

To: WRIA 35 Planning Unit	
From: John Koreny, LHG, PH, HDR Engineering, Inc.	Project: WRIA 35 Water Storage Project
CC:	
Date: June 7, 2006	Job No: 22604

RE: Limited Evaluation of Aquifer Storage Options for Lower Pataha Creek

INTRODUCTION

HDR Engineering was requested to perform a limited evaluation of the feasibility of developing an aquifer storage project in the Pataha Creek floodplain. The potential project location is between the Town of Pomeroy and Pataha Creek's confluence with the Tucannon River, a reach of approximately 20 miles. This limited evaluation is based solely on a preliminary, general review of previously published materials and limited field reconnaissance. No invasive fieldwork was done for this project. This memorandum provides a summary of the results of our limited evaluation which focuses on the sediments overlying basalt bedrock and outlines some basic project elements if an aquifer recharge project is pursued in the lower Pataha Creek drainage.

PHYSICAL SETTING OF THE LOWER PATAHA CREEK VALLEY

Pataha Creek flows within an approximately ¼- to ½-mile wide valley incised in to basalt bedrock. The valley generally is several hundred feet deep and the valley floor is relatively flat to gently undulating. The Pataha Creek channel generally is incised approximately 5 to 10 feet into the valley floor below the Town of Pataha. Channel incision deepens considerably to the west, and is approximately 10 to 30 feet below the valley floor in the reach above the confluence with the Tucannon River.

Prior to incision, Pataha Creek probably meandered across the valley floor, and the valley floor represents the natural floodplain of this stream. The Pataha Creek valley is partially filled with alluvial deposits. Based on a brief review of the few drillers logs available for the area, examination of out crops in the incised stream valley, and regional reconnaissance geologic maps, this alluvial material is inferred to consist of interstratified stream channel deposits and flood plain deposits. The channel deposits generally are inferred to consist of a mix of sandy and gravelly strata with variable mud content. Flood plain deposits consist predominantly of reworked Touchet Bed and loess silt and fine sand. One would suspect that channel deposits buried within the alluvial valley fill form elongate, lenticular bodies embedded within the flood plain fines.

The alluvial valley fill materials probably vary greatly in thickness. Based on the limited available information these alluvial deposits pinch out against the basalt bedrock valley walls, and thickens into the valley. Maximum alluvial thickness ranges between 20 and as much as 100 feet.

We did not find any direct physical data describing alluvial sediment hydrologic properties in the Pataha Creek area. However, one can generally infer that the coarser alluvial deposits will have hydraulic conductivities of a few feet to several hundred feet per day. The fine grained alluvial valley fill will likely have hydraulic conductivities several orders of magnitude less than the coarser deposits. The basalt bedrock underlying the alluvial valley fill generally will be impermeable except where interflow zones separating each basalt flow occur. The available reconnaissance scale geologic maps allow one to identify where some, but not all, of these occur. With out site specific data and/or more detailed geologic mapping of the Pataha Creek valley it is not possible to determine with any degree of certainty locations in the valley where aquifer storage would, or would not, be feasible.

DESCRIPTION OF A POTENTIAL PROJECT

The following discussion briefly presents basic criteria and considerations that figure into the selection and design of a potential shallow aquifer recharge site. Note however, at this time a recharge site has not been selected and if or when one is selected, site specific investigation may still be needed before a recharge project can begin.

Location

A potential aquifer storage project site in the lower Pataha Creek valley would require an accessible stream reach, valley fill deposits that will accommodate infiltrated water, and background information that would allow one to assess project performance. In addition, a potential project site would require landowner consent to use it, available water delivery infrastructure that could be modified for groundwater recharge use, and existing or new monitoring data to use in measuring recharge performance. At this time a specific location or locations has not been identified for possible use in an aquifer recharge project.

Regulatory Requirements

A water use permit likely will be required from the Department of Ecology for permission to use water diverted from the creek for aquifer recharge. Although this permit probably will not be an Aquifer Storage and Recovery (ASR) Permit, it will probably include monitoring and water quality stipulations like ASR permits commonly contain. In addition, a recharge permit probably will also include minimum stream flow requirements, a timeframe in which recharge can be done, and reporting requirements.

Water Conveyance

Water conveyance consists of three main components: (1) diversion from the creek, (2) transport to the recharge site, and (3) delivery into the infiltration structure.

Diversion from Pataha Creek would be via new or existing structures. Any diversion likely would require fish screens. For the diversion, weirs or ponds would need to be constructed to provide sufficient water depth to allow the diversion to function properly. If, as seems likely given the depth

of incision along most of the creek, water is pumped out of the creek, pumps and piping sufficient to remove water from the creek also will be needed.

Once diverted from the creek water would likely be transported some distance from the creek channel before entering the area where it will be infiltrated into the ground. This conveyance probably would be via either ditches or pipes.

There are several possible scenarios for allowing water to infiltrate into the ground. One is to simply allow water to flow out across the land surface where it can then infiltrate into the ground at whatever rate the surface soils and underlying substrate will allow. Alternatively, water could be introduced into purpose built infiltration trenches and/or ponds. These would probably be excavated to a depth sufficient to get the bottoms of these structures below the surface soils. Another method that could be used to promote infiltration would be the use of a buried drain field. Finally, water could be broadcast onto the infiltration site via irrigation sprinklers.

Water Storage Methods

As noted above there are several ways to deliver water to the shallow aquifer in the Pataha Creek alluvial valley fill, but all lead to introducing water into the shallow alluvial aquifer and using that aquifer to store the water. The challenge with aquifer storage in the shallow, valley fill alluvium is that once it is delivered to the aquifer, stored moves through the aquifer and back to the stream at the time and location wanted.

Monitoring

Monitoring is needed to establish site conditions before, during, and after a recharge event. Monitoring is used to demonstrate the effects of recharge on the aquifer and targeted surface water, meet regulatory requirements, and provide operational information during recharge that is used to control recharge operations. Monitoring can be done via existing wells and infrastructure (if present) and/or new wells and structures.

EVALUATION OF PATAHA CREEK AQUIFER STORAGE OPTION

The benefits and challenges of the Pataha Creek aquifer storage option are presented below:

Benefits

- Flow in the Pataha Creek is very low and warm during the summer. The creek would benefit from increased base flow which would help increase stream flow and reduce temperature.
- There is likely to be land available for purchase or lease within the Pataha Creek floodplain that could be used for the project.
- It would be possible to install or use existing irrigation equipment to facilitate the project.
- Shallow aquifer recharge ponds could also provide riparian wetland or wildlife habitat.

Challenges

- Water infiltrated into the shallow alluvial deposits of the Pataha Creek floodplain during the winter or spring high-flow period would likely quickly flow back to the creek, providing little augmentation of seasonal flow in the creek during the late spring and summer low-flow period.
- Pumping would be required to lift water from the channel up to the floodplain. Minor in-channel construction may be required to construct a pumping intake. The on-going cost of pumping and pump maintenance would need to be funded by the project or by a sponsor.
- It may be difficult to manage a land application project so that application rates do not exceed infiltration capacity and so the soils do not become waterlogged creating excess runoff. Additionally, this method would require the purchase and lease of irrigation equipment or land for land application.
- The project would require a site investigation to determine whether the subsurface deposits in the floodplain are significantly permeable to facilitate aquifer infiltration.
- Insufficient funding is available within the current budget to fully complete site investigations, and design and implement an aquifer infiltration basin project on the Pataha Creek.