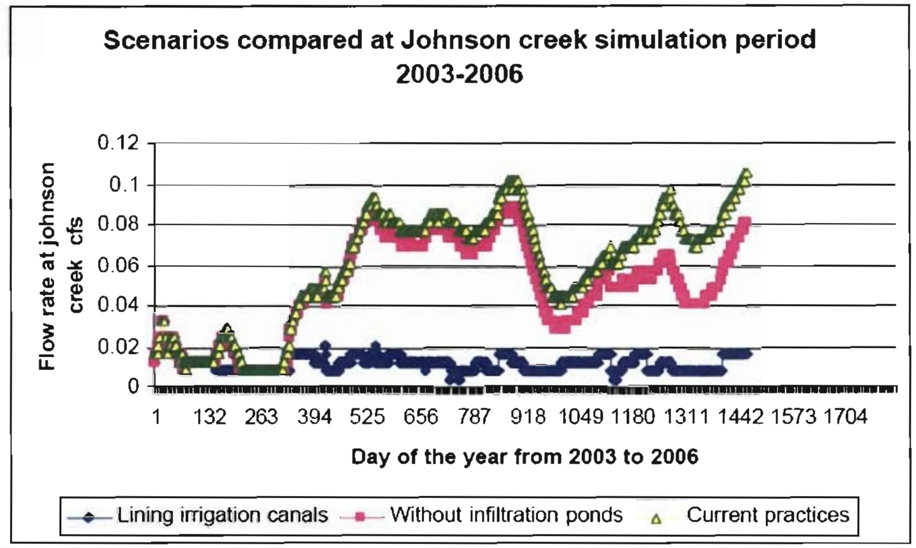
Figure 7 ARSR Program Area showing 1 of 5 geologic strata
N
WALLA WALLA
COLLEGE PLACE
Mill Creek
Yellowhawk Creek
Touchet River
TOUCHET
Walla Walla River
Washington
Oregon
46°0'0"N
46°0'0"N
Pine Creek
MILTON-FREEWATER
Legend
Rivers and Streams
Type
River or Stream
Spring
Quaternary Fine Unit Contours (50 ft)
State Boundary
Spring
Shallow Aquifer System
UTM Zone 11 North coordinate system

Figure 8

Rebirth of a stream



Johnson Creek flowing again after 25+ years of being dry.



Surface-groundwater Modeling tracks HBDIC contributions to Johnson Creek Returned flows. (Petrides, OSU 2008)

Figure 9

HBDIC Recharge Project Site: Current

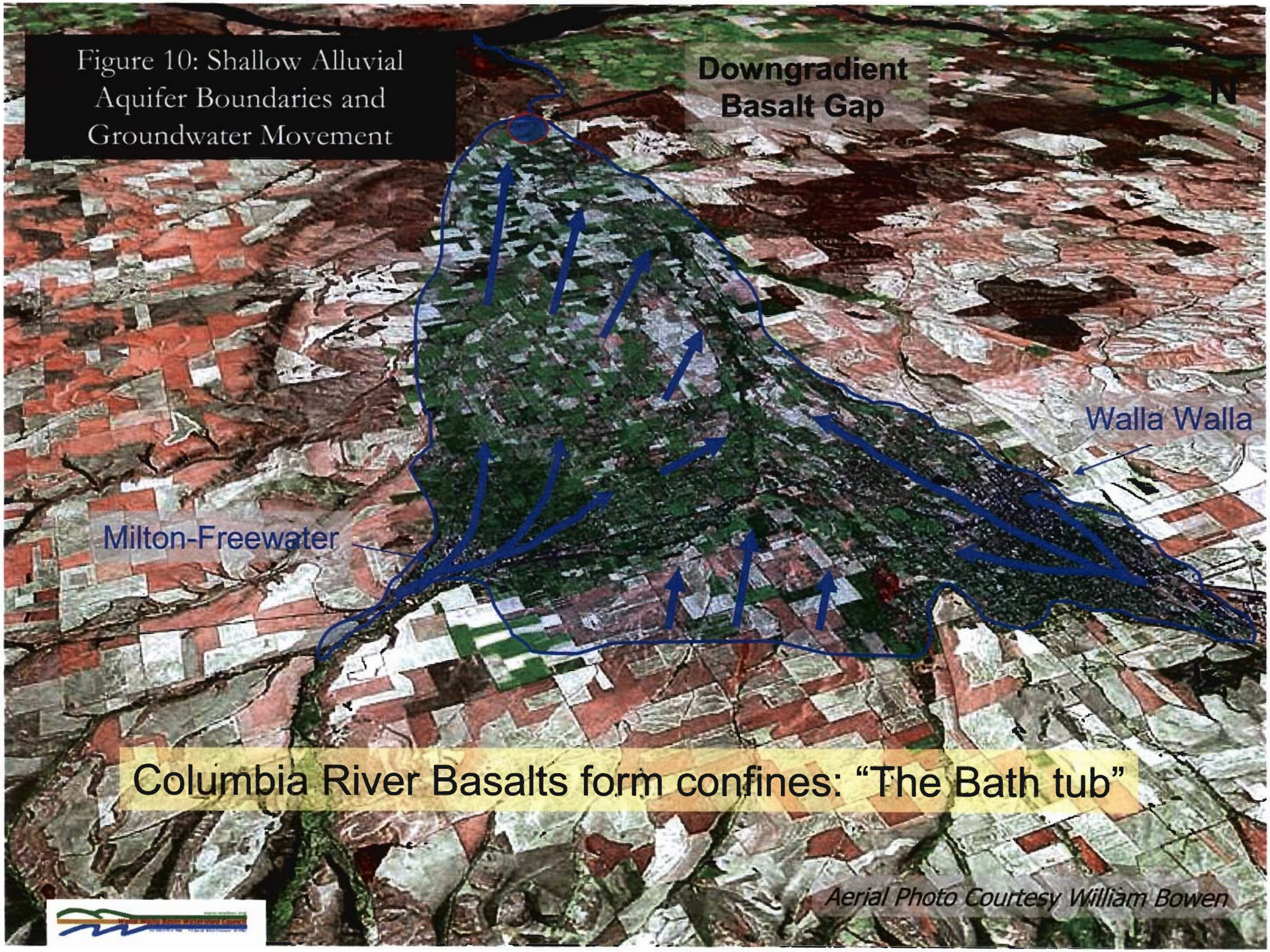


Figure 10: Shallow Alluvial Aquifer Boundaries and Groundwater Movement
Downgradient Basalt Gap
N
Walla Walla
Milton-Freewater
Columbia River Basalts form confines: "The Bath tub"
Aerial Photo Courtesy William Bowen

Figure 11. Surface-groundwater interactions with high gradient between water table and surface water

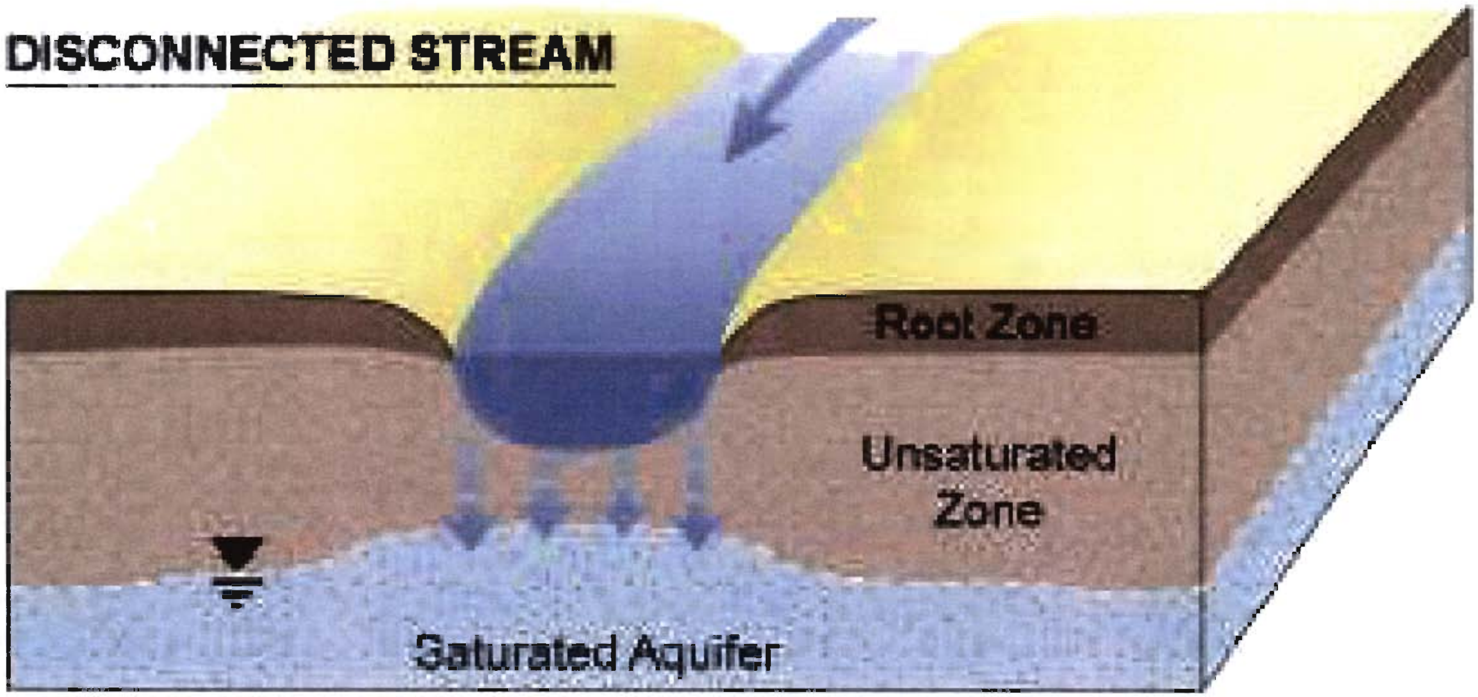
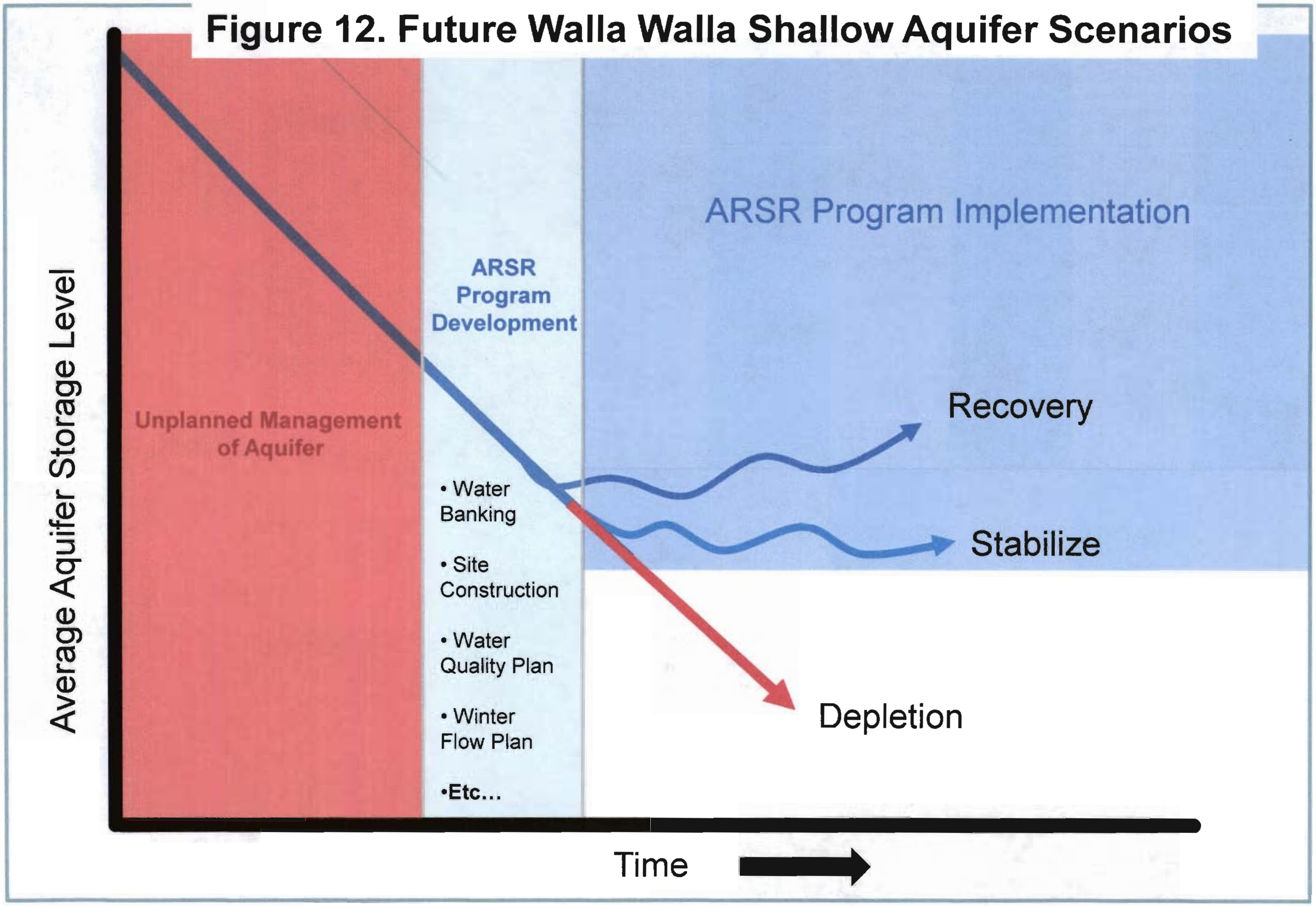


Image Courtesy of OSU

Figure 12. Future Walla Walla Shallow Aquifer Scenarios



* Diagraph concept from Umatilla County 2050 Plan (2008, UCCGTF)

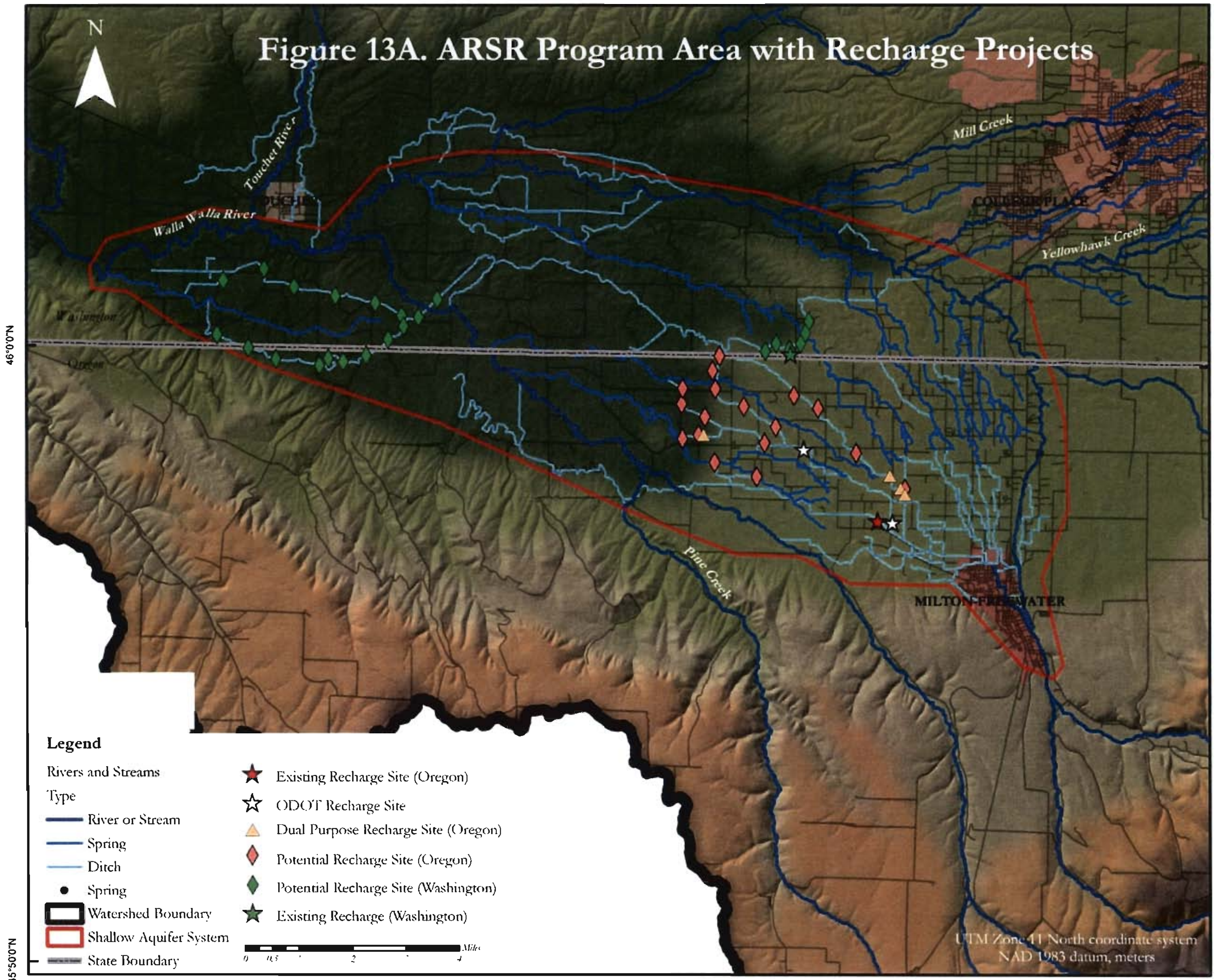


Figure 13A. ARSR Program Area with Recharge Projects
N
Mill Creek
Touchet River
Walla Walla River
College Place
Yellowhawk Creek
Washington
Oregon
46°0'0"N
Pine Creek
MILTON-FREEWATER
Legend
Rivers and Streams
Type
River or Stream
Spring
Ditch
Spring
Watershed Boundary
Shallow Aquifer System
State Boundary
Existing Recharge Site (Oregon)
ODOT Recharge Site
Dual Purpose Recharge Site (Oregon)
Potential Recharge Site (Oregon)
Potential Recharge Site (Washington)
Existing Recharge (Washington)
0 0.5 1 2 3 4 Miles
UTM Zone 11 North coordinate system
NAD 1983 datum, meters
45°50'0"N

Figure 13. OWEB Funded ARSR Recharge Sites and Monitoring System

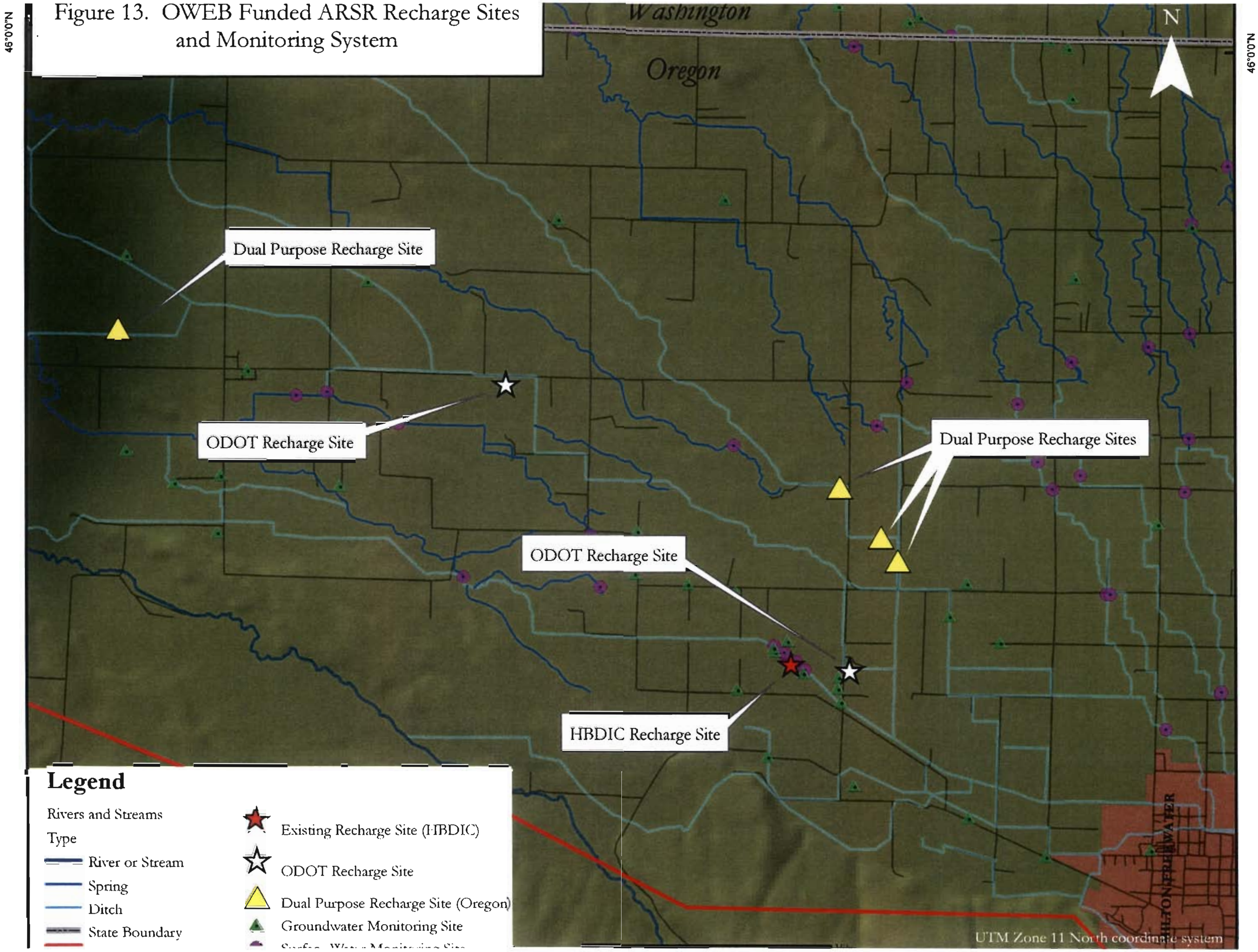


Figure 14

HBDIC Recharge Site: Phase III of III
6N 35E 33 NE

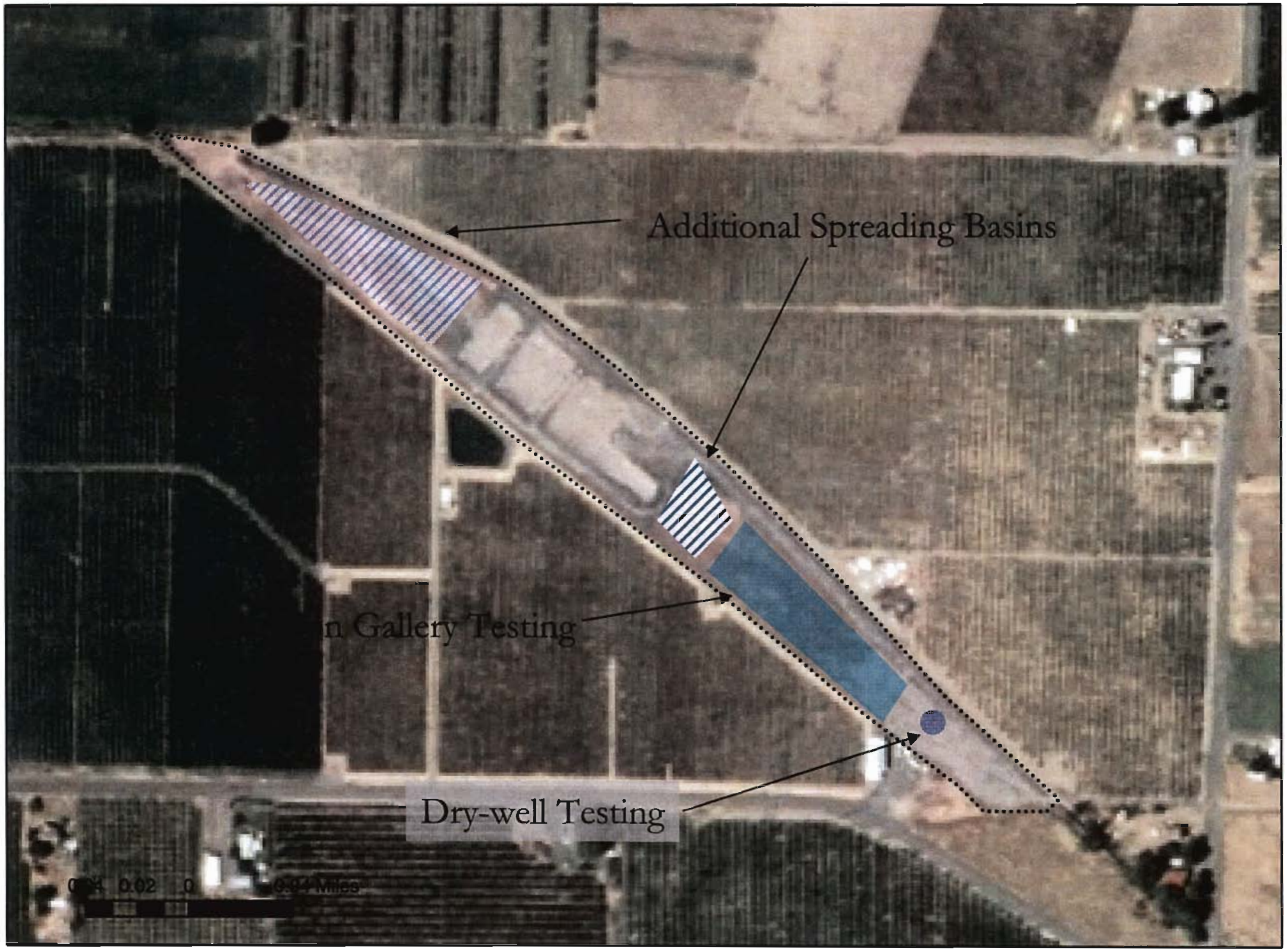


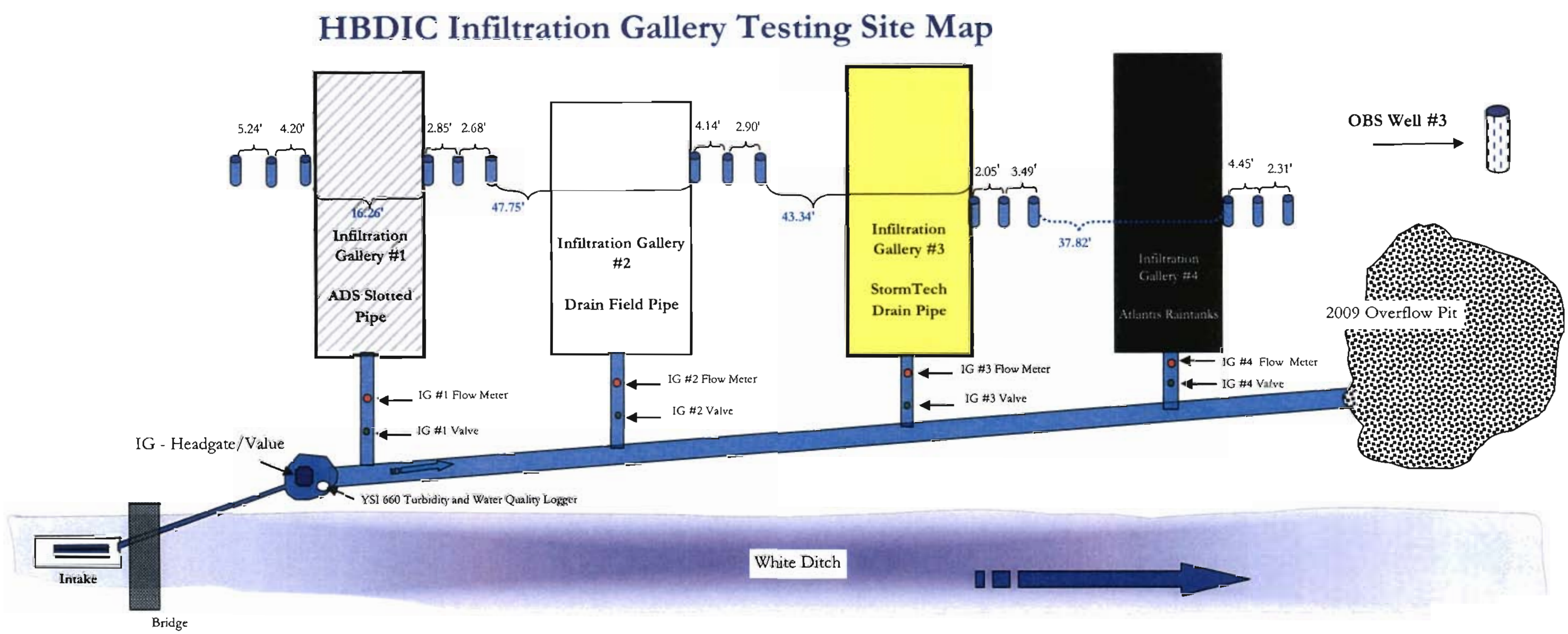
Figure 15

ODOT Surplus Property #1
6N 35E 34 NW

Figure 16

ODOT Surplus Property #2
6N 35E 29 NW

Figure 17

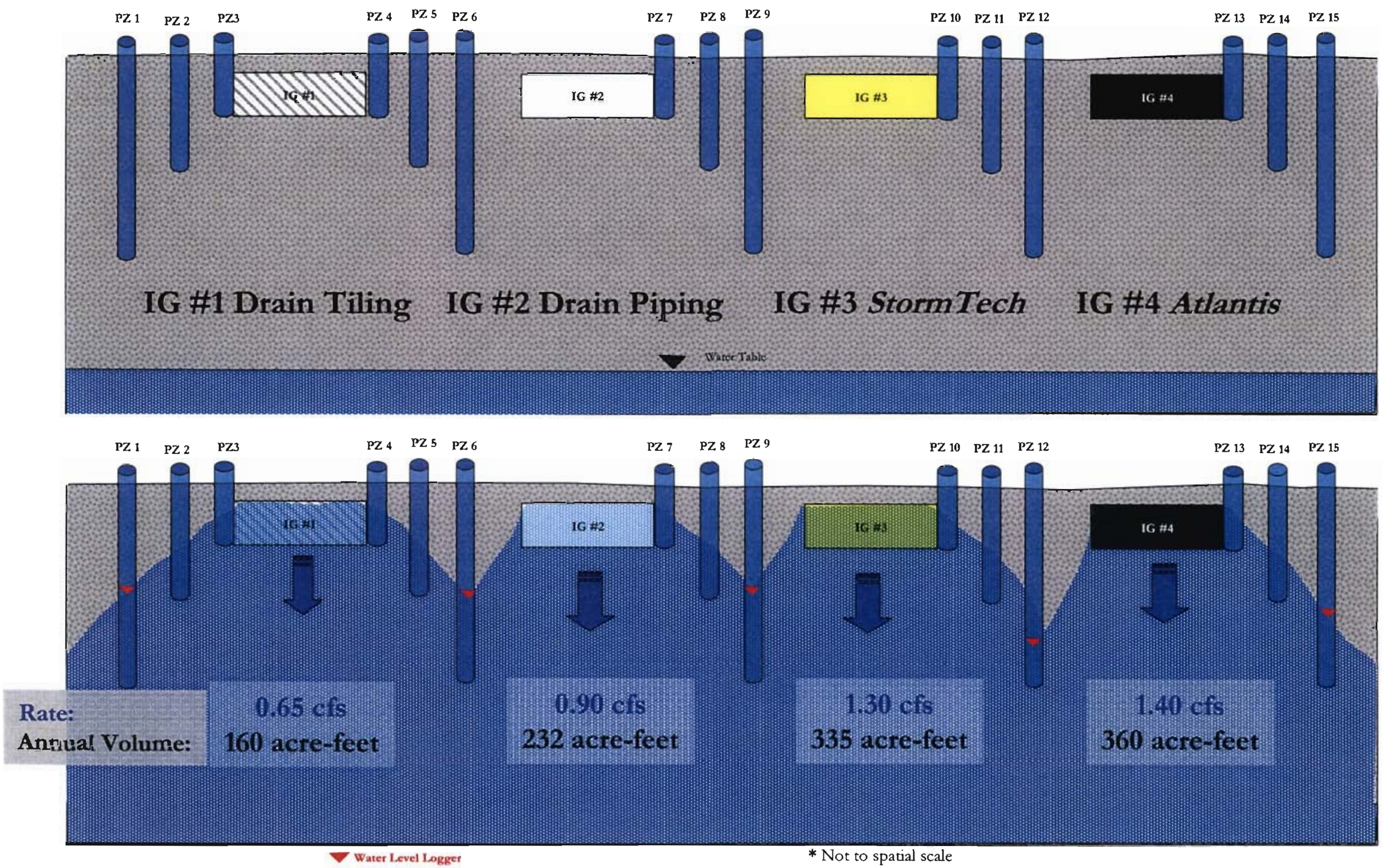


During the 2008-2009 Recharge Season, infiltration galleries are being tested at the HBDIC Recharge site, near Milton-Freewater Oregon. Preliminary testing results indicate infiltration galleries are viable recharge mechanism for areas where spreading basins are not feasible. A combination of all methods will be assessed during the design and siting phase of this program.

Figure 18

HBDIC Infiltration Gallery Testing Site: Profile of Galleries and Piezometers

2008-2009 Preliminary Testing Results



* Not to spatial scale

Figure 21

Infiltration Gallery Instrumentation

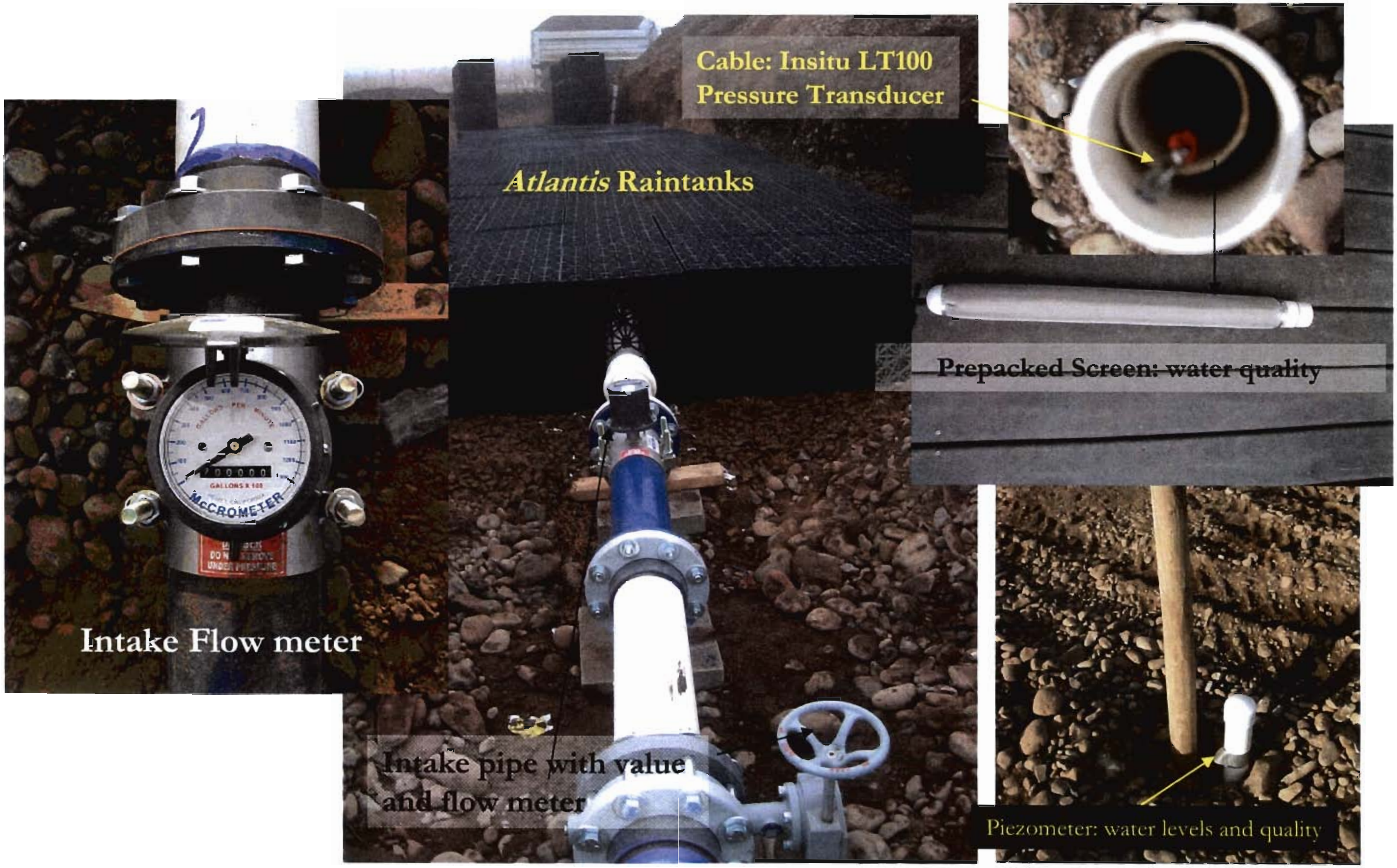
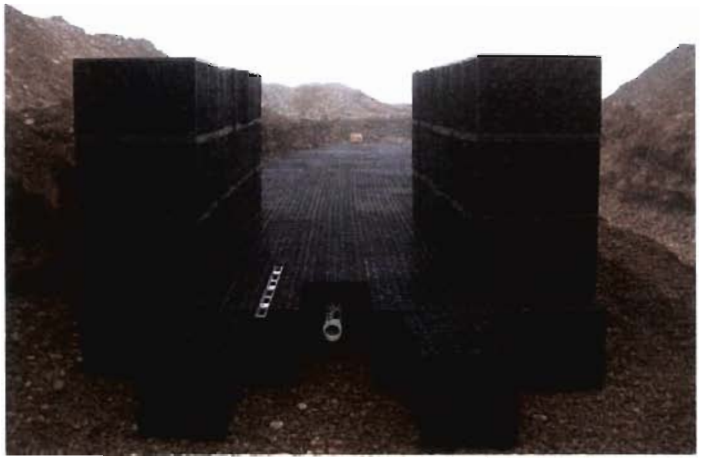
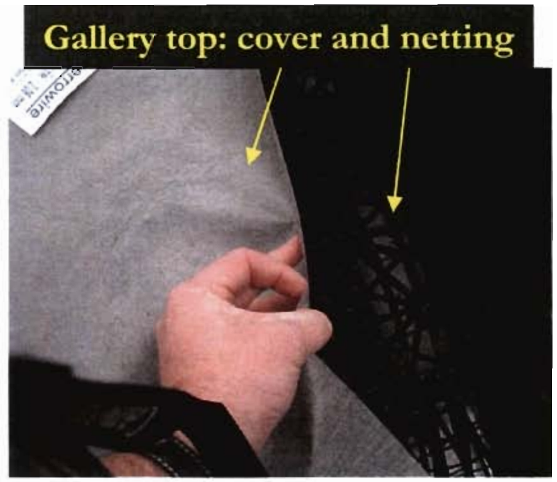


Figure 22

Infiltration Galleries: *Atlantis® D-Raintank® Tank Module*



Raintanks being deployed

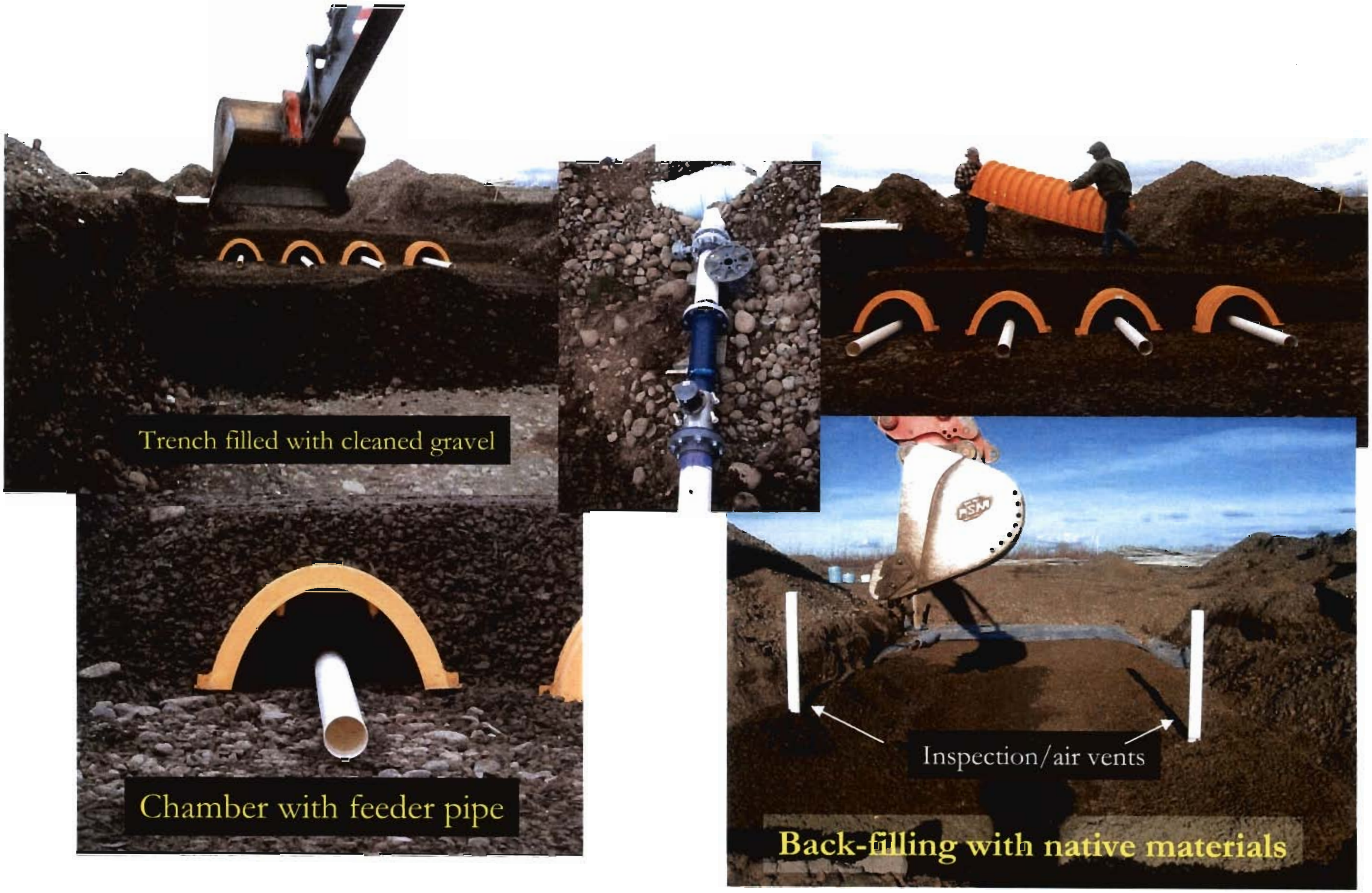


Backfill: native materials

Intake: Value and metered

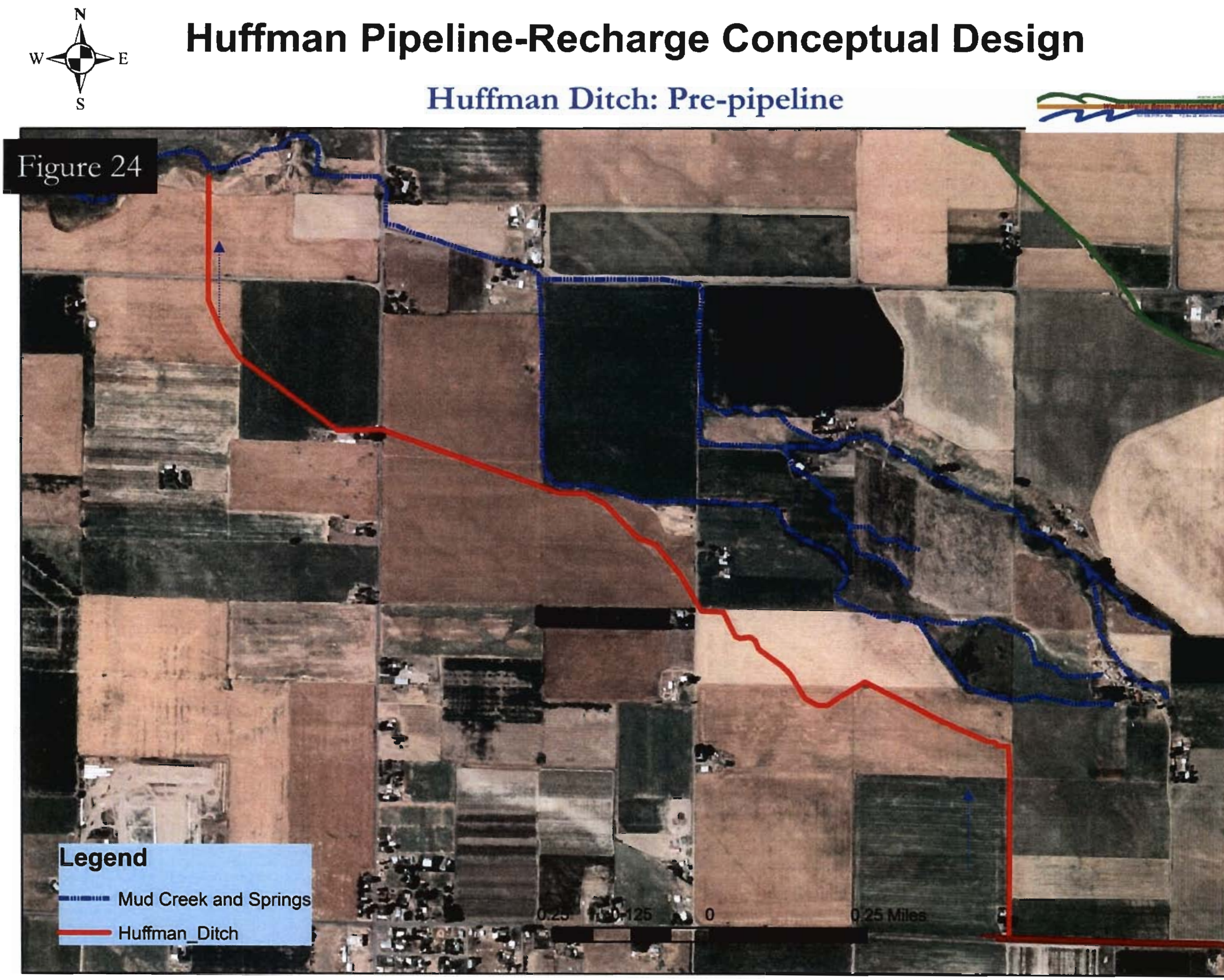
Figure 23

Infiltration Gallery: *Stormtech* **SC-740™ Chamber**



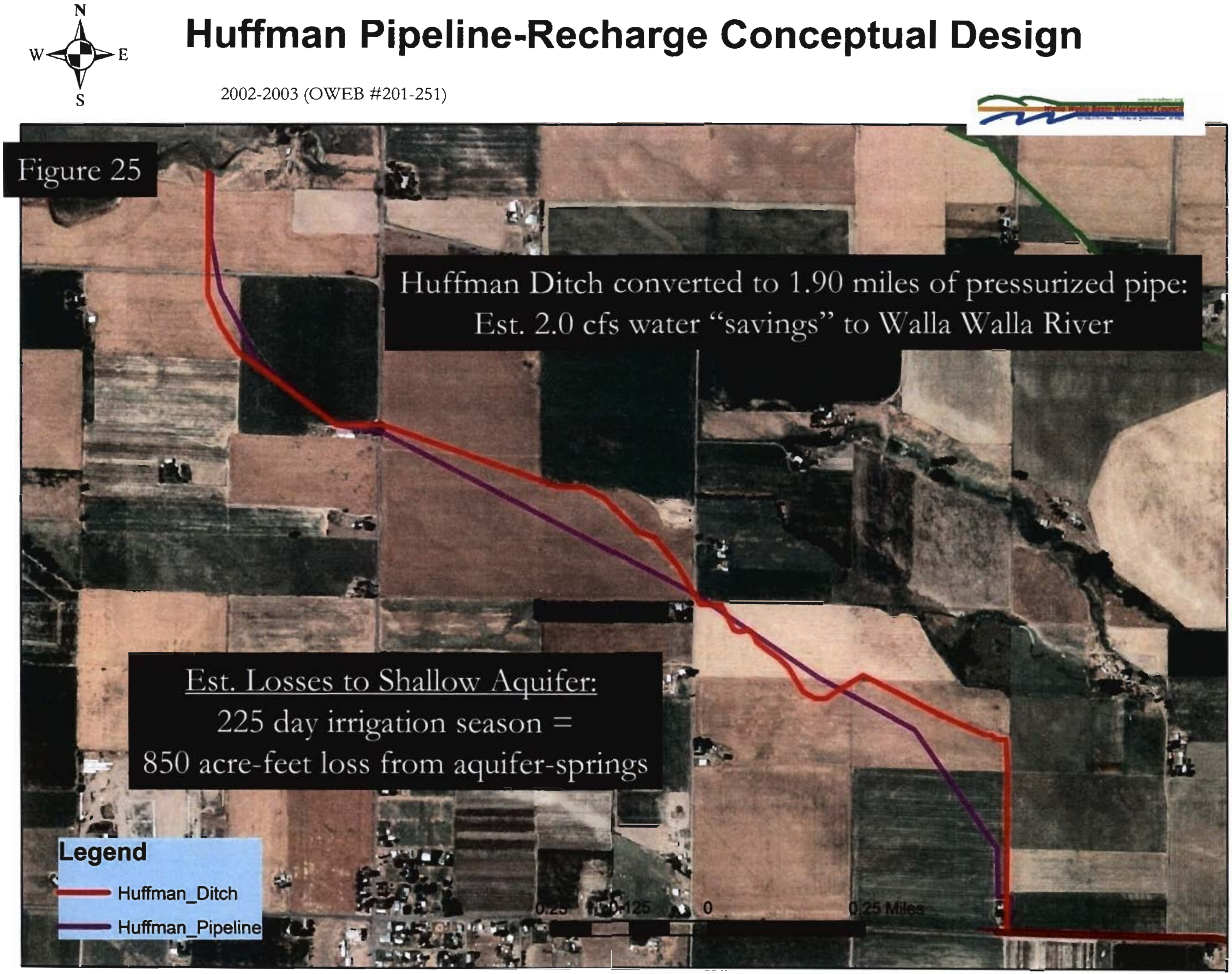
Huffman Pipeline-Recharge Conceptual Design

Huffman Ditch: Pre-pipeline



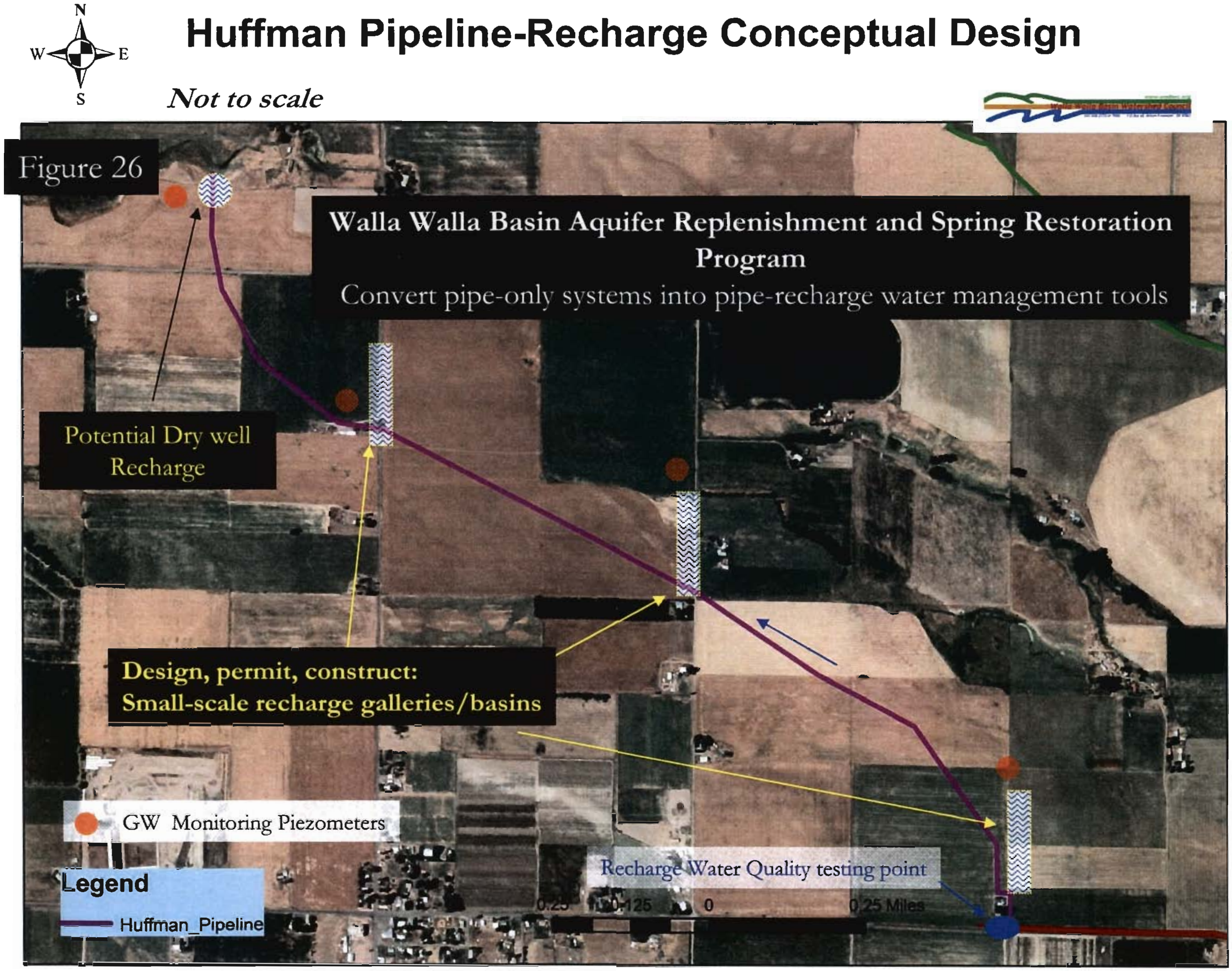
Huffman Pipeline-Recharge Conceptual Design

2002-2003 (OWEB #201-251)

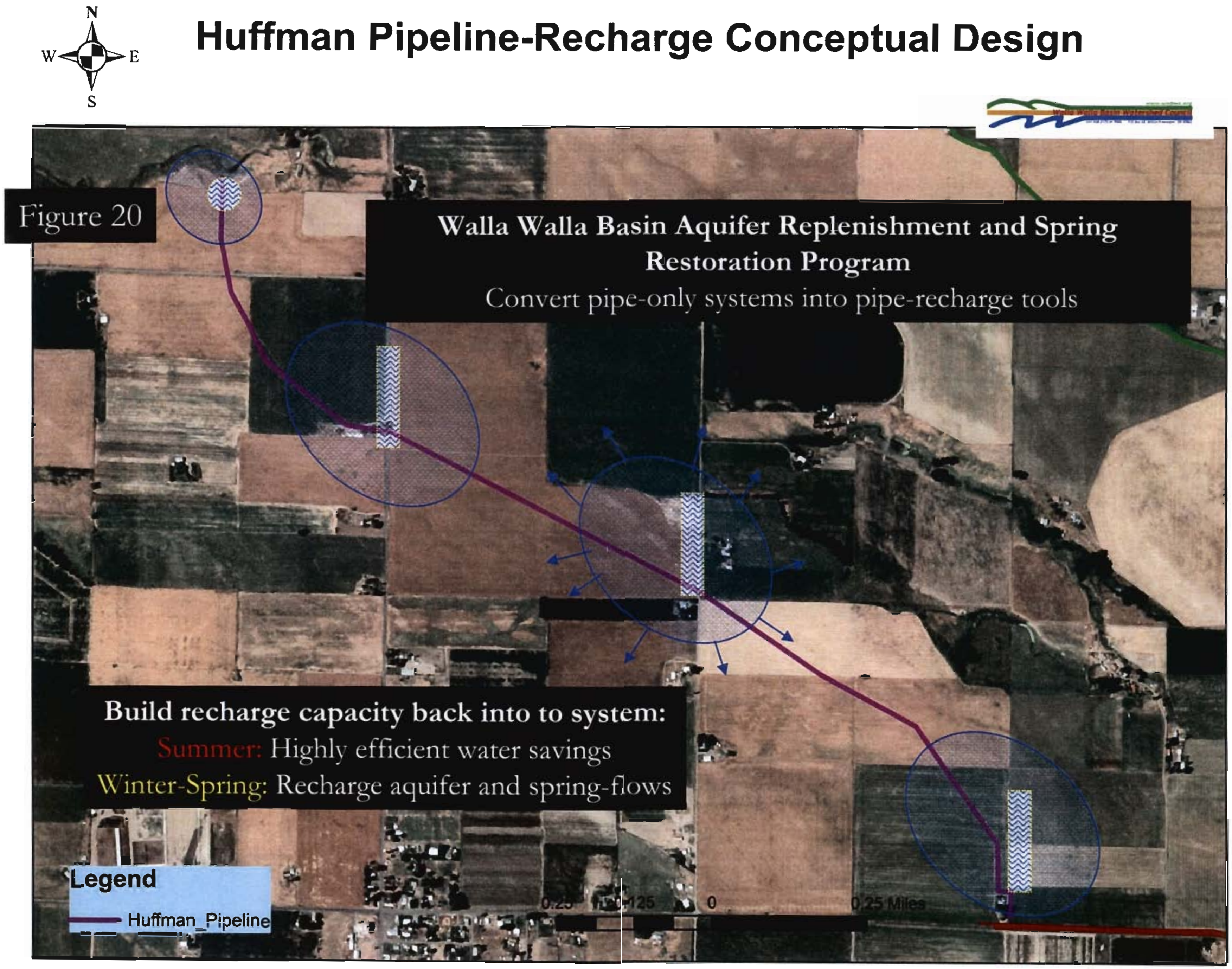


Huffman Pipeline-Recharge Conceptual Design

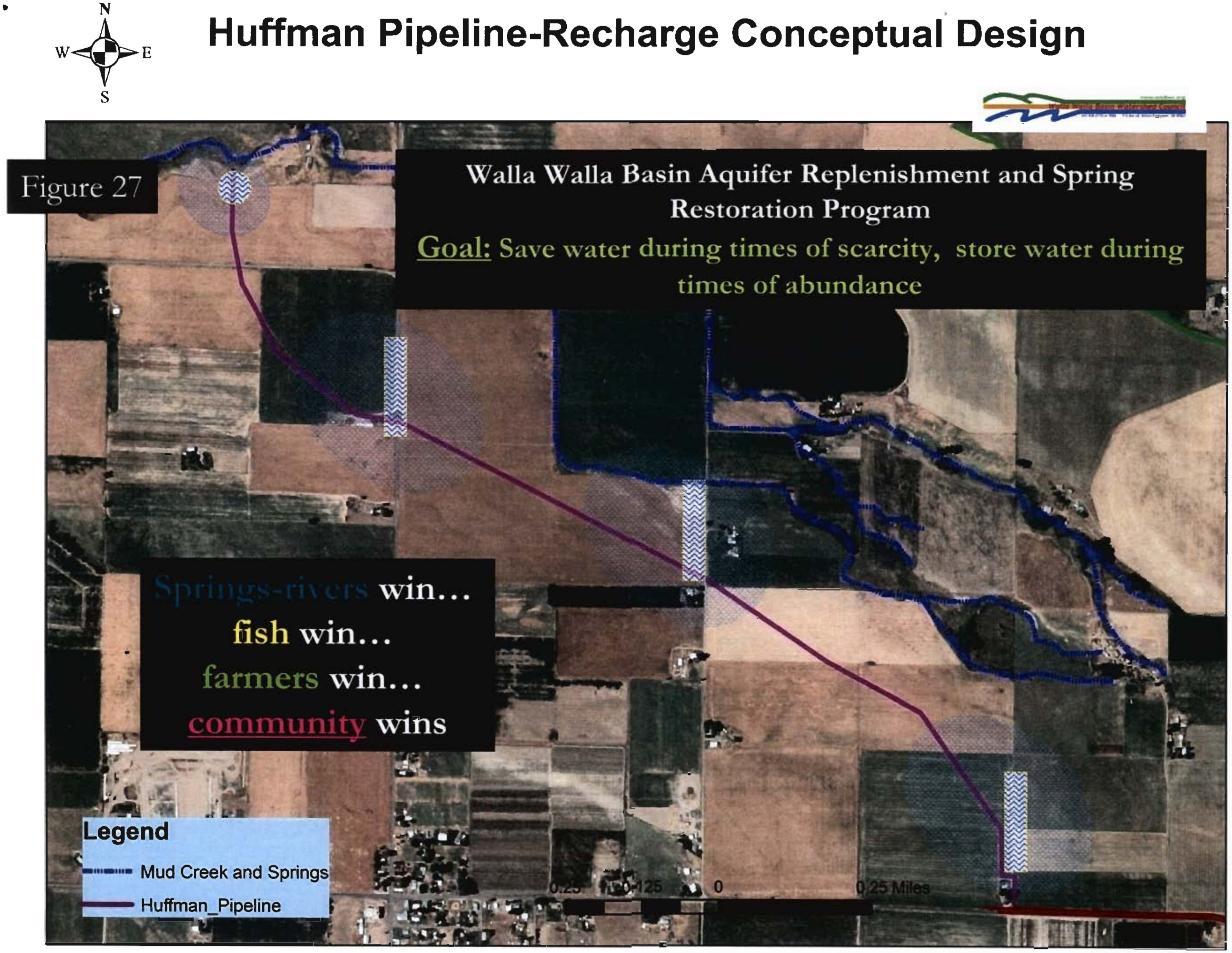
Not to scale



Huffman Pipeline-Recharge Conceptual Design

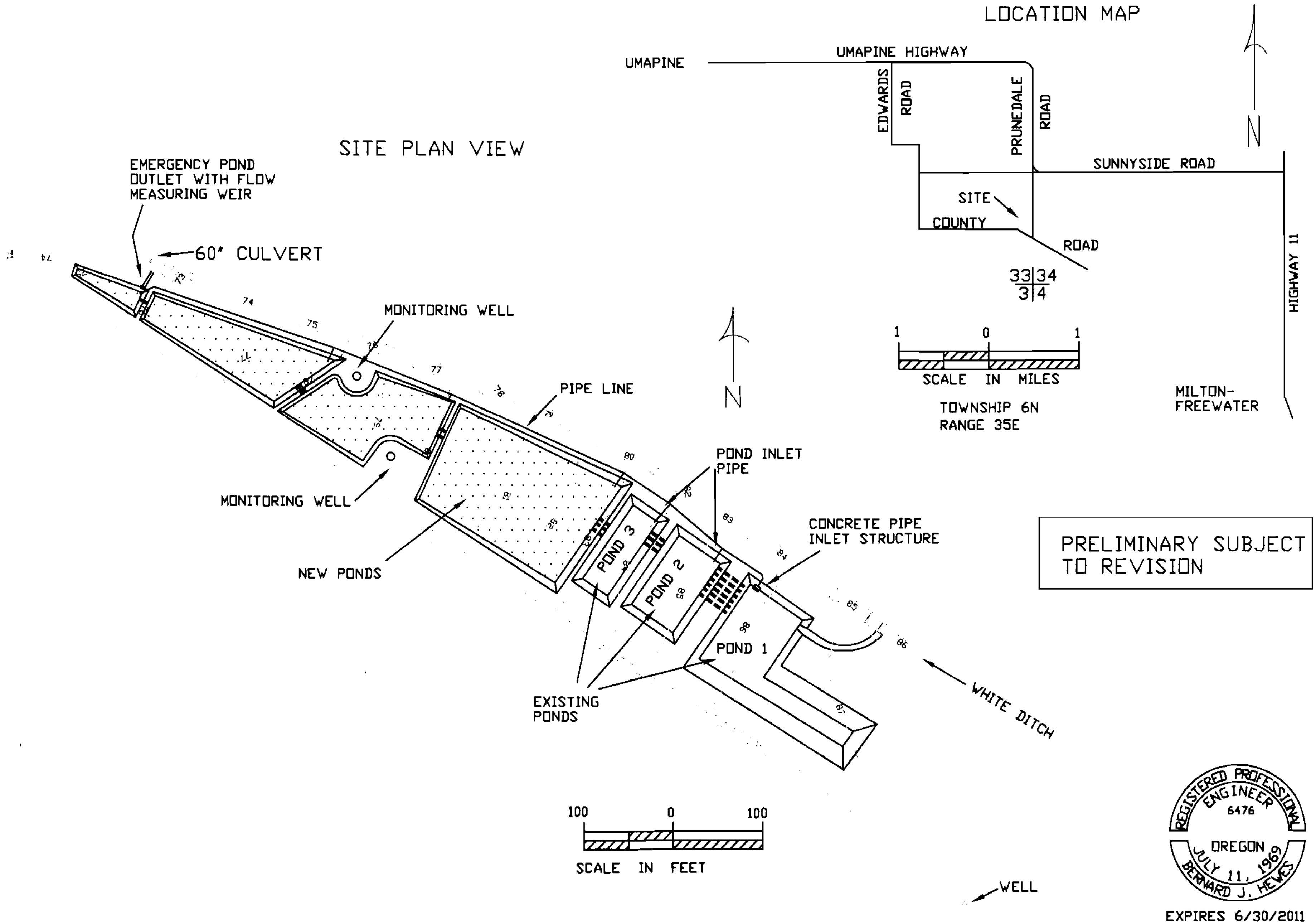


Huffman Pipeline-Recharge Conceptual Design



ATTACHMENT

1



WWBWC/HBDIC LOWER RECHARGE PROJECT
LOCATION MAP & SITE MAP
UMATILLA COUNTY, OREGON

R H ENGINEERING

DESIGNED B. HEWES | DATE 9/09

CHECKED

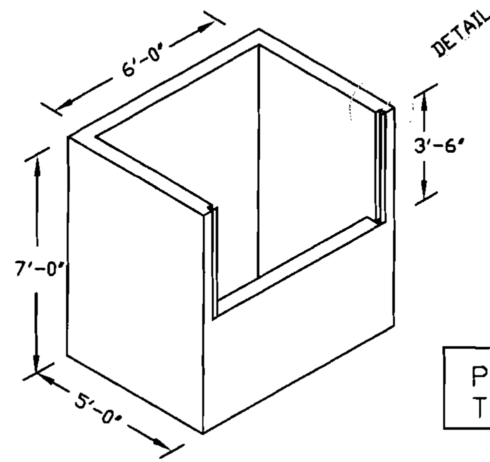
APPROVED

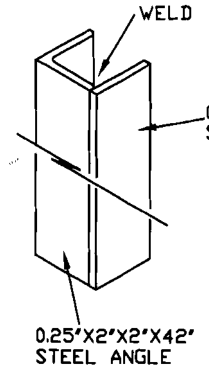
CAD FILE whitelowext

SHEET 1 OF 4

PIPE INLET STRUCTURE PERSPECTIVE VIEW

SLIDE GATE AND TRASH RACK NOT SHOWN

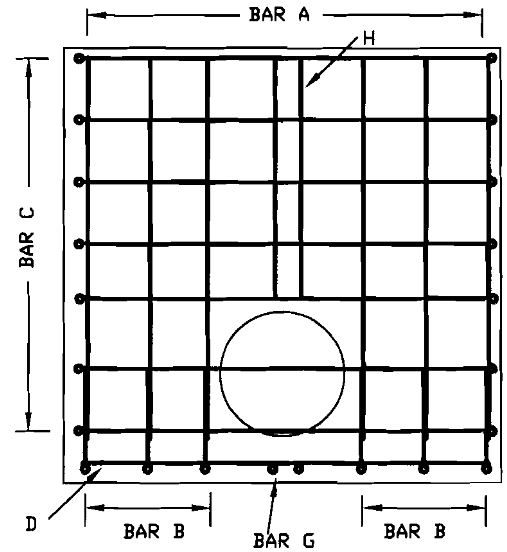




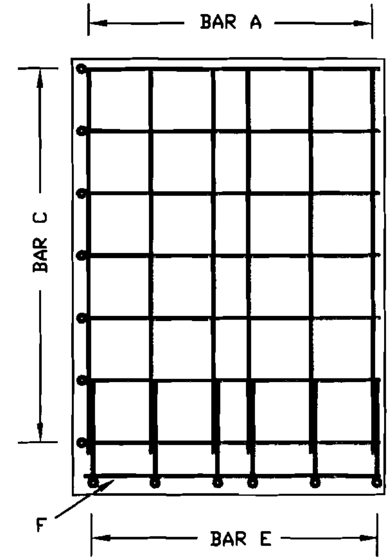
PRELIMINARY SUBJECT TO REVISION

REINFORCING STEEL DETAILS

BACK ELEVATION VIEW

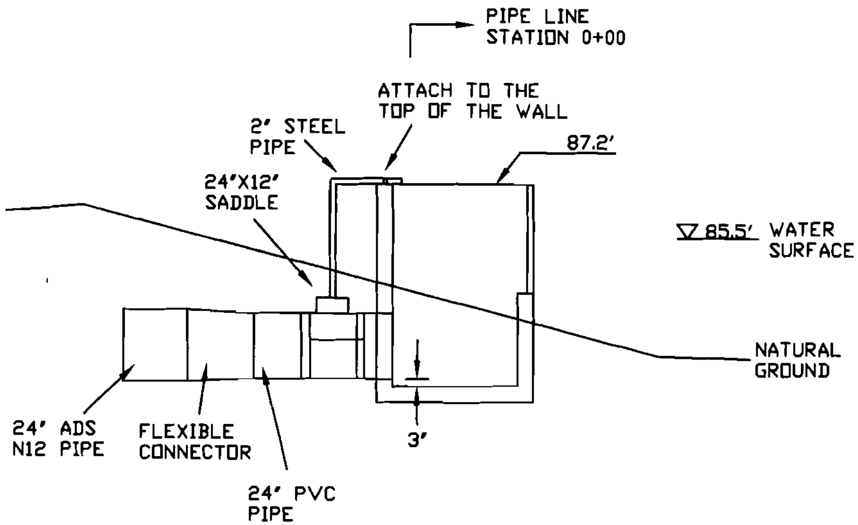


SIDE ELEVATION VIEW



CROSS SECTION VIEW

SLIDE GATE AND TRASH RACK NOT SHOWN



REINFORCING STEEL SCHEDULE

ALL NUMBER 4 BARS, 12" NOMINAL SPACING

BAR	NO.	SHAPE	A	B	C
A	18	straight	6'-2"	--	--
B	6	A⌊ B ⌋C	1'-7"	6'-6"	3'-1"
C	7	A⌊ B ⌋C	4'-7"	6'-6"	4'-7"
D	2	straight	6'-6"	--	--
E	6	A⌊ B ⌋C	1'-7"	6'-6"	1'-7"
F	2	straight	4'-6"	--	--
G	2	A⌋B	6'-6"	3'-1"	--
H	2	straight	3'-11"	--	--

NOTES

INSTALL THE PIPE INLET STRUCTURE ACCORDING TO CONSTRUCTION SPECIFICATION 42, REINFORCED CONCRETE FOR MINOR STRUCTURES, USE 4000 PSI STRENGTH CONCRETE, APPROXIMATELY 3.0 CU. YD. NEEDED.
REINFORCING STEEL TO BE #4 BARS, NEED 400 FEET ASSUMING NO WASTE.

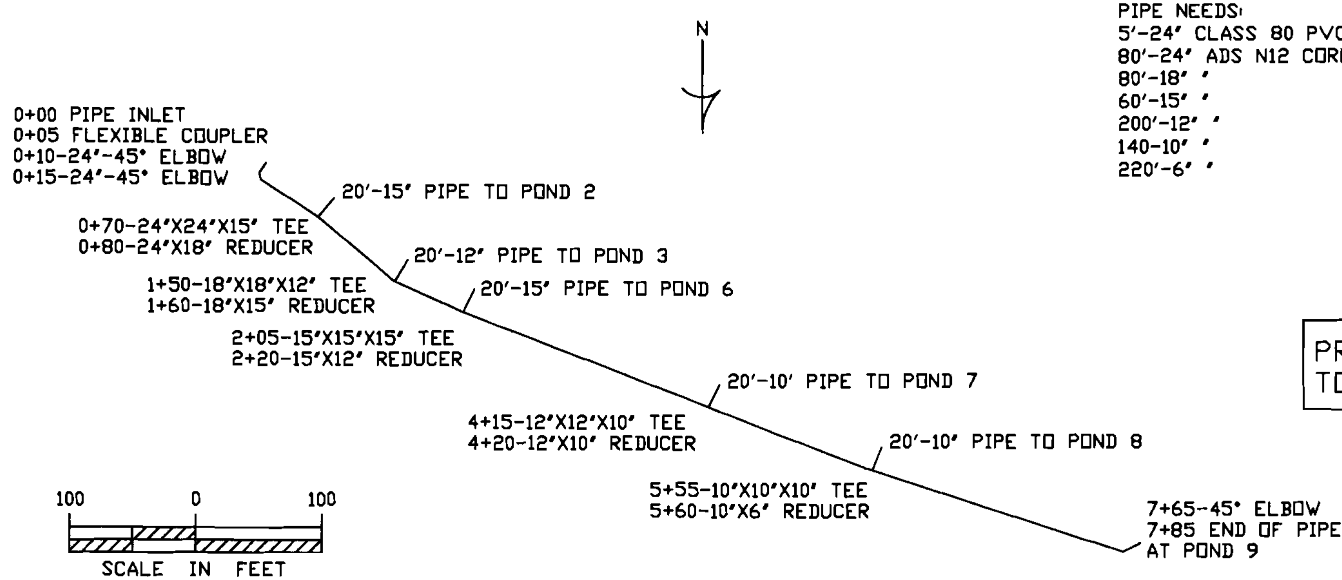
REGISTERED PROFESSIONAL ENGINEER 6476
OREGON
JULY 11, 1969
BERNARD J. HEWES
EXPIRES 6/30/2011

DATE 10/09
DESIGNED B. HEWES
CHECKED
APPROVED

WWBWC/HBDIC LOWER RECHARGE PROJECT
PIPE INLET STRUCTURE
UMATILLA COUNTY, OREGON
R H ENGINEERING

CAD FILE whitelowstruc

SHEET 2 OF 4

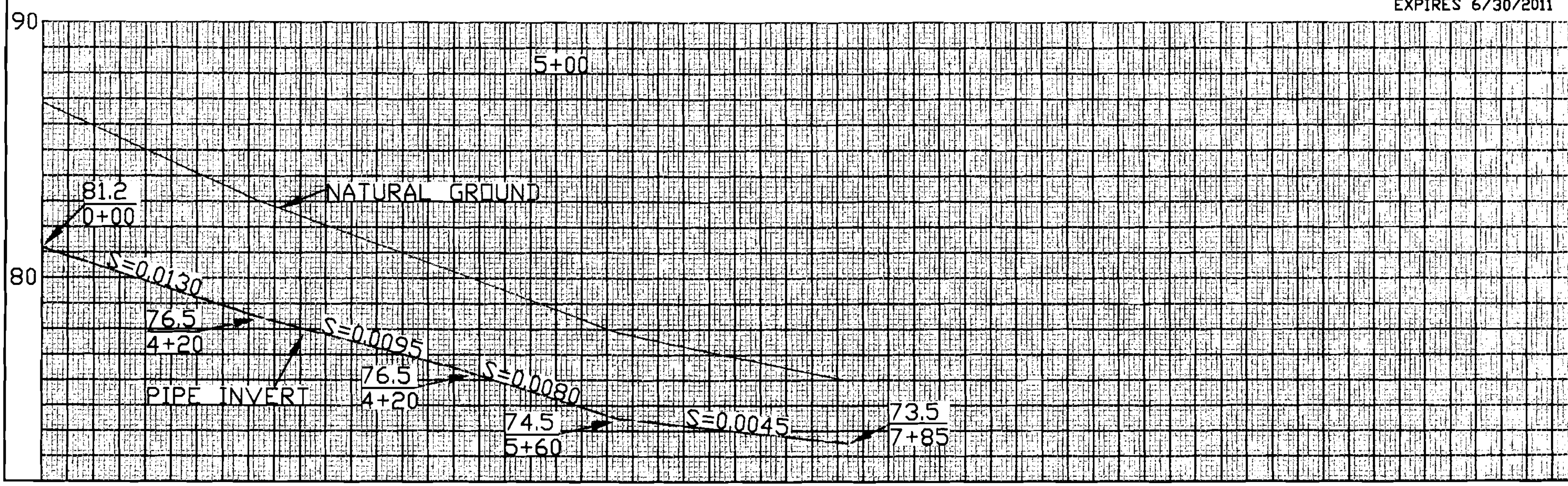


NOTES

PIPE NEEDS:
5'-24' CLASS 80 PVC PIPE
80'-24' ADS N12 CORRUGATED POLYETHYLENE PIPE
80'-18' "
60'-15' "
200'-12' "
140-10' "
220'-6' "

PRELIMINARY SUBJECT TO REVISION

REGISTERED PROFESSIONAL ENGINEER 6476
OREGON
JULY 11, 1969
BERNARD J. HEWES
EXPIRES 6/30/2011

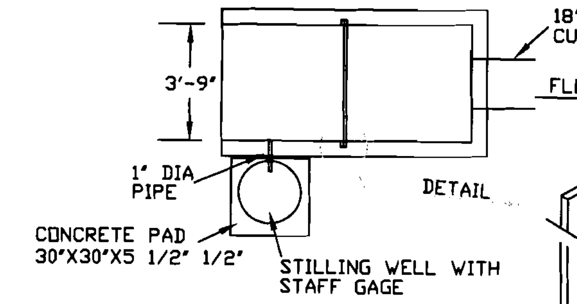


WWBWC/HBDIC RECHARGE PROJECT
POND SUPPLY PIPE PLAN & PROFILE
UMATILLA COUNTY, OREGON

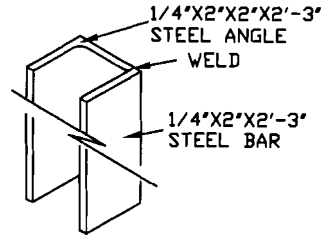
	DATE
DESIGNED B. HEWES	10/09
PLOTTED	
APPROVED	

CAD FILE whitelowpipe
SHEET 3 OF 4

POND EMERGENCY OUTLET PLAN VIEW



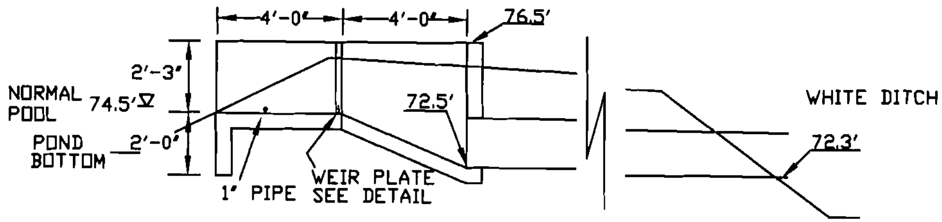
DETAIL

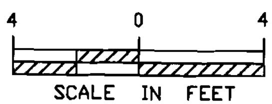


2 NEEDED

SIDE ELEVATION VIEW

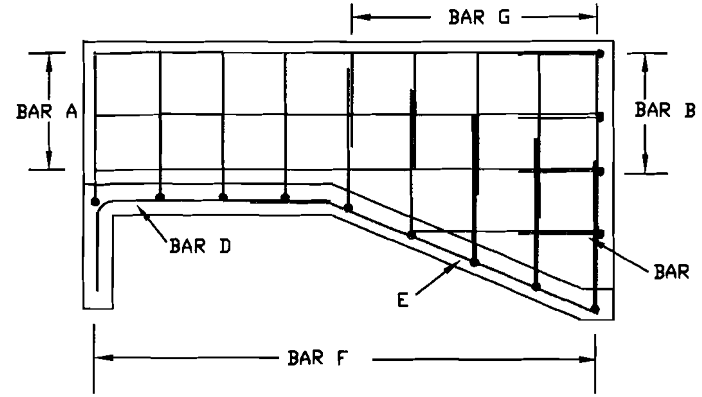
STILLING WELL NOT SHOWN



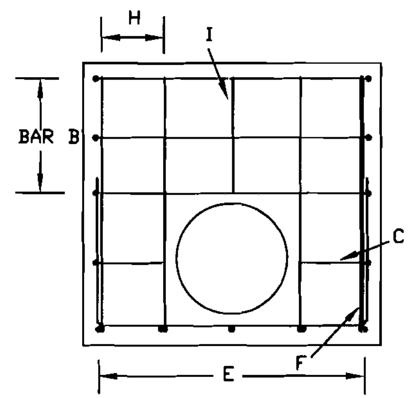


PRELIMINARY SUBJECT TO REVISION

REINFORCING STEEL DETAILS SIDE ELEVATION VIEW



PIPE INLET END ELEVATION VIEW



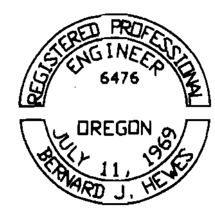
NOTES

INSTALL CONCRETE IN ACCORDANCE WITH CONSTRUCTION SPECIFICATION 42, "REINFORCED CONCRETE FOR MINOR STRUCTURES". USE 4000 PSI STRENGTH CONCRETE, NEED ABOUT 2.2 CU. YD.
REINFORCING STEEL ALL #4 BARS, NEED 260 FEET WITH NO WASTE.
CULVERT PIPE MAY BE STEEL OR HIGH DENSITY POLYETHYLENE.
SET THE WEIR PLATE IN A RABBET CUT INTO A 1 1/2"X1 3/4" BOARD AND SET INTO THE SOCKETS. THE WEIR PLATE TO BE STEEL 1/8"X3"X48".
SET THE STILLING WELL AT LEAST 2" INTO THE CONCRETE BASE. USE A MINIMUM PIPE DIAMETER OF 18" EITHER PVC OR STEEL.
SET THE STAFF GAGE ZERO POINT IN THE STILLING WELL LEVEL WITH THE CREST OF THE WEIR PLATE. INSTALL THE 1" PIPE TO THE STILLING WELL WITH 1" BETWEEN THE FLOOR AND PIPE.

REINFORCING STEEL SCHEDULE

ALL #4 BARS, 12" NOMINAL SPACING

BAR	NO.	SHAPE	A	B	C
A	6	straight	7'-8"	--	--
B	3	A|_B_|C	1'-3"	4'-3"	1'-3"
C	2	A|_B	1'-3"	1'-1"	--
D	5	A|_B	1'-6"	4'-0"	--
E	5	A_B	1'-3"	4'-8"	--
F	9	A|_B_|C	2'-4"	4'-3"	2'-4"
G	10	straight	varies	--	--
H	4	A|_B	1'-3"	4'-1"	--
I	1	straight	1'-10"	--	--



EXPIRES 6/30/2011

WWBWC/HBDIC LOWER RECHARGE PROJECT
EMERGENCY SPILLWAY WEIR
UMATILLA COUNTY, OREGON
B H ENGINEERING

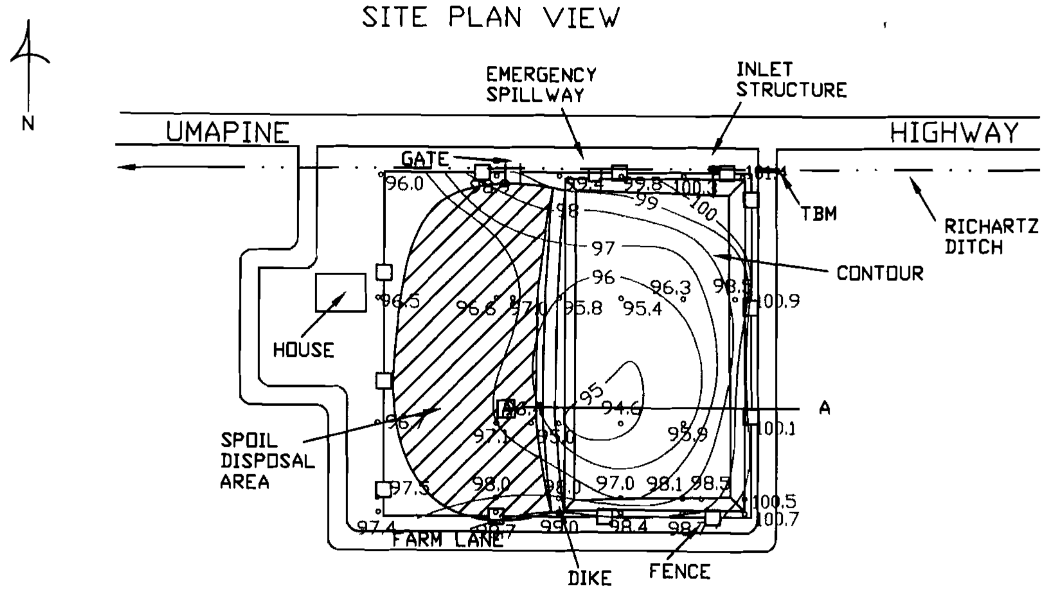
DESIGNED B. HEWES
DATE 10/0
CHECKED
APPROVED

CAD FILE whitelowweir

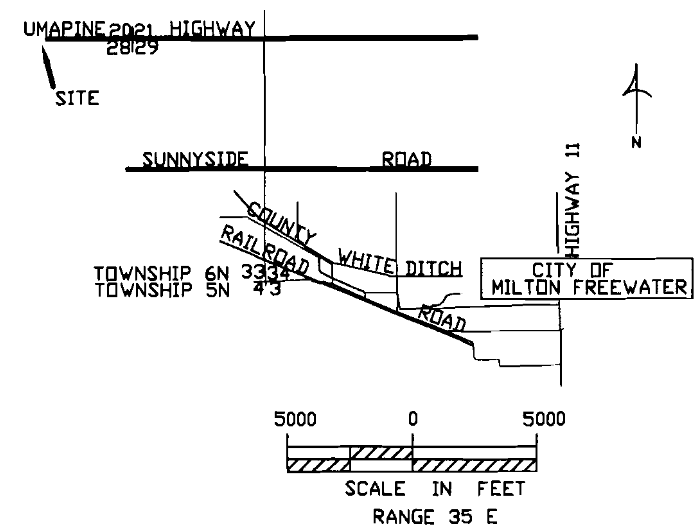
SHEET 4 OF 4

ATTACHMENT

2



NOTES
TBM IS AT THE TOP OF THE 30' CORRUGATED METAL PIPE AT THE UPSTREAM END. ELEVATION 100.00



PRELIMINARY SUBJECT TO REVISION

REGISTERED PROFESSIONAL ENGINEER 6476 OREGON JULY 11, 1969 BERNARD J. HEWES
EXPIRES 6/30/2011

WWBWC ODOT 2 RECHARGE PROJECT
LOCATION MAP & SITE MAP
UMATILLA COUNTY, OREGON

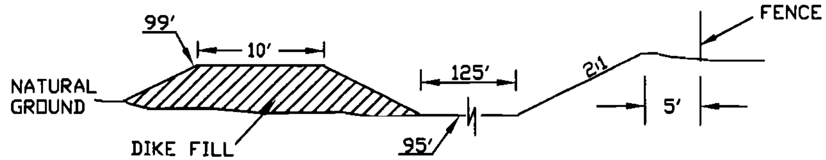
B H ENGINEERING

DESIGNED	B. HEWES	DATE 9/09
CHECKED		
APPROVED		

CAD FILE odot2site

SHEET 1 OF 3

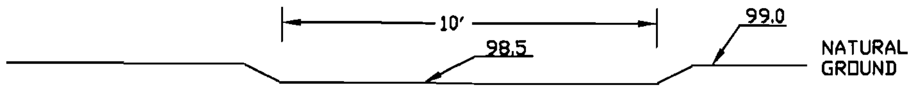
CROSS-SECTION A DETAIL



NOTES

BOTTOM LENGTH OF THE POND 245'. EXCAVATION VOLUME 2600 CU. YD.
DIKE VOLUME ABOUT 400 CU. YD.

EMERGENCY SPILLWAY DETAIL



PRELIMINARY SUBJECT TO REVISION

REGISTERED PROFESSIONAL ENGINEER 6476
OREGON
JULY 11, 1969
BERNARD J. HEWES
EXPIRES 6/30/2011

Bernard Hewes, n/a 9/17/2009 8:55 PM odot2misc.dwg

WWBWC ODOT2 RECHARGE PROJECT
MISCELLANEOUS DETAILS
UMATILLA COUNTY, OREGON
B. H. ENGINEERING

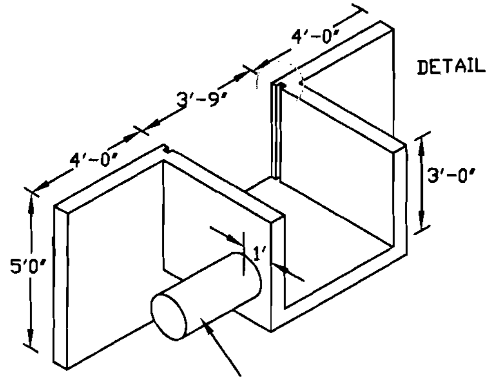
		DATE
DESIGNED	B. HEWES	9/09
CHECKED		
APPROVED		

CAD FILE odot2misc

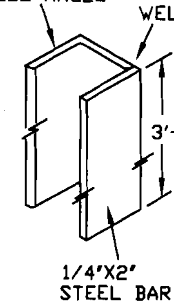
SHEET 2 OF 3

INLET STRUCTURE PERSPECTIVE VIEW

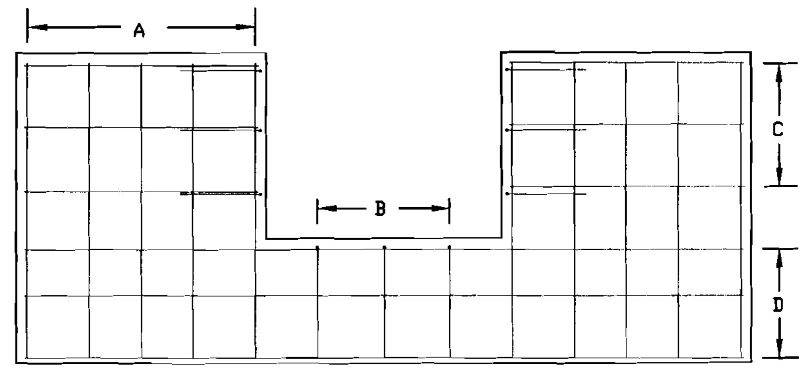
SLIDE GATE NOT SHOWN



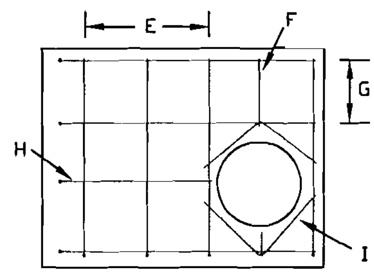
DETAIL



REINFORCING STEEL DETAILS STRUCTURE HEADWALL



TYPICAL SIDEWALL



NOTES

CONSTRUCT STRUCTURE ACCORDING TO CONSTRUCTION SPECIFICATION 42, CONCRETE FOR MINOR STRUCTURES. ALL EXPOSED EDGES TO BE FINISHED WITH AN EDGING TOOL. CONCRETE IS TO BE VIBRATED INTO THE FORMS. USE 4000 PSI STRENGTH CONCRETE, 1.7 CU. YD. NEEDED. SET THE FLOOR EVEN WITH THE BOTTOM OF THE DITCH. NEED 220 FT. OF #4 REINFORCING STEEL ASSUMING NO WASTE. SLIDE GATE IS TO BE A 15" WATERMAN MODEL C 10 OR EQUIVALENT. SET THE 15" PIPE INVERT 2" ABOVE THE STRUCTURE FLOOR.

PRELIMINARY SUBJECT TO REVISION

REINFORCING STEEL SCHEDULE

BAR	NO.	SHAPE	A	B	C
A	10	straight	4'-7"	--	--
B	3	A|_B_	1'-7"	4'-0"	--
C	6	straight	3'-8"	--	--
D	3	straight	11'-5"	--	--
E	5	A|_B_|C	3'-1"	4'-3"	3'-1"
F	1	straight	1'-1"	--	--
G	7	A|_B_	1'-3"	4'-3"	--
H	1	A|_B_	1'-3"	2'-5"	--
I	4	straight	1'-2"	--	--

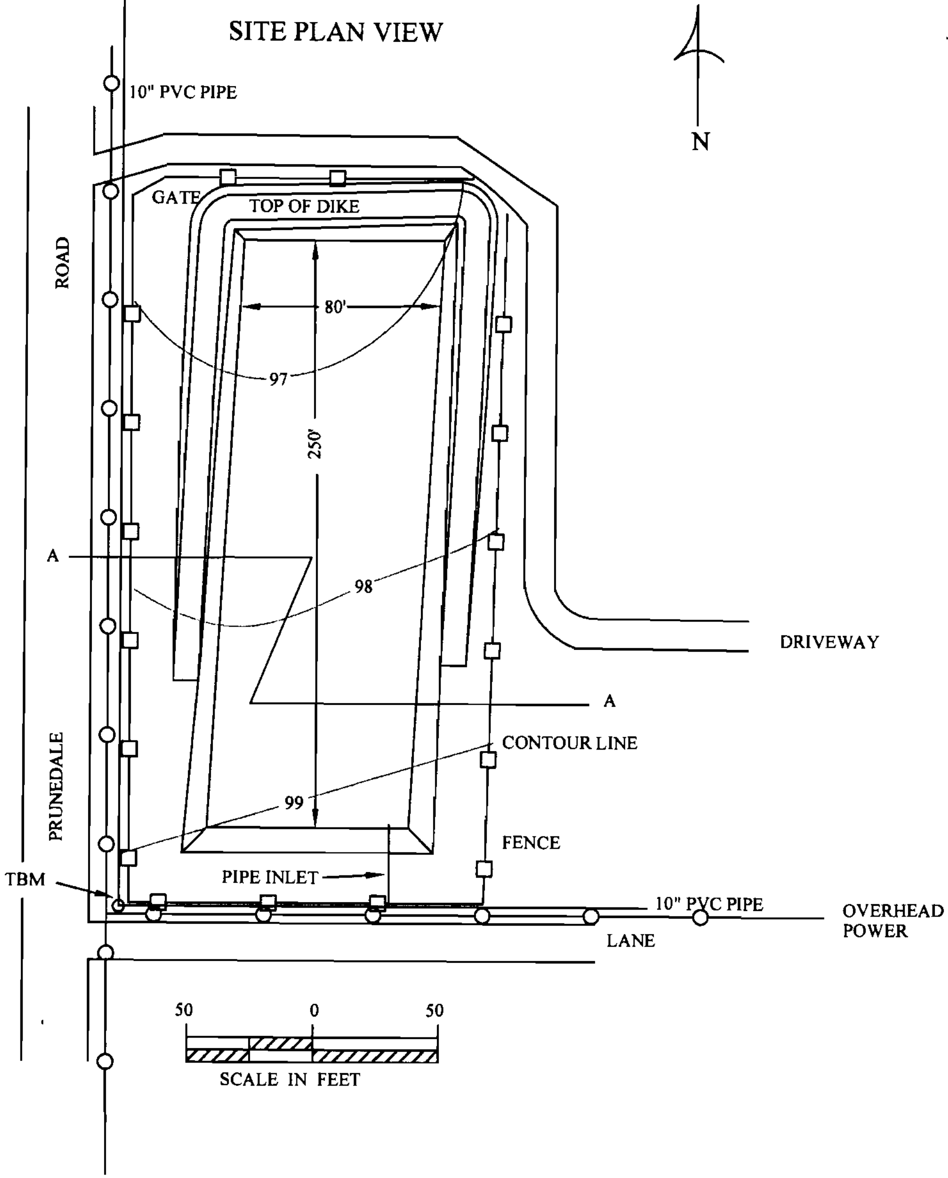
ALL #4 BARS, NOMINAL SPACING 12"

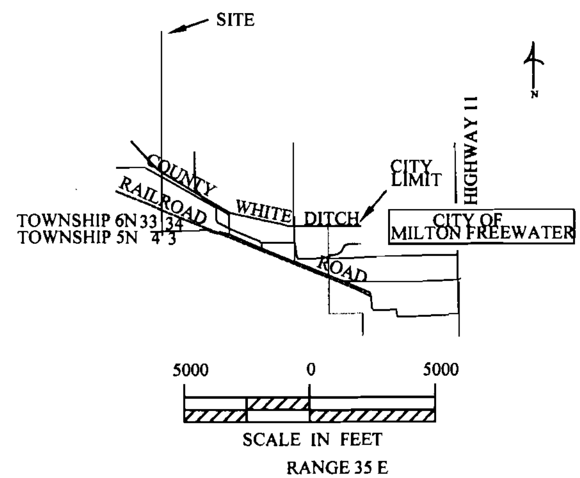
WWBWC ODOT#2 RECHARGE PROJECT
INLET STRUCTURE
UMATILLA COUNTY, OREGON

DESIGNED B. HEWES DATE 9/09
CHECKED
APPROVED

CAD FILE odot2struc

SHEET 3 OF 3





NOTES

ESTIMATED EXCAVATION VOLUME 2900 CU. YD. ALL TO BE USED IN CONSTRUCTING THE DIKE.

THE TBM IS ON THE TOP OF A 6" RISER PIPE FOR A 2" AIR-VAC VALVE ON THE NORTH SIDE OF THE RISER NEAR THE SOUTH WEST PROPERTY CORNER. ELEVATION 100.00'.

PRELIMINARY SUBJECT TO REVISION

REGISTERED PROFESSIONAL ENGINEER 6476
OREGON
JULY 11, 1969
BERNARD J. HEWES

EXPIRES 6/30/2011

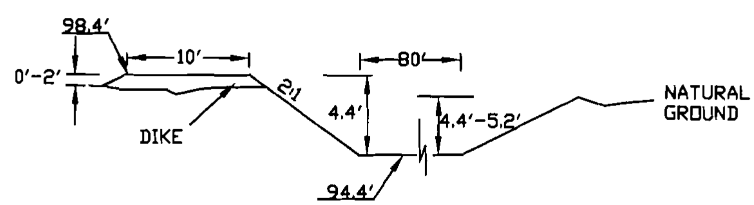
WWBWC ODOT 1 RECHARGE PROJECT
LOCATION MAP & SITE MAP
UMATILLA COUNTY, OREGON
B H ENGINEERING

DESIGNED	B. HEWES	DATE 9/09
CHECKED		
APPROVED		

CAD FILE odot1

SHEET 1 OF 2

CROSS SECTION A

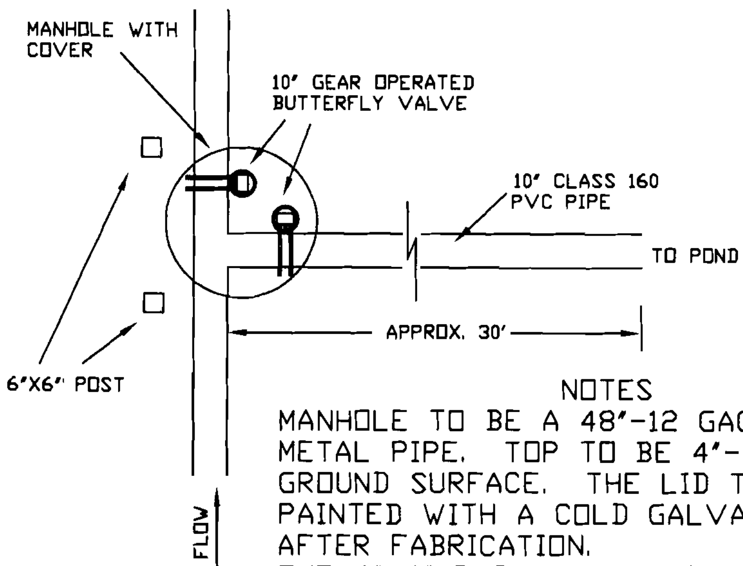


PRELIMINARY SUBJECT TO REVISION

NOTES

BURN VEGETATION THAT WILL BE UNDER THE DIKE BEFORE CONSTRUCTING.

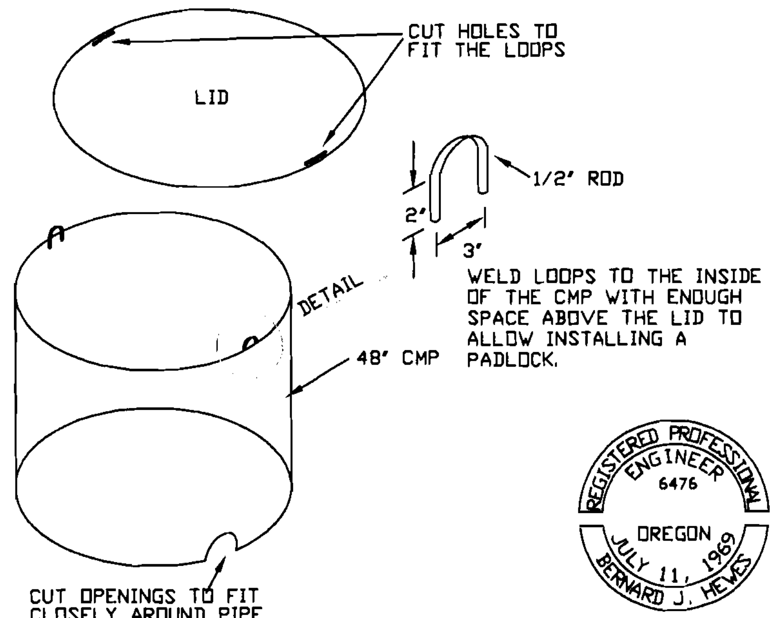
WATER SUPPLY PIPE TO POND DETAILS



NOTES

MANHOLE TO BE A 48"-12 GAGE CORRUGATED METAL PIPE. TOP TO BE 4"-6" ABOVE THE GROUND SURFACE. THE LID TO BE 1/8" STEEL PAINTED WITH A COLD GALVANIZING PAINT AFTER FABRICATION.
THE 6"X6" POSTS TO B PRESSURE TREATED.

MANHOLE AND LID DETAIL



REGISTERED PROFESSIONAL ENGINEER 6476 OREGON JULY 11, 1969 BERNARD J. HEWES

EXPIRES 6/30/2011

WWBWC ODOT 1 RECHARGE PROJECT MISCELLANEOUS DETAILS UMATILLA COUNTY, OREGON	DESIGNED B. HEWES DATE 9/09
	CHECKED
	APPROVED
CAD FILE odot1detail	SHEET 2 OF 2

ATTACHMENT

3

PLANS FOR THE WALLA WALLA RIVER RECHARGE PROJECT

UMATILLA COUNTY, OREGON

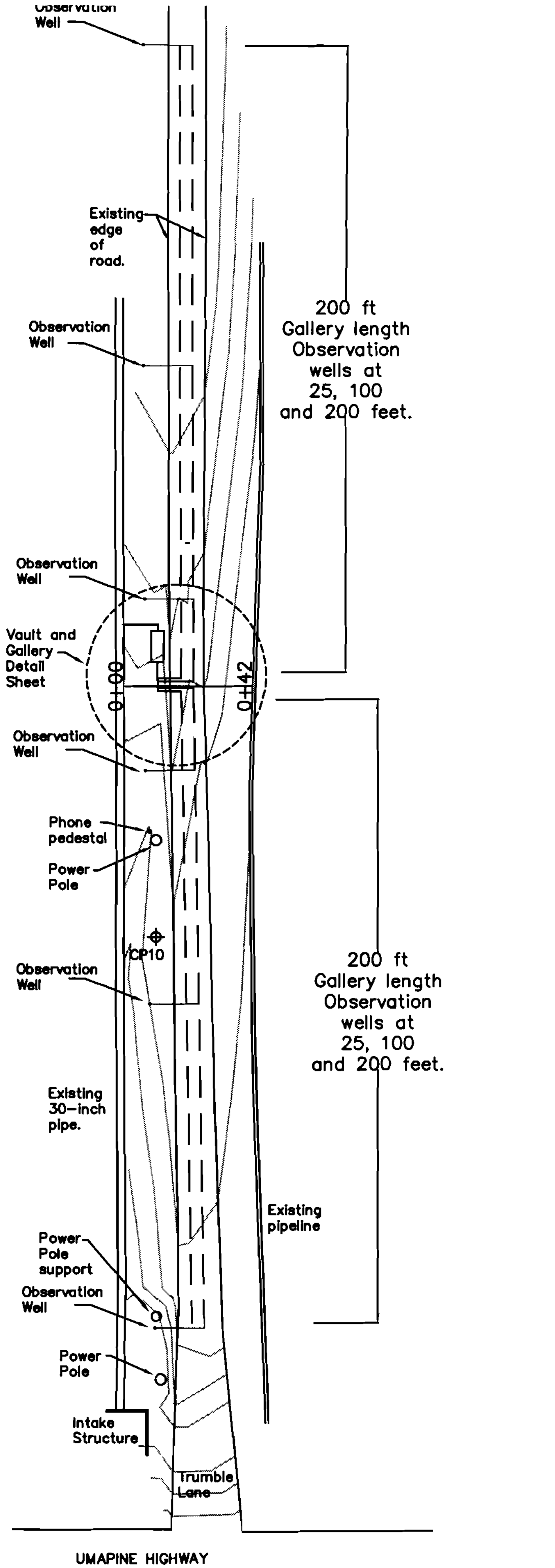
PREPARED FOR THE WALLA WALLA BASIN WATERSHED COUNCIL

BY KELLY CAHILL, PE

REGISTERED PROFESSIONAL ENGINEER
76981PE
OREGON
JANUARY 10, 2006
STEVEN KELLY CAHILL
EXPIRATION DATE:

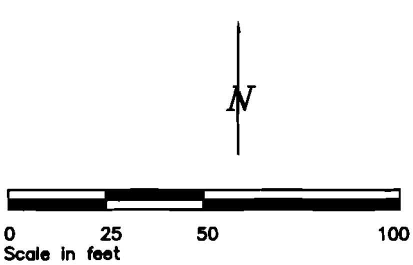
INDEX OF DRAWINGS

Sheet #	Title
1	Title Sheet
2	Trumble Lane 1 Site Plan
3	Trumble Lane West Site Plan and Vault/Gallery Plan
4	DeMaris Site Plan
5	Typical Details — Gallery and Vault
6	Typical Details — Observation Well
7	Arnzen/Preston Site Plan
8	Arnzen/Preston Plan and Profile



Trumble Lane Site 1 Materials Quantities:

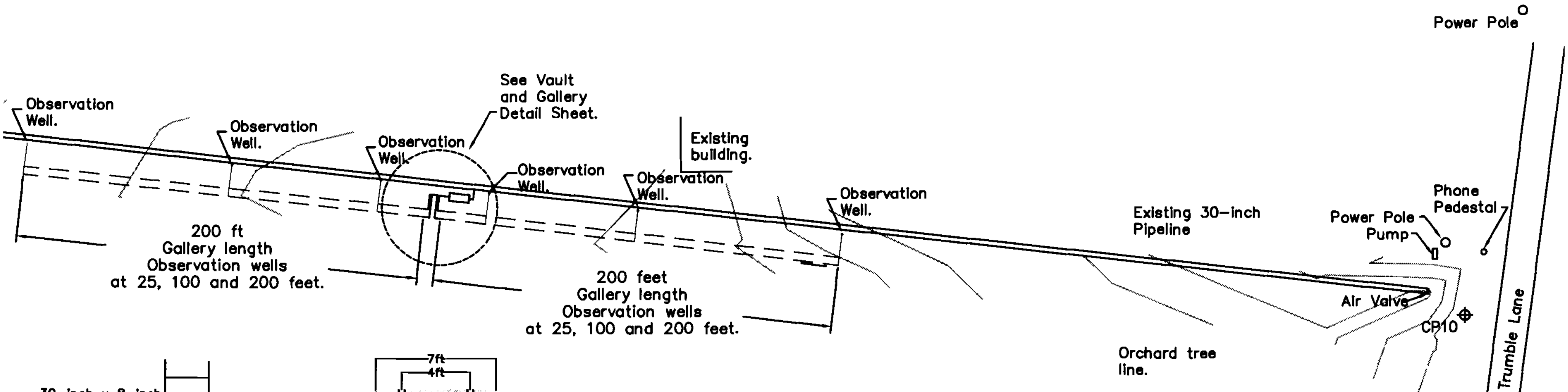
	Unit of Measure	Quantity
30x8 saddle and tee	ea	1
8-inch PVC, class 100 pipe and elbows	lin ft	40
8-inch Butterfly valve	ea	1
6-inch flowmeter w/8-inch adapters	ea	1
48-inch CMP vault and lid	ea	1
Vortechs Model 2000 vault, by Contech or equal	ea	1
4-inch PVC pipe, class 100, and fittings for gallery connections and observation wells.	lin ft	200
8x4 tees	ea	4
4-inch Butterfly valves	ea	4
4-inch perforated pipe, ASTM 2729	lin ft	800
Drain rock, 1" – $\frac{1}{2}$"	cubic yd	110
Geotextile Fabric, Mirafi MSCAPE or equal	sq ft	2800
Excavation quantities, total	cubic yd	1150
Crushed Rock, $\frac{3}{4}$"-minus road surfacing	cubic yd	70

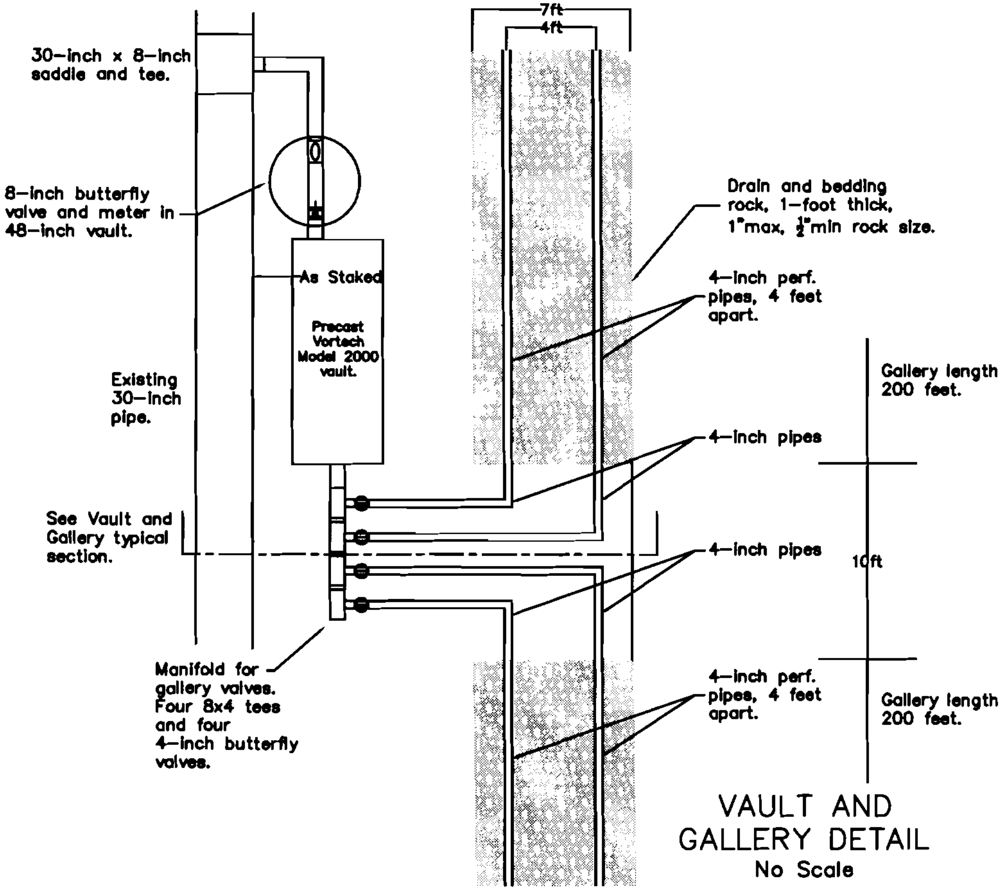


Contour interval 0.5 feet

TRUMBLE LANE SITE 1
PROJECT SITE PLAN

Sheet 2/8

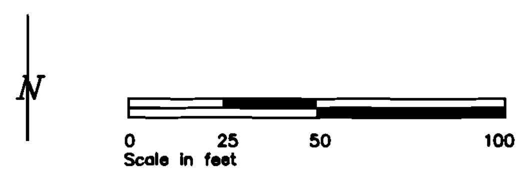




VAULT AND GALLERY DETAIL
No Scale

Trumble Lane West Materials Quantities:

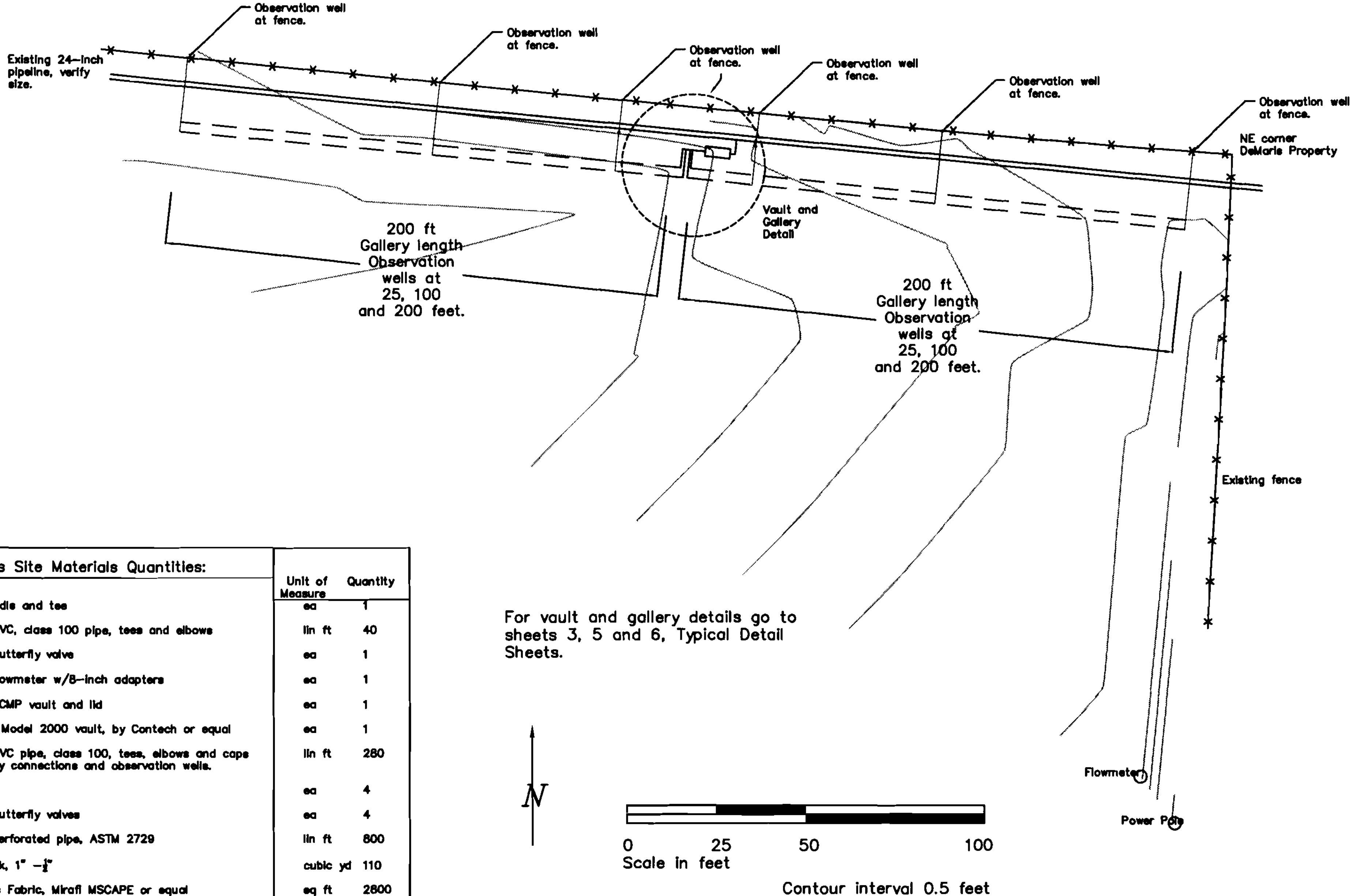
	Unit of Measure	Quantity
30x8 saddle and tee	ea	1
8-inch PVC, class 100 pipe and elbows	lin ft	40
8-inch Butterfly valve	ea	1
6-inch flowmeter w/8-inch adapters	ea	1
48-inch CMP vault and lid	ea	1
Vortechs Model 2000 vault, by Contech or equal	ea	1
4-inch PVC pipe, class 100, and fittings for gallery connections and observation wells.	lin ft	200
8x4 tees	ea	4
4-inch Butterfly valves	ea	4
4-inch perforated pipe, ASTM 2729	lin ft	800
Drain rock, 1" -½"	cubic yd	110
Geotextile Fabric, Mirafi MSCAPE or equal	sq ft	2800
Excavation quantities, total	cubic yd	1150



Contour interval 0.5 feet

TRUMBLE LANE WEST SITE PLAN AND VAULT DETAIL PLAN

Sheet 3/8

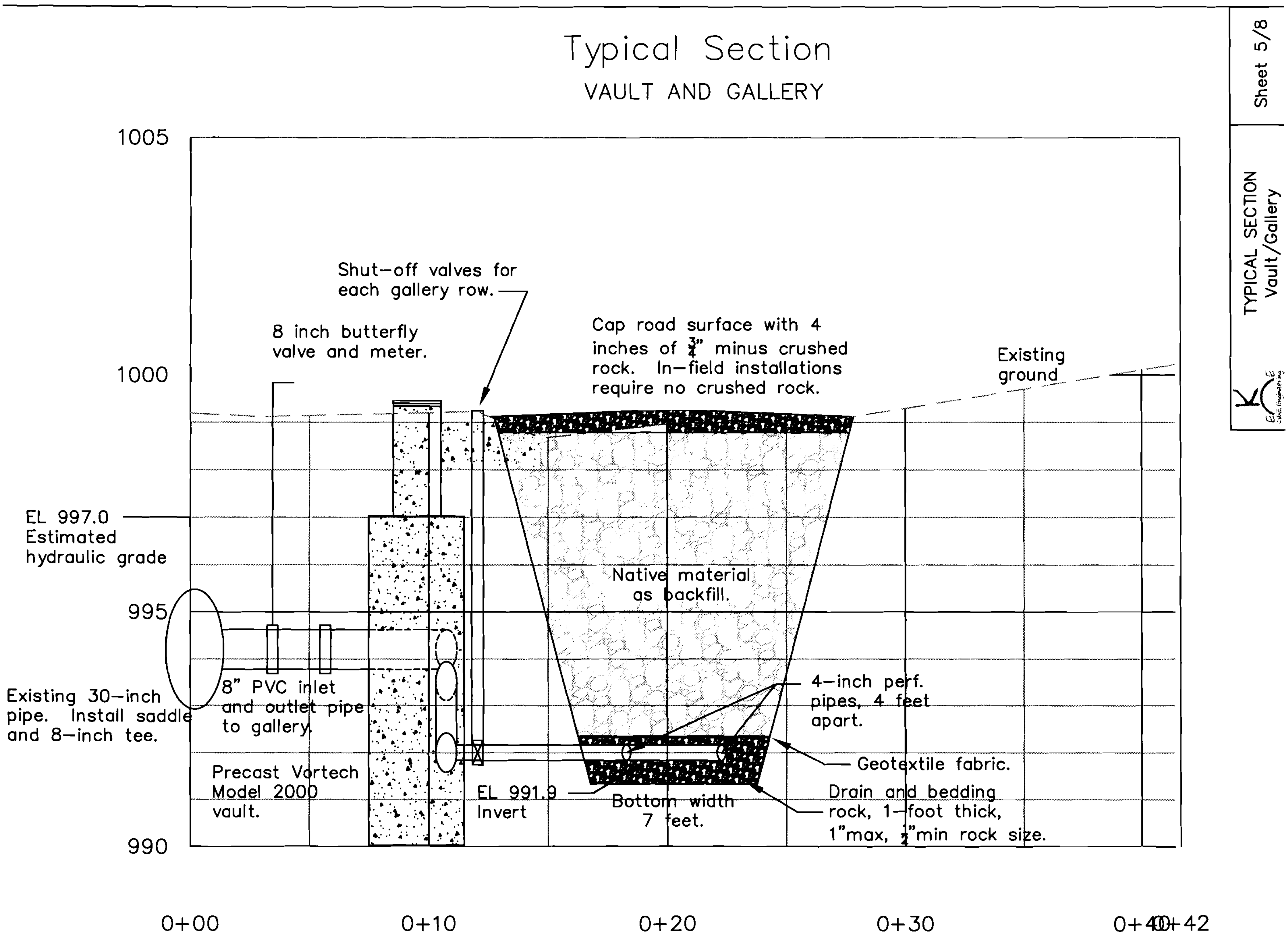


For vault and gallery details go to sheets 3, 5 and 6, Typical Detail Sheets.

Demaris Site Materials Quantities:	Unit of Measure	Quantity
30x8 saddle and tee	ea	1
8-inch PVC, class 100 pipe, tees and elbows	lin ft	40
8-inch Butterfly valve	ea	1
6-inch flowmeter w/8-inch adapters	ea	1
48-inch CMP vault and lid	ea	1
Vortechs Model 2000 vault, by Contech or equal	ea	1
4-inch PVC pipe, class 100, tees, elbows and caps for gallery connections and observation wells.	lin ft	280
8x4 tees	ea	4
4-inch Butterfly valves	ea	4
4-inch perforated pipe, ASTM 2729	lin ft	800
Drain rock, 1" - ½"	cubic yd	110
Geotextile Fabric, Mirafi MSCAPE or equal	sq ft	2800
Excavation quantities, total	cubic yd	1150

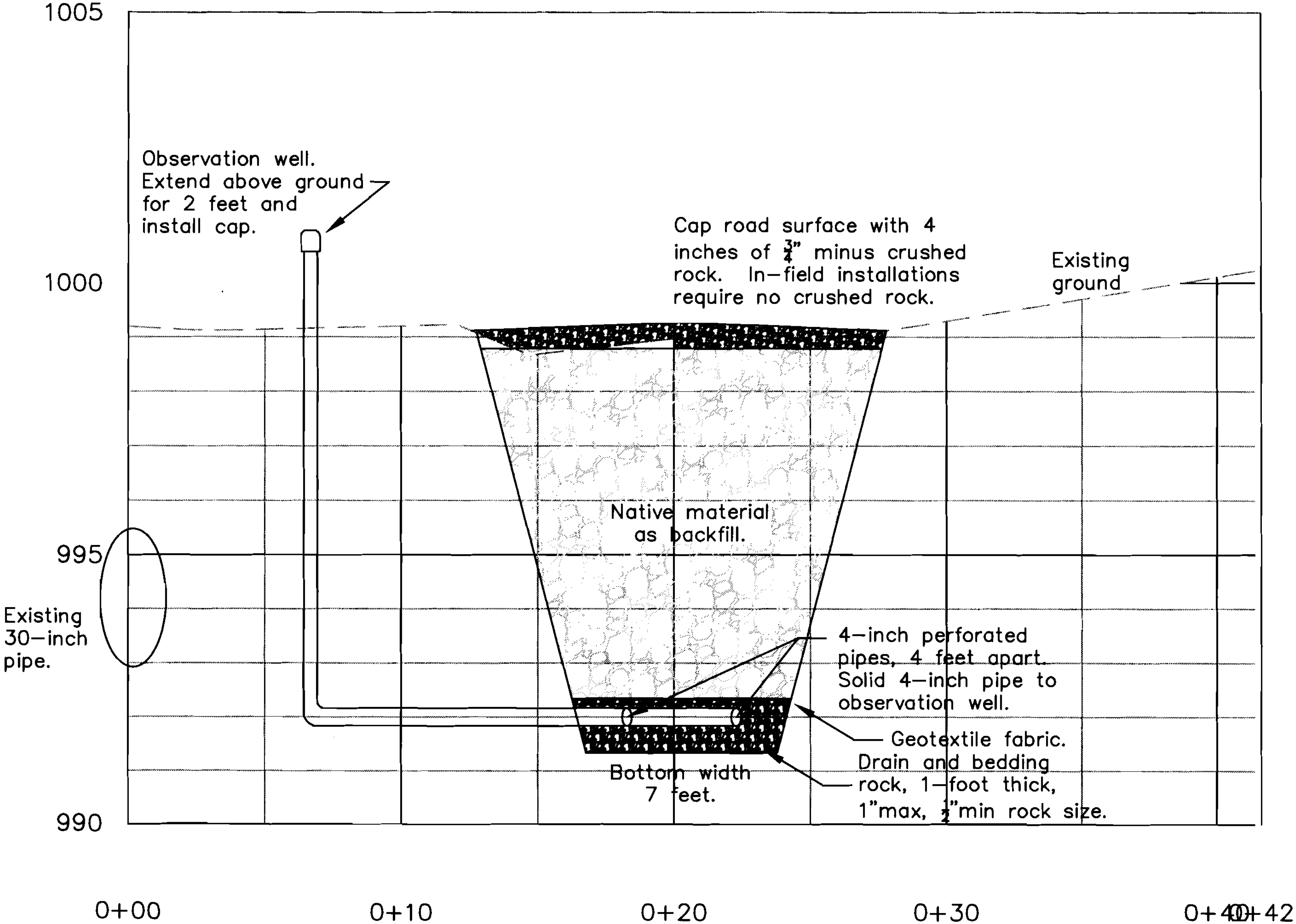
Sheet 4/8

DEMARIS PROJECT SITE PLAN


Typical Section
VAULT AND GALLERY
Sheet 5/8
TYPICAL SECTION Vault/Gallery
1005
1000
995
990
EL 997.0
Estimated
hydraulic grade
Shut-off valves for
each gallery row.
8 inch butterfly
valve and meter.
Cap road surface with 4
inches of ¾" minus crushed
rock. In-field installations
require no crushed rock.
Existing
ground
Native material
as backfill.
Existing 30-inch
pipe. Install saddle
and 8-inch tee.
8" PVC inlet
and outlet pipe
to gallery.
Precast Vortech
Model 2000
vault.
EL 991.9
Invert
Bottom width
7 feet.
4-inch perf.
pipes, 4 feet
apart.
Geotextile fabric.
Drain and bedding
rock, 1-foot thick,
1"max, ½"min rock size.
0+00
0+10
0+20
0+30
0+40
0+42

Typical Section

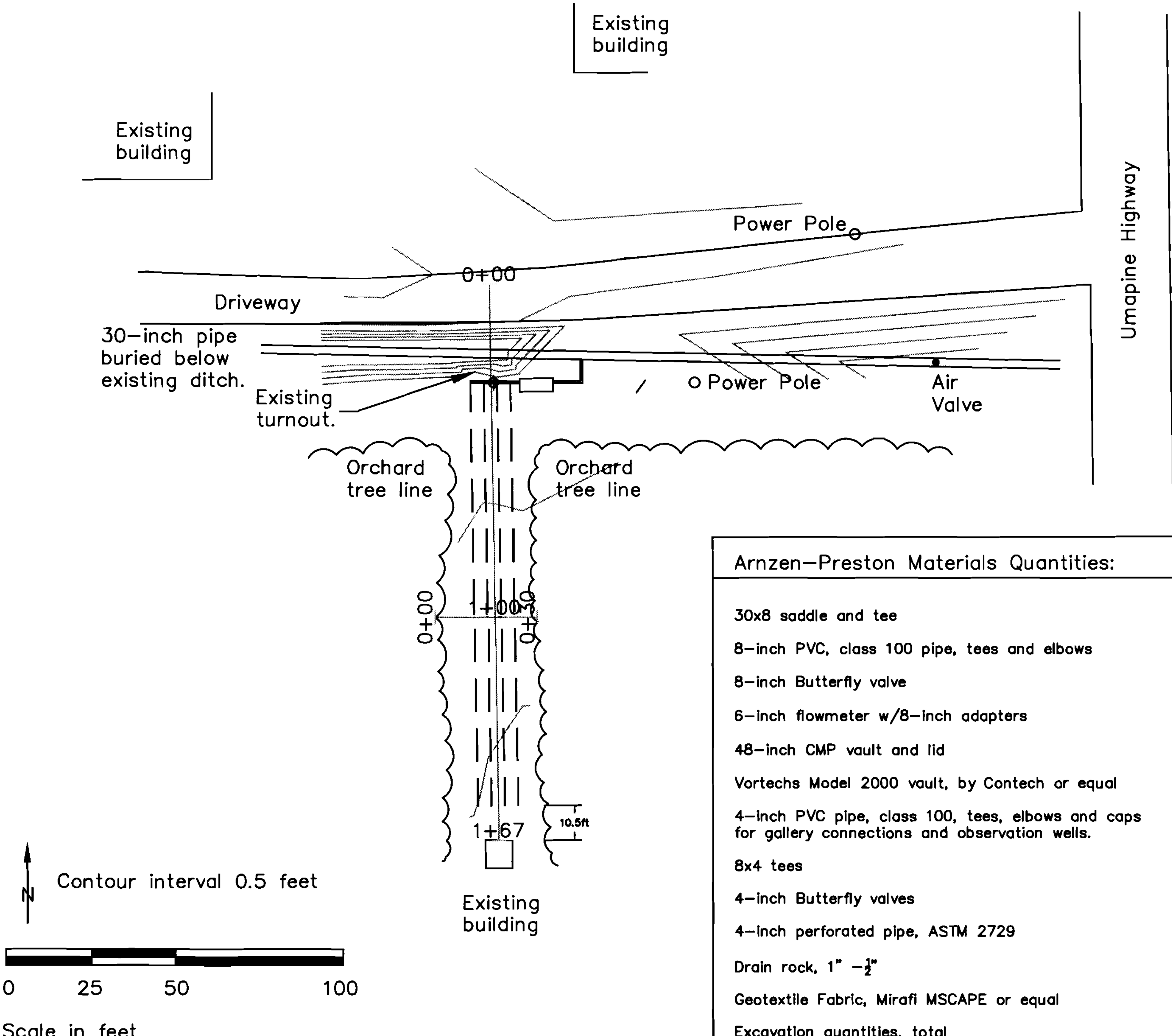
OBSERVATION WELL



Sheet 6/8

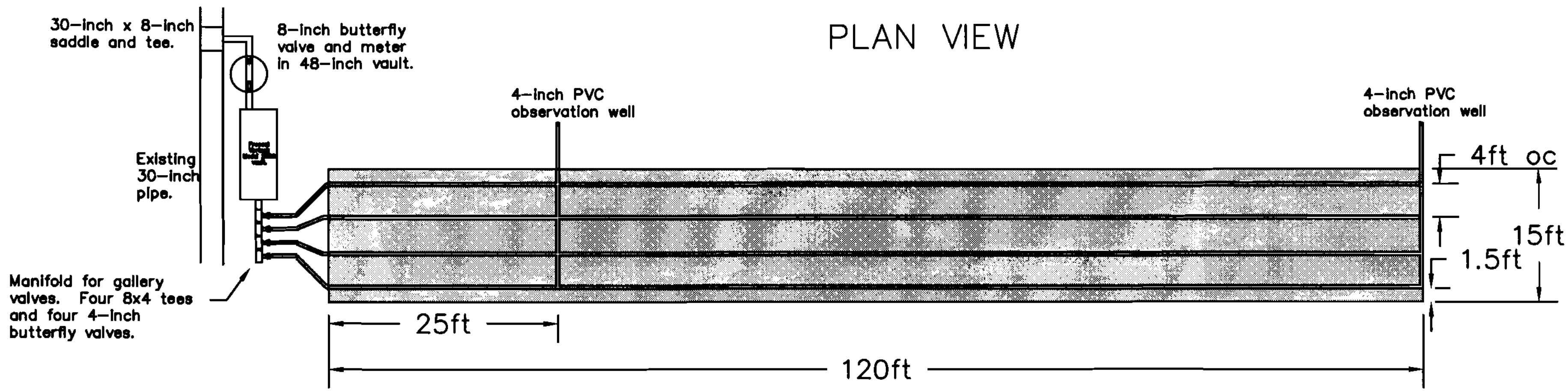
TYPICAL SECTION
Observation Well

Arnzen–Preston Project Site Plan



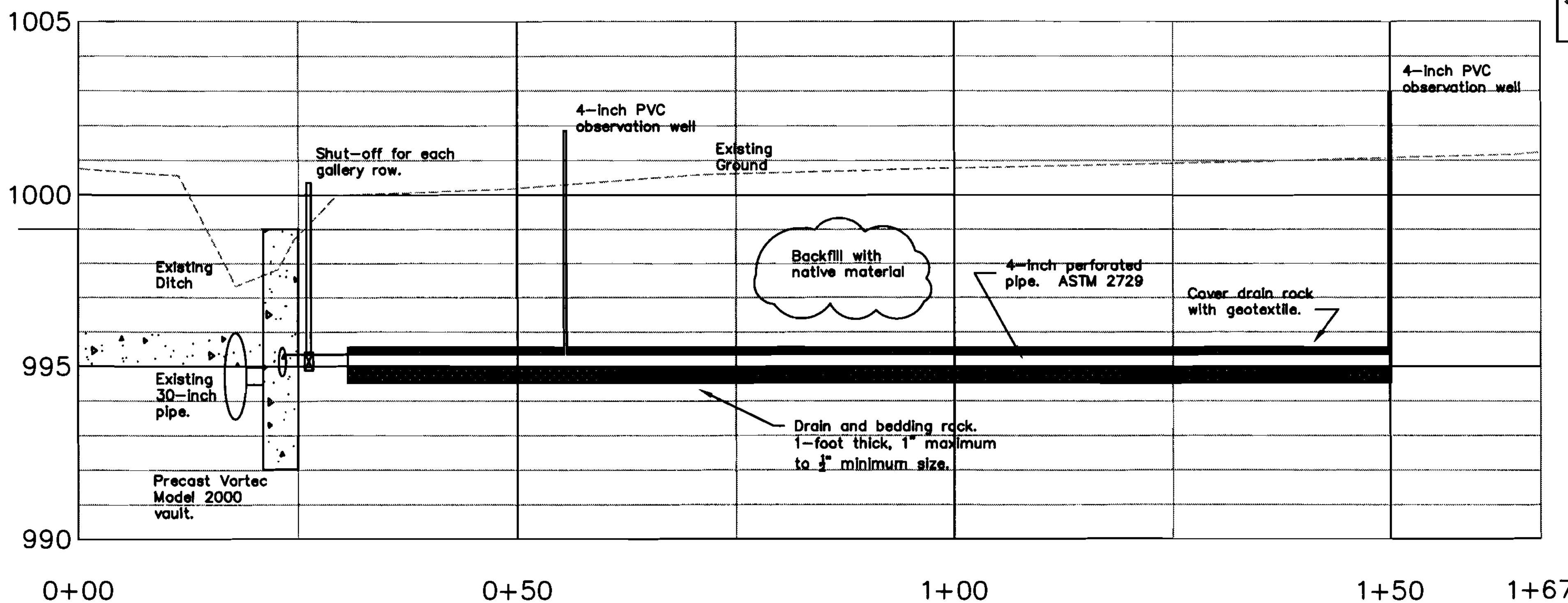
Arnzen–Preston Materials Quantities:	Unit of Measure	Quantity
30x8 saddle and tee	ea	1
8–inch PVC, class 100 pipe, tees and elbows	lin ft	40
8–inch Butterfly valve	ea	1
6–inch flowmeter w/8–inch adapters	ea	1
48–inch CMP vault and lid	ea	1
Vortechs Model 2000 vault, by Contech or equal	ea	1
4–inch PVC pipe, class 100, tees, elbows and caps for gallery connections and observation wells.	lin ft	140
8x4 tees	ea	4
4–inch Butterfly valves	ea	4
4–inch perforated pipe, ASTM 2729	lin ft	480
Drain rock, 1" – ½"	cubic yd	70
Geotextile Fabric, Mirafi MSCAPE or equal	sq ft	1800
Excavation quantities, total	cubic yd	750

PLAN VIEW



PROFILE

Arnzen-Preston Gallery Profile



Sheet 8/8

Arnzen-Preston Plan and Profile

Walla Wall River Recharge
ENGINEER'S ESTIMATE - Trumble Lane 1

ITEM NO.	WORK OR MATERIAL	QUANTITY	UNITS	UNIT PRICE	TOTALCOST
1	CS-01 Mobilization	1	Lump Sum	$500.00	$500.00
2	Excavation and Backfill	1150	cubic yd	$3.60	$4,140.00
3	30x8-inch tapping sleeve, material and install	1	ea	$2,250.00	$2,250.00
4	8-inch PVC pipe, IPS, class 100	40	Lin. Ft.	$4.25	$170.00
5	8-inch PVC pipe, IPS, class 160 elbow	1	ea	$175.00	$175.00
6	8-inch Butterfly valve	1	ea	$3,500.00	$3,500.00
7	8-inch flowmeter	1	ea	$3,200.00	$3,200.00
8	48-inch CMP vault and lid	1	ea	$450.00	$450.00
9	8x4 PVC tee class 160	4	ea	$150.00	$600.00
10	4-inch Butterfly valve	4	ea	$275.00	$1,100.00
11	4-inch PVC pipe, class 100, includes all fittings	280	lin ft	$1.75	$490.00
12	4-inch PVC perforated pipe, ASTM 2729	800	lin ft	$1.45	$1,160.00
13	Drain Rock, 1" max to 1/2" minimum size	110	cubic yds	$32.50	$3,575.00
14	Geotextile Fbric, Mirafi MSCAPE or equal	2800	sf	$0.15	$420.00
15	Vortechs Model 2000 vault, Contech or equal	1	ea	$21,500.00	$21,500.00
16	Crushed Rock, 3/4" minus	70	ea	$40.00	$2,800.00
	All costs include materials and installation			**SUBTOTAL**	$46,030.00
	15% for contigencies			+	$6,904.50
	Total cost to Construct				$52,934.50

Prepared by: ______________________

Kelly Cahill, PE
Cahill Engineering

Date: 10/09/2009

Walla Wall River Recharge
ENGINEER'S ESTIMATE - Arnzen-Preston

ITEM NO.	WORK OR MATERIAL	QUANTITY	UNITS	UNIT PRICE	TOTALCOST
1	CS-01 Mobilization	1	Lump Sum	$1,500.00	$1,500.00
2	Excavation and Backfill	750	cubic yd	$3.60	$2,700.00
3	30x8-inch tapping sleeve	1	ea	$2,250.00	$2,250.00
4	8-inch PVC pipe, IPS, class 100	40	Lin. Ft.	$4.25	$170.00
5	8-inch PVC pipe, IPS, class 160 elbow	1	ea	$175.00	$175.00
6	8-inch Butterfly valve	1	ea	$3,500.00	$3,500.00
7	8-inch flowmeter	1	ea	$3,200.00	$3,200.00
8	48-inch CMP vault and lid	1	ea	$450.00	$450.00
9	8x4 PVC tee class 160	4	ea	$150.00	$600.00
10	4-inch Butterfly valve	4	ea	$275.00	$1,100.00
11	4-inch PVC pipe, class 100, includes all fittings	140	lin ft	$1.75	$245.00
12	4-inch PVC perforated pipe, ASTM 2729	480	lin ft	$1.45	$696.00
13	Drain Rock, 1" max to 1/2" minimum size	70	cubic yds	$32.50	$2,275.00
14	Geotextile Fbric, Mirafi MSCAPE or equal	1800	sf	$0.15	$270.00
15	Vortechs Model 2000 vault, Contech or equal	1	ea	$21,500.00	$21,500.00
	All costs include materials and installation			**SUBTOTAL**	$40,631.00
	15% for contigencies			+	$6,094.65
	Total cost to Construct				$46,725.65

Prepared by: ______________________

Kelly Cahill, PE
Cahill Engineering

Date: 10/09/2009

Walla Wall River Recharge
ENGINEER'S ESTIMATE - Trumble Lane West

ITEM NO.	WORK OR MATERIAL	QUANTITY	UNITS	UNIT PRICE	TOTALCOST
1	CS-01 Mobilization	1	Lump Sum	$500.00	$500.00
2	Excavation and Backfill	1150	cubic yd	$3.60	$4,140.00
3	30x8-inch tapping sleeve, material and install	1	ea	$2,250.00	$2,250.00
4	8-inch PVC pipe, IPS, class 100	40	Lin. Ft.	$4.25	$170.00
5	8-inch PVC pipe, IPS, class 160 elbow	1	ea	$175.00	$175.00
6	8-inch Butterfly valve	1	ea	$3,500.00	$3,500.00
7	8-inch flowmeter	1	ea	$3,200.00	$3,200.00
8	48-inch CMP vault and lid	1	ea	$450.00	$450.00
9	8x4 PVC tee class 160	4	ea	$150.00	$600.00
10	4-inch Butterfly valve	4	ea	$275.00	$1,100.00
11	4-inch PVC pipe, class 100, includes all fittings	280	lin ft	$1.75	$490.00
12	4-inch PVC perforated pipe, ASTM 2729	800	lin ft	$1.45	$1,160.00
13	Drain Rock, 1" max to 1/2" minimum size	110	cubic yds	$32.50	$3,575.00
14	Geotextile Fbric, Mirafi MSCAPE or equal	2800	sf	$0.15	$420.00
15	Vortechs Model 2000 vault, Contech or equal	1	ea	$21,500.00	$21,500.00
	All costs include materials and installation			**SUBTOTAL**	$43,230.00
	15% for contigencies			+	$6,484.50
	Total cost to Construct				$49,714.50

Prepared by: ______________________

Kelly Cahill, PE
Cahill Engineering

Date: 10/09/2009

Walla Wall River Recharge
ENGINEER'S ESTIMATE - DeMaris

ITEM NO.	WORK OR MATERIAL	QUANTITY	UNITS	UNIT PRICE	TOTALCOST
1	CS-01 Mobilization	1	Lump Sum	$500.00	$500.00
2	Excavation and Backfill	1150	cubic yd	$3.60	$4,140.00
3	30x8-inch tapping sleeve, material and install	1	ea	$2,250.00	$2,250.00
4	8-inch PVC pipe, IPS, class 100	40	Lin. Ft.	$4.25	$170.00
5	8-inch PVC pipe, IPS, class 160 elbow	1	ea	$175.00	$175.00
6	8-inch Butterfly valve	1	ea	$3,500.00	$3,500.00
7	8-inch flowmeter	1	ea	$3,200.00	$3,200.00
8	48-inch CMP vault and lid	1	ea	$450.00	$450.00
9	8x4 PVC tee class 160	4	ea	$150.00	$600.00
10	4-inch Butterfly valves	4	ea	$275.00	$1,100.00
11	4-inch PVC pipe, class 100, includes all fittings	280	lin ft	$1.75	$490.00
12	4-inch PVC perforated pipe, ASTM 2729	800	lin ft	$1.45	$1,160.00
13	Drain Rock, 1" max to 1/2" minimum size	110	cubic yds	$32.50	$3,575.00
14	Geotextile Fbric, Mirafi MSCAPE or equal	2800	sf	$0.15	$420.00
15	Vortechs Model 2000 vault, Contech or equal	1	ea	$21,500.00	$21,500.00
	All costs include materials and installation			**SUBTOTAL**	$43,230.00
	15% for contigencies			+	$6,484.50
	Total cost to Construct				$49,714.50

Prepared by: ____________________

Kelly Cahill, PE
Cahill Engineering

Date: 10/09/2009

WWBWC
810 S. Main Street
Milton-Freewater, Oregon
97862

October 19, 2009

Dear Oregon Watershed Enhancement Board;

The Walla Walla Basin Watershed Council (WWBWC) resubmitting our bi-state Aquifer Replenishment and Spring Restoration (ARSR) program grant as was suggested in August by the Middle Columbia OWEB review team. This re-submittal of our application **210-6011** was reworked to spread the implementation of the program out in order to reduce current costs and provide the ARSR program team time to secure additional funding and revenue sources to implement the program.

From our original application last April, OWEB should have on file a) letters of support for this program's funding and b) Attachment B: Land Use Information Form and c) Attachment C: Public Record Certification. Besides reducing costs and number of recharge projects we are implementing, nothing has changed relative to these forms.

We look forward to answering any questions the Mid-Columbia or Board might have regarding this application.

Thank you for your time and attention.

Sincerely,

Bob Bower

Senior Hydrologist *MS-Eng.*
Walla Walla Basin Watershed Council
Phone/fax: 541-938-2170
Cell: 509-520-3534
bob.bower@wwbwc.org
www.wwbwc.org

Oregon Watershed Enhancement Board
Region 6 (Mid Columbia) Review Team
Evaluation for April 20, 2009 Applications

APPLICATION NO.: **210-6011** **PROJECT TYPE:** Restoration
PROJECT NAME: Walla Walla Basin Aquifer Replenishment and Stream Restoration Program Phase I
APPLICANT: Walla Walla Basin WSC
BASIN: UMATILLA **COUNTY:** Umatilla
OWEB FUNDS REQUESTED: $824,400.00 **TOTAL COST:** $2,162,000.00

APPLICATION DESCRIPTION:
The Walla Walla Basin is located in Northeastern Oregon and Southeastern Washington. The subbasin of focus for this program is the Walla Walla River which flows into this bi-state valley and becomes a distributary river system of historic river branches, spring-creeks and in the last century, irrigation systems. This proposal is a continuation of aquifer recharge projects starting with an OWEB funded technical assistance grant in 2002.

Because of an agreement with U.S. Fish and Wildlife Service (USFWS), the irrigation districts and the Walla Walla Basin Watershed Council, 25 cfs now stays in the Walla Walla River. The in-stream requirement combined with irrigation efficiency projects and the increase of domestic wells drilled in the last century, has resulted in a drop of aquifer levels that impact springs, creeks and wells. The application states that watershed benefits realized by this project include improved late-season flow, reduced stream temperature and improved fish habitat.

OWEB funds are requested for pre-implementation (8%), project management (11%), in-house personnel (7%), contracted services (23%), travel (.5%), supplies and materials (26%), effectiveness monitoring (16%), educational/outreach (1%), fiscal administration (7%) and post-implementation status reporting (.5%). Partners include BPA, Washington Department of Ecology, Bureau of Reclamation and Oregon Department of Transportation and would provide 56% match funding.

REGIONAL TEAM REVIEW:
The Walla Walla Basin Watershed Council is internationally recognized as a leader in aquifer recharge technology. The bi-state water program and the previous aquifer recharge projects are showing positive results in springs returning, well levels rising, Johnson Creek flowing again, 25 cfs left in the Walla Walla River year-round and water rights in the valley being met.

While the reviewers recognized the accomplishments of the applicant, and noted that previous projects had excellent track records, they also had many questions about this application and the project. The reviewers noted that this proposal is a continuation of several previous applications funded by OWEB, and that led to the discussion about the long-term goals of these aquifer replenishment projects and "when do we know when we're done." The application was not clear how much on-the-ground enhancement was proposed and how much was continued demonstration/research projects on aquifer recharge. The team did not find any clear goals or targets in the application and wondered whether there is a specific end-point. They noted that it would be very helpful to see maps showing what has been done already, where this proposal fits, and future phases – in other words, "where is this going?" Some of their questions included, "what is the goal: Water in streams? Well levels increased? Where is the balance between the watershed and dried-up wells? Will water go into the aquifer or get pumped somewhere else? Are the spring-fed streams fish bearing?"

They also noted that it was hard to understand from the application what they are monitoring for. The review team felt that more detail was needed in the effectiveness monitoring component; there was not enough information to explain what would be monitored and what questions would be answered; such as are they monitoring just water quality/quantity or more? They felt that the budget lacked detail; for example, no unit costs were provided. The reviewers wanted more information to explain how the budget was developed and the work that it supported. They questioned the number of hours of in-house personnel staff time and didn't know what that staff time was for. Reviewers also wanted more detailed information about the specific work and actions of the project.

The review team felt that the application is not ready to fund at this time, and recommended that the applicant resubmit an application that contains a more detailed budget and explanation of costs; clear short- and long-term goals of aquifer recharge identified (e.g. specific streams restored to perennial flow, number of historic springs returned, fish returning to historic spawning and rearing streams.) The team wanted to know if there are identified benchmarks to determine when the objectives of aquifer recharge projects have been achieved and if this project would ever take on a life of its own and self-support.

REGIONAL TEAM RECOMMENDATION: Do Not Fund

STAFF RECOMMENDATION TO BOARD: Do Not Fund