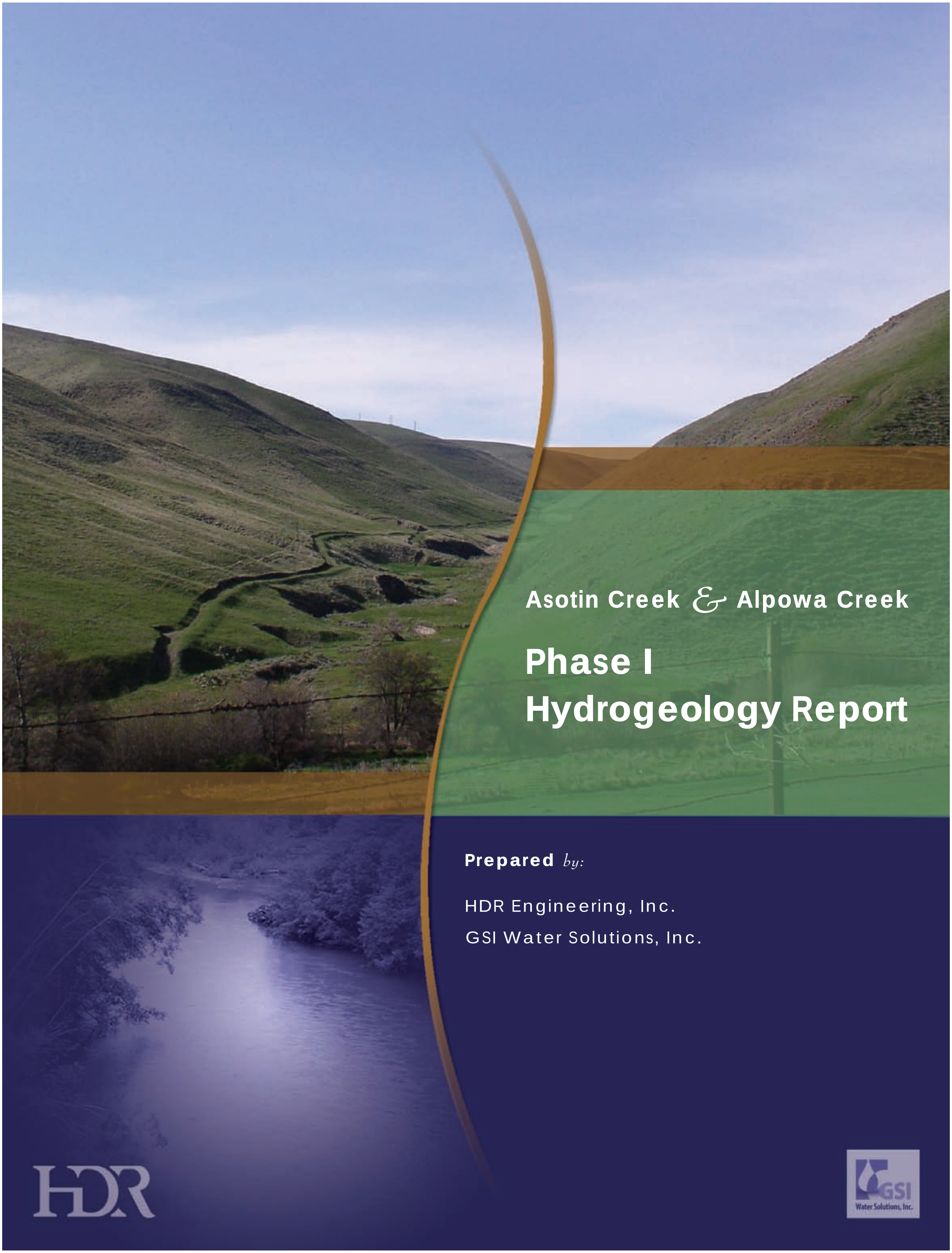

Asotin Creek & Alpowa Creek

Phase I Hydrogeology Report

Prepared *by:*

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GSI Water Solutions, Inc.

Phase I Hydrogeology Report
Asotin Creek and Alpowa Creek Sub-Basins

August 27, 2008

for

WRIA 35 Planning Unit

Asotin Public Utilities District

Washington State Department of Ecology

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Chapter 1
Introduction and Summary of Findings

Phase I of the Asotin Creek and Alpowa Creek Sub-Basin Hydrogeologic Study evaluates the potential effects of current and projected future ground water use on flow depletion in the Asotin Creek and Alpowa Creek sub-basins. The project area, shown on **Figure 1-1**, is located in Garfield and Asotin County, Washington. Individual maps showing each of the project sub-basins are presented on **Figures 1-2** and **1-3**. The project was conducted according to the scope of services described in the January 18, 2008 proposal that was authorized by Asotin PUD on behalf of the WRIA 35 Planning Unit. This report was prepared by HDR Engineering, Inc. (HDR) and GSI Water Solutions, Inc. (GSI).

The technical material in the report is organized into the next three chapters, each of which is summarized here. Chapter 2 presents the results of a hydrogeologic evaluation of the occurrence and distribution of the principal ground water supply aquifers in the project area and assesses, to the extent possible based on available data, ground water flow direction within the aquifer system and the extent of hydrologic connection between the different portions of the aquifer system and surface water (springs, tributaries and mainstem creeks). The hydrogeologic evaluation was based on examination of well logs, field reconnaissance, regional geologic reports and the authors' experience with the Columbia River Basalt Group (CRBG) aquifers. Chapter 2 shows that the primary ground water supply aquifers in the project area currently being tapped by water wells are shallow and intermediate basalt hydrostratigraphic units (SBHU and IBHU). The SBHU is interpreted to be hydrologically-connected to tributary and mainstem creeks throughout much of the project area, although this connection may be more extensive in the upper portions of the drainages, than the lower. The available data is interpreted to indicate that the IBHU is hydrologically-connected in the upper portion of the basin and may be connected in the lower portion of the basin. The deep basalt hydrostratigraphic unit (DBHU) has very limited use in the lower portion of the basin (less than 15 percent of all wells are solely completed in the DBHU), where it is located well below canyon bottoms and therefore probably has limited hydrologic connection with surface water in the lower portion of the Asotin Creek and Alpowa Creek basin. There are few wells and limited data to establish the degree of hydrologic connection for the IBHU and DBHU. The alluvial aquifer present in creek valley bottoms generally has a high degree of hydrologic connection with streams but it is not used for ground water supply.

Chapter 3 presents the results of a ground water use assessment. This assessment was completed to estimate the extent and seasonal nature of ground water use in the project area. Three types of ground water use were examined: (1) domestic use by permit-exempt wells for residences with septic tanks, (2) public supply use and (3) agricultural use. Growth projections were evaluated to determine the current ground water use, projected future ground water use (over the next 50 years), and future ground water use assuming a partial build-out of developable lots in the lower portion of the sub-basin. The results of the assessment show that ground water use and depletion of surface water flows in each of the sub-basins is relatively small (less than about 0.5 cfs) for both current and future (50-year) growth projections assuming a 1 percent annual growth rate. Another growth scenario (partial build-out) was completed to examine the effects of additional population growth and further build-out of developable lots. The partial build-out scenario assumes that development in the lower portion of the basins expands to the amount allowed under current zoning regulations. The resulting higher population increases groundwater use significantly (up to 0.8 cfs and 4 cfs for Alpowa and Asotin Creek Sub-Basins, respectively).

Chapter 4 presents recommendations for Phase II activities. The activities recommended for Phase II are to collect field data to allow a more precise evaluation of ground water flow directions in the SBHU and IBHU, and the extent of hydrologic connection in the lower portion of the basins between streams and these basalt aquifers. The proposed field work includes: (1) stream gaging (seepage runs) during low-flow periods, (2) installation of stream flow gages, and (3) ground water level monitoring. We also recommend compiling monthly stream flow statistics for Asotin Creek and Alpowa Creek during Phase II to evaluate the relative quantity of stream flow depletion caused by ground water pumping.

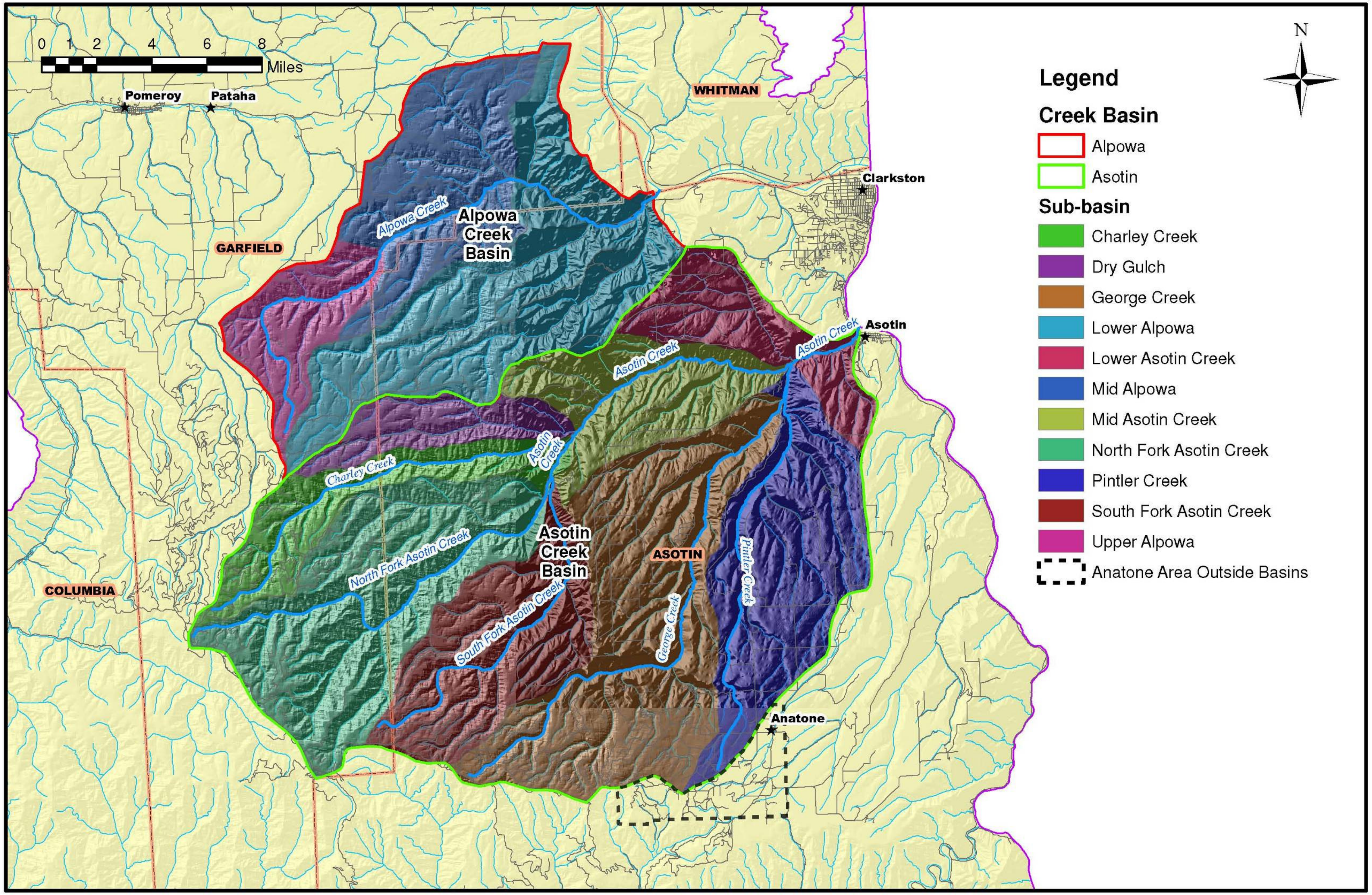


Figure 1-1 Map Of Project Area

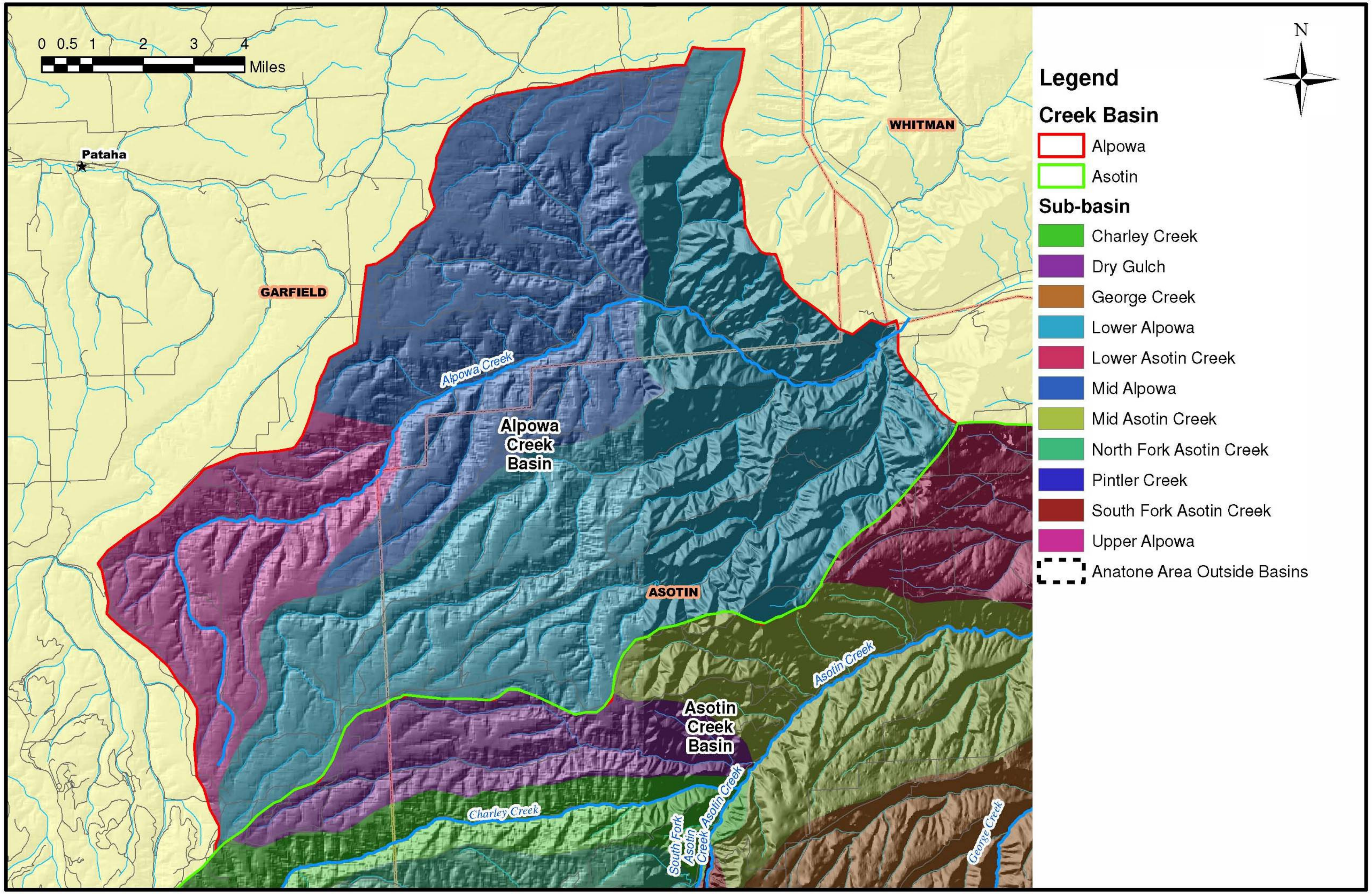


Figure 1-2 Map of Alpowa Creek Sub-Basin

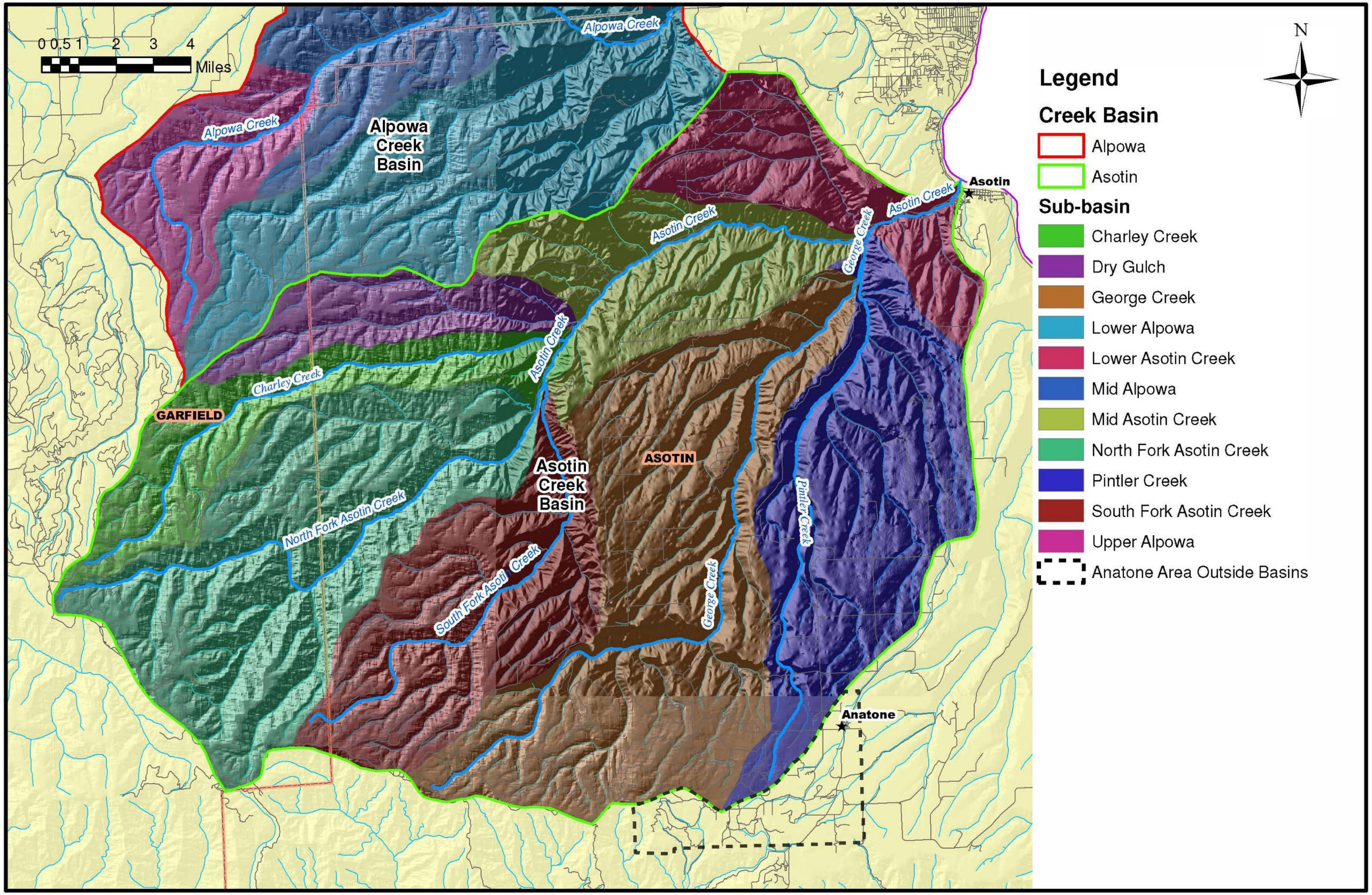


Figure 1-3 Map of Asotin Creek Sub-Basin

Chapter 2
Hydrogeology of the Alpowa and Asotin Creek Sub-Basins

2.1 Introduction

The objective of this chapter is to describe the results of an evaluation of hydrogeologic conditions within the Alpowa Creek and Asotin Creek sub-basins of Water Resources Inventory Area (WRIA) 35 (**Figure 2-1**). This chapter identifies the main aquifers that interpreted to underlie the project area and describes the potential source(s), movement, occurrence, and discharge of groundwater within these sub-basins.

This chapter is subdivided into several sections that describe or summarize:

1. Data sources and analysis methods.
2. The physical setting of the Alpowa Creek and Asotin Creek sub-basins, including a review of the basic regional geologic and hydrogeologic framework.
3. A conceptual hydrogeologic model which presents interpretations concerning the aquifers' nature and extent, groundwater discharge and recharge, impacts of wells on surface water, and groundwater-surface water interaction.

2.2 Data Sources

This chapter builds on an earlier geologic and hydrogeologic evaluation of WRIA 35 (Kennedy/Jenks, 2005). In addition, it draws on a regional geologic and hydrogeologic framework evaluation of the Columbia Basin Ground Water Management Area (GWMA, 2007) and geologic studies and well evaluations in the Walla Walla Basin (GSI, 2007). This other work has utility in WRIA 35 because these areas, like WRIA 35, are underlain by similar geologic units and features, which similarly impact groundwater occurrence and movement where they exist.

The hydrologic conditions within the Alpowa Creek and Asotin Creek sub-basins (project area) of WRIA 35 (**Figure 2-1)** described in this chapter are based on existing information, such as driller's logs and geologic maps. A limited field reconnaissance was done to observe the project area surface geologic conditions that might provide additional information about potential groundwater conditions. Invasive subsurface investigations such as exploratory and/or monitoring well drilling and geologic logging, measuring water levels in new and existing wells, and aquifer testing, were not part of the project scope.

2.2.1 Driller's Logs

Driller's logs were used to assess groundwater conditions in the project area, including:

- Identifying areas where wells are clustered and groundwater pumping is occurring.

- Interpreting potential aquifer types or units where wells might be extracting water.
- Evaluating more or less productive portions of the aquifer systems underlying the project area.
- Assessing the potential occurrence of groundwater in the project area, including source and discharge areas for that groundwater.

Driller's logs were selected for use for the project using the following criteria:

- First, if a well could be located to the nearest ¼ - ¼ section based on the location described on the driller's log, it was considered for possible use.
- If a driller's log was for a well which seemed to have a reasonable location, given the stated use of the well, then the driller's log was evaluated to determine whether or not geologic, well construction, and groundwater information recorded on the driller's log was clearly described.
- Finally, in areas where multiple wells are present, driller's logs were selected in an attempt to describe the range of potential conditions across the project area.
- Given budget and schedule constraints, well locations were only field verified as circumstances allowed.

Information compiled and interpreted from the approximately 240 driller's logs used in this chapter are tabulated in **Appendix A** and summarized below. A well location map is also presented in **Appendix A**. No well drill cuttings were found for interpretation for this project.

2.2.1.1 Alpowa Sub-Basin Wells

A total of 49 wells were evaluated within the Alpowa Creek sub-basin. General observations with respect to pumping performance for these wells include the following:

- Reported pumping rates range from 1 to 250 gpm, with the average rate being 42 gpm.
- Reported water temperatures are consistently less than 62 degrees F.
- Most of the wells evaluated are reported to be for domestic use and as a consequence well pumping data, with drawdown measurements, only were found for 3 of the 49 wells. For these three wells calculated specific capacities are 0.183, 1.632, and 18.75 gpm/foot draw down.
- Average well depth is approximately 300 feet, with deepest reported to be 700 feet.

2.2.1.2 Asotin Sub-Basin Wells

Within the Asotin Creek sub-basin, 160 driller's logs were examined to evaluate general groundwater conditions. In addition, approximately 30 driller's logs for wells located near, but outside, the sub-basin were examined to provide additional information on the Anatone area. General observations relative to these wells include the following:

- Reported pumping rates for wells within the sub-basin range from 1 to 150 gpm, with the average rate being 24 gpm.
- Reported water temperatures are consistently less than 65 degrees F.
- Most of the wells evaluated are reported to be for domestic use and as a consequence well pumping data, with drawdown measurements, only were found for 7 of the wells. For 6 of these 7 wells, calculated specific capacities were less than 1 gpm/foot draw down. The seventh well is calculated to have a specific capacity of 250 gpm/foot draw down.
- Average well depth in the sub-basin is approximately 266 feet, with the deepest reported to be 1,155 feet.

2.2.2 Surface Geologic Maps

In conjunction with the driller's logs, surface geologic maps of the project area were also used for this evaluation. The primary geologic map used is Schuster (1993). This map was used to determine the basic physical geologic framework for the aquifers underlying the project area, including probable hydrostratigraphy, potential flow boundaries and evidence for compartmentalization, and the probable relationship of canyons to the basic aquifer architecture. This geologic map was also used to place the groundwater and well construction information from driller's logs into a basic physical geologic framework. The elements of the physical geologic framework that were identified using the geologic map and that are important in evaluating groundwater conditions within the project area include:

1. Identifying the basic geologic units which are interpreted to host groundwater.
2. Determining the distribution of these units, including dip and pinch outs.
3. Locating folds, faults, and dikes which cross-cut units, and potentially form barriers, and in some cases may be pathways, to groundwater occurrence, movement, and quantity.
4. Evaluating the depth of incision of the modern drainage system into and through geologic units and the potential impact this has on: (1) groundwater occurrence, movement, recharge, and discharge and (2) surface water and aquifer interaction.
5. Identifying basic surface units that may influence vadose zone conditions, especially soil moisture infiltration.

2.2.3 Springs

During the course of this project, one of the things noted was the presence of springs. Springs are important because they provide insight into the presence and availability of groundwater (especially shallow), discharge points from the aquifer system, and the potential for groundwater discharge to provide base flow to streams. Given these relationships a preliminary review of spring distribution was conducted in the project area primarily using published 7.5 minute topographic maps and field reconnaissance.

2.3 Physical Setting

This section briefly summarizes the physical geographic, geologic, and hydrogeologic setting of the project area.

2.3.1 Geographic Setting

The project area (**Figure 2-1**) is located in Asotin County and Garfield County in southeastern Washington. The project area ranges from relatively dry valleys and canyons (**Figure 2-2**) adjacent to the Snake River on the north and east, to forested highlands (**Figure 2-3**) on the edge of the Blue Mountains to the south and west. Elevations range from about 690 feet above mean sea level (msl) to over 5,000 feet above msl. The project area is deeply incised by streams which form the main branches of Alpowa Creek and Asotin Creek, and their numerous tributaries. From the highlands of the upstream areas to the Snake River, canyon depths may exceed 1,500 feet.

In the project area the largest concentration of human population is found in the City of Asotin at the confluence of Asotin Creek with the Snake River. The largest population center in the area, the City of Clarkston and environs, generally lies outside the project area, although continued population growth west of Clarkston has resulted in rural residential home construction in the upland areas of the northeastern portion of the Asotin Creek sub-basin. The rest of the project area is characterized by a rural population with concentrations of rural homes being found in the lower portions of Asotin Creek and Alpowa Creek and in the plateau area surrounding the unincorporated town of Anatone.

Land uses across the bulk of the project area generally consist of:

1. Forest managed for recreation, rural residential, forestry, and stock grazing in the upland (western and southern) portions of the project area.
2. Dryland farming and stock grazing across many of the high, unforested plateau areas into which the many canyons in the project area are incised.
3. Small (<20 acre) irrigated farm plots, grazing, stock raising, and rural residential in canyon bottoms, especially along perennial reaches of the two streams that are the focus of this project.

2.3.2 Geologic Setting

Kennedy/Jenks (2005), completed for the WRIA 35 Phase I/II characterization effort, identifies the main geologic units underlying the project area and evaluates the relationship between these units and groundwater occurrence and movement, summarizes the possible effect of geologic structure (folds and faults) on groundwater distribution, and presents a basic conceptual model of probable groundwater occurrence and movement throughout the WRIA 35 region. As described in that report, the predominant geologic unit underlying the project area is the Columbia River Basalt Group (CRBG) (**Figure 2-4**). The CRBG is overlain by a series of relatively localized continental clastic deposits (clay, silt, loess, sand, and gravel) and underlain by widespread (but very deep) metamorphic rocks (**Figure 2-4**).

2.3.2.1 Sediments Overlying the CRBG

The sediments that overlie the CRBG consist of a variety of wind-deposited to water-deposited strata. These strata typically are localized in stream valleys or covering upland areas. They also occur locally where ancient streams deposited them in and around ancient river channels. Pleistocene cataclysmic flood deposits which are common in the region are not common in the project area. The following general summary is based on Hooper and others (1985), Kuhns (1980), Webster and others (1982), Schuster (1993), and our own observations.

Alluvial deposits (water-deposited): Generally coarse, well-bedded, stream-rounded, basaltic and mixed-lithology continental clastic strata (predominantly sand and gravel) are found as thin (generally less than 50 feet thick) to locally thick (>100 feet) deposits partially filling many valley and canyon bottoms and on terraces near Asotin, Washington. More angular to blocky, commonly muddy, cobble to boulder gravel also is found at the mouths of small canyons feeding into the larger valleys, and in landslide and talus deposits at the base of steep slopes and canyon walls. The coarse basaltic alluvial deposits range from Pleistocene to Holocene in age (possibly older than 700,000 years to present). Mixed lithology, partially indurated conglomerate gravel in the Clarkston area may be even older, possibly Pliocene in age and deposited by the ancestral Salmon-Clearwater River.

Loess (wind-deposited): Loess is a wind deposited silt and very fine sand. It mantles most of the upland areas within the project area lying between the edge of the Snake River canyon and the Blue Mountains. The loess, also referred to as the Palouse Formation, is deeply incised by stream erosion and rarely more than 100 feet thick. It is potentially early Pleistocene to late Pleistocene in age (>750,000 to 10,000 years).

2.3.2.2 Columbia River Basalt Group (CRBG)

Collectively the CRBG consists of a thick sequence of more than 300 continental tholeiitic flood basalt flows that cover an area of more than 164,000 km^2 in Washington, Oregon, and western Oregon (Tolan and others, 1989), and underlies the entire project area. The total estimated volume for the CRBG is greater than 174,000 km^3 (Tolan et. al, 1989) with the maximum thickness of over 3.2 km occurring in the Pasco Basin area (Reidel et al, 1982, 1989a,b). CRBG flows were erupted between approximately 17 and 6 million years ago from long (10 to >50 km), north-northwest-trending linear fissure systems located in eastern Washington, northeastern Oregon, and western Idaho, including within the project area (Schuster, 1993).

The CRBG is divided into a host of regionally mappable units (**Figure 2-5**) based on variations in physical, chemical, and paleomagnetic properties (Swanson et al, 1979a; Beeson et al, 1985; Reidel et al, 1989b; Bailey, 1989). The CRBG underlying the project area is divided into four formations. These formations are, from youngest to oldest, the Saddle Mountains Basalt, Wanapum Basalt, Grande Ronde Basalt, and Imnaha Basalt (Swanson et al, 1979a,b). These formations are further subdivided into members defined, as are the formations, on the basis of a combination of unique physical, geochemical, and paleomagnetic characteristics. These members can be, and often are, further subdivided into flow units (Beeson et al, 1985).

Most CRBG flow units, or flows, occur as sheet flows which form laterally widespread, planar-tubular sheets (or layers). Each basalt flow has a top and bottom where porous and permeable rock is found (**Figures 2-6** and **2-7**). The interiors of these flows generally consist of dense, glassy basalt. Based on available geologic studies (Lindberg, 1989) cooling joints within dense flow interiors are interpreted to have low to no effective porosity and permeability unless disturbed by deformation or erosion because they are over 99 percent filled by secondary clay, silica, and zeolite minerals. The lateral extent of individual sheet flows is controlled by erosion, faulting, and the original extent of the basalt flow. A small number of CRBG basalt flows (primarily in the Saddle Mountains Basalt) emplaced in, and filled, pre-existing canyons and valleys and form narrow, elongated, ribbons which are referred to as intra-canyon flows.

Saddle Mountain Basalt: This is the youngest (13,500,000 to 6,500,000 years ago) and aerially most limited CRBG unit in the project area. Eight Saddle Mountains units are present in the Asotin area where they occur as very small sheet flows and/or as intra-canyon flows.

Wanapum Basalt: The Wanapum Basalt consists predominantly of sheet flows subdivided into the Roza Member (1 flow), Frenchman Springs Member (3 to 6 flows) and Eckler Mountain Member (3 or more flows). Wanapum Basalt sheet flows are found predominantly in the northern portion of the project area, particularly in the Alpowa Creek sub-basin, and on the drainage divide above the Grande Ronde River. In the project area the Wanapum Basalt has limited lateral continuity because the modern drainage has cut canyons, which erode completely through it in many areas. Where it has not been removed by erosion in the project area, the Wanapum Basalt usually is less than 300 feet thick. Feeder dikes for the eruptions that feed at least the Roza Member are present in the Asotin Creek drainage.

Grande Ronde Basalt: The Grande Ronde Basalt (emplaced between approximately 15.6 and 14.5 million years ago) underlies the Wanapum Basalt and is the most widespread and voluminous CRBG unit in the project area. In the project area the Grande Ronde Basalt consists of dozens of flows subdivided into 4 magnetostratigraphic units (from top to bottom, N_2, R_2, N_1, and R_1). The depth of erosion into the Grande Ronde Basalt generally increases up gradient in the project area. The deeper Grande Ronde units (N_1 and R_1) are exposed in the deepest canyons in the upper reaches of the project area, and in the highlands bordering the southern edge of the project area. Grande Ronde Basalt sheet flows typically become more widespread and thicker away from the crest of the Blue Mountains. In the project area the Grande Ronde Basalt usually is several thousand feet thick, although immediately to the east, along the Snake River, older rocks are exposed. Feeder dikes for eruptions that feed many Grande Ronde flows are present in the Asotin Creek drainage (**Figure 2-8**).

Imnaha Basalt: The Imnaha Basalt, the oldest CRBG unit, only is exposed at the Earth's surface in the project area at the mouth of Alpowa Creek, although it underlies the entire project area. The Imnaha Basalt is exposed adjacent to the project area in the Snake River canyon. Beneath the project area it is inferred to consist of several sheet flows that buried an irregular, pre-existing land surface.

Ellensburg Formation: The Ellensburg Formation consists of claystone, mudstone, sandstone, and conglomerate interbedded between some CRBG units, especially in the Saddle Mountains Basalt. Ellensburg units are most common in the Asotin area where they crop out on canyon walls. Generally these sediments consist of coarse to fine alluvial strata deposited in fluvial systems active between CRBG eruptions.

2.3.2.3 Structural Geology (Folds and Faults)

The project area lies within the western half of the Lewiston Basin (**Figure 2-9**). The Lewiston Basin is a structural basin bounded by folded and faulted CRBG, and it has been subsiding since at least the beginning of emplacement of the Saddle Mountains Basalt approximately 13.5 million years ago. It has experienced several thousand feet of subsidence in its history.

CRBG strata within the Alpowa Creek sub-basin and the western half of the Asotin Creek sub-basin generally dip to the east, toward the center of the Lewiston Basin. CRBG strata in the southern portion of the Asotin Creek sub-basin generally dip to the north-northeast, off the anticline which separates this drainage from the Grande Ronde River to the south. Structural dips in the CRBG across the project area commonly range from 2 to 10 degrees, and CRBG strata found exposed on the highlands surrounding the project area are found at or below the Snake River in the center of the Lewiston Basin.

Faulting accounts for much of the structural offset seen between strata surrounding and underlying the Lewiston Basin. A number of generally east-west oriented faults are mapped in association with the anticline located near the southern edge of the project area (**Figure 2-9**). Generally north-south oriented faults also occur from the mouth of Alpowa Creek south to Charley Creek, a tributary of Asotin Creek (**Figure 2-7**). The sense of motion on these faults generally is downwards on the Lewiston Basin side.

2.3.2.4 Pre-CRBG Rocks

The rocks underlying the CRBG crop out in small areas in the bottoms of several canyons near the project area, especially in the Snake River canyon south of Asotin. These rocks consist of metamorphic volcanic and sedimentary rocks having liming porosity. Pre-CRBG rocks probably are not a source of significant groundwater in the project area and they essentially form the bottom of the CRBG aquifer system that is discussed in the next section.

2.3.3 Hydrogeologic Setting

Aquifers underlying the project area are hosted by the layered CRBG, continental sediments interbedded between some CRBG basalt flows (Ellensburg Formation), and continental sediments overlying the CRBG. Aquifers hosted by the CRBG range from small yielding and localized to potentially quite large and widespread. The sediments overlying the CRBG host generally localized aquifers, referred to as the suprabasalt sediment (or alluvial) aquifer system, while the underlying metamorphic rocks probably contain little or no usable groundwater. The folding, faulting, and feeder dikes cross-cutting the project area, plus the many deep canyons which are incised into the project area, probably exert some degree of influence on the lateral continuity of these aquifers. Unfortunately, direct evidence of aquifer conditions generally is lacking for the project area due to the lack of monitoring, aquifer testing, and characterization data. Consequently, the following discussion of the hydrogeologic setting relies largely on insights inferred from driller's logs, area reconnaissance, and regional knowledge of the CRBG.

2.3.3.1 Alluvial Aquifer System

The alluvial aquifer system is found predominantly in valley filling alluvial sand and gravel and to a lesser extent the silty loess overlying basalt on the highlands separated by deep canyons. Where found as alluvial canyon fill sediments, the aquifer system is inferred to general consist of localized, laterally restricted, unconfined groundwater-bearing zones less than 50 feet thick. The water table in these situations generally is less than a few feet below the ground surface, although it may be deeper locally. The distribution of the suprabasalt sediment aquifer in canyons likely is controlled by the physical extent of the sedimentary strata within the canyon, including the location of the bedrock below the canyon filling sediments and comprising the canyon walls.

On the highlands the distribution of the portion of the alluvial aquifer hosted by loess is limited by the location of canyons incised into these highlands, the moisture holding capacity of the loess, and the availability of recharge. The water table in loess portions of the alluvial aquifer likely only lies a few feet above the basalt bedrock surface that underlies these strata.

The alluvial aquifer system is interpreted to be highly compartmentalized by the limited width of the canyons and by the depth of incisions through the loess highlands. Generally there is little or no hydrologic continuity between the parts of this aquifer system located in different stream valleys and in isolated highlands. However, the canyon fill portion of this aquifer probably does typically have a high degree of hydrologic continuity with nearby streams, both discharging to and receiving discharge from them. The canyon filling coarse alluvial components of this aquifer system (sand and gravel) are inferred to generally have high hydraulic conductivity and transmissivity given their typically uncemented character. The loess portions of this system tend to have lower hydraulic conductivity and transmissivity given their silty character.

2.3.3.2 CRBG Aquifers

The physical characteristics and properties of individual CRBG flows affect their intrinsic hydraulic properties and influence potential distribution of groundwater within the CRBG (**Figure 2-6**). Groundwater within the CRBG generally is found in flow tops and flow bottoms, with the top of one flow and the bottom of the overlying flow referred to as an interflow zone. These interflow zones are separated by dense flow interiors which are characterized by dense, glassy jointed rock. These joints typically are filled by secondary minerals and clay (Lindberg, 1989), usually resulting in little to no effective porosity. Dense flow interiors undisturbed by tensional fractures, faults, flow pinch outs, and related features act to significantly restrict, if not block, movement of groundwater between successive interflow zones. Consequently, groundwater in the CRBG generally occurs in multiple, stacked, confined, aquifers which have limited hydrologic continuity with overlying and underlying units. CRBG aquifers can be very productive (high transmissivity), but generally have very low overall storativity, which can readily result in the decline of ground water levels where pumping exceeds recharge. Under current conditions, this is not expected to be a widespread issue the project area with its generally low net volume of well pumping and proximity to potential recharge areas. Groundwater flow direction within an individual interflow zone generally is in the down-dip direction. Given the regional dip of the CRBG in the project area, to the north and east off the Blue Mountains towards the Snake River, groundwater flow in CRBG aquifers generally will be towards the Snake River, parallel to dip direction.

Interflow zone aquifers are as widespread as the host geologic units. Consequently, potential aquifers in the Saddle Mountains Basalt (dominated by intracanyon flows and very localized sheet flows) generally will be narrow and elongated, whereas those in the sheet flow dominated Wanapum and Grande Ronde Basalts are thin, but potentially laterally extensive. The lateral continuity of potential Wanapum and Grande Ronde aquifers in the project area is largely controlled by depth of erosion, flow edges, faults, and feeder dikes. The more each of these features are overprinted on the Wanapum Basalt and Grande Ronde Basalt, the more restricted or limited the lateral continuity. Groundwater movement in CRBG interflow zones generally will be down-dip in these stratified materials.

Because flow interiors are relatively impermeable, the majority of recharge to CRBG interflow aquifers likely occurs where individual interflow zones crop out at, or are near, the surface. Such areas have to be where surface water and/or precipitation are present and can infiltrate into the ground. Conversely, discharge from these aquifers generally has to be where these interflow zones terminate at or near the surface (such as in canyons) or to other aquifers down dip of recharge areas.

The large number of springs shown in the headwaters of the project area on 1:24,000 scale maps suggests widespread aquifer discharge is an important source of stream flow high in the project area. Conversely, the small number of springs low in the project area suggests aquifer discharge to streams is less common on the down gradient of the headwaters areas. Based on the extent of interflow zone aquifers in the various CRBG units with respect to potential recharge areas, lateral continuity, and location, Saddle Mountains and Wanapum aquifers are inferred to be of limited extent and low, sustainable productivity (<100 gpm). Because these units do crop out in the canyons which cross-cut the project area, stream flows probably are in part derived from springs discharging from these units. Grande Ronde aquifers are more widespread and may be potentially more productive, but the relative lack of deep, high capacity, water production wells in the project areas makes any prediction of Grande Ronde aquifer production capacity and pumping sustainability in the project area premature.

For this project a basic three-tier subdivision of the CRBG aquifer system was adapted based on geologic unit, location, and unit distribution with respect to lateral continuity as influenced by the depth of canyon incision. Maps presented on **Figures 2-11** to **2-13** and a hydrogeologic cross-section presented in **Figures 2-14** and **2-15** assist in illustrating the geologic and hydrogeologic conditions in the study area. These subdivisions, referred to as hydrostratigraphic units, are defined as follows:

1. The Shallow Basalt Hydrostratigraphic Unit (SBHU) (consisting of the Saddle Mountains Basalt and the Wanapum Basalt) is found predominantly within the Lewiston Basin in the highlands above lower Asotin Creek. It is highly dissected by canyons which commonly cut completely through the unit. **Figure 2-11** illustrates the general extent of this unit while **Figure 2-12** shows

the depth of incision typically seen where this shallow basalt hydrostratigraphic unit (SBHU) occurs.

2. The Intermediate Basalt Hydrostratigraphic Unit (IBHU) (consisting of the N2 and R2 Grande Ronde Basalt magnetostratigraphic units) is found beneath almost the entire project area (**Figure 2-13**). In the headwater areas of Alpowa Creek and Asotin Creek, it is deeply eroded by canyons, while in the lower reaches of these drainages, erosion only cuts into the top of the intermediate basalt hydrostratigraphic unit (IBHU).
3. The Deep Basalt Hydrostratigraphic Unit (DBHU) (consisting of the N1 and R1 Grande Ronde Basalt magnetostratigraphic units) is found beneath the entire project area, and is only rarely exposed in the deepest canyons (**Figure 2-13**).
4. Folds and faults cross-cut each of these hydrostratigraphic units, while dikes commonly cross-cut the deeper units in the Asotin Creek sub-basin. Based on the regional studies of Newcomb (1961, 1965, 1969) these features are inferred to more likely form at least local barriers to groundwater flow, impeding groundwater movement down dip in the strataform CRBG units. However, these same features may also provide local pathways for vertical and subvertical groundwater flow, although no direct evidence of this in the project area was found during the course of this evaluation.

2.4 Groundwater Conditions in the Project Area

This section presents an interpretation of the basic hydrogeologic system inferred to underlie the project area. This interpretation, as noted in the introduction to this chapter, is based largely on regional information, our understanding of physical CRBG geology, inferences drawn from an evaluation of water well logs for selected wells in the project area, and a brief field reconnaissance. As such, this interpretation of project area groundwater conditions is limited by the lack of up-to-date monitoring data and detailed characterization data. If new information, such as pumping test data, water level monitoring data, and seepage runs is collected as a result of future work, the hydrogeologic interpretations presented herein may need to be re-evaluated.

2.4.1 Basin Considerations

In the Alpowa Creek sub-basin the SBHU is largely absent. Most wells evaluated for this project constructed in the bottoms of canyons in the Alpowa Creek sub-basin intersect and extract water from the DBHU, while most wells in the upland areas extract water from the IBHU (**Table 1**). Almost all of these wells are reported to be for domestic use. Water well logs report that water levels in some DBHU wells were at or above the bottom of the Alpowa Creek canyon at some locations at the time these wells were completed. Current water level data to verify this observation currently is lacking.

Most springs seen on canyon walls in the Alpowa Creek sub-basin are in the IBHU, and springs are more common in upland areas and the headwaters areas of the sub-basin than they are in the lower reaches of Alpowa Creek. The decreasing number of springs in the lower reaches of Alpowa Creek (compared to the upper reaches) suggests decreasing contributions of discharge from the basalt aquifer system to base flow in this stream in the lower reaches of the stream system.

Unlike in the Alpowa Creek sub-basin, the SBHU is widespread within the Asotin Creek sub-basin. It underlies most of the upland surfaces between the deep canyons, including the Anatone area. Consequently, a large number of wells in this sub-basin, potentially as many of 75%, are open to and extracting water from the SBHU (**Table 1**). Of the other wells in the sub-basin, more are open to the IBHU than the DBHU.

The IBHU and the DBHU are widespread beneath the Asotin Creek sub-basin, with the IBHU being more frequently dissected by deep canyons than the DBHU. Nevertheless, the DBHU is present at or near the Earth's surface in the upper reaches of both forks of Asotin Creek and on the drainage divide between the headwaters of Asotin Creek and the Grande Ronde River. The DBHU also is widespread in the Snake River canyon up-dip and up stream of the project area.

Many springs are present in the Asotin Creek sub-basin, especially in the upper portions of the drainage and in the highland areas separating stream headwaters. These springs appear to be concentrated in the SBHU and upper part of the IBHU. Springs appear to be far less numerous in these same units, in the lower reaches of the sub-basin.

2.4.2 Conceptual Groundwater Model

The following sub-sections summarize our current interpretation of the basic groundwater system underlying the project area. As noted above, it is based on regional knowledge and only general project area specific information. If new data and information is collected as a result of future investigations, this conceptual hydrogeologic model may need to be modified as suggested by the new data and information.

2.4.2.1 Alluvial Hydrostratigraphic Unit (AHU)

The alluvial sand and gravel portion of the AHU is localized in stream valleys and canyons is relatively thin (only a few tens of feet thick) and is in direct hydrologic continuity with nearby streams. Consequently, impacts to one (increased pumping, decreased recharge, etc.) will affect the other. The alluvial aquifer in these canyons likely discharges to and is recharged by the streams found in the canyons.

The silty loess portion of the AHU generally is perched high above the bottoms of stream canyons on the elevated, deeply dissected plateaus and ridges separated by these deep canyon. In the wooded upland areas, much of which is public lands, the AHU probably receives significant recharge from rain and snow melt. Springs seen on the upper portions of canyon walls near the apparent top of basalt suggests the loess lying on the highland surfaces contains at least some groundwater. This water likely is recharged by the seepage of precipitation from the ground surface, through the loess, and to the top of basalt where it accumulates and moves down dip across the buried basalt surface. This water discharges in springs high on the canyon walls (many hundreds of feet above canyon floors) that probably have only a limited direct connection to streams in the canyon bottoms. In addition, because loess, which consist predominantly of silty fine sand to sandy fine silt, typically has very low transmissivity and conductivity, it is not to be considered a productive groundwater resource and few if any wells are completed in it.

2.4.2.2 Shallow Basalt Hydrostratigraphic Unit (SBHU)

The SBHU is found beneath the highland plateaus separated by the various deep canyons cross-cutting the project area. It is most extensive in the Asotin Creek sub-basin extending up dip from the dry canyon walls above Asotin to the Anatone area. Many of the driller's logs evaluated for wells in the upland area around Anatone appear to intersect these strata, and the low production, discontinuous aquifers within them.

Based on the distribution of the unit, recharge is probably derived predominantly from snow melt and precipitation infiltrating downwards into easily accessible interflow zones. Data is not available to construct a reliable potentiometric map for this hydrostratigraphic unit. However, given the stratiform nature of the basalts in which the shallow basalt aquifer occurs, the depth of incision of canyons through it, and dip direction, groundwater in it is interpreted to be moving predominantly to the north and northeast. Consequently, most discharge from the SBHU appears to be in the upper portions of the sub-basin where springs are more abundant (such as on Pintler Creek and Huber Gulch) than in the lower portions near Asotin, where springs are rare. Given the presence of the springs near the headwaters of Pintler Creek and Huber Gulch, it seems plausible that shallow wells in that area could impact those streams. This seems to differ from other streams in the upper drainages where their headwaters generally lie in deeper hydrostratigraphic units. Wells in the shallow basalt likely will have little impact on these springs and the streams they feed. In the Anatone area, where strata dip to the northeast, a significant portion of the groundwater moving through this unit likely discharges into springs high on the walls of Tenmile Creek canyon which is outside the sub-basin. Tenmile Creek drains into the Snake River south of Asotin, and outside the project area.

2.4.2.3 Intermediate Basalt Hydrostratigraphic Unit (IBHU)

The IBHU is the hydrologic unit exposed in most of the canyons cross-cutting the project area. It typically is exposed at the bottom of the deepest canyons, and extends for some depth below the canyon bottoms, especially in the lower reaches of these streams. In the Alpowa Creek sub-basin the IBHU is deeply eroded into by the main canyons, and it is completely eroded through in the lowest part of the sub-basin. Given the thinness of the SBHU in the sub-basin, the IBHU is the primary upper basalt aquifer unit in the Alpowa sub-basin and has very limited lateral continuity as a result of canyon incision. Most springs in the upper portion of the sub-basin drain this unit.

Within the Asotin Creek sub-basin the IBHU is widespread. West of Anatone, essentially in the headwaters of north and south Asotin Creek, the IBHU is deeply incised and has little lateral continuity as a result of this incision. In the lower portion of the sub-basin and in the Anatone area, structural dip places the unit deeper into the subsurface and only its uppermost parts are incised into, and potentially interrupted by canyons. In these areas this unit may display some degree of lateral continuity, only being interrupted by the deepest canyons.

In deep canyons where all or much of the IBHU is exposed, it is likely that it discharge to streams, where groundwater is present in it. Based on the mapped distribution of the N2 and R2 Grande Ronde Basalt, it is inferred that this interconnection, if occurring, is more common in the upper portions of the two sub-basins, areas where few wells are drilled into these strata because of the sparse population. In the lower basin more wells intersect IBHU, but the hydrologic connection between streams and the IBHU is uncertain. It appears that most wells in this area are completed in interflow zones several hundred feet below ground surface. Such interflow zones, even if they display potentiometric water levels at or above the bottoms of the canyons, probably have limited hydraulic connection with surface water in the project area because of the presence of multiple, laterally widespread, uninterrupted dense basalt flow interiors. Such limited hydrologic connection is further suggested by the general scarcity of springs on canyon walls in these lower reaches. Nevertheless, the lack of up-to-date water level monitoring data from the IBHU makes this difficult to verify, and future data collections activities should look at this.

Many faults and feeder dikes cross-cut the basalt layers of the IBHU. While currently available data in the project area is inadequate for characterizing their actual impact on groundwater occurrence and movement, knowledge of their presence should be factored into future groundwater work in the project area. If they act as barriers to groundwater movement water levels would likely be higher on the up dip side of them. If, on the other hand, they provide pathways for groundwater movement, springs would likely be associated with them. Based on current knowledge, including field reconnaissance, these features more likely act as barriers to groundwater movement in the project area.

2.4.2.4 Deep Basalt Hydrostratigraphic Unit (DBHU)

The DBHU exists beneath the entire project area.. The only locations within the project area where this portion of the basalt aquifer system has largely unrestricted continuity with the surface is in canyons of the North Fork of Asotin Creek and the South Fork of Asotin Creek and in the lower end of the Alpowa Creek. However, immediately south of the project area on the drainage dived between Asotin Creek and the Grande Ronde River and southeast of the project area along the Snake River the unit is widespread at and near the Earth's surface. In these area the recharge and discharge relationship with the streams is unknown due to the few wells completed in the unit in this area. To the east downstream, only a few wells appear to intersect and take water from this unit.

Because this hydrostratigraphic unit exists almost entirely below the depth of the deepest canyons, these canyons are expected to have little or no impact on limiting the lateral continuity of this unit. If this unit is receiving recharge, it may have the potential to support more groundwater pumping than it currently does. If this unit is compartmentalized to any extent, the most likely cause will be folds, faults, and feeder dikes such as described for IBHU. Such compartmentalization could limit potential groundwater pumping sustainability. Based on the location of surface and near surface occurrences of this unit, it seems likely that the bulk of the recharge it receives could originate outside of the surface watershed.

Given the depth of the unit beneath the project area, and the dip of the unit into the Lewiston Basin, it seems likely that hydrologic continuity between this system and streams in the project area is extremely limited. Water-bearing interflow zones within it, even if they display potentiometric water levels at or above the bottoms of the canyons, probably have limited hydraulic connection with surface water in the project area because of the presence of multiple, laterally widespread, uninterrupted dense basalt flow interiors. Such limited hydrologic connection is further suggested by the general scarcity of springs on canyon walls in these lower reaches. Nevertheless, the lack of up-to-date water level monitoring data from the DBHU makes this difficult to verify, and future data collections activities should look at this. Given the dip of Grande Ronde Basalt units into the basin, water-bearing zones in this unit will lie progressively deeper beneath canyon bottoms as one goes from the up stream to down stream portions of the sub-basin.

2.5 Conclusions

Groundwater within the project area is found within both the alluvial and CRBG aquifers. The nature and occurrence of these aquifers vary greatly.

The alluvial aquifer is found in either: (1) canyon fill coarse gravel and sand or (2) fine loess lying across upland areas separated by deep canyons. In both cases the alluvial aquifer probably is unconfined. Where the alluvial aquifer is found in canyon fill sediments it displays a high degree of hydrologic continuity with streams, providing cool base flow during hot summer months.

The CRBG aquifer system consists of a series of layered, stacked, confined aquifers. These aquifers generally dip off the crest of the Blue Mountains toward the Snake River. A three tiered subdivision of these aquifers was adapted for this report. These subdivisions are based on the identity of the geologic value(s) hosting a portion of the aquifer system and lateral continuity as defined by canyon erosion.

The most laterally restricted basalt hydrostratigraphic unit is the SBHU. It consists of highly eroded Saddle Mountains Basalt and Wanapum Basalt displaying limited aerial extent, hosting low production wells and discharging to springs in the upper portions of the sub-basin. This unit is hydrologically connected to surface water but contains only minor volumes of groundwater in the lower portions of the project area, and probably does not contribute significant discharge to streams because of the numerous deep canyons cutting into it in up-dip areas, isolating it from recharge areas at higher elevations.

The DBHU is only locally observed in the deepest canyons. While it may contain laterally widespread and potentially productive aquifers, few wells intersect it and its properties within the project area are relatively unknown. Given the depth of the unit, its degree of hydrologic continuity with surface water is probably very limited in the project area. Recharge to the DBHU may be predominantly outside the project area, in such areas as the wooded highlands bordering the western and southern edge of the project area and in the Snake River canyon.

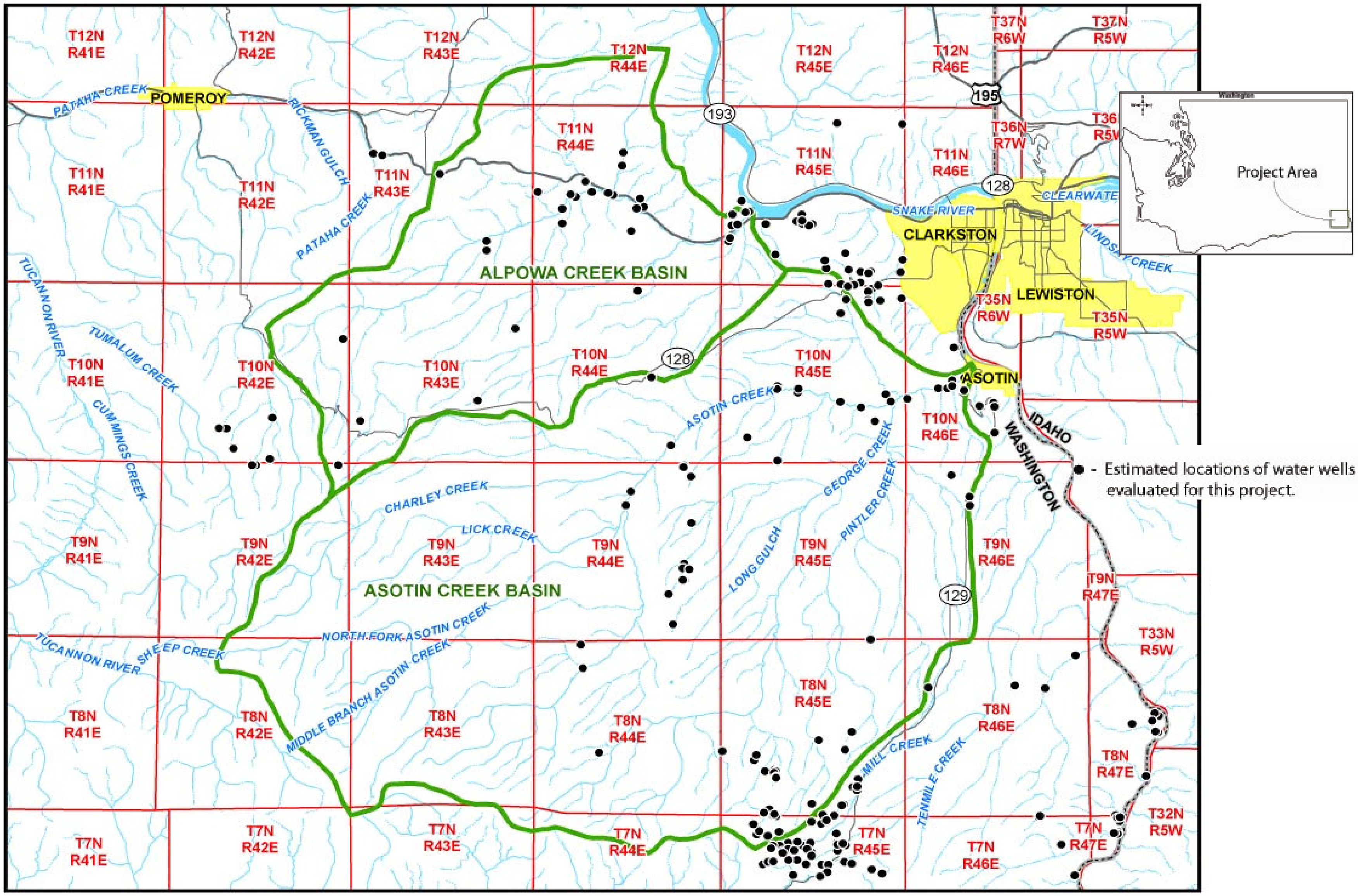
The IBHU displays characteristics of both the shallow and deep units, depending on location. In the Alpowa Creek and upper Asotin Creek areas, the unit is deeply incised by canyons; aquifers likely display limited lateral continuity, water production is low, and many water-bearing zones discharge to springs in the headwaters areas of these streams. In the Lower Asotin Creek area this unit is generally at or below most canyon bottoms. Given this, the upper portions of the unit may have localized hydrologic connection to streams, while deeper portions of the unit may have only limited hydrologic connections to surface water.

In the Alpowa Creek sub-basin, groundwater flow in the basalt aquifers is inferred to generally be from the west and southwest, down structural dip towards the Snake River. In the Asotin Creek sub-basin, groundwater flow in the basalt aquifers is inferred to be to the north, east, and northeast depending on location and structural dip of the stratiform layers. In the western portion of the sub-basin this flow will generally be towards the east, while in the southern portion of the sub-basin (in the Anatone area), the structural dip suggests it will be to the northeast, with significant groundwater movement out of the sub-basin and towards Tenmile Creek and the Snake River.

Table 2-1 Distribution (number) of water wells evaluated for the project by geographic area and hydrostratigraphic unit.

Sub-Bbasin	Area	Hydrostraigraphic unit						
		A	**A+B**	**SBHU**	**IBHU**	**DBHU**	**SBHU+ IBHU**	**IBHU+ DBHU**
Alpowa	Upland	0	0	0	14	2	0	1
	Valley	0	0	0	4	11	0	1
Asotin	Upland	0	0	105	12	3	0	2
	Valley	0	0	0	6	7	0	5

Table Legend:
A – alluvial hydrostratigraphic unit
B – all basalt
SBHU– shallow basalt hydrostratigraphic unit
IBHU – intermediate basalt hydrostratigraphic unit
DBHU – deep basalt hydrostratigraphic unit



● - Estimated locations of water wells evaluated for this project.

Figure 2-1 Geographic setting of the project area.

Figure 2-2 Photograph of the deep, relatively dry canyons typical of the lower portions of the project area. View is generally south across the lower George Creek canyon.

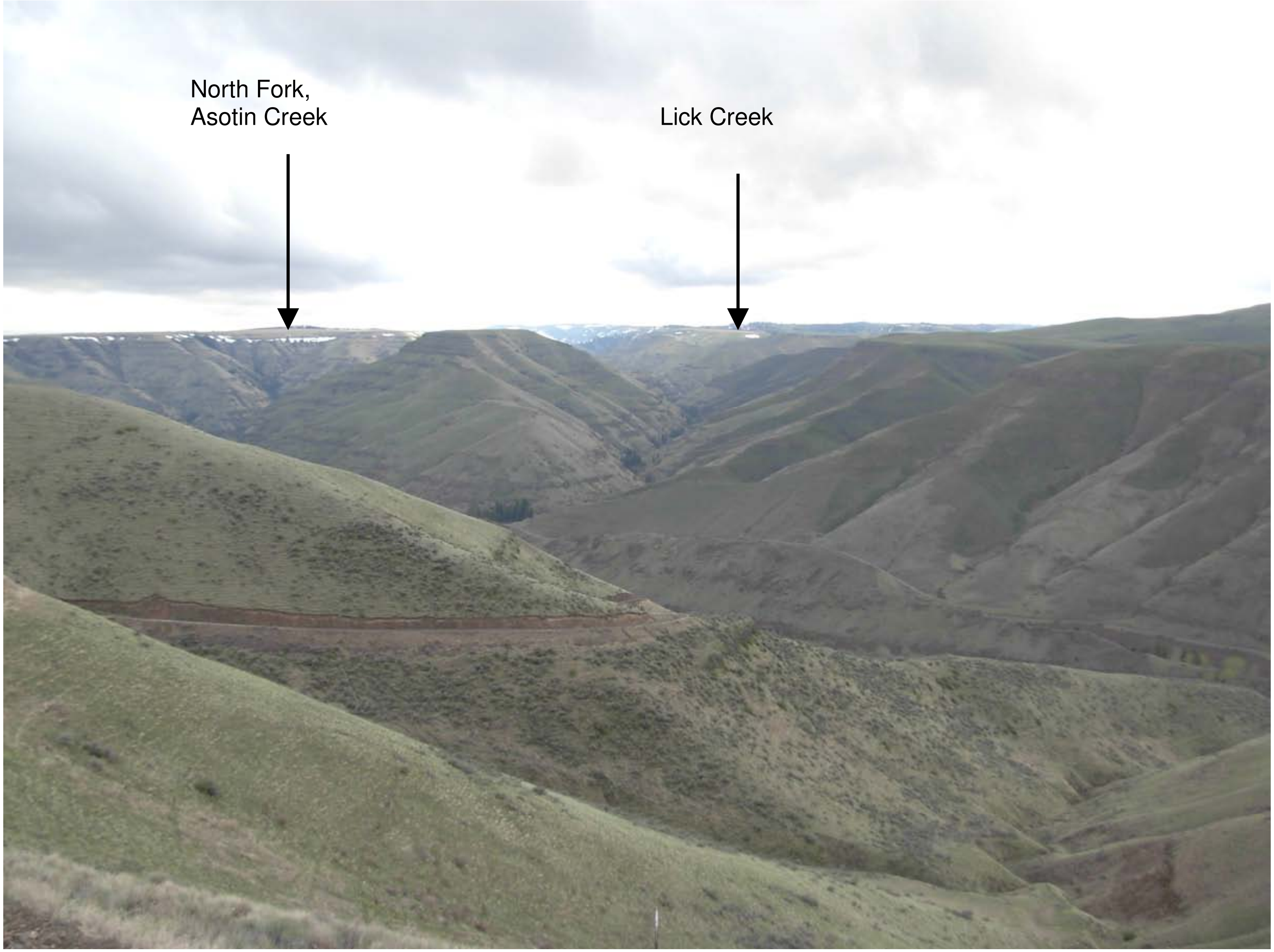


Figure 2-3 Photograph looking up the Asotin Creek drainage towards the Blue Mountain in the distance. View looking west from the top of Campbell Grade.

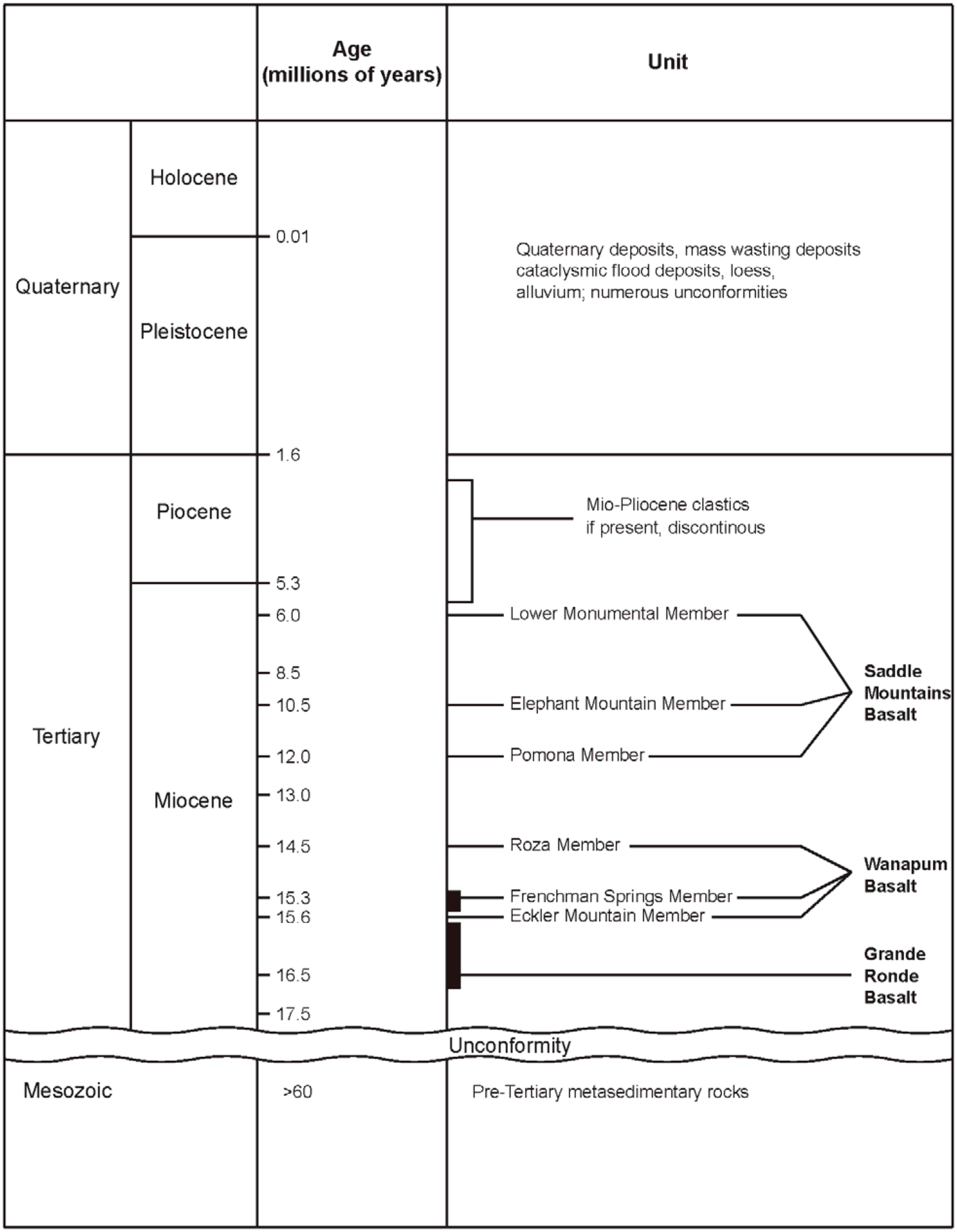
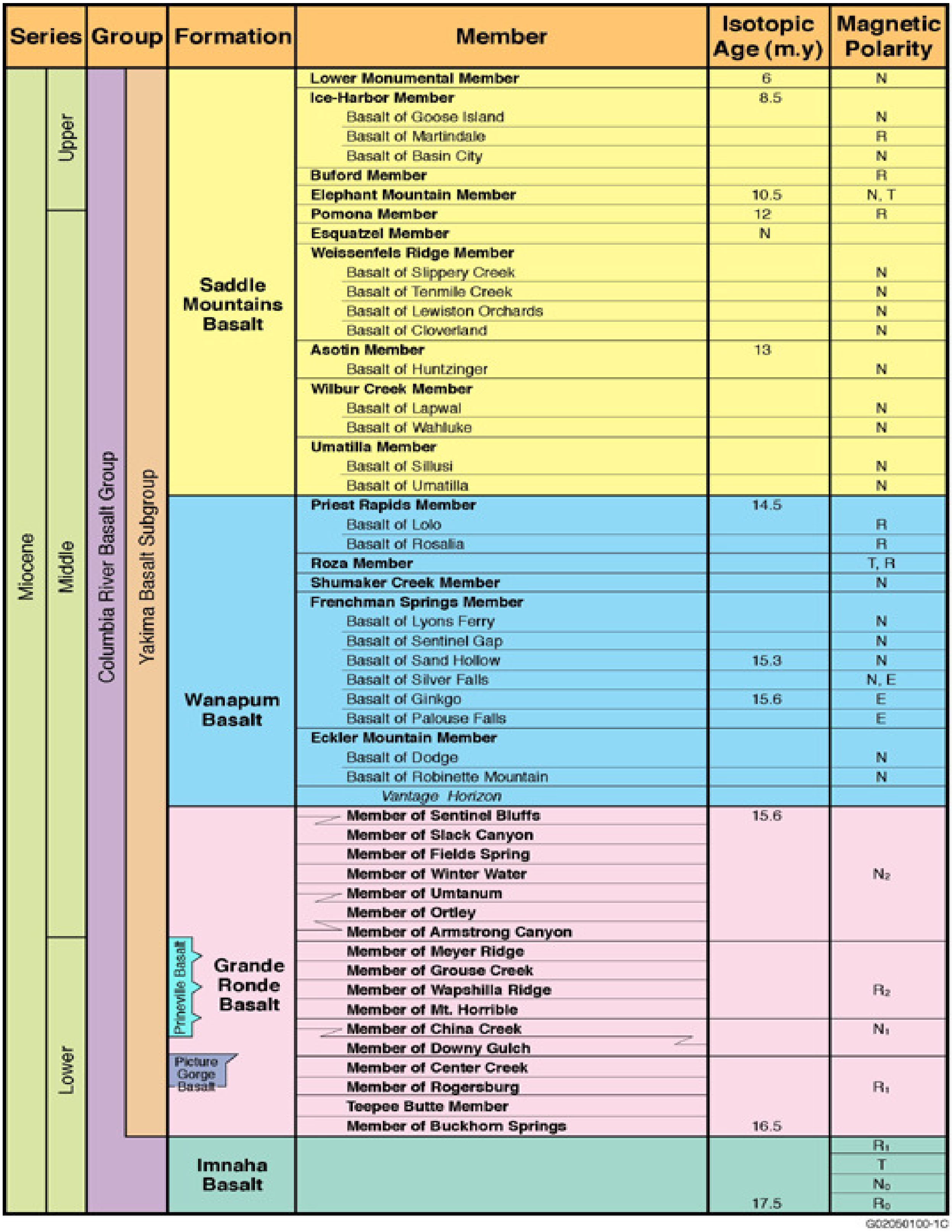


Figure 2-4 General stratigraphic chart for project area.



Series		Group		Formation	Member	Isotopic Age (m.y)	Magnetic Polarity
Miocene	Upper	Columbia River Basalt Group	Yakima Basalt Subgroup	**Saddle Mountains Basalt**	**Lower Monumental Member**	6	N
					Ice-Harbor Member	8.5	
					Basalt of Goose Island		N
					Basalt of Martindale		R
					Basalt of Basin City		N
					Buford Member		R
					Elephant Mountain Member	10.5	N, T
	Middle				**Pomona Member**	12	R
					Esquatzel Member	N	
					Weissenfels Ridge Member		
					Basalt of Slippery Creek		N
					Basalt of Tenmile Creek		N
					Basalt of Lewiston Orchards		N
					Basalt of Cloverland		N
					Asotin Member	13	
					Basalt of Huntzinger		N
					Wilbur Creek Member		
					Basalt of Lapwai		N
					Basalt of Wahluke		N
					Umatilla Member		
					Basalt of Sillusi		N
					Basalt of Umatilla		N
				Wanapum Basalt	**Priest Rapids Member**	14.5	
					Basalt of Lolo		R
					Basalt of Rosalia		R
					Roza Member		T, R
					Shumaker Creek Member		N
					Frenchman Springs Member		
					Basalt of Lyons Ferry		N
					Basalt of Sentinel Gap		N
					Basalt of Sand Hollow	15.3	N
					Basalt of Silver Falls		N, E
					Basalt of Ginkgo	15.6	E
					Basalt of Palouse Falls		E
					Eckler Mountain Member		
					Basalt of Dodge		N
					Basalt of Robinette Mountain		N
					Vantage Horizon		
				Grande Ronde Basalt	**Member of Sentinel Bluffs**	15.6	N_2
					Member of Slack Canyon		
					Member of Fields Spring		
					Member of Winter Water		
					Member of Umtanum		
					Member of Ortley		
					Member of Armstrong Canyon		
	Lower			Prineville Basalt	**Member of Meyer Ridge**		R_2
					Member of Grouse Creek		
					Member of Wapshilla Ridge		
					Member of Mt. Horrible		
					Member of China Creek		N_1
					Member of Downy Gulch		
				Picture Gorge Basalt	**Member of Center Creek**		R_1
					Member of Rogersburg		
					Teepee Butte Member		
					Member of Buckhorn Springs	16.5	
				Imnaha Basalt			R_1
							T
							N_0
						17.5	R_0

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Figure 2-5 Detailed stratigraphic chart for the Columbia River Basalt Group.

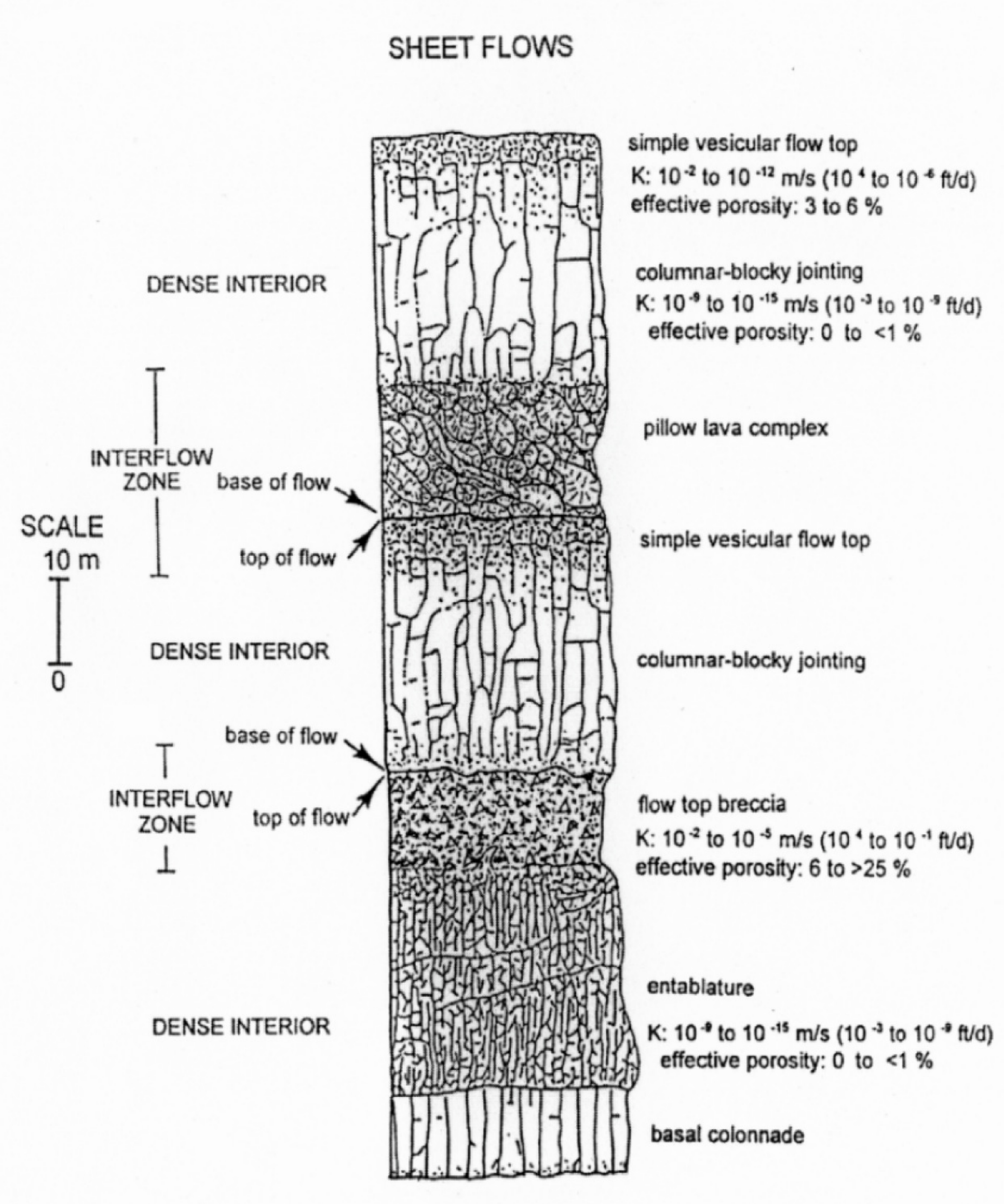

Figure 2-6 **Basic interflow structure typical of CRBG sheet flows.**

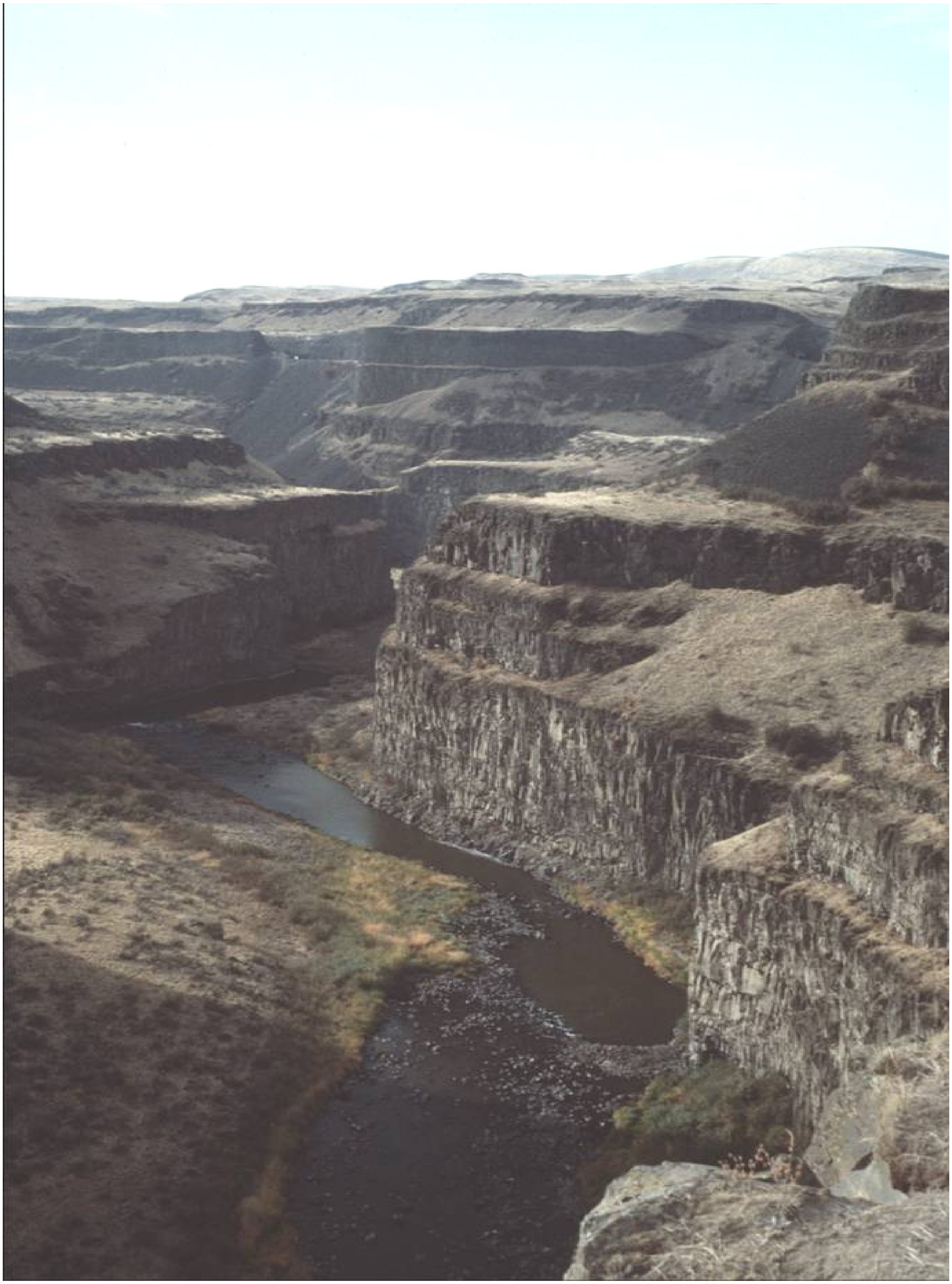

Figure 2-7 Photograph of the lower Palouse River canyon showing the layered nature of multiple, stacked CRBG flows.
Most of the benches seen on the canyon walls mark interflow zones.

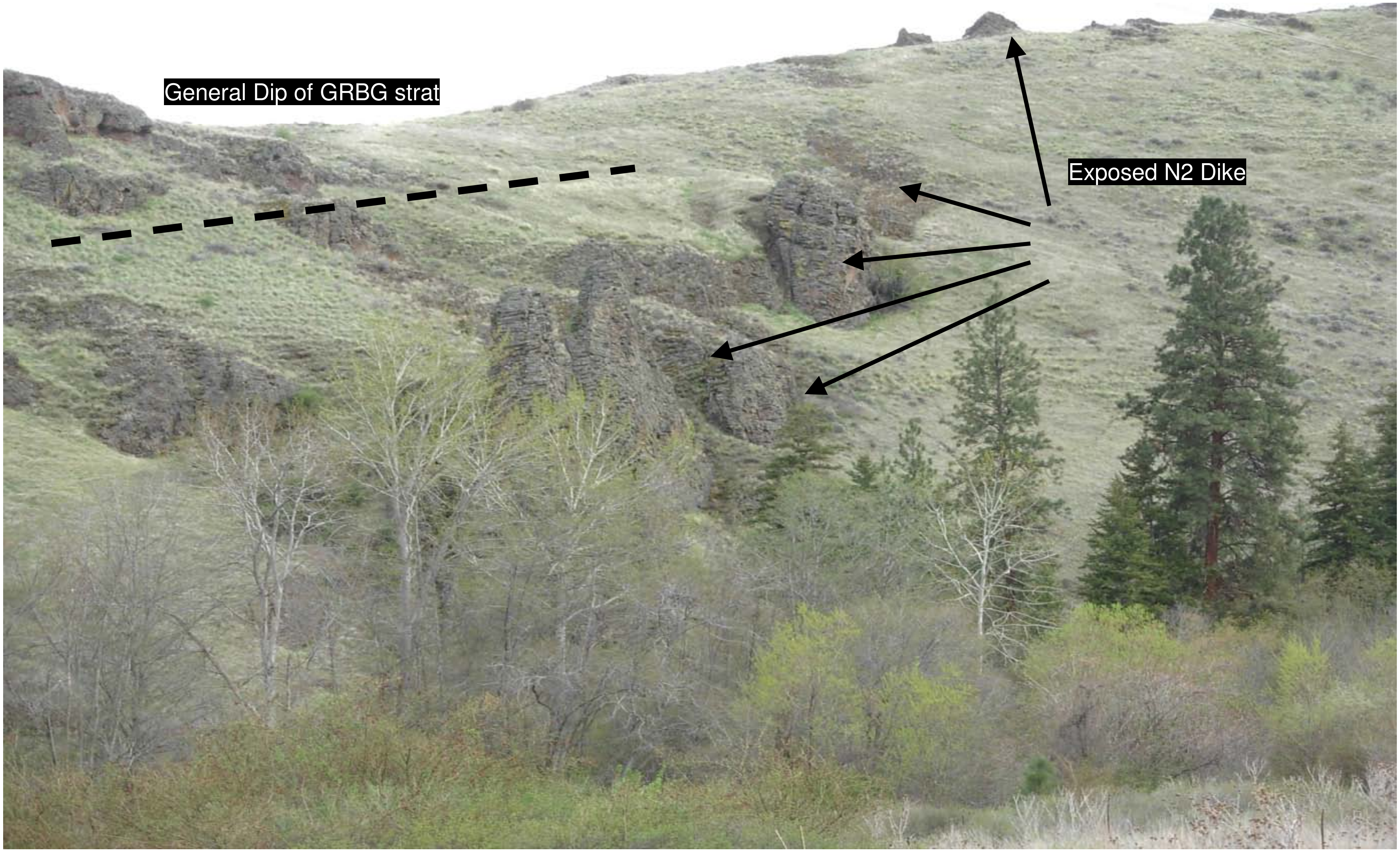

Figure 2-8 N2 Grande Ronde Basalt feeder dike cross-cutting older, sub-horizontal CRBG units.
View generally is looking west across lower North Fork, Asotin Creek.

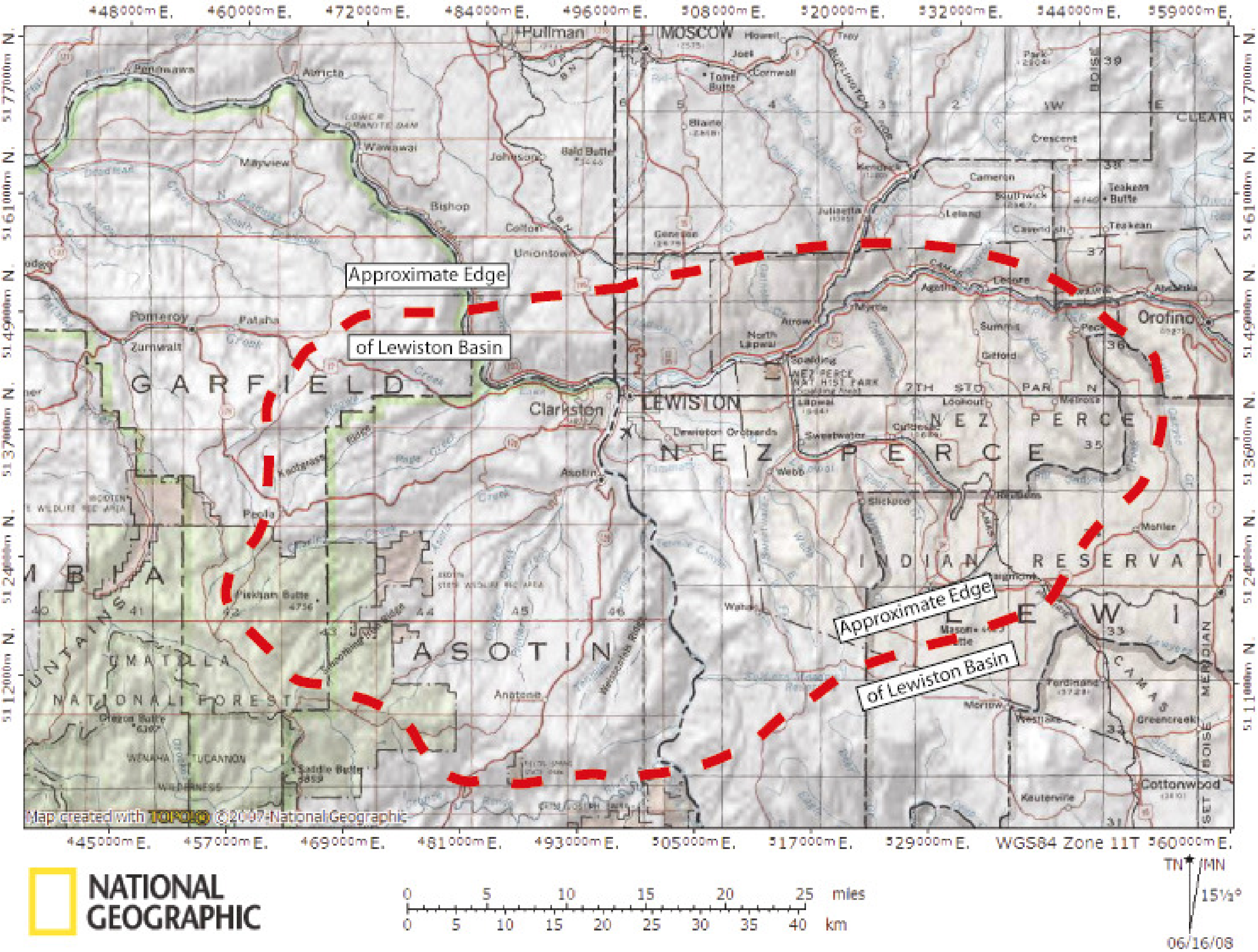

Figure 2-9 Approximate extent of the Lewiston Basin.

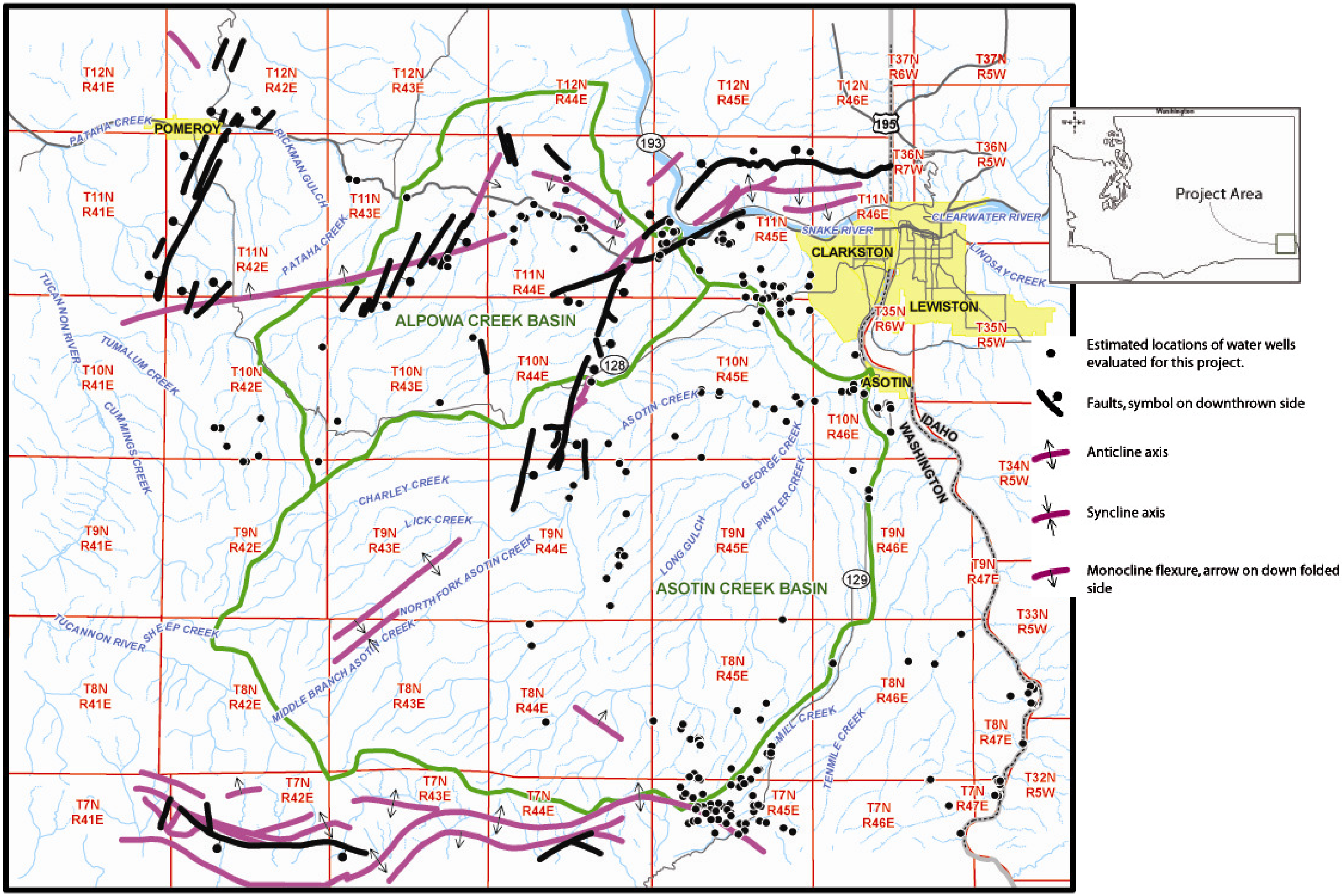

Figure 2-10 Basic Geologic Structures In The Project Area.

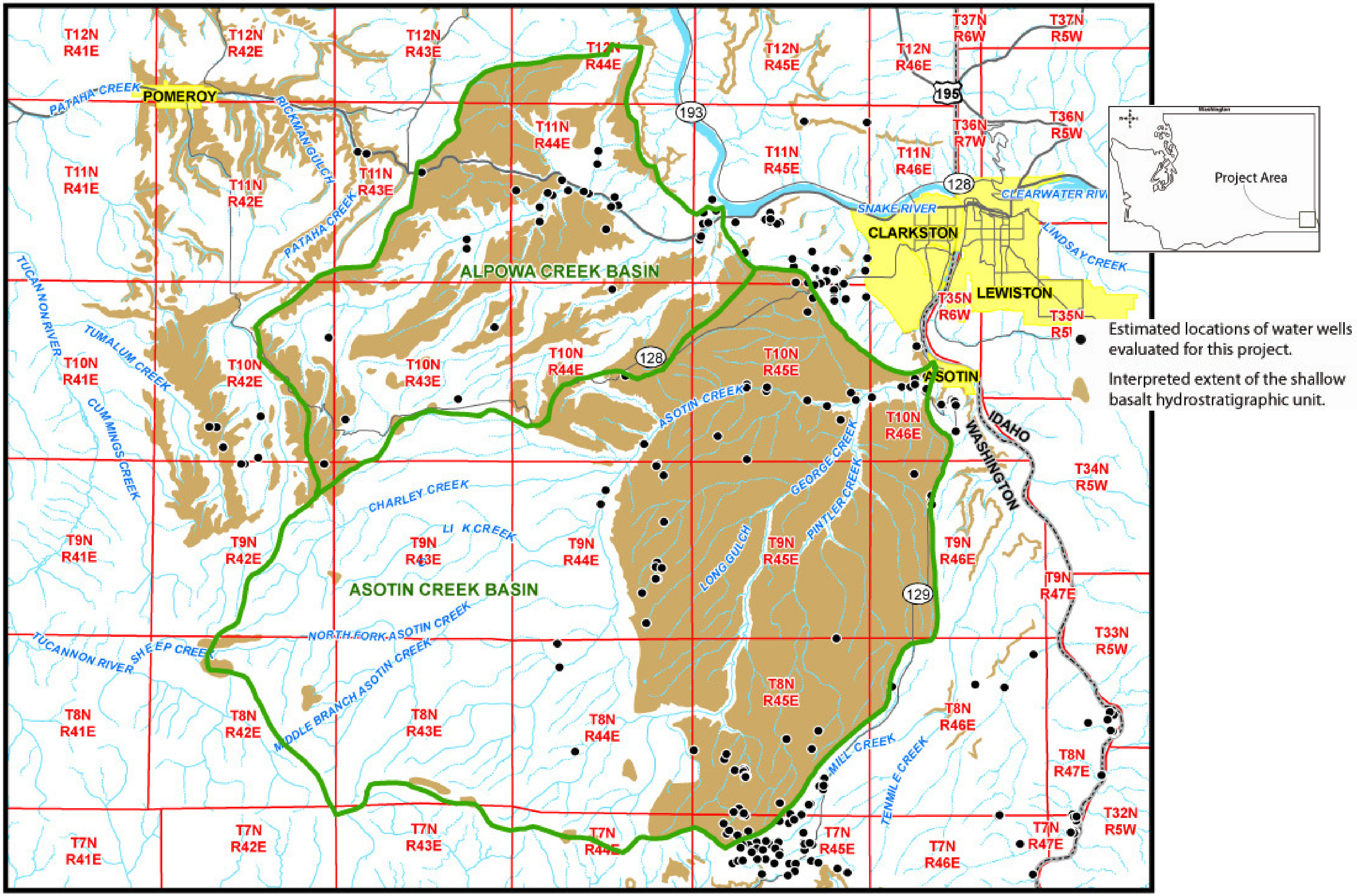

Figure 2-11 **Map showing the estimated extent of the shallow basalt hydrostratigraphic unit in the Project Area.** Note, the unit is absent from the bottom of most canyons, being completely eroded through.

Figure 2-12 Photograph looking south, up the George Creek near its confluence with Asotin Creek. This photograph shows the highly dissected nature of the shallow basalt hydrostratigraphic unit and the limited lateral continuity of any water bearing interflow zones in it. The top of the Grande Ronde Basalt and the intermediate hydrostratigraphic unit lies near the bottom on the canyon.

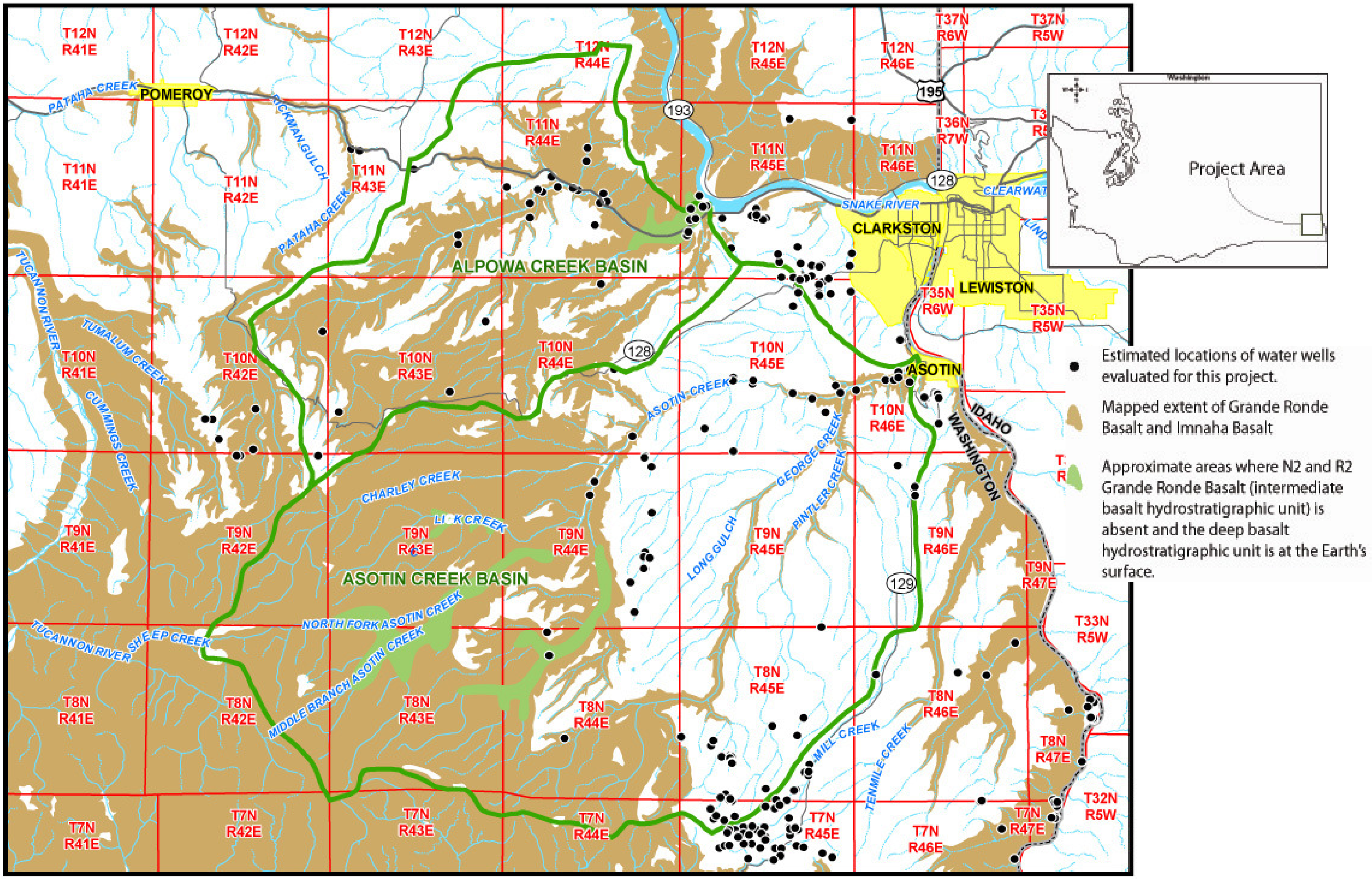

Figure 2-13 Map showing the mapped extent of the Grande Ronde Basalt and the Imanha Basalt at the Earth's surface in the project area.

These units, and the intermediate and deep basalt hydrostratigraphic units hosted by them, underlie the entire project area except as shown on the map.

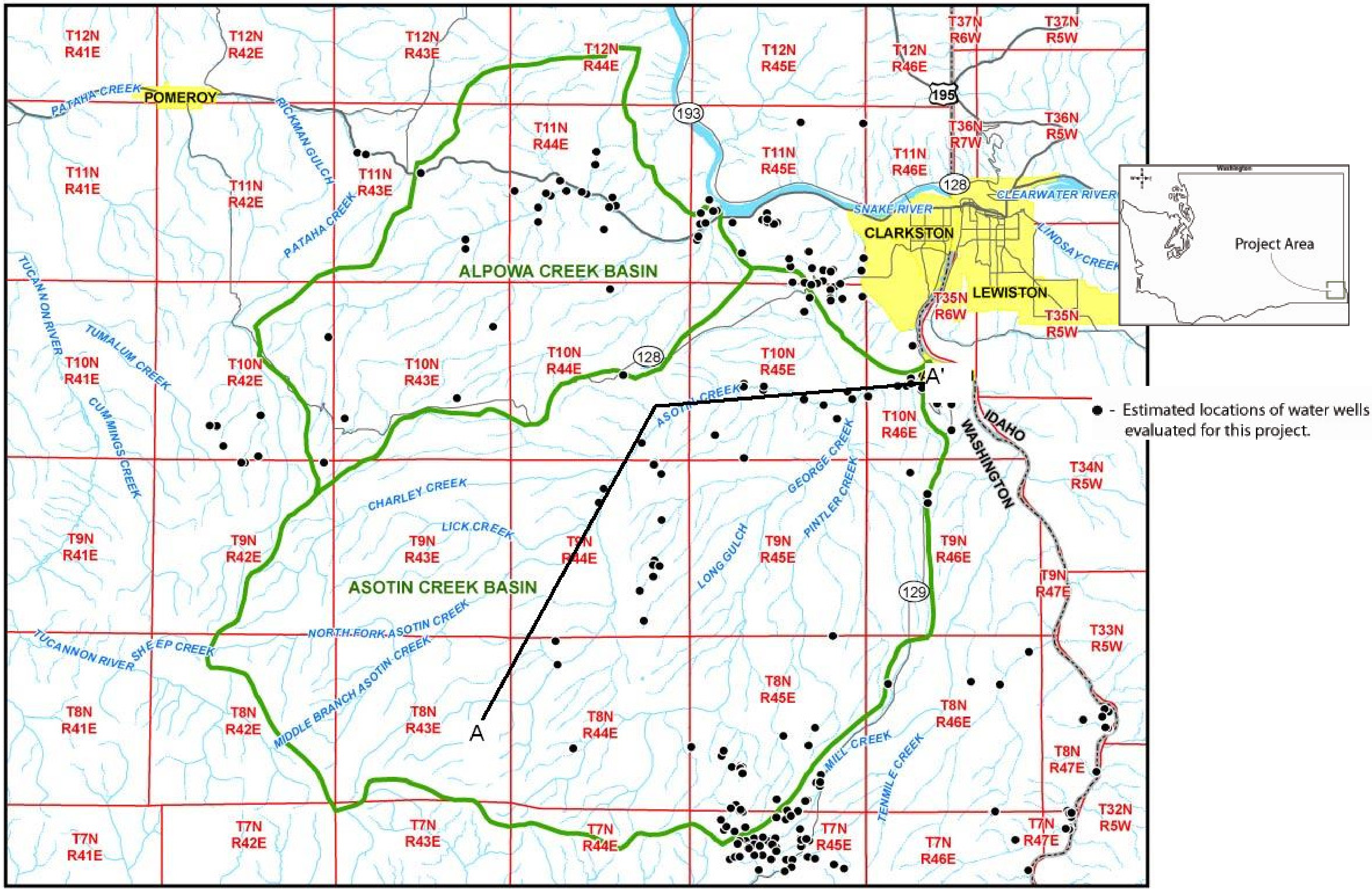

Figure 2-14 Map showing location of cross section A-A'.

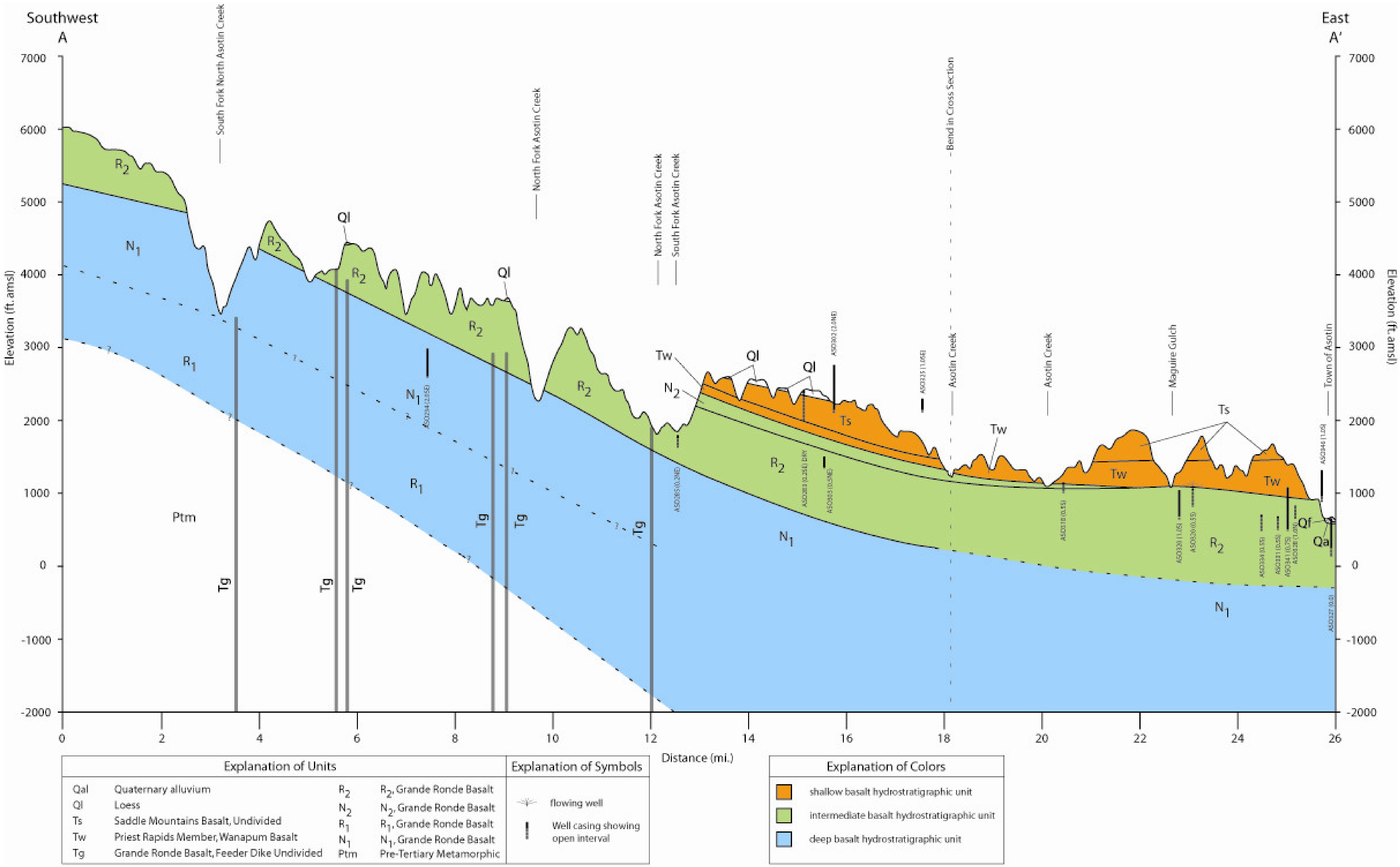

Figure 2-15 Hydrogeologic Cross-Section A-A' In The Asotin Creek Sub-Basin.

Chapter 3
Ground Water Use in the Alpowa and Asotin Creek Sub-Basins

This chapter presents an estimate of the amount of ground water used for water supply in the Alpowa and Asotin Creek sub-basins (**Figure 3-1**). Ground water use was estimated for three common types of water use: domestic (permit-exempt) residential use, public supply use and agricultural use. Ground water use was also estimated for three population scenarios: 1) current population, 2) 50-year future growth population and 3) increased population growth assuming partial build-out of current zoning.

3.1 Domestic Ground Water Use

Ground water is used in the project area by residences that are served by permit-exempt residential wells. A permit-exempt residential well is exempted from the requirements to obtain a water right. Ecology Publication No. F-WR-92-104 explains the limitations on the use of a permit-exempt well as:

- Providing water for livestock
- Watering a lawn or garden (up to half an acre in size)
- Providing water for a residence (5,000 gpd limit)

There may be other restrictions on the use of permit-exempt wells depending on the specific situation and the availability of water.

3.1.1 Residential Use Rate

The study scope includes estimating the actual current water use and projecting future water use. Domestic permit-exempt water use was calculated by estimating per household water use and multiplying by the number of residences. A water balance calculation was used to estimate typical household use for residents served by a permit-exempt well and a septic tank. The components of typical household use are shown on **Figure 3-2**. The process used is explained below.

3.1.1.1 Lawn Watering

This is the amount of water used to irrigate a residential lawn. The water applied to the lawn that is taken up for evapotranspiration (ET) will be lost and the remainder will return to the shallow aquifer. The methods used calculate the crop irrigation requirement (CIR) is summarized in Hargreaves and Merkley (1989) and Jensen et al. (1982). The flow chart in **Figure 3-3** summarizes the method, which is described below.

- Lawn size of 1/12 acre (about 3,600 sq. ft.). Based on interviews with persons familiar with the area, lawns in these sub-basins are limited to a small area in the front and back of the house that can be watered with a garden hose[1]. Pictures of typical residences in the project area are shown in **Figure**

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[1] Brad Johnson and Tim Simpson, Asotin PUD, April 2, 2008.

3-4. This size lawn allows for a lawn of about 40 feet by 40 feet in the front and back of the house with some additional watering for shrubs and trees.

- Lawn watering field application efficiency of 75 percent. This is based on a periodically moved handline irrigation method as presented in the Washington State Department of Ecology guidance document GUID-1210: "Determining Irrigation Efficiency and Consumptive Use" Table 1 Page 8. An additional 10 percent of total water is estimated to be lost due to factors other than crop ET, as per the method.
- Lawn ET was calculated using the Agrimet ET data for the Lake Bryan-Rice Bar Agrimet Station located about 10 miles north of Pomeroy at an elevation of 600 ft msl. This is the closest meteorological station located at an altitude comparable to project areas (the Town of Asotin is located at elevation 800 ft msl). Agrimet ET calculations are based on meteorological records at specific stations and are computed on a monthly basis for various crop types. The period of record for ET data from the Lake Bryan-Rice Bar Agrimet station is 2003 to 2007. The daily data during this period was summed for individual months and averaged to obtain average monthly ET estimates, as shown in **Table 3-1**. Pasture grass was assumed to be the closest typical crop for a residential lawn.
- Average monthly precipitation data was obtained from the Western Regional Climate Center using the Lewiston WSO AP, Idaho weather station[2], as shown in **Table 3-2**. Monthly precipitation data from this station was used to compute effective precipitation during the irrigation season. Effective precipitation is the amount of precipitation during the irrigation season that meets the crop ET requirements. Higher precipitation is less effective because a greater portion of the precipitation is lost to seepage or runoff, as shown in **Table 3-3**. The procedure used to compute effective precipitation was based on the method in USDA Publication 1275.
- The residential houses that are located in the zoned area in proximity to the Town of Anatone do not have lawns. Therefore, lawn watering (irrigation) is not included in the water use calculation for this area. Pictures of typical residences in this area are shown in **Figure 3-5**. The zoned area in the vicinity of the Town of Anatone is shown on **Figure 3-6**.

3.1.1.2 Indoor Use

This is the amount of water used inside of a house for a typical residence. Water that is not consumed by the residents is returned to the subsurface via a septic tank, except for the amount evaporated by the lawn above the drainfield. The following detailed assumptions were used:

- The indoor use is assumed to be 190 gpd/residence based on the metered Asotin PUD municipal service area winter water use rate.
- Most water used indoors is assumed to drain to a septic drainfield and discharge to the shallow aquifer except the amount that is used for lawn ET

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[2] Monthly average precipitation data was obtained from the Western Regional Climate Center for the Lewiston WSO AP, Idaho weather station for the 1948 to 2007 period www.wrcc.dri.edu/climsum.html.

above the drainfield. A septic tank drainfield with dimensions 10 ft by 20 ft was assumed.

- Lawn ET above the drainfield was assumed the same as described above.

3.1.1.3 Consumptive Use and Return Flow

An estimated 90 percent of water used indoors is discharged to the septic drainfield and returns to the shallow unconfined sedimentary aquifer except for lawn ET losses to the drainfield[3]. Irrigation returns of about 15 percent were assumed based on the method in Ecology Guidance Document Guid-1210. All return flows were assumed to reduce the depletive amount of pumping by wells on surface water.

The methods and assumptions for irrigation use calculations were intended to be conservative (i.e., overestimate actual use) because they assume application of water to meet the full irrigation requirement for a lawn with a well-developed soil profile for a house in the lower portion of the sub-basin. Almost all of the residences with wells and septic tanks are rural and are outside of municipal water service areas. Based on interviews with persons familiar with the area, many houses are on lots with rocky soil and do not have lawns. Houses with lawns are typically under watered and brown lawns are common during July to September. Also, many houses are located higher in the sub-basin and the ET requirements for lawns at these houses will be lower than for houses in the lower part of the watershed.

3.1.1.4 Per Household Water Use Estimate

The results of the water balance assessment for typical residences served by private wells and septic systems within the Asotin and Alpowa Creek sub-basins are presented in **Table 3-4** and the water use estimate for residences around the town of Anatone are presented in **Table 3-5**. This information shows that:

- During the summer (April to Sept) average water use is about 571 gpd/residence, with about 37 percent returning to the aquifer.
- During the winter the total use is 190 gpd/residence with 90 percent returning to the aquifer.
- On average for the year, total water use is estimated at about 381 gpd/residence with about 50 percent return flow to the aquifer.
- For residences around the Town of Anatone, the summer and annual water use is the same (because of the assumption that no lawn irrigation occurs) and is about 190 gpd/residence, with 90 percent returning to the aquifer.

3.1.1.5 Comparison to Asotin PUD Metered Water Use Data

The average annual estimated residential water use rate (381 gpd/residence) and the average summer monthly water use rate (571 gpd/residence) shown on **Table 3-4** is about 25 percent less than meter records for residences within the Asotin PUD service area. The Asotin PUD service area residential water use records for 1996-2007 report an average annual use rate of 510 gpd/residence and an average summer use rate of 759 gpd/residence. Based on interviews with persons familiar with the area, lawn sizes and lawn watering in the rural areas of these sub-basins is

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[3] A 90 percent in-house water use estimate was based on a recommendation from William Neve at the May 2008 WRIA 35 Planning Unit meeting.

less as compared to residences in the Asotin PUD service area[4]. This indicates that the water use estimates discussed above compare favorably with the metered records from the Asotin PUD service areas and are reasonable.

3.1.2 Population Estimates

3.1.2.1 Current Population Scenario

The largest concentration of human population in the project area is near the City of Asotin. The City of Clarkston suburbs are generally outside the project area. Most of the project area and residences are in rural areas in the lower portions of Asotin Creek, Alpowa Creek and the highlands near the Town of Anatone.

The current residences were determined by examining aerial photos from the 2006 National Agriculture Imagery Program[5] (NAIP). All buildings were assumed to have one residential well and if a group of buildings were in close proximity to each other, such as a house and barn, they were counted as a single residence. **Figure 3-7** shows the locations of the digitized residences. It was assumed 2.5 residences per household based on the U.S. Census Data statistics for Asotin County for the current population estimate and the two growth projection scenarios below.

3.1.2.2 Projected 50-year Growth Scenario

This scenario includes the projected population and residences for the next 50 years to year 2057 for the area outside of the municipal service areas within the project area. The Washington Office of Financial Management[6] (OFM) provides projected growth scenarios at a county level and includes a medium and high projection, shown in **Table 3-6**. Currently the OFM projections extend to 2030. As a result, an average annual percentage change was calculated between the years 2010 and 2030. The high growth projection (about 1 percent annual growth) was used to project the average annual rate of growth to 2057.

3.1.2.3 Partial Build-out Population Scenario

This scenario represents a partial build-out of areas in about the lower third of each sub-basin that are zoned as rural residential or ag-transition. The partial build-out scenario assumes that areas zoned as ag-transition and rural residential will be built out according to the minimum lot sizes as stipulated in current zoning ordinance established in each county, thus representing growth well beyond the expected 50-year planning horizon. It was assumed that development of residences would only occur on lots with an average land slope of less than 20 percent (thus removing areas with steep hillsides that are less likely to experience growth). Zoning information was obtained from Asotin and Garfield Counties. The minimum lot sizes for the areas zoned as ag-transition are 1 acre per lot and rural residential is 5 acres per lot in Asotin County[7], shown on **Figure 3-6**. An ag-transition zone with 1 acre

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[4] Brad Johnson and Tim Simpson, Asotin PUD, April 2, 2008.

[5] The National Agricultural Imagery Program acquires aerial photos during the growing season of the continental United States. Aerial Photos were obtained from http://duff.geology.washington.edu/data/raster/doqs_naip.html

[6] The Office of Financial Management Forecasting Division develops official state and local population estimates. They also administer the U.S. Census Bureau State Data Center Program in Washington. http://www.ofm.wa.gov/pop/default.asp

[7] Asotin County 2001 Zoning Map, Asotin County Planning Dept.

parcels exists at the bottom of the Alpowa Creek sub-basin. Further up the lower Alpowa Creek valley, a rural residential zone with 5 acre parcels was assumed to exist because the area has potential for further growth. This assumed zoned area is not shown in the Garfield County zoning map. The Town of Anatone and the area immediately around it is zoned as ag-transition. The remainder of the Anatone area is zoned as rural residential. In both Asotin and Alpowa Creek sub-basins there is a large agricultural area used primarily for dry-land wheat farming and a 1 percent annual growth was assumed in this area.

Table 3-7 presents the estimated population for the current (2007), 50-year projection (2057), and the partial build-out scenarios. This information shows that:

Current Population: The population within the sub-basins in 2006 (not including of the Town of Asotin municipal service area) was 915 persons with about 365 residences.

50-Year Future Population Projection: By 2057 the estimated population is projected to increase to about 1,600 persons with 640 residences.

Partial Build-Out Population Projection: The estimated population using the partial build-out scenario will be 21,000 persons with about 8,400 residences.

The methods and assumptions for the 50-year population growth estimates are probably conservative since population was projected using the high growth rate scenario. The partial build-out scenario is an upper bound estimate of the maximum amount of ground water use in the project areas. It is unlikely that this level of ground water use will occur because it is unlikely that this level of growth will occur, with all buildable lots developed.

3.2 Public Supply Ground Water Use

This section presents an estimate of ground water used by the Group A and B public water systems (PWS). A GIS file showing the locations of Group A and B public water systems was obtained from the Washington Department of Health (**Figure 3-8**).

The assumptions for the calculations for Group A/B public water systems served by ground water were the same as used for residential domestic exempt wells (described above). A connection to a PWS was assumed to be equivalent to a single residence.

The results of the PWS water balance show that:

- The Town of Asotin has the highest amount of connections (544), followed by the Asotin Creek sub-basin with 30 connections, the Anatone Area with 8 connections and the Alpowa Creek Basin with 2 connections (**Table 3-8**).
- The average annual water use by Group A/B systems in the Asotin Creek sub-basin is about 7,230 gpd (0.011 cfs) with about 8,750 gpd (0.014 cfs) summer use. Approximately 73 percent (0.008 cfs) is returned on average for the year, while 63 percent (0.008 cfs) is returned during the summer (**Table 3-9**).
- The average annual water use by Group A/B systems in the Alpowa Creek sub-basin is about 760 gpd (0.001 cfs) with about 1,140 gpd (0.002 cfs)

summer use. During the summer (April to Sept) in the Alpowa Creek Basin, about 37 percent (0.001 cfs) returns. On average for the year, about 50 percent (0.001 cfs) returns (**Table 3-10**).

- The water use for the Town of Asotin is about 361,000 gpd average annual use (0.56 cfs) with about 576,000 gpd summer use (0.89 cfs) (**Table 3-12)**. However, the Town of Asotin wells are in deep basalt and are connected to the deep basalt aquifers of the Lewiston/Clarkston basin and the Snake River and are likely not in connection with Asotin Creek. Therefore, the Town of Asotin water use will not be counted in the Asotin Creek sub-basin water use.

3.3 Agricultural Ground Water Use

This section presents the estimated annual quantity of ground water pumped for agricultural use based on a field survey of water rights actively used in the project area. The predominant agricultural enterprise in the project study area is dryland wheat farming in the upland plateau areas. The large irrigated farms that are present in other areas in Washington State are not present in the project area, likely due to the high elevation of potentially farmable areas, the high cost of pumping ground water to these areas, and sufficient moisture in these areas for dryland wheat farming. There are a few small farms in the lowland valleys that irrigate using ground water, primarily for pasture grass for cattle grazing or hay with a few small orchards. Persons familiar with agricultural practices in the project area indicate that the amount of land in irrigated agriculture in the lowland valleys has decreased over the past few decades[4]. For these reasons, irrigated agriculture is relatively small in the project area.

3.3.1 Survey to Identify Active Water Rights

The irrigation and stock watering ground water rights and claims were extracted from the Ecology WRIA 35 water rights database and mapped based on geographic location data to the nearest quarter-section (**Figure 3-9**). A telephone and field survey was completed by Brad Johnson of the Asotin Public Utility District and Duane Bartels of the Pomeroy Conservation District to determine actual ground water use (acres irrigated and stock watered) for agriculture. The details of the water rights and the results from the field survey are presented in **Appendix B**. The active water rights were then evaluated to determine how much ground water was used for irrigation and stockwatering.

3.3.1.1 Irrigation

This is the amount of water used to irrigate the acres from the water rights. The water applied to the land that is taken up for evapotranspiration (ET) is lost and the remainder will return to the upper shallow aquifer. The assumptions used in the crop irrigation are identical to the assumptions used for the lawn irrigation reported previously under domestic use except for the method of irrigation. Irrigation water was delivered to the crops using a side roll wheelline with an application efficiency of 75 percent. For lawn irrigation, a periodically moved handline was used to irrigate, which also had an application efficiency of 75 percent.

A total of 91 acres are irrigated with ground water irrigation water rights (**Table 3-13**). During the year, 245 AF of ground water is used to irrigate the crops in the project area. Approximately 32 percent (78 AF/year) of the irrigation water is used in Asotin

Creek sub-basin and about 60 percent (148 AF/year) is used in the Alpowa Creek sub-basin. The remaining 8 percent (19 AF/year) is used in the Anatone area outside of the basins.

3.3.1.2 Stockwatering

This is the amount of water that is consumed by livestock (horses and cattle) on an annual basis. Separate water use rates were assigned for horses and cattle based on literature values. Many cattle are brought into stockyards in the winter and then transferred to pasture outside of the sub-basins in the summer. Cattle that do not reside in the sub-basins year-round were assigned appropriate seasonal use at the same rate identified below.

The literature was reviewed and a water use estimate was developed for cattle and horses. A per-stock use rate was utilized with cattle at 27 gallons of water per day (gpd) and horses at 18 gpd[8]. This water use rate is conservative because it is the high end of the range for dairy cattle. It has also conservatively been assumed livestock water use is 100 percent consumptive use with no return flow. The total stock estimate included about 1,000 livestock associated with specific water rights and another 900 cattle and 20 horses watered from a domestic permit-exempt well not associated with a water right.

A total of 1,922 head of stock use 29 acre-feet (AF) of water per year assuming 27 gpd/head of cattle, 18 gpd/head of horse and 100 percent consumptive use. The breakdown of water use for livestock is 24 AF/yr in the Asotin Creek sub-basin and 6 AF/yr in the Alpowa Creek sub-basin (**Table 3-14**).

3.3.1.3 Discussion of Agricultural Ground Water Use

The agricultural ground water rights analysis results are presented in **Table 3-15**, **Table 3-16** and **Table 3-17**. These tables show that during the summer (April to September) average monthly ground water use for agriculture is 13 AF/month (Asotin Creek sub-basin), 24.6 AF/month (Alpowa Creek sub-basin) and 3.1 AF/month (Anatone Area outside of basins) with about 15 percent return flow. The peak monthly agricultural ground water use occurs in July, reaching 22.5 AF/month in Asotin Creek sub-basin, 42.7 AF/month in Alpowa Creek sub-basin and 5.4 AF/month in the Anatone Area. On average for the year, monthly agricultural ground water use is about 8.5 AF/month in Asotin Creek sub-basin with about 11 percent return flow. In Alpowa Creek sub-basin, the monthly average is 12.8 AF/month with about 14.5 percent return flow. About 37 percent of the ag water use (101.6 AF/month) is in the Asotin Creek sub-basin and about 56 percent (153.5 AF/month) of the ag water use is in the Alpowa Creek sub-basin.

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[8] These estimates are based on Lardy, G. and C. Stoltenow, July 1999. Livestock and Water, NDSU Publication No. AS-954, North Dakota State University, Fargo, North Dakota. Table 5 on page 3 provides that cattle intake rate and Table 7 on page 4 provides the horse intake rate.

3.4 Summary of Total Ground Water Use by Sub-Basin

The following section summarizes the total water use for each sub-basin for current, future (50-year) projected growth and partial build-out growth scenarios. The results are shown on **Figures 3-10** to **3-12** and **Tables 3-18** to **3-26**.

3.4.1 Current Population Scenario- Total Ground Water Use

In the Alpowa Creek sub-basin the current ground water use during the summer is about 0.48 cfs with approximately 18 percent (0.09 cfs) return flow (**Table 3-18**). On average for the year, current ground water use is about 0.26 cfs with approximately 23 percent (.06 cfs) return flow. The majority of the ground water use occurs in the Lower Alpowa Creek sub-basin.

Currently during the summer in the Asotin Creek sub-basin 0.38 cfs of ground water are used with a return flow of 26 percent (0.10 cfs) (**Table 3-20**). The annual average ground water use is about 0.26 cfs with approximately 35 percent (0.09 cfs) return flow. Lower Asotin Creek sub-basin consumes the most ground water in the Asotin Creek sub-basin.

The zoned area near Anatone that lies outside of the creek basins has an annual average ground water use of about 0.05 cfs and about 0.08 cfs during the summer (**Table 3-19**). The respective return flows are about 60 percent (0.03 cfs) for the year and approximately 37 percent (0.03 cfs) during the summer months.

3.4.2 Projected Future (50-year) Growth Scenario- Total Ground Water Use

In the Alpowa Creek sub-basin the summer ground water use during the year 2057 will increase to about 0.53 cfs with approximately 20 percent (0.11 cfs) return flow (**Table 3-21**). On average for the year 2057, ground water use will increase to about 0.29 cfs with approximately 23 percent (0.06 cfs) return flows. The majority of the ground water use is estimated to occur in the Lower Alpowa Creek sub-basin.

During the summer of 2057 in the Asotin Creek sub-basin, a projected 0.50 cfs of ground water will be used with a return flow of 32 percent (0.16 cfs) (**Table 3-23**). The annual average ground water will increase to 0.34 cfs with approximately 38 percent (0.13 cfs) return flow. Lower Asotin Creek sub-basin is estimated to consume the most ground water in the Asotin Creek sub-basin.

In 2057 the zoned area near Anatone that lies outside of the creek basins will have an approximate annual average ground water use of 0.07 cfs and about 0.10 cfs during the summer (**Table 3-22**). The respective return flows will be about 57 percent (0.04 cfs) for the year and approximately 50 percent (0.05 cfs) during the summer months.

3.4.3 Partial Build-out Growth Scenario- Total Ground Water Use

In the Alpowa Creek sub-basin the ground water use during the summer will be about 0.84 cfs with approximately 26 percent (0.22 cfs) return flow (**Table 3-24**). On average for the year, ground water use is estimated to be 0.50 cfs with approximately

36 percent (0.18 cfs) return flow. Lower Alpowa Creek sub-basin is projected to use the most ground water.

Under the partial build out-scenario, the Asotin Creek sub-basin is estimated to use 4.03 cfs during the summer and return approximately 44 percent (1.77 cfs) (**Table 3-26**). The annual average water use will be about 2.91 cfs with approximately 57 percent (1.66 cfs) return flow. Lower Asotin Creek sub-basin is projected to use the most ground water in the Asotin Creek sub-basin.

The zoned area near Anatone that lies outside of the creek basins has an annual average ground water use of about 0.67 cfs and about 0.70 cfs during the summer (**Table 3-25**). The respective return flows are about 87 percent (0.58 cfs) for the year and approximately 84 percent (0.59 cfs) during the summer months.

3.5 Ground Water Use By Aquifer And Potential Surface Water Flow Depletion

Chapter 2 describes that the major aquifers used for ground water supply in the project area are the shallow and intermediate basalt hydrostratigraphic units (SBHU and IBHU). The SBHU is intersected and eroded by the tributary and mainstem creek canyons and the aquifer discharges to springs in the upper portion of the Alpowa and Asotin Creek sub-basins. The SBHU is hydrologically connected to surface water and pumping by wells completed in the aquifer may reduce flow in tributary and mainstem creeks. The IBHU displays characteristics of both the shallow and deep units, depending on location. In the Alpowa Creek and upper Asotin Creek areas, the unit is deeply incised by canyons; aquifers likely display limited lateral continuity, water production is low, and many water-bearing zones discharge to springs in the headwaters areas of these streams. In the Lower Asotin Creek area this unit is generally at or below most canyon bottoms. Given this, the upper portions of the unit may have localized hydrologic connection to streams, while deeper portions of the unit may have only limited hydrologic connections to surface water.

Table 2-1 in Chapter 2 shows that very few wells (less than 15 percent) are exclusively completed in the deep basalt hydrostratigraphic unit (DBHU). This is probably due to the high cost of drilling into deep basalt and the availability of water from the more-shallow basalt aquifers. The available data shows that the DBHU is present well below the bottom of the canyon bottoms and is not in hydrologic connection to mainstem and tributary creeks. Most of these wells are located in the lower portion of the basin and probably use water that would eventually flow into the Snake River and are not hydrologically connected to the Asotin or Alpowa Creeks or their tributaries. Therefore, we can conclude that the few wells that are pumping from the deep aquifer are probably not affecting streamflow in the project area.

The alluvial aquifer present in the very shallow deposits along the creek canyon bottoms is not used for a ground water supply (see Table 2-1). This is likely because the aquifer is too thin to support a reliable ground water supply and because of the potential for seasonal fluctuations that may cause pump dewatering problems if the ground water level drops below the pump intake. Therefore, we can conclude that ground water use in the alluvial aquifer is not affecting streamflow in the project area.

Based on this understanding, it is evident that almost all ground water use in the project area is pumped from the SBHU and IBHU. Insufficient data is available to determine which, if any, of the ground water pumping from specific areas in the IBHU is not in hydrologic connection to Asotin or Alpowa Creeks and their tributaries.

The previous section of this chapter showed that the current and 50-year projected ground water use in the Asotin and Alpowa Creek sub-basins are about 0.5 cfs or less. Accounting for return flow, it is likely that the total depletive effect from ground water pumping is even less. The relatively low amount of ground water use is due to the small population and low forecasted population growth in the project area and the relatively small number of acres in irrigated agriculture. Because there is not sufficient hydrogeologic data to determine exactly which portions of the IBHU is not in hydrologic connection with surface water, and because of the low percentage of pumping in the DBHU (less than 15 percent of all wells), we have conservatively assumed that all of the current and 50-year projected ground water use in the project area may deplete surface water. Recommendations are provided in the next chapter for Phase II field work and analysis to more precisely determine the degree of hydrologic interconnection and flow depletion caused by ground water pumping and to evaluate the relative effect on surface water flow.

Table 3-1 Average monthly ET estimates, 2003-2007, from the Lake Bryan-Rice Bar Agrimet station.

Month	Pasture ET (ft)
January	0.00
February	0.00
March	0.06
April	0.24
May	0.36
June	0.49
July	0.63
August	0.49
September	0.29
October	0.06
November	0.00
December	0.00
Total	2.62

Table 3-2 Average Monthly Precipitation, 1948 to 2007, from the Lewiston WSO AP, Idaho weather station.

Month	Precipitation (in)	Effective Precip(in)
January	1.21	1.14
February	0.88	0.84
March	1.07	1.01
April	1.23	1.16
May	1.52	1.42
June	1.36	1.27
July	0.60	0.57
August	0.71	0.67
September	0.75	0.71
October	1.00	0.95
November	1.19	1.12
December	1.14	1.08
Total	12.66	11.94

Table 3-3 Summary of effective precipitation method from USDA Publication 1275.

Precipitation (in/mon)	% Effective Precip
<=1	0.95
1-2	0.90
2-3	0.82
3-4	0.65
4-5	0.45
5-6	0.25
>6	0.05

Note: For example, consider a total rainfall of 2.5 inches for the month of March. Using the table above, it can be seen that the first inch of rain each month is 95% effective. The second inch of rain is 90% effective, and the last half inch of rain is 82% effective.. As a result, 2.5 inches of rain would be (1" x 0.95) + (1" x 0.9) + (0.5" x 0.82) = 2.26 in/mon of effective precipitation.

Table 3-4 Estimates of ground water use, consumptive use and return flow for average residences served by private wells and septic systems in Asotin and Alpowa Creek Sub-basins.

	Water Use			Consumptive Use			Return Flow to Aquifer		
	Indoor	Irrigation	Total	Indoor	Irrigation	Total	Indoor	Irrigation	Total
January	190	0	190	19	0	19	171	0	171
February	190	0	190	19	0	19	171	0	171
March	190	0	190	19	0	19	171	0	171
April	190	166	356	25	141	167	165	25	190
May	190	271	461	29	230	260	161	41	202
June	190	445	635	36	378	414	154	67	221
July	190	653	843	43	555	599	147	98	244
August	190	486	676	37	413	451	153	73	226
September	190	267	457	29	227	256	161	40	201
October	190	0	190	19	0	19	171	0	171
November	190	0	190	19	0	19	171	0	171
December	190	0	190	19	0	19	171	0	171
Ave. Summer (April-Sept)	190	381	571	33	324	358	157	57	214
Ave. Winter (Oct.-March)	190	0	190	19	0	19	171	0	171
Annual Average	190	191	381	26	162	188	164	29	192

Note: All values are in gpd.

Table 3-5 Estimates of ground water use, consumptive use and return flow for average residences served by private wells and septic systems in the zoned area around Anatone.

	Water Use			Consumptive Use			Return Flow to Aquifer		
	Indoor	Irrigation	Total	Indoor	Irrigation	Total	Indoor	Irrigation	Total
January	190	0	190	19	0	19	171	0	171
February	190	0	190	19	0	19	171	0	171
March	190	0	190	19	0	19	171	0	171
April	190	0	190	19	0	19	171	0	171
May	190	0	190	19	0	19	171	0	171
June	190	0	190	19	0	19	171	0	171
July	190	0	190	19	0	19	171	0	171
August	190	0	190	19	0	19	171	0	171
September	190	0	190	19	0	19	171	0	171
October	190	0	190	19	0	19	171	0	171
November	190	0	190	19	0	19	171	0	171
December	190	0	190	19	0	19	171	0	171
Ave. Summer (April-Sept)	190	0	190	19	0	19	171	0	171
Ave. Winter (Oct.-March)	190	0	190	19	0	19	171	0	171
Annual Average	190	0	190	19	0	19	171	0	171

Note: All values are in gpd.

Table 3-6 Average Annual Growth Rates 2010 to 2030.

Growth Projection	County	Average Annual Change (%)
Medium	Asotin	0.8
	Garfield	0.5
High	Asotin	1.1
	Garfield	1.1

Note: The average annual growth rate was based on the Office of Financial (OFM) Management projections for the years 2010 to 2030.

Table 3-7 Population estimates for areas outside of municipal service areas within Asotin and Alpowa Creek Sub-basins.

		Current (2007)		Projected Growth Scenario (2057)		Partial Build Out	
Creek Basin	**Sub-Basin**	**Residences**	**Population**	**Residences**	**Population**	**Residences**	**Population**
Alpowa	Lower Alpowa	41	103	71	179	424	1,061
	Mid Alpowa	29	73	51	126	51	126
	Upper Alpowa	7	18	12	30	12	30
Alpowa Total		77	193	134	335	487	1,217
Asotin	Charley Creek	1	3	2	4	2	4
	George Creek	55	138	96	240	1,321	3,302
	Lower Asotin Creek	75	188	131	327	2,912	7,281
	Mid Asotin Creek	26	65	45	113	194	485
	North Fork Asotin Creek	-	-	-	-	-	-
	Pintler Creek	42	105	73	183	1,296	3,241
	South Fork Asotin Creek	2	5	3	9	3	9
	Dry Gulch	1	3	2	4	2	4
Asotin Total		202	505	352	880	5,730	14,326
Anatone Area Outside Basins		86	215	150	375	2,184	5,460
Totals		365	913	636	1,590	8,401	21,003

Note:
1) To determine population from residences, a multiplier of 2.5 people per residence was used.
2) The current residences were digitized from 2006 National Agricultural Imagery Program (NAIP) aerial photographs, as shown in Figure 1.
3) The Projected Growth Scenario used the high projection growth scenario from the Office of Financial Management.
4) Partial Build Out was based on the ag-transition and rural residential zoned areas found in Figure 2. Land zoned as agricultural/national forest was assumed to experience minimal growth (1 percent annual growth).

Table 3-8 Public water systems in the Asotin Creek Sub-basin, the Alpowa Creek Sub-basin, the Anatone Area outside the basins and the Town of Asotin.

Public Water System	System Type	Total Connections	Creek Basin
ALPOWA SUMMIT REST AREA	A, Transient Non-Community	2	Alpowa Creek
ANATONE HIGHWAY MAINTENANCE SHOP	B	1	Anatone Area
ASOTIN COUNTY ROAD DEPT SHOP	B	2	Anatone Area
BUBBA S COUNTRY STORE & GRILL	B	1	Anatone Area
MAX MALLORY WATER SYSTEM	B	1	Anatone Area
WEB OWENS WATER SYSTEM	B	3	Anatone Area
BLUE MOUNTAIN HOMESITES	B	13	Asotin Creek
CLEARWATER GUARD STATION	B	2	Asotin Creek
CLOVERLAND FREE METHODIST CHURCH	B	2	Asotin Creek
COUNTRY LIVING COURT	B	9	Asotin Creek
HATLEY WATER SYSTEM #1	B	4	Asotin Creek
ASOTIN WATER DEPT	A, Community	544	Town of Asotin

Table 3-9 Ground water use of public water systems in Asotin Creek Sub-basin.

	Water Use			Consumptive Use			Return Flow to Aquifer		
	Indoor	Irrigation	Total	Indoor	Irrigation	Total	Indoor	Irrigation	Total
January	5,700	0	5,700	570	0	570	5,130	0	5,130
February	5,700	0	5,700	570	0	570	5,130	0	5,130
March	5,700	0	5,700	570	0	570	5,130	0	5,130
April	5,700	1,331	7,031	620	1,131	1,751	5,080	200	5,280
May	5,700	2,169	7,869	651	1,844	2,495	5,049	325	5,374
June	5,700	3,558	9,258	703	3,024	3,727	4,997	534	5,530
July	5,700	5,225	10,925	766	4,441	5,207	4,934	784	5,718
August	5,700	3,891	9,591	716	3,307	4,023	4,984	584	5,568
September	5,700	2,138	7,838	650	1,817	2,467	5,050	321	5,370
October	5,700	0	5,700	570	0	570	5,130	0	5,130
November	5,700	0	5,700	570	0	570	5,130	0	5,130
December	5,700	0	5,700	570	0	570	5,130	0	5,130
Ave. Summer (April-Sept)	5,700	3,052	8,752	684	2,594	3,278	5,016	458	5,473
Ave. Winter (Oct.-March)	5,700	0	5,700	570	0	570	5,130	0	5,130
Annual Average	5,700	1,526	7,226	627	1,297	1,924	5,073	229	5,302

Note: All values are in gallons per day.

Table 3-10 Ground water use of public water systems in Alpowa Creek Sub-basin.

	Water Use			Consumptive Use			Return Flow to Aquifer		
	Indoor	Irrigation	Total	Indoor	Irrigation	Total	Indoor	Irrigation	Total
January	380	0	380	38	0	38	342	0	342
February	380	0	380	38	0	38	342	0	342
March	380	0	380	38	0	38	342	0	342
April	380	333	713	50	283	333	330	50	379
May	380	542	922	58	461	519	322	81	403
June	380	889	1,269	71	756	827	309	133	442
July	380	1,306	1,686	87	1,110	1,197	293	196	489
August	380	973	1,353	74	827	901	306	146	451
September	380	534	914	58	454	512	322	80	402
October	380	0	380	38	0	38	342	0	342
November	380	0	380	38	0	38	342	0	342
December	380	0	380	38	0	38	342	0	342
Ave. Summer (April-Sept)	380	763	1,143	67	649	715	313	114	428
Ave. Winter (Oct.-March)	380	0	380	38	0	38	342	0	342
Annual Average	380	381	761	52	324	377	328	57	385

Note: All values are in gallons per day.

Table 3-11 Ground water use of public water systems in the Anatone Area outside the basins.

	Water Use			Consumptive Use			Return Flow to Aquifer		
	Indoor	Irrigation	Total	Indoor	Irrigation	Total	Indoor	Irrigation	Total
January	1,520	0	1,520	152	0	152	1,368	0	1,368
February	1,520	0	1,520	152	0	152	1,368	0	1,368
March	1,520	0	1,520	152	0	152	1,368	0	1,368
April	1,520	0	1,520	152	0	152	1,368	0	1,368
May	1,520	0	1,520	152	0	152	1,368	0	1,368
June	1,520	0	1,520	152	0	152	1,368	0	1,368
July	1,520	0	1,520	152	0	152	1,368	0	1,368
August	1,520	0	1,520	152	0	152	1,368	0	1,368
September	1,520	0	1,520	152	0	152	1,368	0	1,368
October	1,520	0	1,520	152	0	152	1,368	0	1,368
November	1,520	0	1,520	152	0	152	1,368	0	1,368
December	1,520	0	1,520	152	0	152	1,368	0	1,368
Ave. Summer (April-Sept)	1,520	0	1,520	152	0	152	1,368	0	1,368
Ave. Winter (Oct.-March)	1,520	0	1,520	152	0	152	1,368	0	1,368
Annual Average	1,520	0	1,520	152	0	152	1,368	0	1,368

Note: All values are in gallons per day.

Table 3-12 Ground water use of the Asotin Water Department in the Town of Asotin.

	Water Use			Consumptive Use			Return Flow to Aquifer		
	Indoor	Irrigation	Total	Indoor	Irrigation	Total	Indoor	Irrigation	Total
January	131,016	0	131,016	131,016	0	131,016	0	0	0
February	126,268	0	126,268	126,268	0	126,268	0	0	0
March	106,726	0	106,726	106,726	0	106,726	0	0	0
April	49,497	90,496	139,993	49,497	76,922	126,419	0	13,574	13,574
May	336,058	147,503	483,561	336,058	125,377	461,436	0	22,125	22,125
June	417,769	241,918	659,687	417,769	205,630	623,399	0	36,288	36,288
July	458,367	355,288	813,655	458,367	301,995	760,362	0	53,293	53,293
August	534,141	264,585	798,726	534,141	224,897	759,038	0	39,688	39,688
September	414,565	145,355	559,920	414,565	123,552	538,117	0	21,803	21,803
October	252,300	0	252,300	252,300	0	252,300	0	0	0
November	149,863	0	149,863	149,863	0	149,863	0	0	0
December	110,077	0	110,077	110,077	0	110,077	0	0	0
Ave. Summer (April-Sept)	368,399	207,524	575,924	368,399	176,396	544,795	0	31,129	31,129
Ave. Winter (Oct.-March)	146,042	0	146,042	146,042	0	146,042	0	0	0
Annual Average	257,221	103,762	360,983	257,221	88,198	345,418	0	15,564	15,564

Note:
1) All values are in gpd.
2) Water use numbers are based on meter records provided by Asotin PUD.
3) Indoor use in the Town of Asotin is assumed to be 100 percent consumptive because it is discharged to a sewer system.

Table 3-13 Estimates of irrigated acres from ground water rights in Asotin Creek Sub-basin, Alpowa Creek Sub-basin and Anatone Area outside the basins.

Basin	Sub Basin	Active Water Rights	Estimated Actual Irrigated Acres
Asotin Creek Basin	Certificates	8	8.0
	Claims	72	21.0
Alpowa Creek Basin	Certificates	5	49.5
	Claims	62	5.5
Anatone Area	Certificates	1	1.0
	Claims	11	6.0
	Totals	159	91.0

Table 3-14 Estimates of livestock water use from ground water rights in Alpowa and Asotin Creek Sub-basin and the Anatone Area outside the basins.

Basin	Sub Basin	Estimated Livestock (Horses and Cattle)	Calculated Annual Livestock Use (ac-ft/year)
Asotin Creek Basin	Dry Gulch	0	0.0
	George Creek	110	1.7
	Lower Asotin Creek	450	6.8
	Mid Asotin Creek	800	12.1
	North Fork Asotin Creek	0	0.0
	Pintler Creek	170	2.6
	South Fork Asotin Creek	40	0.6
	Charley Creek	0	0.0
Alpowa Creek Basin	Lower Alpowa	123	2.1
	Mid Alpowa	109	1.7
	Upper Alpowa	120	1.9
Anatone Area	Anatone Area	0	0.0
	Totals	1,922	29.4

Note:

1) Annual livestock use assumes 27 gpd per cow and 18 gpd per horse.
2) The total water use calculation assumes most cattle are present for 6 months of the year during the winter.

Table 3-15 Estimates of ground water use, consumptive use and return flow for agricultural ground water rights in Asotin Creek Sub-basin.

	Irrigation and Livestock		
	Water Use (acre-feet)	Consumptive Use (acre-feet)	Return Flow to Aquifer (acre-feet)
January	4.0	4.0	0.0
February	3.6	3.6	0.0
March	4.0	4.0	0.0
April	5.6	4.7	0.8
May	9.4	7.9	1.4
June	14.8	12.6	2.2
July	22.5	19.1	3.4
August	16.8	14.3	2.5
September	8.9	7.6	1.3
October	4.0	4.0	0.0
November	3.9	3.9	0.0
December	4.0	4.0	0.0
Ave. Summer (April-Sept)	13.0	11.0	1.9
Ave. Winter (Oct.-Mar)	3.9	3.9	0.0
Annual Total	101.6	89.9	11.7

Note: All values are in acre-ft.

Table 3-16 Estimates of ground water use, consumptive use and return flow for agricultural ground water rights in Alpowa Creek sub-basin.

	Irrigation and Livestock		
	Water Use (acre-feet)	Consumptive Use (acre-feet)	Return Flow to Aquifer (acre-feet)
January	1.0	1.0	0.0
February	0.9	0.9	0.0
March	1.0	1.0	0.0
April	10.5	9.0	1.6
May	17.7	15.1	2.7
June	28.1	23.9	4.2
July	42.7	36.3	6.4
August	31.8	27.0	4.8
September	16.9	14.4	2.5
October	1.0	1.0	0.0
November	0.9	0.9	0.0
December	1.0	1.0	0.0
Ave. Summer (April-Sept)	24.6	20.9	3.7
Ave. Winter (Oct.-Mar)	0.9	0.9	0.0
Annual Total	153.5	131.3	22.2

Note: All values are in acre-ft.

Table 3-17 Estimates of ground water use, consumptive use and return flow for agricultural ground water rights in the Anatone Area.

	Irrigation		
	Water Use (acre-feet)	Consumptive Use (acre-feet)	Return Flow to Aquifer (acre-feet)
January	0.0	0.0	0.0
February	0.0	0.0	0.0
March	0.0	0.0	0.0
April	1.3	1.1	0.2
May	2.3	1.9	0.3
June	3.6	3.0	0.5
July	5.4	4.6	0.8
August	4.0	3.4	0.6
September	2.2	1.8	0.3
October	0.0	0.0	0.0
November	0.0	0.0	0.0
December	0.0	0.0	0.0
Ave. Summer (April-Sept)	3.1	2.7	0.5
Ave. Winter (Oct.-Mar)	0.0	0.0	0.0
Annual Total	18.8	16.0	2.8

Note: All values are in acre-ft.

Table 3-18 Total current ground water use in Alpowa Creek Sub-basin.

Alpowa Creek sub-basin					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Lower Alpowa	Residential (Domestic Exempt)	0.04	0.02	0.02	0.01
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.35	0.30	0.18	0.15
	Sub-Basin Total	0.39	0.32	0.20	0.16
Mid Alpowa	Residential (Domestic Exempt)	0.03	0.02	0.02	0.01
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.06	0.05	0.03	0.03
	Sub-Basin Total	0.08	0.06	0.05	0.03
Upper Alpowa	Residential (Domestic Exempt)	0.01	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.01	0.00	0.01	0.00
Total		0.48	0.39	0.26	0.20

Table 3-19 Total current ground water use in the Anatone Area outside the basins.

Anatone Area Outside Basins					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Anatone Area Outside Basins	Residential (Domestic Exempt)	0.03	0.00	0.03	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.05	0.04	0.03	0.02
Total		0.08	0.05	0.05	0.02

Table 3-20 Total current ground water use in the Asotin Creek Sub-basin.

Asotin Creek sub-basin					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Charley Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
George Creek	Residential (Domestic Exempt)	0.03	0.02	0.02	0.01
	Public Water System	0.01	0.00	0.00	0.00
	Agricultural	0.01	0.01	0.01	0.01
	Sub-Basin Total	0.05	0.03	0.04	0.02
Lower Asotin Creek	Residential (Domestic Exempt)	0.07	0.04	0.04	0.02
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.15	0.13	0.09	0.08
	Sub-Basin Total	0.22	0.18	0.13	0.10
Mid Asotin Creek	Residential (Domestic Exempt)	0.02	0.01	0.02	0.01
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.02	0.02	0.03	0.02
	Sub-Basin Total	0.04	0.03	0.04	0.03
North Fork Asotin Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Pintler Creek	Residential (Domestic Exempt)	0.03	0.02	0.02	0.01
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.03	0.02	0.02	0.01
	Sub-Basin Total	0.06	0.04	0.04	0.02
South Fork Asotin Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Dry Gulch	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Total		0.38	0.28	0.26	0.17

Table 3-21 Total projected ground water use in the year 2057 in Alpowa Creek Sub-basin.

Alpowa Creek sub-basin					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Lower Alpowa	Residential (Domestic Exempt)	0.06	0.04	0.04	0.02
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.35	0.30	0.18	0.15
	Sub-Basin Total	0.41	0.34	0.22	0.17
Mid Alpowa	Residential (Domestic Exempt)	0.04	0.03	0.03	0.01
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.06	0.05	0.03	0.03
	Sub-Basin Total	0.10	0.08	0.06	0.04
Upper Alpowa	Residential (Domestic Exempt)	0.01	0.01	0.01	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.01	0.01	0.01	0.01
Total		0.53	0.42	0.29	0.22

Table 3-22 Total projected ground water use in the year 2057 in Anatone Area outside the basins.

Anatone Area Outside Basins					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Anatone Area Outside Basins	Residential (Domestic Exempt)	0.04	0.00	0.04	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.05	0.04	0.03	0.02
Total		0.10	0.05	0.07	0.03

Table 3-23 Total projected ground water use in the year 2057 in Asotin Creek Sub-basin.

Asotin Creek sub-basin					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Charley Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
George Creek	Residential (Domestic Exempt)	0.06	0.03	0.04	0.02
	Public Water System	0.01	0.00	0.00	0.00
	Agricultural	0.01	0.01	0.01	0.01
	Sub-Basin Total	0.08	0.04	0.06	0.02
Lower Asotin Creek	Residential (Domestic Exempt)	0.12	0.07	0.08	0.04
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.15	0.13	0.09	0.08
	Sub-Basin Total	0.27	0.21	0.17	0.11
Mid Asotin Creek	Residential (Domestic Exempt)	0.04	0.03	0.03	0.01
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.02	0.02	0.03	0.02
	Sub-Basin Total	0.06	0.04	0.05	0.04
North Fork Asotin Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Pintler Creek	Residential (Domestic Exempt)	0.05	0.03	0.04	0.02
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.03	0.02	0.02	0.01
	Sub-Basin Total	0.08	0.05	0.06	0.03
South Fork Asotin Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Dry Gulch	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Total		0.50	0.34	0.34	0.21

Table 3-24 Total partial build-out ground water use in Alpowa Creek Sub-basin.

Alpowa Creek sub-basin					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Lower Alpowa	Residential (Domestic Exempt)	0.38	0.23	0.25	0.12
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.35	0.30	0.18	0.15
	Sub-Basin Total	0.73	0.53	0.43	0.28
Mid Alpowa	Residential (Domestic Exempt)	0.04	0.03	0.03	0.01
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.06	0.05	0.03	0.03
	Sub-Basin Total	0.10	0.08	0.06	0.04
Upper Alpowa	Residential (Domestic Exempt)	0.01	0.01	0.01	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.01	0.01	0.01	0.01
Total		0.84	0.62	0.50	0.32

Table 3-25 Total partial build-out ground water use in the Anatone Area outside the basins.

Anatone Area Outside Basins					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Anatone Area Outside Basins	Residential (Domestic Exempt)	0.64	0.06	0.64	0.06
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.05	0.04	0.03	0.02
Total		0.70	0.11	0.67	0.09

Table 3-26 Total partial build-out ground water use in the Asotin Creek Sub-basin.

Asotin Creek sub-basin					
Sub-basin	Type of Water Use	Summer Total (cfs)	Summer Net (Total - Return Flow) (cfs)	Annual Total (cfs)	Annual Net (Total - Return Flow) (cfs)
Charley Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
George Creek	Residential (Domestic Exempt)	0.41	0.06	0.40	0.05
	Public Water System	0.01	0.00	0.00	0.00
	Agricultural	0.01	0.01	0.01	0.01
	Sub-Basin Total	0.43	0.07	0.41	0.06
Lower Asotin Creek	Residential (Domestic Exempt)	2.58	1.61	1.72	0.85
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.15	0.13	0.09	0.08
	Sub-Basin Total	2.73	1.75	1.80	0.92
Mid Asotin Creek	Residential (Domestic Exempt)	0.14	0.11	0.11	0.06
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.02	0.02	0.03	0.02
	Sub-Basin Total	0.16	0.12	0.14	0.08
North Fork Asotin Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Pintler Creek	Residential (Domestic Exempt)	0.67	0.30	0.53	0.17
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.03	0.02	0.02	0.01
	Sub-Basin Total	0.70	0.32	0.55	0.18
South Fork Asotin Creek	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Dry Gulch	Residential (Domestic Exempt)	0.00	0.00	0.00	0.00
	Public Water System	0.00	0.00	0.00	0.00
	Agricultural	0.00	0.00	0.00	0.00
	Sub-Basin Total	0.00	0.00	0.00	0.00
Total		4.03	2.26	2.91	1.25

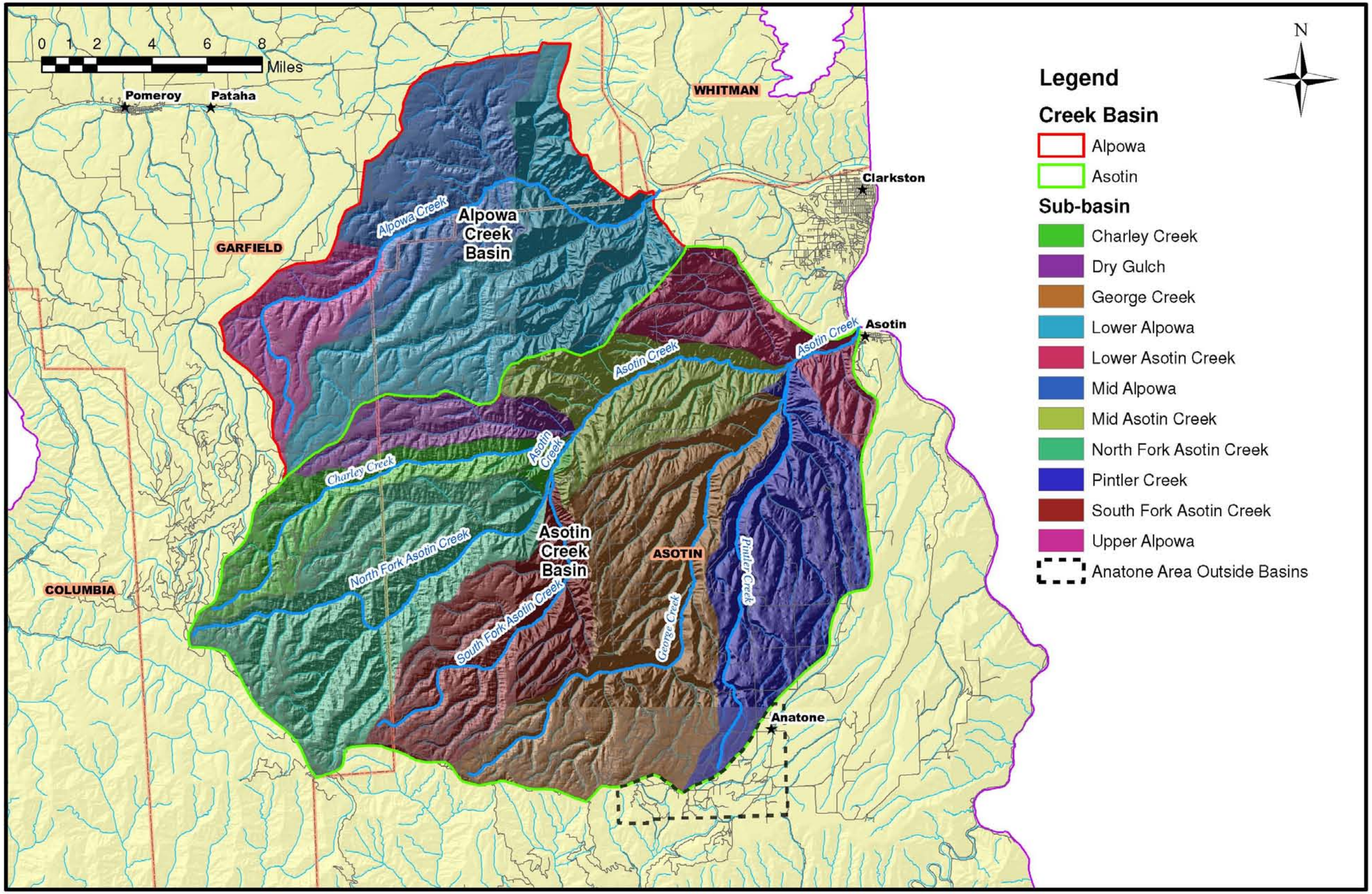


Figure 3-1 Sub-basins of Alpowa and Asotin Creek and the Anatone Area outside of the basins.

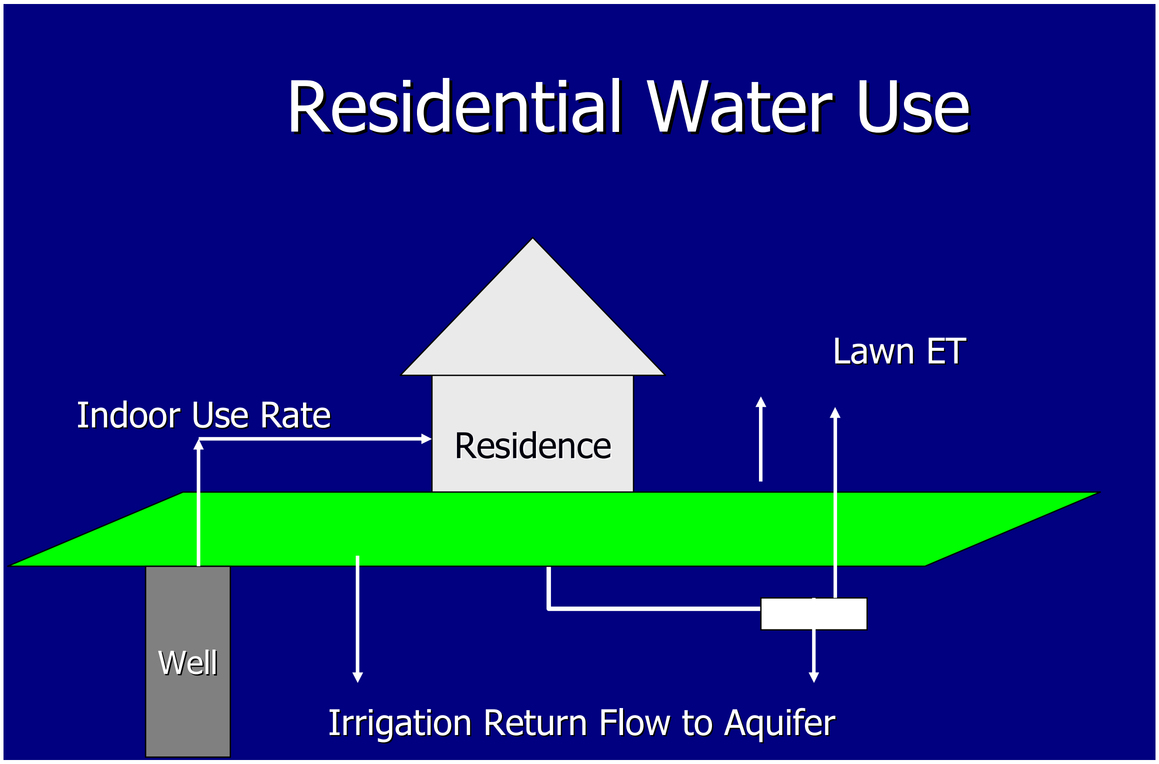


Figure 3-2 Water balance for residence served by well and septic tank.

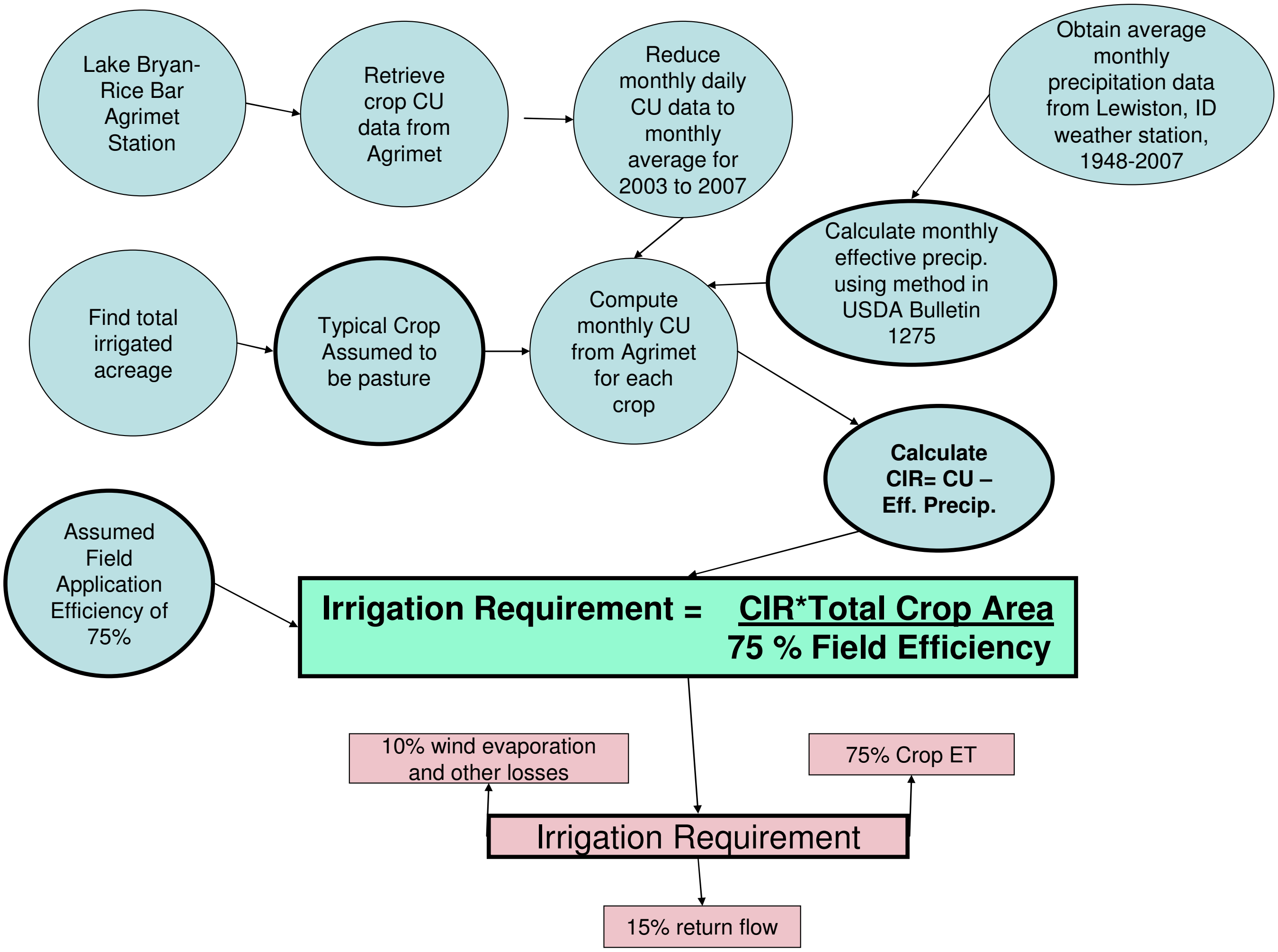


Figure 3-3 Flow chart of the process to calculate irrigation requirements, consumptive use and return flow.

Figure 3-4 Photographs of typical residences in Alpowa and Asotin Creek Sub-basins.

Figure 3-4 continued.

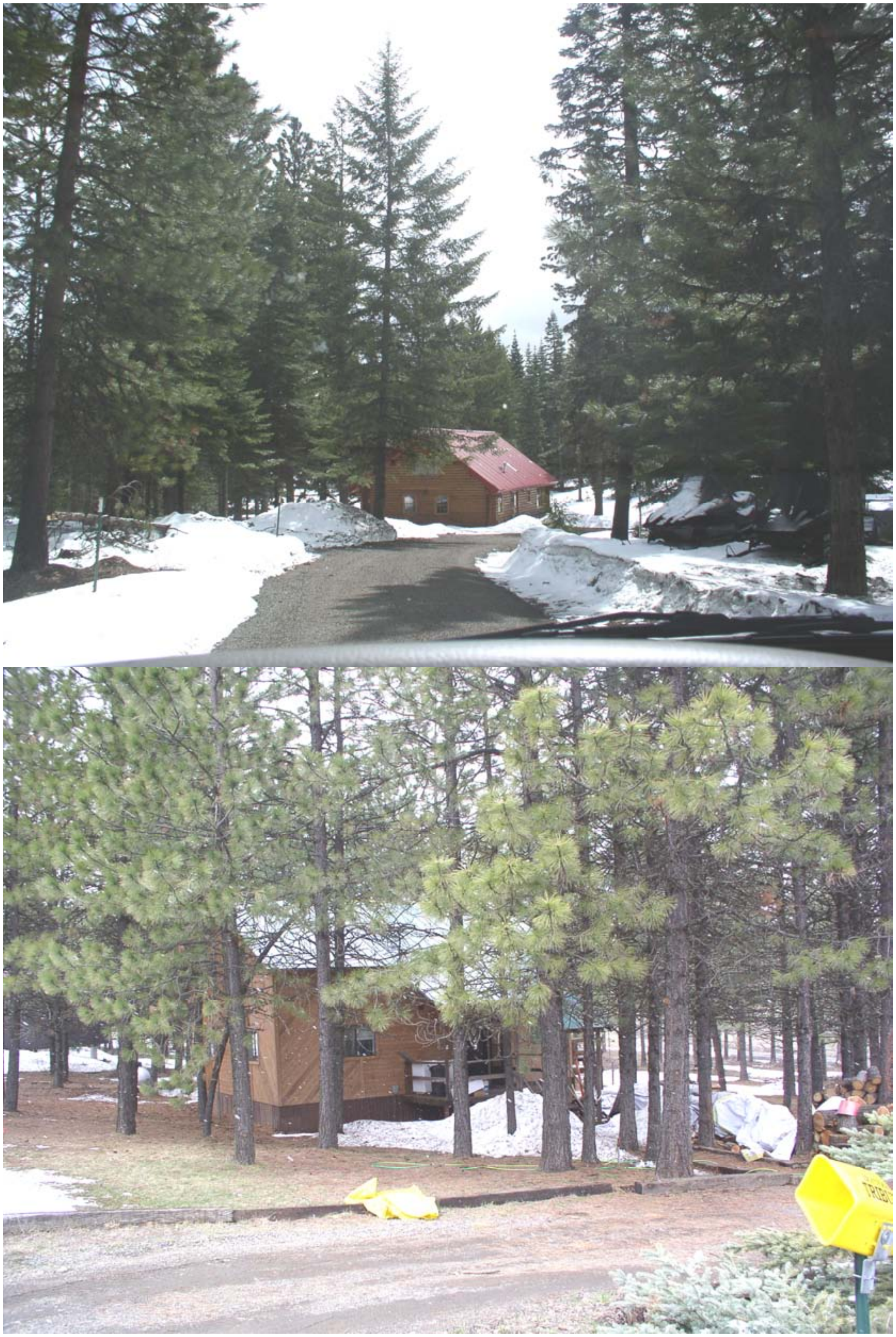
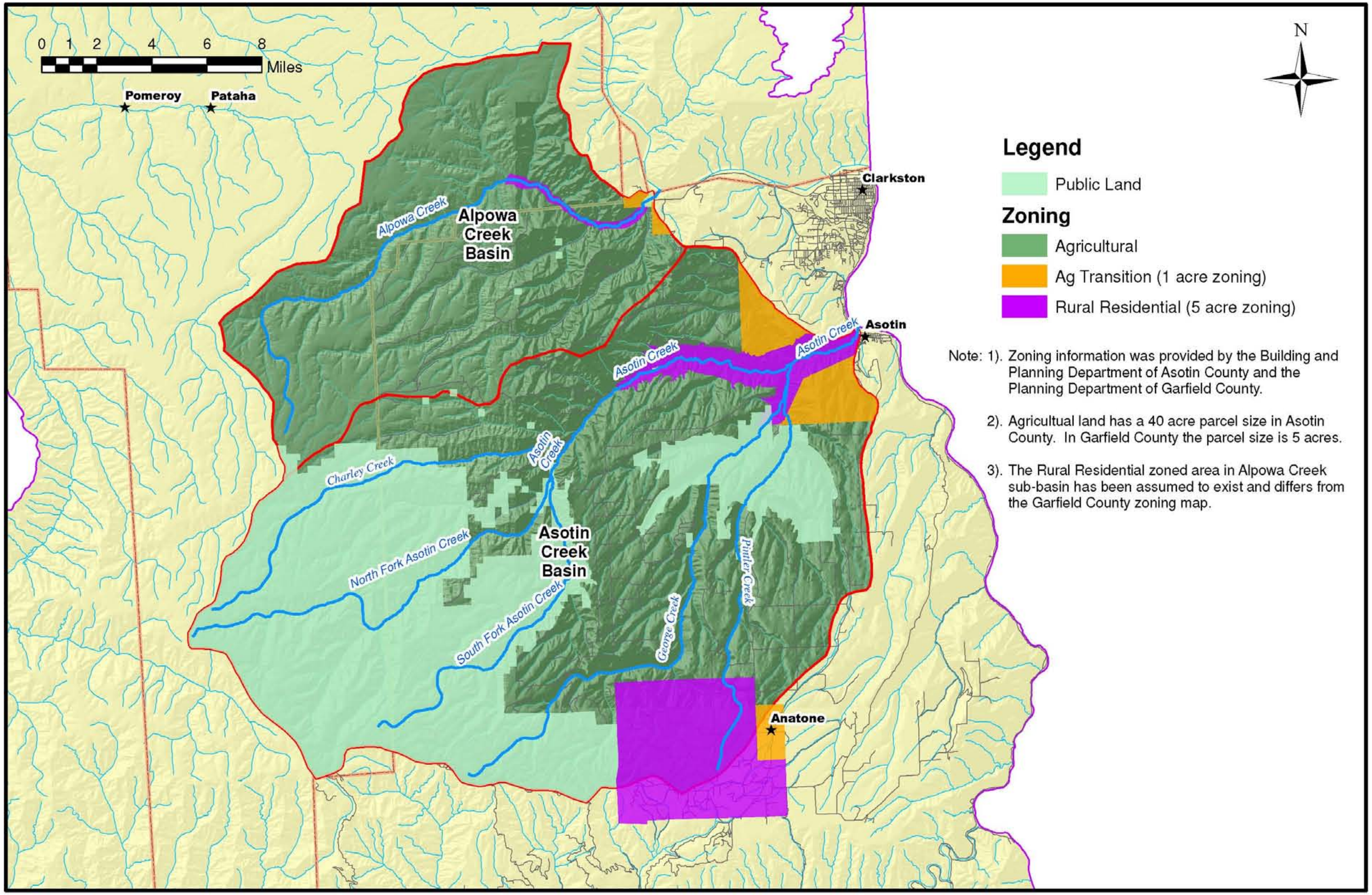


Figure 3-5 Photograph of typical residences in the Town of Anatone area.

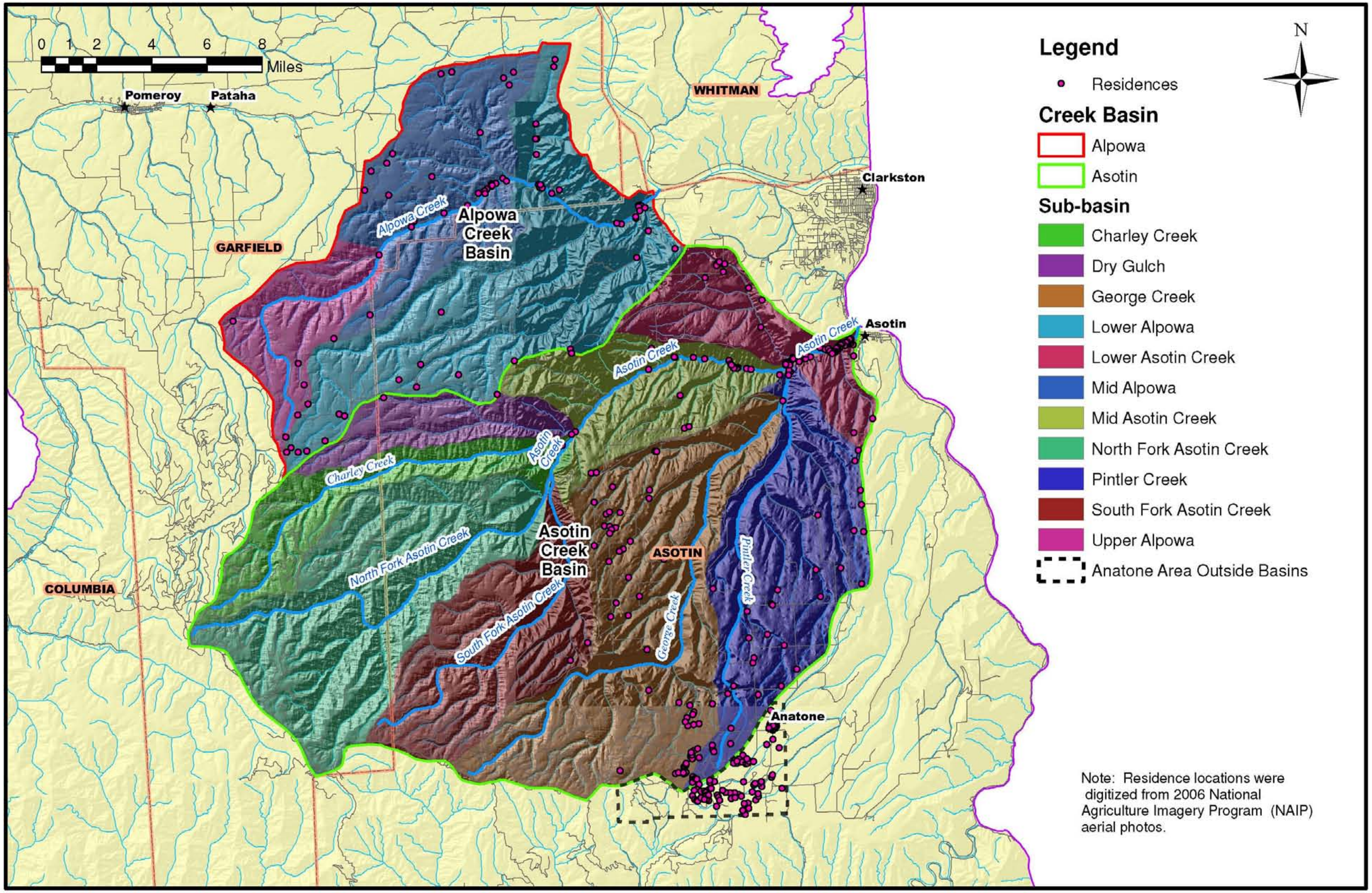


Note: 1). Zoning information was provided by the Building and Planning Department of Asotin County and the Planning Department of Garfield County.

2). Agricultural land has a 40 acre parcel size in Asotin County. In Garfield County the parcel size is 5 acres.

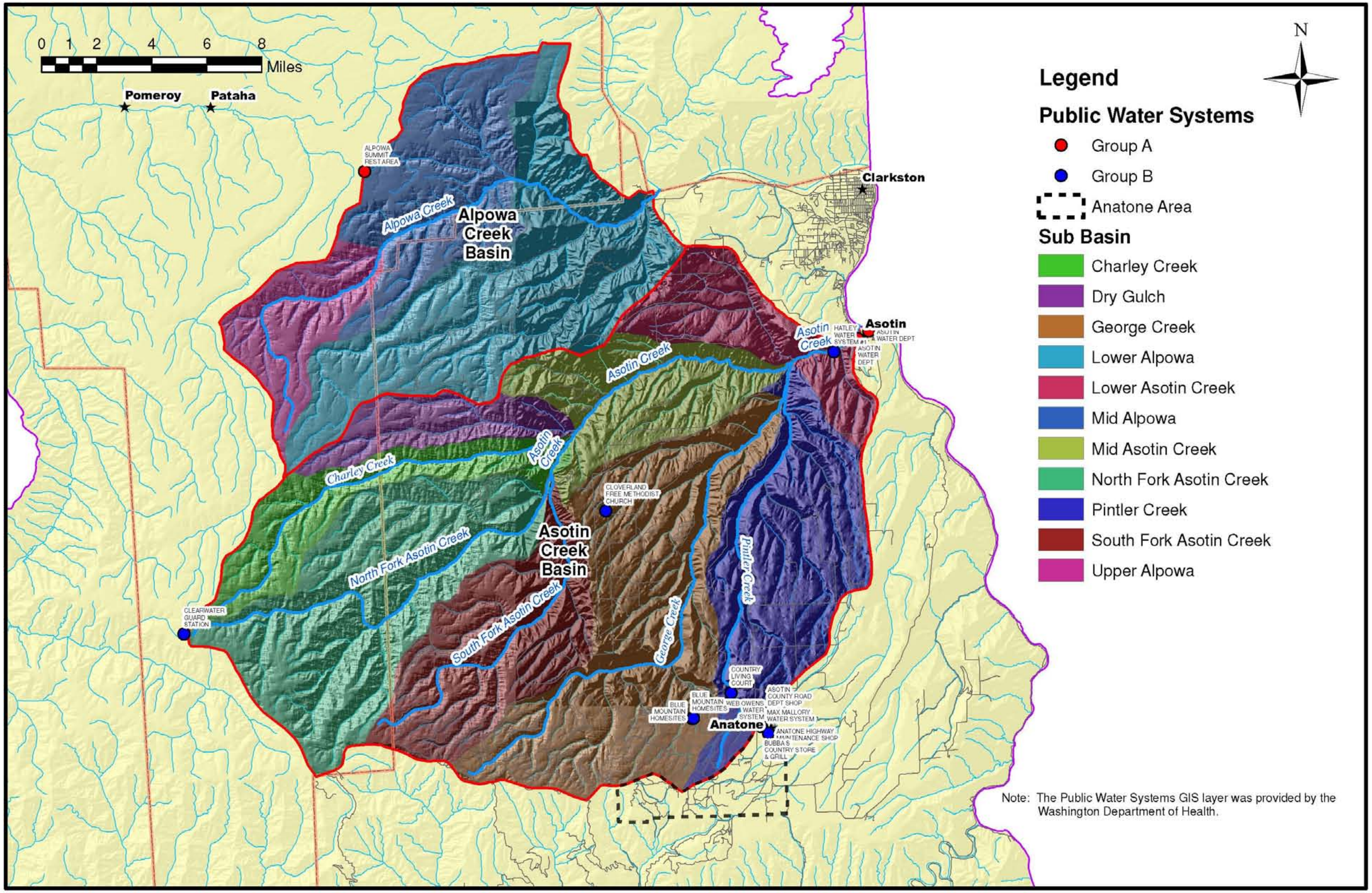
3). The Rural Residential zoned area in Alpowa Creek sub-basin has been assumed to exist and differs from the Garfield County zoning map.

Figure 3-6 Zoning and land use in the Alpowa and Asotin Creek sub-basins.



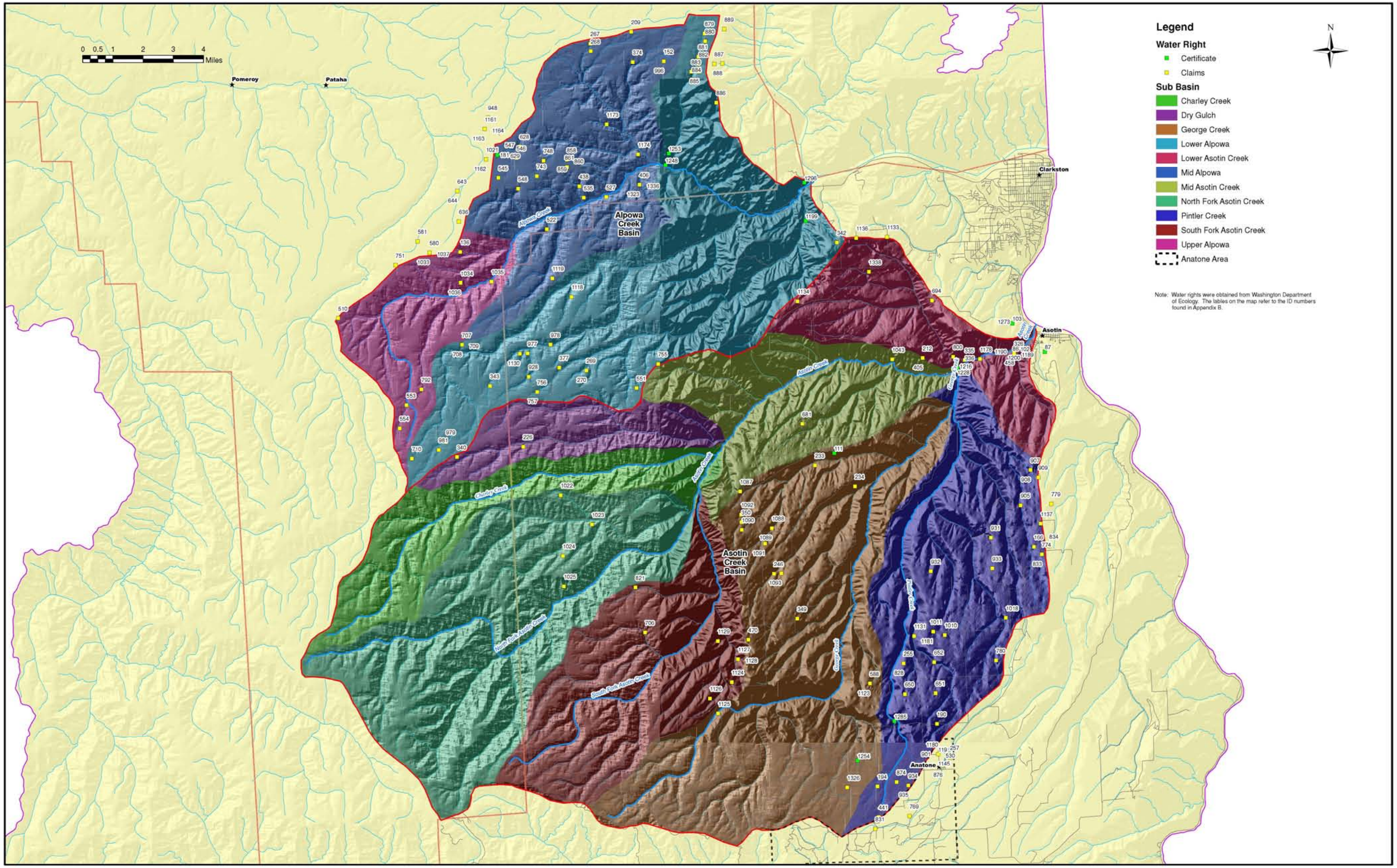
Note: Residence locations were digitized from 2006 National Agriculture Imagery Program (NAIP) aerial photos.

Figure 3-7 Locations of residences digitized from aerial photographs.



Note: The Public Water Systems GIS layer was provided by the Washington Department of Health.

Figure 3-8 Group A and B public water supply systems in the project area.



Note: Water rights were obtained from Washington Department of Ecology. The lables on the map refer to the ID numbers found in Appendix B.

Figure 3-9 Water right certificates and claims in the project area.

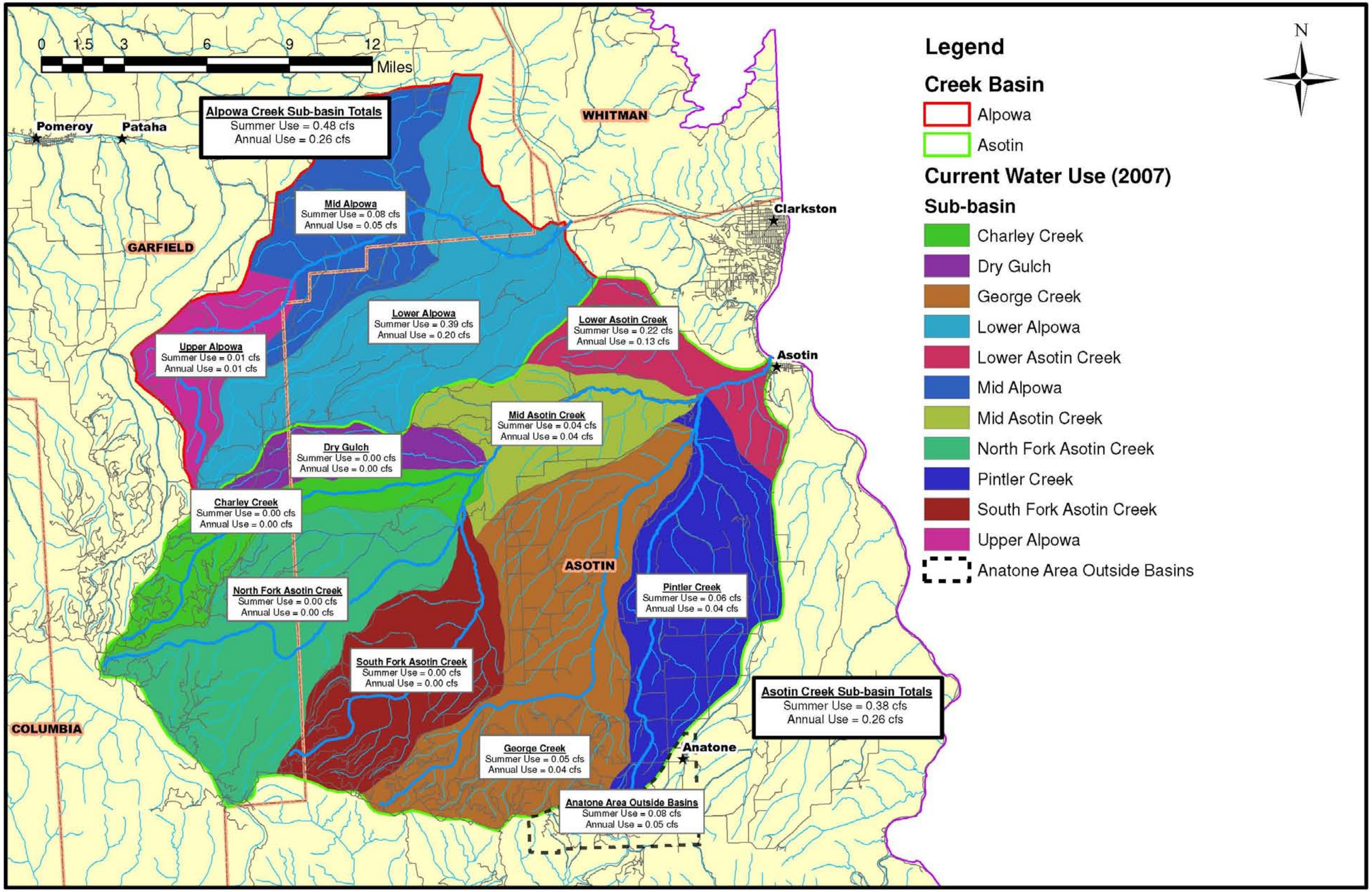


Figure 3-10 Current ground water use by sub-basin.

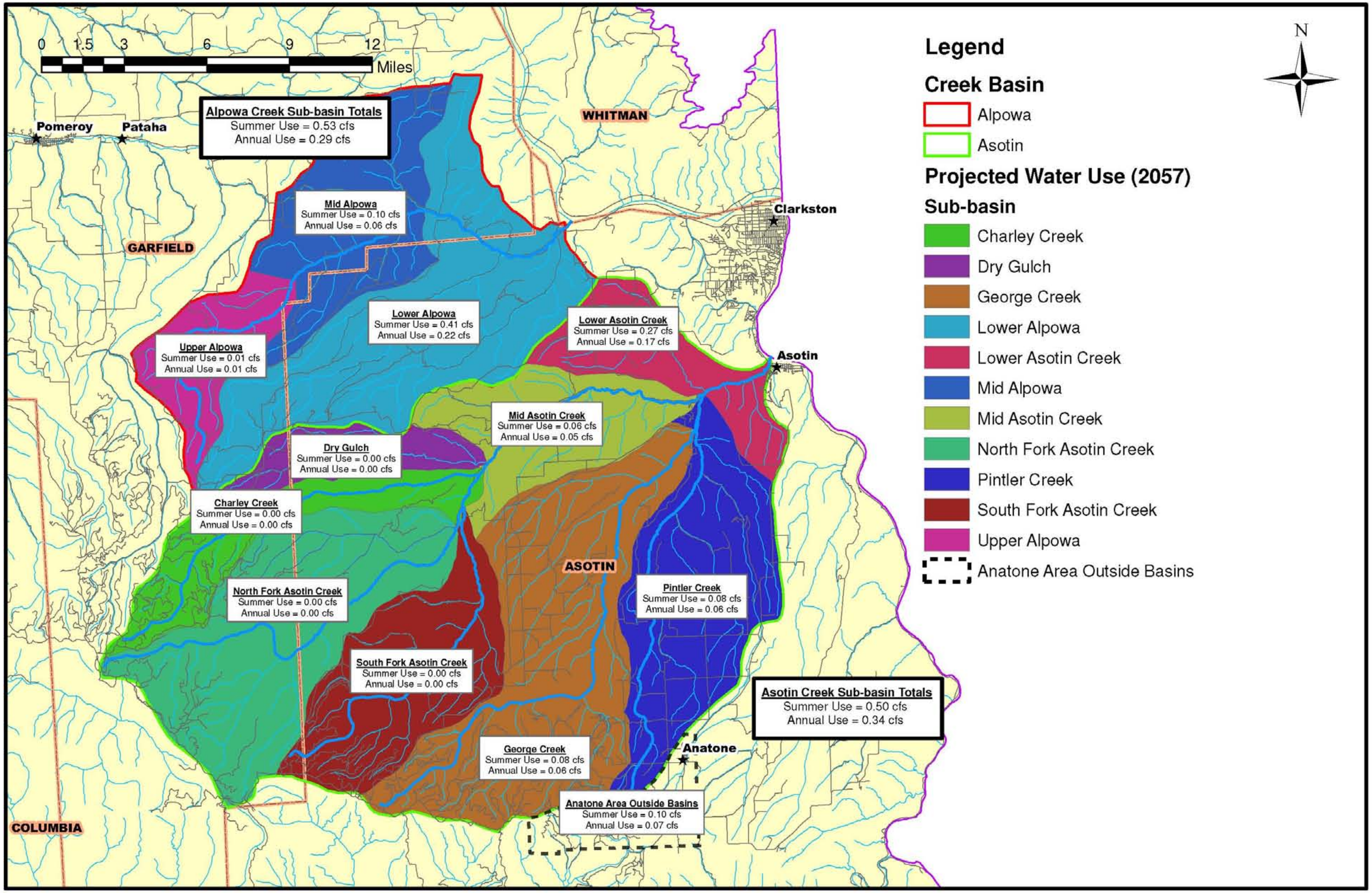


Figure 3-11 Ground water use by sub-basin for 50-year Future-Growth Scenario.

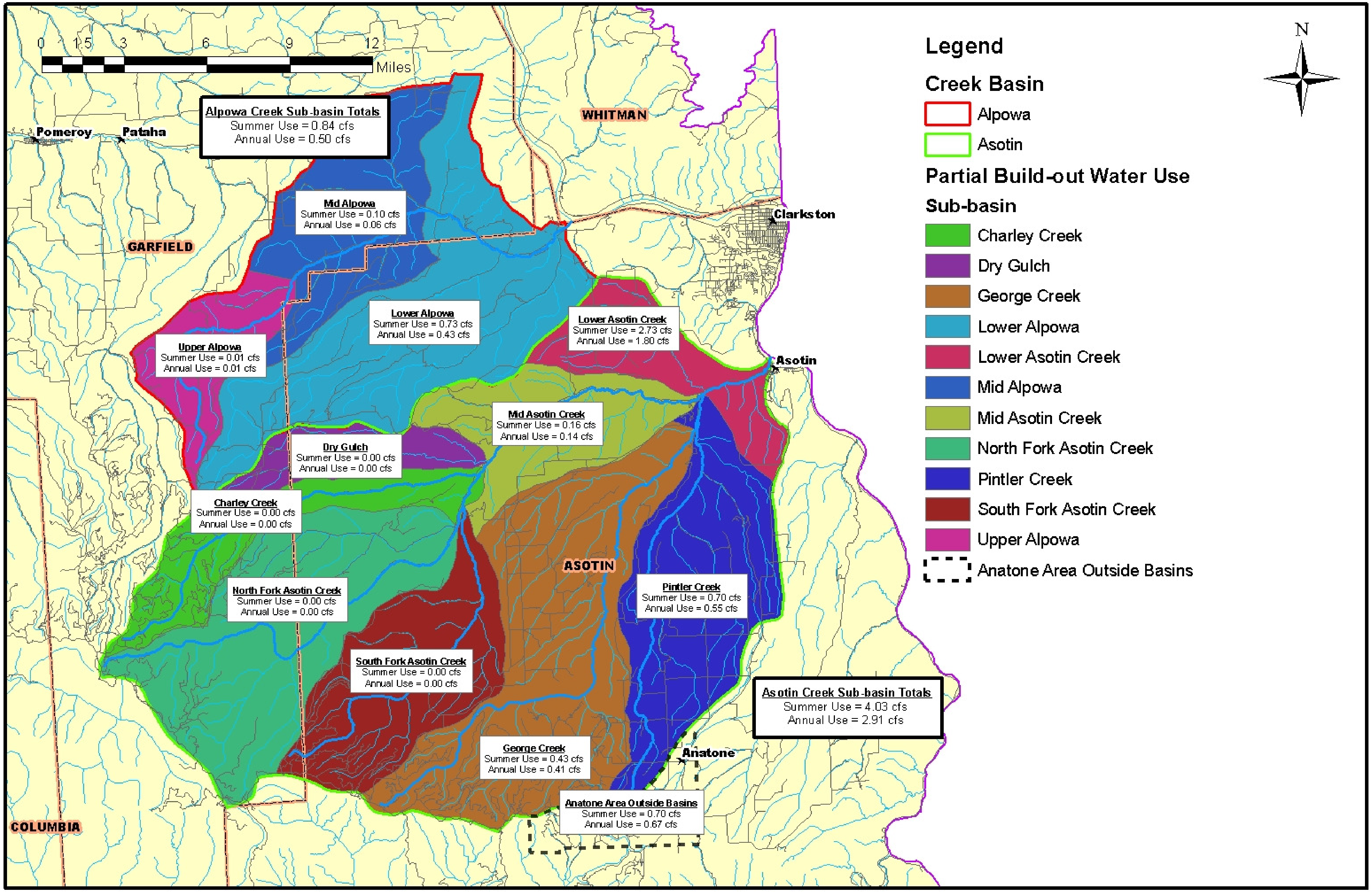


Figure 3-12 Ground water use by sub-basin for Partial Build-Out Scenario.

Chapter 4
Recommendations

The findings of Phase I indicate that the principal ground water supply aquifers in the study area are the confined, shallow and intermediate basalt hydrostratigraphic units (SBHU and IBHU) aquifers. The lateral continuity of these units is controlled by the deeper canyons which partially to completely truncate these units. Most of the ground water inflow from these aquifers to surface waters appears to be within the upper portions of the basin. The deep basalt hydrostratigraphic unit (DBHU) is probably not in hydrologic connection with streams based on hydrostratigraphic mapping.

Additional information is needed to confirm that ground water is discharging from the SBHU and IBHU to the Asotin and Alpowa Creeks and tributaries and to determine the extent to which the SBHU and IBHU discharge contributes flow in the lower portion of the basin. We recommend that Phase II field work and monitoring be conducted to obtain data to assist in developing our understanding of the hydrogeology of the basins and to evaluate where the basalt aquifers may be contributing groundwater to Asotin Creek and Alpowa Creek. The field work recommended includes: (1) seepage run stream flow and temperature measurement and spring flow measurements during low-flow periods in the late summer, (2) setting up several continuous stream flow and temperature gages on portions of the mainstem creeks and tributaries that are ungaged and (3) ground water level monitoring of the shallow and intermediate basalt aquifers in area wells completed in basalt aquifers. In addition, we recommend that spring data inventory compiled by Asotin CD be reviewed in conjunction with the recommended field work. A preliminary review of that information suggests it will be useful in the evaluation of surface water and ground water hydrologic connection. The collected field data then would be analyzed to allow a more precise evaluation of ground water flow directions in the SBHU and IBHU and the extent of hydrologic connection in the lower portion of the basins between streams and these basalt aquifers. We also recommend compiling monthly stream flow statistics for Asotin Creek and Alpowa Creek and tributaries during Phase II to evaluate the relative quantity of stream flow depletion caused by ground water pumping and using the tributary gaging data to assess the relative effects of flow depletion by ground water pumping on tributary creeks. This information can then be used, along with the information that will be compiled from on-going instream flow studies, to develop management alternatives regarding the amount of water that should be reserved for instream flow and out-of-stream use in the basins.

Part of the proposed Phase II activities (low-flow stream flow gaging) should be conducted during the late summer or fall when stream flow is low and does not fluctuate appreciably. These types of flow conditions are most-advantageous to determine the percentage of ground water inflow to the creeks. Ground water monitoring can be conducted later in the fall prior to snowfall when the project area is fully accessible. A scope of work, dated June 25 2008, that more fully details the tasks and schedule to complete the recommended Phase II activities has been prepared and submitted to the WRIA 35 Planning Unit.

Chapter 5
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Appendix A

Well Log Information

Well Specifications

Explanation of Column Headings Abbreviations

Well ID – Project identification number

Ecology Well ID # - Department of Ecology well identification number

T-N – Township, North

R-E – Range, East

Sec. – section number

Q-Q – quarter/quarter section

Surf elev (ft amsl) – surface elevation at well estimated from digital elevation model

TOB depth – depth to top of basalt report on dirller's log in feet

TOB elev – calculate elevation of top of basalt

Use: D – domestic well; M – public supply well; S – stock well; S – stock well

Surf seal depth – depth below ground surface surface seal reported to extend, in feet

Elev seal bottom – elevation of bottom of surface seal, in feet

Prod casing depth – depth below ground surface production casing extends, in feet

Elev casing bottom – elevation of bottom of production casing, in feet

Open int top depth – depth below ground surface of top of open/screened interval, in feet

Elev open int top – elevation of top of open/screened interval, in feet

Open int bottom depth – depth below ground surface of bottom of open/screened interval, in feet

Elev open int bottom – elevation of bottom of open/screened interval, in feet

Open in dia (in) – reported diameter of open/screened interval, in inches

DTW (ft) – reported depth to water, in feet

WT elev (ft amsl) – calculated elevation of water in well, in feet above mean sea level

Pump test type: A – airlift; B – bailer; P – pump

Rate (gpm) – reported rate for well pump test, gallons per minute

DD (ft) – reported draw down during well test, in feet

SC – calculated specific capacity for pumping test, gallons per minute, per foot fo draw down

Temp – water temperature in degrees Fahrenheit

Upland – well placed in upland area above canyon bottoms

Valley – well placed at or near canyon bottoms, typical near streams

QMs – well interpreted to be open to Quaternary to Miocene sediments

Mvsu – well interpreted to be open to upper portion of Saddle Mountains Basalt

Mvsl – well interpreted to be open to lower portion of Saddle Mountains Basalt

Mvwu – well interpreted to be open to upper portion of Wanapum Basalt

Mvwl – well interpreted to be open to lower portion of Wanapum Basalt

N2 – well interpreted to be open to N2 Grande Ronde Basalt

R2 – well interpreted to be open to R2 Grande Ronde Basalt

N1 – well interpreted to be open to N1 Grande Ronde Basalt

R1 – well interpreted to be open to R1 Grande Ronde Basalt

I – well interpreted to be open to Imnaha Basalt

Well Specification Table

Well ID	DOE Well Log ID #	Latitude	Longitude	T - N	R - E	Sec.	Q-Q	Owner	year drilled	month drilled	surf elev (ft amsl)	TOB depth	TOB elev	TD (ft bgs)	TD elev (ft amsl)	Use	surf seal depth	elev seal bottom	prod casing depth	elev casing bottom	open int top depth	elev open int top	open int bottom depth	elev open int bottom
ASO0069	332825	46.360320	-117.368800	10	43	12	NE/NE	Fitzgerald Farms	2001	10	2897	17	2880	710	2187	D	18	2879	610	2287	570	2327	610	2287
ASO0071	159378	46.324730	-117.394380	10	43	23	SW/SW	Roosevelt	1986	10	3457	7	3450	61	3396	D	19	3438	19	3438	19	3438	61	3396
ASO0234	166720	46.192530	-117.321380	8	44	5	SW/SE	Schibbe	1995	7	3235	1	3234	405	2830	D	18	3217	405	2830	380	2855	405	2830
ASO0235	166721	46.204200	-117.323000	8	44	8	NW/NE	Schibbe	1995	7	3919	1	3918	445	3474	D		3919	18	3901	18	3901	445	3474
ASO0236	173571	46.150930	-117.310050	8	44	21	SE/SW	Sangster	1979	12	4128	12	4116	165	3963	D	35	4093	35	4093	35	4093	165	3963
ASO0239		46.142530	-117.190070	8	45	29	SE/NE	Blue Mtn Water Users	1986	12	3557	3	3554	377	3180	D	18	3539	323	3234	120	3437	377	3180
ASO0241		46.141800	-117.196620	8	45	29	SW/NE	Blue Mtn Water Users	1986	11	3524	60	3464	430	3094	D	70	3454	70	3454	70	3454	430	3094
ASO0242	423422	46.147320	-117.204070	8	45	29	NW/NW	Blue Mtn Water Users	1992	4	3644	0	3644	840	2804	M	18	3626	19	3625	19	3625	840	2804
ASO0243	423421	46.141930	-117.189220	8	45	29	SE/NE	Blue Mtn Water Users	1992	4	3602	15	3587	1155	2447	M	19	3583	19	3583	19	3583	1155	2447
ASO0244	163699	46.141250	-117.190280	8	45	29	SW/NE	Blue Mtn Water Users	1976	11	3588	2	3586	575	3013	M	20	3568	220	3368	25	3563	575	3013
ASO0245	343667	46.122980	-117.193450	8	45	32	N1/2 SE	VanTrease	2002	10	3884	30	3854	126	3758	D	45	3839	45	3839	45	3839	126	3758
ASO0247	353534	46.119650	-117.188870	8	45	32	SE/SE	Pabst	2002	10	3968	16	3952	157	3811	D	57	3911	157	3811	137	3831	157	3811
ASO0248	165764	46.157330	-117.159900	8	45	22	SW/NW	Poe	1987	4	3496	3	3493	213	3283	D	37	3459	37	3459	37	3459	213	3283
ASO0250	353533	46.120050	-117.191120	8	45	32	SE/SE	Mathews	2002	10	3968	3	3965	160	3808	D	62	3906	160	3808	140	3828	160	3808
ASO0252	166516	46.149850	-117.202520	8	45	20	SE/SW	Everette & Ramsden	1971	7	3576	0	3576	153	3423	D	18	3558	18	3558	18	3558	153	3423
ASO0255	353535	46.120580	-117.190130	8	45	32	SE/SE	Newbry	2002	10	3973	3	3970	160	3813	D	56	3917	56	3917	56	3917	160	3813
ASO0256	167085	46.138080	-117.132820	8	45	26	NW/SE	Reed	1979	11	3563	6	3557	95	3468	D		3563	18	3545	18	3545	95	3468
ASO0257	167128	46.161480	-117.137180	8	45	23	NE/NW	Dennier	1986	6	3477	3	3474	99	3378	D	36	3441	36	3441	36	3441	99	3378
ASO0258	167227	46.134700	-117.136200	8	45	26	SE/SW	Holzmiller	1956	3	3592	5	3587	100	3492	D	80	3512	97	3495	97	3495	100	3492
ASO0259	167518	46.120280	-117.157020	8	45	34	SE/SW	Covey	1990	7	3795	20	3775	94	3701	D	38	3757	38	3757	38	3757	94	3701
ASO0260	168170	46.138770	-117.189500	8	45	29	NE/SW	Barkly	1979	6	3648	3	3645	27	3621	D	18	3630	18	3630	18	3630	27	3621
ASO0261	168171	46.139100	-117.189020	8	45	29	NE/SE	Barkly	1979	6	3647	0	3647	176	3471	D	18	3629	160	3487	110	3537	176	3471
ASO0262	168172	46.138920	-117.188230	8	45	29	NE/SE	Barkly	1979	6	3644	5	3639	50	3594	D	18	3626	18	3626	18	3626	50	3594
ASO0263	168173	46.138620	-117.188800	8	45	29	NE/SE	Barkly	1979	6	3647	8	3639	162	3485	D	137	3510	137	3510	137	3510	162	3485
ASO0264	169083	46.125770	-117.164470	8	45	34	NW/SW	Keller	1986	6	3737	4	3733	78	3659	D	27	3710	27	3710	27	3710	78	3659
ASO0265	169733	46.125270	-117.142380	8	45	35	NW/SW	Hamilton	1995	8	3698	2	3696	485	3213	D	19	3679	265	3433	265	3433	485	3213
ASO0266	169734	46.125030	-117.143930	8	45	35	NW/SW	Hamilton	1995	8	3702	25	3677	203	3499	D	32	3670	203	3499	163	3539	203	3499
ASO0267	386243	46.152650	-117.141880	8	45	23	NW/SW	Seibly	2004	8	3540	3	3537	265	3275	D	19	3521	265	3275	185	3355	265	3275
ASO0268	294025	46.134270	-117.137030	8	45	26	SE/SW	Mallory	1969	6	3602	8	3594	200	3402	D	91	3511	91	3511	91	3511	200	3402
ASO0271	171119	46.151770	-117.225800	8	45	19	SW/SW	Ramsden	1997	5	3727	2	3725	270	3457	D	18	3709	84	3643	24	3703	27	3700
ASO0272	172216	46.134070	-117.136330	8	45	26	SW/SE	VanTrease	1979	12	3599	2	3597	110	3489	D		3599	18	3581	18	3581	110	3489
ASO0275	347009	46.121270	-117.197320	8	45	32	SW/SE	Lane	2002	9	3905	3	3902	138	3767	D		3905	47	3858	47	3858	138	3767
ASO0276	173580	46.120000	-117.149130	8	45	34	SE/SE	Trutter	1984	8	3794	2	3792	129	3665	D	31	3763	31	3763	31	3763	129	3665
ASO0277	294354	46.132600	-117.133580	8	45	35	NW/NE	WA Dept of Highways	1968	8	3597	4	3593	164	3433	D		3597	70	3527	70	3527	164	3433
ASO0278	174320	46.134420	-117.133450	8	45	26	SW/SE	Hasoenrahl	1992	5	3576	5	3571	132	3444	D	19	3557	19	3557	19	3557	132	3444
ASO0281	159637	46.287500	-117.247780	9	44	1	SW/NW	Petti	1979	7	2556	8	2548	192	2364	D	18	2538	192	2364	152	2404	192	2364
ASO0282		46.293020	-117.252430	9	44	9	NE/NE	Reeves	1979	12	2451	3	2448	250	2201	D	18	2433	18	2433	18	2433	250	2201
ASO0283	157902	46.292080	-117.253070	9	44	2	NE/NE	Reeves	1979	12	2469	30	2439	460	2009	D		2469	36	2433	36	2433	460	2009
ASO0284	316468	46.280070	-117.288930	9	44	3	SW/SW	Cook	2001	12	2195	29	2166	94	2101	D	31	2164	94	2101	74	2121	94	2101
ASO0285		46.273120	-117.292530	9	44	10	SW/NW	WA State Game Dept.	1964	1	1962	39	1923	172	1790	D		1962	39	1923	39	1923	172	1790
ASO0286	150371	46.264470	-117.247370	9	44	13	NW/NW	Johnson	1995	3	2765	8	2757	328	2437	D	30	2735	328	2437	288	2477	328	2437
ASO0287	151959	46.244530	-117.252230	9	44	23	SE/NE	McMillen	1995	7	2992	8	2984	129	2863	D	22	2970	22	2970	22	2970	129	2863
ASO0288	159613	46.242280	-117.253280	9	44	23	NE/SE	Kurdy	1995	12	3003	6	2997	120	2883	D		3003	120	2883	60	2943	120	2883
ASO0289	154559	46.236420	-117.251950	9	44	23	SE/SE	Cooper	1995	12	3080	5	3075	129	2951	D	22	3058	129	2951	69	3011	129	2951
ASO0290		46.241800	-117.248920	9	44	24	NW/SW	Strike	1997	6	3003	3	3000	475	2528	D	18	2985	263	2740	263	2740	475	2528
ASO0291	158383	46.236420	-117.253280	9	44	24	NW/SW	Strike	1995	7	3075	6	3069	304	2771	D	19	3056	19	3056	19	3056	304	2771
ASO0293	160260	46.229430	-117.262730	9	44	26	SE/NW	Parson	1993	10	3246	7	3239	157	3089	D	18	3228	157	3089	142	3104	157	3089
ASO0294	442446	46.214520	-117.259830	9	45	35	SW/NE	Parsons	1992	5	3409	3	3406	192	3217	D	19	3390	19	3390	19	3390	192	3217
ASO0295	151979	46.207050	-117.124430	9	45	35	SE/SE	Browne	1997	1	2932	1	2931	165	2767	D	18	2914	150	2782	110	2822	150	2782
ASO0296		46.288370	-117.069200	9	46	5	SW/NE	Hostetter	1992	10	2243	3	2240	500	1743	D	25	2218	446	1797	446	1797	500	1743
ASO0298	152289	46.276830	-117.057220	9	46	9	NW/NW	Ausman	1996	9	2340	2	2338	530	1810	D	38	2302	530	1810	490	1850	530	1810
ASO0299	256928	46.277770	-117.056720	9	46	9	NW/NW	Ausman	2000	7	2331	0	2331	605	1726	D	18	2313	605	1726	585	1746	595	1736
ASO0300	156184	46.273420	-117.056650	9	46	32	SW/NW	Ausman	1995	4	2345	44	2301	303	2042	D	79	2266	79	2266	79	2266	303	2042
ASO0301	149961	46.379280	-117.284750	10	44	3	NE/NW	Pernsteiner	1995	8	1848	23	1825	186	1662	D	18	1830	184	1664	184	1664	186	1662
ASO0302	352056	46.336720	-117.275200	10	44	22	NE/NE	Lunch	2002	5	2859	12	2847	650	2209	D	18	2841	650	2209	610	2249	650	2209
ASO0303	155700	46.302980	-117.261630	10	44	35	SE/NE	Hood	1997	6	1924	33	1891	175	1749	D	33	1891	175	1749	145	1779	175	1749
ASO0304	154204	46.374780	-117.118130	10	45	1	NW/SW	Pope	1997	12	1448	9	1439	489	959	D	18	1430	489	959	355	1093	489	959

Well in Alpowa Creek sub-basin
Well in Asotin Creek sub-basin

Well Specification Table

Well ID	open int dia (in)	DTW (ft bgs)	WT elev (ft amsl)	pump test type	rate (gpm)	DD (ft)	SC (gpm/ft-DD)	Temp (F)	upland	valley	QMs	Mvsu	Mvsl	Mvwu	Mvwl	N2	R2	N1	R1	I	Comments
ASO0069	8	200	2697	A	1			51	X							X	X				0069 is well deepening of 0070
ASO0071	6	25	3432	A	10				X							X					
ASO0234	12	340	2895	A	40			52	X								X				
ASO0235	12	395	3524	A	1			51	X							X					
ASO0236	8	25	4103	A	10			57	X												
ASO0239	8	120	3437	A	10																
ASO0241	8								X				X								Dry Hole
ASO0242	8								X						X						Dry Hole
ASO0243	8			B					X						X						Dry Hole
ASO0244	8	82	3506		27	30	0.900		X				X								
ASO0245	8	92	3792	A	12				X				X								
ASO0247	8	24	3944	A	6				X				X								
ASO0248	8	33	3463	A	30				X			X	X								
ASO0250	8	60	3908	A	4				X				X								
ASO0252	6	80	3496	A	5			51	X				X								
ASO0255	8	58	3915	A	6				X				X								
ASO0256	8	25	3538	A	20				X				X								
ASO0257	8	15	3462	A	2				X			X									
ASO0258	8	2	3590	B	10	70	0.143	42													
ASO0259	8	50	3745	A	42				X				X								
ASO0260	6	16	3632	A	1				X				X								
ASO0261	6	16	3631	A	2				X				X								
ASO0262	6	15	3629	A	1				X				X								
ASO0263	8	35	3612	A	150				X				X								
ASO0264	8	53	3684	A	100				X				X								
ASO0265	8	100	3598	A	1			54	X				X								
ASO0266	8	110	3592	A	50			54	X				X								
ASO0267	8	27	3513	A	50			56	X			X	X								
ASO0268	6	38	3564	A	75				X				X								
ASO0271	8	22	3705	A	3				X				X								
ASO0272	8	19	3580	A	30			54	X				X								
ASO0275	8	97	3808	A	30				X				X								
ASO0276	8	15	3779	A	3				X				X								
ASO0277	6	20	3577		25	63	0.397	60	X				X								
ASO0278	8	8	3568	A	6				X				X								
ASO0281	6	135	2421	A	12			50	X			X									
ASO0282	6								X			X									Dry hole
ASO0283	8	360	2109						X			X									water info not legible
ASO0284	8	28	2167	A	15					X						X					
ASO0285	6	18	1944		20	140	0.143			X							X	X			
ASO0286	8	225	2540	A	20				X			X									
ASO0287	8	75	2917	A	10				X				X								
ASO0288	8	60	2943	A	12				X				X								
ASO0289	8	40	3040	A	12				X				X								
ASO0290	6	240	2763	A	3				X				X								
ASO0291	8	265	2810	A	20				X				X								
ASO0293	6	96	3150	A	60				X				X								
ASO0294	6	182	3227		6				X				X								
ASO0295	8	60	2872	A	5			52	X			X									
ASO0296	6	325	1918		4				X			X									
ASO0298	8	180	2160	A	10			51	X			X									
ASO0299	8	380	1951	A	2				X			X									
ASO0300	8	80	2265	A	2				X			X									
ASO0301	6	145	1703	A	10				X								X				
ASO0302	6	490	2369	A	10			55	X								X	X			
ASO0303	6	120	1804	A	35					X							X	X			
ASO0304	6	305	1143	A	70				X					X							

🟩 Well in Alpowa Creek sub-basin
🟦 Well in Asotin Creek sub-basin

Well Specification Table

Well ID	DOE Well Log ID #	Latitude	Longitude	T - N	R - E	Sec.	Q-Q	Owner	year drilled	month drilled	surf elev (ft amsl)	TOB depth	TOB elev	TD (ft bgs)	TD elev (ft amsl)	Use	surf seal depth	elev seal bottom	prod casing depth	elev casing bottom	open int top depth	elev open int top	open int bottom depth	elev open int bottom
ASO0305	254155	46.375870	-117.103630	10	45	1	SE/NE	Sanford	2000	2	1439	8	1431	160	1279	D	18	1421	6	1433	150	1289	160	1279
ASO0306	150026	46.380650	-117.124070	10	45	2	NE/NE	Langager	1996	6	1380	7	1373	250	1130	D	143	1237	143	1237	143	1237	250	1130
ASO0307	150027	46.379280	-117.126550	10	45	2	NE/NE	Langlager	1997	11	1329	3	1326	175	1154	D		1329	172	1157	172	1157	175	1154
ASO0310	358822	46.375270	-117.141730	10	45	2	SW/NW	Cunningham	2003	4	1685	15	1670	125	1560	D		1685	125	1560	85	1600	125	1560
ASO0311	151136	46.375080	-117.126470	10	45	2	SE/NE	Pitron	1997	7	1472	33	1439	175	1297	D	38	1434	175	1297	155	1317	175	1297
ASO0312	153317	46.373950	-117.126330	10	45	2	NE/SE	Witter	1997	11	1542	12	1530	260	1282	D	23	1519	260	1282	240	1302	260	1282
ASO0313	156706	46.332450	-117.188530	10	45	20	NE/NE	Gehrke	1993	10	1515	17	1498	98	1417	D	18	1497	98	1417	78	1437	98	1417
ASO0314	149848	46.331030	-117.188900	10	45	20	SE/NE	Weatherly	1990	9	1388	0	1388	90	1298	D	18	1370		1388	18	1370	90	1298
ASO0315	369497	46.329330	-117.174750	10	45	21	NW/SE	Hendrickson	2003	7	1335	38	1297	77	1258	D	41	1294	41	1294	41	1294	77	1258
ASO0316	151201	46.331180	-117.174180	10	45	21	SW/NE	Simpson	1987	7	1479	31	1448	160	1319	D	34	1445	34	1445	34	1445	160	1319
ASO0318	153171	46.324730	-117.145570	10	45	22	SE/SE	Porter	1974	11	1240	5	1235	150	1090	D	20	1220	36	1204	36	1204	150	1090
ASO0319	156306	46.328500	-117.114380	10	45	24	NE/SW	Burnam	1972	11	1089	8	1081	97	992	D,I	37	1052	97	992	87	1002	97	992
ASO0322	426686	46.324880	-117.110920	10	45	24	SW/SE	Leavitt	1989	4	1072	16	1056	60	1012	D	18	1054	18	1054	18	1054	60	1012
ASO0323	308255	46.315200	-117.121730	10	45	25	NW/NE	McHarque	2000	11	1457	5	1452	405	1052	D,S	19	1438	401	1056	360	1097	400	1057
ASO0324	318099	46.322050	-117.131350	10	45	26	NW/NE	Hendrickson	2001	10	1080	42	1038	90	990	D	46	1034	46	1034	46	1034	90	990
ASO0325	347006	46.307000	-117.209320	10	45	31	NE/NE	Adcock	2002	4	2294	90	2204	190	2104	D	88	2206	190	2104	140	2154	180	2114
ASO0326	368583	46.295470	-117.188470	10	45	32	SE/SE	Tietz	2003	7	2329	7	2322	175	2154	D	18	2311	175	2154	135	2194	175	2154
ASO0328	159039	46.351570	-117.066030	10	46	17	NE/NE	Carl	1966	3	872	6	866	181	691	D	6	866	6	866	6	866	181	691
ASO0329	149765	46.351570	-117.067650	10	46	17	NW/NE	Marvel	1985	9	981	9	972	285	696	D		981	44	937	44	937	285	696
ASO0330	426693	46.326250	-117.099470	10	46	14	SW/SW	Dimke	1999	9	905	12	893	150	755	D	18	887	150	755	110	795	150	755
ASO0332	159564	46.331530	-117.078180	10	46	20	SW/NW	Balone	1995	3	1052	7	1045	177	875	D	18	1034	175	877	15	1037	175	877
ASO0333	155838	46.336620	-117.060450	10	46	20	NE/NE	Shuss	1969	7	923	10	913	100	823	D		923		923	0	923	100	823
ASO0336	154251	46.335380	-117.068720	10	46	20	NW/NE	Tilton	1998	8	1245	23	1222	175	1070	D	18	1227	175	1070	155	1090	175	1070
ASO0338	152372	46.331530	-117.071970	10	46	20	SE/NW	Rasmussen	1993	11	980	28	952	115	865	D	20	960	115	865	95	885	115	865
ASO0341	426677	46.330400	-117.060580	10	46	20	NE/SE	Hostetler	2002	2	1009	19	990	610	399	D	56	953	610	399	570	439	610	399
ASO0342	149688	46.332750	-117.068870	10	46	20	SW/NE	Schrader	1989	9	836	25	811	100	736	D	20	816	27	809	27	809	100	736
ASO0343	349408	46.324300	-117.040370	10	46	21	SE/SE	Thornton	2002	10	1685	6	1679	650	1035	D	18	1667	650	1035	610	1075	650	1035
ASO0344	381870	46.322430	-117.039600	10	46	28	NE/NE	Bausch	2004	5	1707	8	1699	750	957	D	18	1689	740	967	700	1007	740	967
ASO0345		46.309480	-117.039520	10	46	28	SE/SE	Donaldson	1991	3	1919	76	1843	242	1677	D	22	1897	78	1841	78	1841	242	1677
ASO0346		46.322680	-117.049920	10	46	28	NE/NW	Fohd	2001	5	1374	77	1297	435	939	D	23	1351	417	957	357	1017	417	957
ASO0505	256919	46.104980	-117.170450	7	45	4	SE/SE	Grinder	2000	8	3893		3893	110	3783	D	18	3875	110	3783	60	3833	110	3783
ASO0506	163073	46.093450	-117.123470	7	45	12	SW/SW	Lansing	1987	12	3798		3798	174	3624	D	20	3778	174	3624	144	3654	174	3624
ASO0507	432454	46.115800	-117.158070	7	45	3	NE/NW	Jeffreys	1989	7	3871		3871	166	3705	D	24	3847	24	3847	24	3847	166	3705
ASO0508	455595	46.106320	-117.180650	7	45	4	SE/SW	Lane	2006	9	3952		3952	160	3792	D	22	3930	160	3792	120	3832	160	3792
ASO0509	253939	46.095900	-117.168330	7	45	9	NE/SE	Scheurman	1999	8	3961		3961	210	3751	D	18	3943	210	3751	170	3791	210	3751
ASO0511	432456	46.107000	-117.174320	7	45	4	SW/SE	Tomlinson	1991	6	3921		3921	104	3817	D	19	3902	94	3827	24	3897	104	3817
ASO0512	163725	46.105030	-117.186480	7	45	4	SW/SW	Coleman	1995	7	3992		3992	205	3787	D	38	3954	38	3954	180	3812	205	3787
ASO0513	163833	46.098200	-117.176220	7	45	9	SW/NW	Wright	1996	7	3979		3979	120	3859	D	18	3961	120	3859	18	3961	120	3859
ASO0514	163855	46.064030	-117.006920	7	45	23	SE/SW	Bond Farms	1990	6	861		861	280	581	D		861	280	581	240	621	280	581
ASO0515	163908	46.110420	-117.202230	7	45	5	NE/SW	Palmer	1994	10	4020		4020	246	3774	D		4020	240	3780	206	3814	246	3774
ASO0516	347010	46.102350	-117.184230	7	45	9	NW/NW	Nuxoll	2002	10	4000		4000	175	3825	D	20	3980	21	3979	21	3979	175	3825
ASO0517	432453	46.111050	-117.147730	7	45	3	NE/SE	McKee	1990	9	3852		3852	118	3734	D	39	3813	39	3813	39	3813	118	3734
ASO0518	165077	46.101670	-117.164680	7	45	10	NW/NW	Norman	1995	8	3923		3923	140	3783	D	18	3905	18	3905	18	3905	140	3783
ASO0522		46.103330	-117.180570	7	45	9	NE/NW	Durham	1993	10	3960		3960	102	3858	D	18	3942	82	3878	62	3898	102	3858
ASO0523	165716	46.097170	-117.142100	7	45	11	SW/NW	Hearne	1995	7	3855		3855	205	3650	D	18	3837	205	3650	155	3700	185	3670
ASO0524	451195	46.102600	-117.176350	7	45	9	NW/NE	Nuxoll	2006	7	3957		3957	175	3782	D	21	3936	175	3782	135	3822	175	3782
ASO0526	451194	46.095850	-117.197800	7	45	8	NW/SE	Olsen	2005	7	4034		4034	205	3829	D	38	3996	205	3829	5	4029	205	3829
ASO0527	455116	46.098000	-117.174380	7	45	9	SW/NE	Genfje	2002	10	3954		3954	225	3729	D	18	3936	225	3729	205	3749	225	3729
ASO0529	432452	46.106370	-117.165450	7	45	3	SW/SW	Tenny	1990	11	3860		3860	143	3717	D	18	3842	143	3717	103	3757	143	3717
ASO0531	432599	46.095850	-117.157650	7	45	10	NE/SW	VanScotter	1995	7	3945		3945	235	3710	D	18	3927	235	3710	215	3730	235	3710
ASO0533	167147	46.103280	-117.167700	7	45	9	NE/NE	Jones	1978	7	3900		3900	155	3745	D	57	3843	155	3745	95	3805	155	3745
ASO0540	168524	46.090620	-117.177130	7	45	9	SE/SW	Geist	1998	5	3795		3795	110	3685	D	28	3767	110	3685	70	3725	110	3685
ASO0541		46.098050	-117.180280	7	45	9	SE/NW	Serades	1999	10	3891		3891	190	3701	D	18	3873	190	3701	150	3741	190	3701
ASO0543	168859	46.116920	-117.164750	7	45	3	NW/NW	Guien	1995	7	3907		3907	125	3782	D	28	3879	120	3787	100	3807	120	3787
ASO0544		46.097120	-117.194280	7	45	8	SW/NE	Patters	2001	12	4001		4001	203	3798	D	18	3983	203	3798	120	3881	203	3798
ASO0546	432455	46.111830	-117.186900	7	45	4	SW/NW	Remacle	1993	10	4035		4035	100	3935	D		4035	90	3945	70	3965	90	3945
ASO0547	372998	46.068480	-117.112980	7	45	24	SW/NE	Rickett	2003	10	2251		2251	375	1876	D	33	2218	375	1876	335	1916	375	1876

Well in Alpowa Creek sub-basin
Well in Asotin Creek sub-basin

Well Specification Table

Well ID	open int dia (in)	DTW (ft bgs)	WT elev (ft amsl)	pump test type	rate (gpm)	DD (ft)	SC (gpm/ft-DD)	Temp (F)	upland	valley	QMs	Mvsu	Mvsl	Mvwu	Mvwl	N2	R2	N1	R1	I	Comments
ASO0305	6	90	1349	A	20			56	X				X								
ASO0306	8	60	1320	A	5				X					X							
ASO0307	6	116	1213	A	9				X					X							
ASO0310	6	85	1600	A	30			55	X				X								
ASO0311	6	41	1431	A	70				X				X								
ASO0312	6	200	1342	A	100				X				X								
ASO0313	6	56	1459	A	40				X							X					
ASO0314	6	10	1378						X							X	X				
ASO0315	8	8	1327	A	25				X							X	X				
ASO0316	8	51	1428	A	128			63	X							X					
ASO0318	6	70	1170	A	40					X							X	X			
ASO0319	6	35	1054	A	30					X								X			
ASO0322	6	16	1056	A	30					X								X			
ASO0323	8	330	1127	A	30			54	X								X				
ASO0324	8	20	1060	A	35					X							X				
ASO0325	8	120	2174	A	50			50	X			X									
ASO0326	6	115	2214	A	2			55	X			X									
ASO0328	8	131	741	B	25	0	250.000			X							X	X			
ASO0329	6	261	720		40					X							X	X			
ASO0330	6	8	897	A	40					X							X	X			
ASO0332	6	83	969	A	40					X							X				
ASO0333	8	48	875		50			59		X							X				
ASO0336	6	95	1150	A	50			57	X							X					
ASO0338	6	64	916	A	30			47		X							X				
ASO0341	8	540	469	A	30			57	X								X	X			
ASO0342	6	48	788		40					X							X				
ASO0343	8	520	1165	A	20			56	X						X						
ASO0344	8	520	1187	A	2			56	X						X						
ASO0345	6	160	1759						X			X									
ASO0346	8	156	1218	A	30			56	X						X						
ASO0505	8	15	3878	A	100																
ASO0506	8	42	3756	A	30				X						X						
ASO0507	6	120	3751		12				X				X								
ASO0508	6	90	3862	A	15			55													
ASO0509	8	140	3821	A	20			51	X			X									
ASO0511	8	33	3888	A	14				X				X								
ASO0512	8	28	3964	A	10			51	X				X								
ASO0513	6	30	3949	A	10																
ASO0514	6	18	843							X										X	
ASO0515	6	62	3958	A	48				X				X								
ASO0516	6	52	3948	A	12																
ASO0517	8	90	3762	A	20				X			X									
ASO0518	8	55	3868	A	30			51													
ASO0522	6	34	3926	A	7			47													
ASO0523	12,8	90	3765	A	12			51	X			X									
ASO0524	6	100	3857	A	30			56	X			X									
ASO0526	6	150	3884	A	18			56	X			X									
ASO0527	6	104	3850	A	11			56	X			X									
ASO0529	6	10	3850	B	8	25	0.320		X			X	X								
ASO0531	6	90	3855	A	10				X			X	X								
ASO0533	8	38	3862	A	12				X			X									
ASO0540	8	50	3745	A	15			52	X						X						
ASO0541	8	90	3801	A	15			51	X				X								
ASO0543	6	30	3877	A	10				X			X									
ASO0544	8	85	3916	A	40			56	X			X									
ASO0546	6	16	4019	A	2			48	X				X								
ASO0547	6	98	2153		4			56	X										X		Artesian flow

Well in Alpowa Creek sub-basin
Well in Asotin Creek sub-basin

Well Specification Table

Well ID	DOE Well Log ID #	Latitude	Longitude	T - N	R - E	Sec.	Q-Q	Owner	year drilled	month drilled	surf elev (ft amsl)	TOB depth	TOB elev	TD (ft bgs)	TD elev (ft amsl)	Use	surf seal depth	elev seal bottom	prod casing depth	elev casing bottom	open int top depth	elev open int top	open int bottom depth	elev open int bottom
ASO0549	343663	46.112270	-117.200330	7	45	5	SE/NW	Schnider	2002	8	3997		3997	202	3795	D	37	3960	138	3859	138	3859	202	3795
ASO0551	170072	46.104980	-117.190980	7	45	7	SE/SE	Guise	1996	8	4037		4037	250	3787	D	38	3999	250	3787	210	3827	250	3787
ASO0553		46.101370	-117.184300	7	45	9	NW/NW	Mathot	1993	9	4004		4004	146	3858	D	18	3986	18	3986	18	3986	146	3858
ASO0557	170720	46.103570	-117.192250	7	45	8	NE/NE	Rooney	1994	11	4040		4040	263	3777	D	19	4021	260	3780	260	3780	263	3777
ASO0558	340816	46.105280	-117.141330	7	45	2	SW/SW	Hampton	2002	8	3867		3867	171	3696	D	20	3847	171	3696	151	3716	171	3696
ASO0560	408234	46.037930	-117.140900	7	45	35	NW/NW	Falconer	2002	2	1455		1455	160	1295	D	38	1417	160	1295	120	1335	160	1295
ASO0562	171425	46.100000	-117.164600	7	45	10	SW/NW	Crozier	1997	7	3924		3924	190	3734	D	18	3906	190	3734	150	3774	190	3734
ASO0563	432600	46.095850	-117.152930	7	45	10	NW/SE	Fauber	1992	9	3939		3939	225	3714	D	30	3909	131	3808	131	3808	225	3714
ASO0564	174991	46.117650	-117.154270	7	45	3	NW/NE	Swearingen	1996	8	3817		3817	203	3614	D	22	3795	203	3614	183	3634	203	3614
ASO0565	171985	46.115700	-117.204280	7	45	5	NW/NW	Allen	1993	10	4003		4003	116	3887	D		4003	116	3887	96	3907	116	3887
ASO0568	172158	46.109730	-117.194430	7	45	5	NW/SE	Prigo	1998	5	4042		4042	210	3832	D	36	4006	210	3832	170	3872	210	3832
ASO0570	175867	46.106320	-117.147520	7	45	3	SE/SE	Cawthon	1996	6	3910		3910	195	3715	D	18	3892	195	3715	175	3735	195	3715
ASO0571	436205	46.102450	-117.146820	7	45	10	NE/NE	Keith	2005	8	3863		3863	144	3719	D	18	3845	144	3719	124	3739	144	3719
ASO0573	173356	46.092080	-117.153780	7	45	10	SW/SE	Nash	1995	11	3942		3942	170	3772	D	97	3845	170	3772	170	3772	170	3772
ASO0575	406980	46.096330	-117.137100	7	45	11	NE/SW	Mortimer	2004	9	3844		3844	190	3654	D	44	3800	44	3800	44	3800	190	3654
ASO0576	432460	46.097220	-117.190630	7	45	8	SE/NE	Mullins	1995	7	4004		4004	275	3729	D	18	3986	275	3729	115	3889	275	3729
ASO0578	174169	46.075270	-117.168680	7	45	16	SE/SE	WA State Park & Rec	1978	4	4118		4118	185	3933	D,I	26	4092	180	3938	140	3978	180	3938
ASO0579	174045	46.091450	-117.116280	7	45	12	SE/SW	Beamer	1981	3	3807		3807	91	3716	D	19	3788	19	3788	19	3788	91	3716
ASO0580	432449	46.105630	-117.146880	7	45	3	SE/SE	Elder	1992	9	3910		3910	278	3632	D	25	3885	52	3858	52	3858	278	3632
ASO0581	174213	46.106170	-117.143150	7	45	2	SW/SW	Hayden	1989	9	3874		3874	245	3629	D	40	3834	220	3654	220	3654	275	3599
ASO0582	369498	46.090030	-117.158570	7	45	10	SE/SW	Byrne	2003	6	3998		3998	165	3833	D	64	3934	165	3833	125	3873	165	3833
ASO0583	432604	46.090520	-116.984620	7	46	12	SE/SW	Beamer	1981	3	1223	5	1218	91	1132	D	19	1204	19	1204	19	1204	91	1132
ASO0584	371128	46.072330	-116.987230	7	46	24	NE/NW	Green	2003	10	829	8	821	425	404	D	29	800	425	404	400	429	425	404
ASO0585	309657	46.073570	-116.990950	7	46	24	NW/NW	Kelly	2001	8	1033	21	1012	125	908	D	25	1008	125	908	105	928	125	908
ASO0586	309654	46.074350	-116.991020	7	46	24	NW/NW	Kondo	2001	7	1143	19	1124	275	868	D	20	1123	275	868	255	888	275	868
ASO0587	309655	46.074000	-116.991020	7	46	24	NW/NW	Kondo	2001	8	1012	27	985	275	737	D	40	972	275	737	255	757	275	737
ASO0588	432618	46.063300	-116.993070	7	46	24	SW/SW	Falkins	1990	6	1011	40	971	275	736	D	18	993	39	972	255	756	275	736
ASO0589	432616	46.063730	-116.995600	7	46	24	SW/SW	Felkins	1994	1	1006	3	1003	410	596	D		1006	400	606	370	636	410	596
ASO0590	309656	46.072930	-116.991100	7	46	24	NW/NW	Benson	2001	8	1103	16	1087	225	878	D	18	1085	225	878	190	913	225	878
ASO0591	432614	46.072530	-116.991100	7	46	24	NW/NW	Ingraham	1995	7	1096	21	1075	103	993	D	26	1070	26	1070	26	1070	103	993
ASO0592	432611	46.051230	-117.030830	7	46	27	NE/SW	Jo2 Cattle Co	1998	4	968	17	951	96	872	D	20	948	96	872	59	909	96	872
ASO0593	432620	46.048200	-117.015780	7	46	26	SW/SW	Haberm & Son	1988	1	990	34	956	180	810	D	33	957	33	957	33	957	180	810
ASO0594	353517	46.105670	-116.993700	7	46	1	SW/SW	Blessed Hope	2002	9	2661	18	2643	527	2134	D	34	2627	168	2493	168	2493	527	2134
ASO0595	455120	46.063630	-116.994050	7	46	24	SW/SW	Sulkasky	2001	9	1017	25	992	200	817	D	27	990	200	817	180	837	200	817
ASO0596	432621	46.052750	-117.009520	7	46	26	NW/SW	Haberman	1988	1	892	10	882	180	712	D	18	874	18	874	18	874	180	712
ASO0597	432619	46.068080	-116.983080	7	46	24	SW/SW	Grande Ronde Ranches	1975	6	845	15	830	173	672	M	22	823	27	818	27	818	173	672
ASO0598	173340	46.117220	-116.953870	7	47	5	NE/NE	Buell	1998	3	1018	18	1000	125	893	D	19	999	98	920	88	930	125	893
ASO0599	371127	46.111980	-116.955130	7	47	6	NE/SE	Packer	2003	10	1037	5	1032	100	937	D	18	1019	97	940	57	980	100	937
ASO0600	432624	46.076400	-116.973300	7	47	7	NW/NE	Nowoj	1999	10	818	0	818	475	343	D	18	800	18	800	18	800	475	343
ASO0601	322750	46.111400	-116.956330	7	47	6	SE/NE	Crider	2002	2	1184	0	1184	100	1084	D	18	1166	94	1090	74	1110	100	1084
ASO0602	163947	46.111000	-116.955270	7	47	6	SE/NE	Oakes	1994	1	1049	5	1044	77	972	D		1049	76	973	66	983	77	972
ASO0603	322751	46.111350	-116.957730	7	47	6	SE/NE	Gipple	2002	2	1292	0	1292	225	1067	D	18	1274	275	1017	275	1017	275	1017
ASO0606	372319	46.184420	-117.025700	8	46	10	SW/NE	Swank	2003	10	3032	2	3030	700	2332	D	18	3014	364	2668	364	2668	700	2332
ASO0607	166688	46.183330	-117.085000	8	46	7	NW/SE	Johnson	1977	11	3130	9	3121	200	2930	D	34	3096	34	3096	34	3096	200	2930
ASO0608	166718	46.119420	-117.009380	8	46	35	SE/SW	Scheibe	1995	8	3286	5	3281	503	2783	D	19	3267	320	2966	280	3006	503	2783
ASO0609	423426	46.119900	-117.008470	8	46	35	SE/SW	Scheibe	1995	7	3275	2	3273	242	3033	D	19	3256	242	3033	202	3073	242	3033
ASO0610	408224	46.183100	-117.004820	8	46	11	NW/SE	Ausman	2005	4	1487	17	1470	325	1162	D	18	1469	320	1167	285	1202	325	1162
ASO0611	318095	46.199220	-116.984270	8	46	1	SE/SE	Scheibe	2001	11	1253	12	1241	200	1053	D	24	1229	200	1053	160	1093	200	1053
ASO0613	423428	46.120280	-116.956570	8	47	31	SE/SE	Vanosdale	1993	3	1256	68	1188	204	1052	D	69	1187	69	1187	69	1187	204	1052
ASO0614	423427	46.139600	-116.935750	8	47	29	NE/SE	Army COE	1997	10	848	50	798	50	798	D	26	822	53	795	50	798	50	798
ASO0615	191605	46.119070	-116.955430	8	47	31	SE/SE	Leighton	1999	10	1394	40	1354	200	1194	D	63	1331	200	1194	160	1234	200	1194
ASO0616	316465	46.160670	-116.927170	8	47	21	NW/NW	Landrum	2001	11	884	46	838	278	606	D	48	836	268	616	268	616	278	606
ASO0617	168221	46.119170	-116.953600	8	47	32	SE/SE	Staats	1994	1	1149			69	1080			1149	66	1083	66	1083	69	1080
ASO0618	431362	46.169370	-116.927080	8	47	16	NW/SW	Flerchinger	2006	2	812			275	537	D	18	794	275	537	235	577	275	537
ASO0619	169155	46.170870	-116.929770	8	47	16	NW/SW	Myrick	1979	8	782	39	743	163	619	D		782	40	742	40	742	163	619
ASO0620	170695	46.161350	-116.927650	8	47	21	NW/NW	Gladson	1998	8	929	50	879	202	727	D	50	879	202	727	162	767	202	727
ASO0621	170696	46.161730	-116.929480	8	47	21	NW/NW	Gladson	1992	8	1031	0	1031	440	591	D		1031	110	921	110	921	440	591

Well in Alpowa Creek sub-basin
Well in Asotin Creek sub-basin

Well Specification Table

Well ID	open int dia (in)	DTW (ft bgs)	WT elev (ft amsl)	pump test type	rate (gpm)	DD (ft)	SC (gpm/ft-DD)	Temp (F)	upland	valley	QMs	Mvsu	Mvsl	Mvwu	Mvwl	N2	R2	N1	R1	I	Comments
ASO0549	8	60	3937	A	1				X				X								
ASO0551	8	60	3977	A	10			50													
ASO0553	6	50	3954	A	4				X				X								
ASO0557	8	170	3870	A	10			55	X				X								
ASO0558	6	64	3803	A	40																
ASO0560	6	40	1415	A	30			56	X										X		
ASO0562	8			A	6			50	X			X									
ASO0563	6	74	3865		22				X						X						
ASO0564	8	28	3789	A	30				X			X									
ASO0565	6	51	3952	A	30			51	X				X								
ASO0568	8	150	3892	A	35			48	X				X								
ASO0570	6	118	3792	A	20				X			X									
ASO0571	8	32	3831	A	20				X			X									
ASO0573	8	90	3852	A					X			X									
ASO0575	8	42	3802	A	15				X						X						
ASO0576	6	50	3954	A	6				X			X									
ASO0578	8	56	4062		30	87	0.345	58	X				X								Well 2, Field Springs Park
ASO0579	8	10	3797	A	52				X			X									
ASO0580	6	88	3822		30				X			X									
ASO0581	6	90	3784		30				X				X								
ASO0582	8	53	3945	A	9				X				X								
ASO0583	8	10	1213	A	52				X										X		Same well as ASO0579?
ASO0584	6	101	728	A	12			56		X										X	
ASO0585	6	18	1015	A	30			56		X									X		
ASO0586	6	17	1126	A	12			56		X									X		
ASO0587	6	75	937	A	15			55		X									X		
ASO0588	6	34	977	A	30					X									X		
ASO0589	6	160	846	A	60			45		X									X		ASO0589 & ASO0555 same well
ASO0590	6	16	1087	A	12			56		X									X		
ASO0591	6	18	1078	A	12					X									X		
ASO0592	6	25	943	A	30					X								X	X		Same as ASO0542
ASO0593	6	10	980	A	9			60		X									X		
ASO0594	6			A					X										X	X	Dry well
ASO0595	6	12	1005	A	10					X									X		
ASO0596	6	20	872	A	40			60		X										X	
ASO0597	10	16	829	A	50					X										X	
ASO0598	6	82	936	A	20					X									X		
ASO0599	6	76	961	A	30			56		X									X		
ASO0600	6	200	618	A	1			55		X										X	
ASO0601	6	50	1134	A	13			52	X										X		
ASO0602	6	63	986	A	25			44		X									X		
ASO0603	6	80	1212	A	7				X										X		
ASO0606	6	666	2366	A	1			56	X					X							
ASO0607	8	148	2982	A	37			55	X			X									
ASO0608	8	180	3106	A	6			54	X			X									
ASO0609	8	60	3215	A	9			54	X			X									
ASO0610	8	240	1247	A	22			56		X									X		
ASO0611	6	54	1199	A	10			54		X									X		
ASO0613	8	50	1206	A	15				X										X		
ASO0614	6	24	824	A	100					X	X										
ASO0615	6	119	1275	A	10			68	X										X		
ASO0616	8	36	848	A	8					X										X	
ASO0617	6	56	1093	A	10			55	X										X		
ASO0618	6	186	626	A	22			56		X											
ASO0619	8	120	662	A	10			50		X											
ASO0620	8	80	849	A	10			51		X											
ASO0621	8	90	941	A	1			50		X											

Well in Alpowa Creek sub-basin
Well in Asotin Creek sub-basin

Well Specification Table

Well ID	DOE Well Log ID #	Latitude	Longitude	T - N	R - E	Sec.	Q-Q	Owner	year drilled	month drilled	surf elev (ft amsl)	TOB depth	TOB elev	TD (ft bgs)	TD elev (ft amsl)	Use	surf seal depth	elev seal bottom	prod casing depth	elev casing bottom	open int top depth	elev open int top	open int bottom depth	elev open int bottom
ASO0622	423596	46.166970	-116.931600	8	47	16	SW/NW	Rudd	2005	11	1168			225	943	D	75	1093	225	943	125	1043	225	943
ASO0623	410865	46.165450	-116.945520	8	47	17	SE/SW	Scheibe	2005	3	2416			360	2056	D	18	2398	18	2398	18	2398	360	2056
ASO0639	173723	46.412670	-117.196950	11	45	20	SW/SE	US COE	1976	8	738	96	642	113	625	T	35	703	112	626	102	636	112	626
ASO0640	497577	46.382900	-117.145070	11	45	34	SE/SE	Ashcraft	2007	9	1628	3	1625	380	1248	D	18	1610	380	1248	340	1288	380	1248
ASO0641	163025	46.418720	-117.208550	11	45	19	NE/SE	Monte	1988	7	739	0	739	530	209	D		739	19	720	19	720	530	209
ASO0642	163535	46.397950	-117.141470	11	45	26	SW/SW	Ingram	1993	7	1567	15	1552	255	1312	D	30	1537	250	1317	210	1357	250	1317
ASO0643	163684	46.413150	-117.172630	11	45	21	SW/SE	Duckworth	1979	5	994	30	964	283	711	O	35	959	230	764	230	764	280	714
ASO0644	491120	46.388920	-117.104200	11	45	36	SE/NE	Kennedy	2007	7	1078	7	1071	900	178	D		1078	900	178	860	218	900	178
ASO0646	164317	46.417400	-117.172350	11	45	21	NW/SE	Hayden	1999	4	770	6	764	265	505	D	19	751	265	505	225	545	265	505
ASO0647	164371	46.417400	-117.219780	11	45	19	NE/SW	Kurth	1997	6	1698	1	1697	192	1506	D	18	1680	18	1680	18	1680	192	1506
ASO0648	164372	46.397520	-117.190380	11	45	29	SE/SE	Cumming	1998	2	1365	94	1271	200	1165	D	67	1298	185	1180	185	1180	200	1165
ASO0649	475420	46.390770	-117.155320	11	45	35	SE/NW	Dyer	2007	3	1619	20	1599	375	1244	D	18	1601	375	1244	350	1269	375	1244
ASO0651	497580	46.383050	-117.153830	11	45	34	SW/SE	Gittins	2007	9	1681	5	1676	253	1428	D	19	1662	253	1428	213	1468	253	1428
ASO0653	165765	46.411880	-117.220350	11	45	19	SW/SW	Potson	1993	9	1473	30	1443	204	1269	D	18	1455	37	1436	37	1436	204	1269
ASO0655	458189	46.383680	-117.132050	11	45	35	SW/SE	Ernster	2006	10	1535	9	1526	950	585	D	25	1510	25	1510	25	1510	950	585
ASO0657	165977	46.395120	-117.102870	11	45	36	NE/NE	Radke	1992	9	988	230	758	430	558	D	18	970	430	558	330	658	430	558
ASO0659	358824	46.413450	-117.173900	11	45	21	SW/SE	Czyson	2003	4	890	0	890	279	611	D	19	871	279	611	239	651	279	611
ASO0661	167007	46.418330	-117.210950	11	45	19	SE/NE	Smith	1994	10	919	19	900	300	619	D	22	897	22	897	22	897	300	619
ASO0663	465711	46.412720	-117.165130	11	45	21	SE/SE	Winkler	2006	11	1255	8	1247	400	855	D	21	1234	387	868	347	908	400	855
ASO0664	408206	46.382500	-117.136300	11	45	35	SE/SW	Chase	2005	3	1378	15	1363	960	418	D	60	1318	960	418	920	458	960	418
ASO0665		46.413500	-117.172630	11	45	21	SW/SE	Hawkins	2006	9	1007	7	1000	265	742	D	30	977	260	747	220	787	265	742
ASO0666	167730	46.412320	-117.216470	11	45	19	SW/SE	Carn	1994	1	1152	36	1116	282	870	D	22	1130	282	870	262	890	282	870
ASO0667	293798	46.398250	-117.142300	11	45	27	SW/SW	Houser	1968	1	1550	7	1543	883	667	I		1550	280	1270	280	1270	883	667
ASO0670	501166	46.389200	-117.124780	11	45	35	SE/NE	Allen	2007	10	1531	6	1525	765	766	D	19	1512	765	766	725	806	765	766
ASO0671	168822	46.403970	-117.222620	11	45	30	NE/SW	Johnson	1997	6	836	16	820	400	436	D	23	813	400	436	380	456	400	436
ASO0672	497571	46.381730	-117.140420	10	45	2	SW/SW	Lillard	2007	9	1560	3	1557	203	1357	D	18	1542	203	1357	163	1397	203	1357
ASO0673	168925	46.405630	-117.221420	11	45	30	SE/NW	Wilson	1997	10	884	0	884	105	779	D	23	861	105	779	65	819	105	779
ASO0674	468101	46.413980	-117.175670	11	45	21	SE/SW	Mayberry	2007	1	807	0	807	700	107	D	18	789	700	107	660	147	700	107
ASO0676		46.394680	-117.156300	11	45	34	NE/NW	Whittaker	2004	8	1652	6	1646	505	1147	D	19	1633	130	1522	130	1522	505	1147
ASO0677	439824	46.368430	-117.145420	10	45	3	SE/SE	Davidson	2006	4	1691	9	1682	316	1375	D	18	1673	316	1375	271	1420	316	1375
ASO0679	170252	46.423950	-117.213630	11	45	19	NE/NE	West	1988	11	738	0	738	340	398	D	40	698	36	702	36	702	340	398
ASO0682	499034	46.389100	-117.131700	11	45	35	SW/NE	Knapp	2007	10	1609	13	1596	320	1289	D	18	1591	320	1289	270	1339	320	1289
ASO0683	446917	46.390030	-117.140050	11	45	35	NW/SW	Zembas	2006	7	1553	2	1551	340	1213	D	38	1515	305	1248	260	1293	340	1213
ASO0684	254228	46.412770	-117.171650	11	45	21	SW/NE	Rainville	1997	4	1019	0	1019	305	714	D	30	989	305	714	265	754	305	714
ASO0686	172599	46.412030	-117.167330	11	45	21	SE/SE	Simpson	1994	6	1204	26	1178	660	544	D	33	1171	660	544	620	584	660	544
ASO0687.	501164	46.388270	-117.126400	11	45	35	NE/SE	Ellis	2007	10	1558	4	1554	955	603	D	18	1540	955	603	915	643	955	603
ASO0688	254530	46.414420	-117.172000	11	45	21	SW/SE	Dewitt	1999	12	966	49	917	275	691	D		966	275	691	255	711	275	691
ASO0690	408208	46.382320	-117.119680	11	45	36	SW/SW	Parks	2005	3	1326	14	1312	175	1151	D	18	1308	175	1151	175	1151	175	1151
GAR0061	397355	46.354850	-117.487070	10	42	12	SE/SE	Kimble	2004	10	3391	1	3390	700	2691	D	18	3373	19	3372	19	3372	700	2691
GAR0062	252846	46.315650	-117.535280	10	42	27	NW/SE	Schnell	1998	5	3680	12	3668	370	3310	D	18	3662	370	3310	330	3350	370	3310
GAR0063	153179	46.310120	-117.566450	10	42	28	SW/SW	Scoggin	1981	10	4200	7	4193	300	3900	D	18	4182	18	4182	18	4182	300	3900
GAR0064	152358	46.310420	-117.571680	10	42	29	SE/SE	Prescott/Ogden	1979	7	4202	2	4200	214	3988	D	16	4186	25	4177	25	4177	214	3988
GAR0065	161429	46.300930	-117.562350	10	42	33	NE/SW	Scoggin	1995	7	4334	15	4319	539	3795	D	18	4316	20	4314	20	4314	539	3795
GAR0066	161430	46.300350	-117.561650	10	42	33	NE/SW	Scoggin	1995	7	4413	8	4405	200	4213	D	18	4395	18	4395	18	4395	200	4213
GAR0067	157119	46.295270	-117.536770	10	42	34	SW/SE	Skiles	1984	7	4225	5	4220	460	3765	D	39	4186	39	4186	39	4186	460	3765
GAR0072	154937	46.314370	-117.474830	10	43	30	NE/SW	Flerchinger	1977	8	4009	2	4007	161	3848	O	18	3991	23	3986	23	3986	161	3848
GAR0127	166512	46.446630	-117.466920	11	43	7	NE/SE	Lohman	1978	11	2395	12	2383	138	2257	D	18	2377	24	2371	24	2371	138	2257
GAR0129	175305	46.445750	-117.460700	11	43	8	SW/SW	Morgan	1994	12	2600	2	2598	660	1940	D	19	2581	19	2581	19	2581	660	1940
GAR0131	294353	46.436670	-117.421180	11	43	16	SE/NE	WA Dept of Highways	1968	11	2764	22	2742	575	2189	D,I		2764	298	2466	298	2466	575	2189
GAR0133	354601	46.398980	-117.388670	11	43	26	SW/SE	Ledgerwood	2003	2	1978	17	1961	360	1618	O	18	1960	18	1960	18	1960	360	1618
GAR0134	353746	46.403670	-117.388880	11	43	26	NW/SE	Ledgerwood	2003	2	1730	48	1682	125	1605	O	18	1712	49	1681	49	1681	125	1605
GAR0400	460220	46.291450	-117.546930	9	42	4	NE/NE	Wilson	2006	8	4085	2	4083	280	3805	D	18	4067	280	3805	260	3825	280	3805
GAR0401	152250	46.292080	-117.546370	9	42	4	NE/NE	Baker	1977	5	4021	10	4011	78	3943	M	24	3997	24	3997	24	3997	78	3943
GAR0402	375031	46.292180	-117.548700	9	42	4	NE/NE	Ledgerwood	2003	10	4250	1	4249	350	3900	D	18	4232	18	4232	18	4232	350	3900
GAR0403	160288	46.292330	-117.489580	9	42	1	NW/NE	Flerchinger	1977	7	4487	1	4486	125	4362	D	19	4468	23	4464	23	4464	125	4362
GAR0404	163546	46.420780	-117.280780	11	44	22	SW/NE	Brankhorst	1995	6	1322	0	1322	363	959	D	18	1304	363	959	333	989	363	959
GAR0405	165604	46.433150	-117.321080	11	44	17	NW/SE	Ledgerwood	1980	4	1337	17	1320	139	1198	D	20	1317	29	1308	29	1308	139	1198

🟩 Well in Alpowa Creek sub-basin
🟦 Well in Asotin Creek sub-basin

Well Specification Table

Well ID	open int dia (in)	DTW (ft bgs)	WT elev (ft amsl)	pump test type	rate (gpm)	DD (ft)	SC (gpm/ft-DD)	Temp (F)	upland	valley	QMs	Mvsu	Mvsl	Mvwu	Mvwl	N2	R2	N1	R1	I	Comments
ASO0622	6	101	1067	A	17			56		X											
ASO0623	6	180	2236	A	8				X									X			
ASO0639	10	30	708							X								X	X		
ASO0640	8	250	1378		20			59													
ASO0641	6	210	529	A	3					X										X	
ASO0642	8	200	1367																		
ASO0643	8	186	808	A	100																
ASO0644	8	602	476	A	15			56													
ASO0646	8	151	619	A	12			54		X								X	X		
ASO0647	6	112	1586	A	20				X										X		
ASO0648	8	150	1215	A	50				X							X	X				
ASO0649	6	304	1315	A	20																
ASO0651	8	180	1501	A	12			59													
ASO0653	8	140	1333	A	30			51	X										X		
ASO0655	8			B																	Dry hole - decommissioned
ASO0657	8	258	730	A	60			53													
ASO0659	6	150	740	A	20			59													
ASO0661	6	160	759	A	30					X								X	X		
ASO0663	6	340	915	A	15			55	X												
ASO0664	8	720	658	A	72			56													
ASO0665	6	125	882	A	40			56													
ASO0666	6	96	1056	A	30					X									X	X	
ASO0667	8	835	715					65													
ASO0670	8	600	931	A	25			59													
ASO0671	6	340	496	A	10					X										X	
ASO0672	8	150	1410	A	12			60	X			X									
ASO0673	6	93	791	A	60			50		X										X	
ASO0674	6	488	319	A	20			56		X										X	
ASO0676	8			A					X				X								No water
ASO0677	6	196	1495	A	20			56	X			X									
ASO0679	6	57	681	A	25					X										X	
ASO0682	8	130	1479	A	30			52	X						X						
ASO0683	8	205	1348	A	15			52	X						X						
ASO0684	8	220	799	A	15			54	X								X				
ASO0686	8	570	634	A	30				X								X				
ASO0687.	8	850	708	A	10			60	X								X				
ASO0688	6	220	746	A	16			56	X								X				
ASO0690	6	60	1266	A	15			56	X					X							
GAR0061	6	510	2881	A	2				X								X				
GAR0062	8	150	3530	A	1			46	X								X	X			
GAR0063	8								X							X					DRY HOLE
GAR0064	8	178	4024	B	1				X							X					
GAR0065	6			A					X								X				DRY HOLE
GAR0066	6			A					X							X					DRY HOLE
GAR0067	6								X								X				DRY HOLE
GAR0072	8								X							X					No H2O information
GAR0127	8	70	2325	P	11	60	0.183			X						X					
GAR0129	6									X							X	X			DRY HOLE
GAR0131	8	474	2290	P	62	38	1.632	60		X						X	X				
GAR0133	6	180	1798	A	4					X							X				
GAR0134	8	33	1697	A	250					X							X				
GAR0400	6	200	3885	A	10				X									X			
GAR0401	8	46	3975		7				X								X				
GAR0402	6	250	4000	A	6				X								X				
GAR0403	8	20	4467						X								X				
GAR0404	6	323	999	A	20					X								X			
GAR0405	8	110	1227							X								X			

🟩 Well in Alpowa Creek sub-basin
🟦 Well in Asotin Creek sub-basin

Well Specification Table

Well ID	DOE Well Log ID #	Latitude	Longitude	T - N	R - E	Sec.	Q-Q	Owner	year drilled	month drilled	surf elev (ft amsl)	TOB depth	TOB elev	TD (ft bgs)	TD elev (ft amsl)	Use	surf seal depth	elev seal bottom	prod casing depth	elev casing bottom	open int top depth	elev open int top	open int bottom depth	elev open int bottom
GAR0406	165605	46.426600	-117.302000	11	44	16	SW/SE	Ledgerwood	1979	5	1257	3	1254	295	962		22	1235	51	1206	51	1206	295	962
GAR0407	165606	46.427670	-117.305470	11	44	16	SE/SW	Ledgerwood	1978	6	1285	35	1250	159	1126	I		1285	37	1248	37	1248	159	1126
GAR0408	427264	46.427920	-117.353820	11	44	18	SW/SW	Scharmon	1992	5	2115	0	2115	405	1710	D	18	2097	405	1710	365	1750	405	1710
GAR0409	166289	46.412620	-117.336780	11	44	19	SE/NE	Vornholt	1995	6	1718	2	1716	137	1581	D	18	1700	137	1581	117	1601	137	1581
GAR0410	167597	46.441250	-117.295920	11	44	9	SE/SE	Heistman	1995	5	1623	25	1598	325	1298	D	40	1583	325	1298	285	1338	325	1298
GAR0411	427262	46.408950	-117.289550	11	44	27	NW/NW	Duthie	1995	1	2255	53	2202	175	2080	D	18	2237	54	2201	54	2201	175	2080
GAR0412	309662	46.420180	-117.285820	11	44	22	SW/NW	Dimpke	2001	7	1123	7	1116	175	948	D	18	1105	161	962	141	982	175	948
GAR0413	308812	46.419750	-117.336920	11	44	19	SE/NE	Lansdowne	2000	8	1648	16	1632	110	1538	D	18	1630	110	1538	90	1558	110	1538
GAR0414	253579	46.425670	-117.327730	11	44	20	NE/NW	Lansdowne	1999	3	1491	26	1465	125	1366	D	23	1468	120	1371	85	1406	125	1366
GAR0415	427263	46.428020	-117.316700	11	44	17	SE/SW	Brooks	1994	1	1324	0	1324	125	1199	D	20	1304	20	1305	20	1304	125	1199
GAR0416	427265	46.424880	-117.283400	11	44	22	NW/NW	Estlund	1988	8	1429	29	1400	180	1249	D	20	1409	36	1393	36	1393	180	1249
GAR0418	460234	46.447700	-117.295130	11	44	9	NE/SE	Heitstuman	2006	5	1747	17	1730	380	1367	D	24	1723	24	1723	24	1723	380	1367
GAR0419	332798	46.426930	-117.331270	11	44	17	SW/SW	Ledgerwood	2007	12	1608	26	1582	70	1538	S	52	1556	57	1551	52	1556	70	1538

Well in Alpowa Creek sub-basin
Well in Asotin Creek sub-basin

Well Specification Table

Well ID	open int dia (in)	DTW (ft bgs)	WT elev (ft amsl)	pump test type	rate (gpm)	DD (ft)	SC (gpm/ft-DD)	Temp (F)	upland	valley	QMs	Mvsu	Mvsl	Mvwu	Mvwl	N2	R2	N1	R1	I	Comments
GAR0406	8	230	1027	B	15					X								X			
GAR0407	8	80	1205	P	150	8	18.750			X								X			
GAR0408	6	280	1835					51	X								X				
GAR0409	6	69	1649	A	15					X							X				
GAR0410	6	185	1438	A	40			48		X								X			
GAR0411	8	45	2210	A	42					X					X	X					
GAR0412	6	42	1081	A	42			57		X								X			
GAR0413	8	70	1578	A	200					X							X	X			
GAR0414	8	65	1426	A	60			51		X							X	X			
GAR0415	6	68	1256	A	40					X							X	X			
GAR0416	6	36	1393	A	30					X							X	X			
GAR0418	6	240	1507	A	25					X								X			
GAR0419	8	20	1588	A	150			51		X							X				

Well in Alpowa Creek sub-basin
Well in Asotin Creek sub-basin

Appendix B
Water Rights Field Survey

Certificates

Alpowa Creek Sub-basin Ground Water Certificates

	Department of Ecology Information														Field Survey Results				
HDR ID	**File #**	**Certificate #**	**Person**	**Document Type**	**Priority Date**	**Purpose**	**WRIA**	**County**	**TRS**	**QQ/Q**	**Src**	**1stSrc**	**Qi (gpm)**	**Qa (ac-ft)**	**Irrigated Acres**	**Actual Irrigated Acres***	**Head of Cattle***	**Head of Horse***	**Livestock Months***	**Creek Basin**
181	G3-00375CWRIS		WA Health Department	Cert	8/11/1967	IR,DM	35	GARFIELD	11.0N 43.0E 16	SE/NE	1	WELL	20.0	34.0	9.0	3	0	0	0.00	Alpowa Creek Basin
1199	G3-20293CWRIS		BLANKINSHIP RAYMOND	Cert	6/2/1972	ST,IR	35	ASOTIN	11.0N 45.0E 30	SE/SE	1	WELL	20.0	27.0	5.0	5	0	0	0.00	Alpowa Creek Basin
1248	G3-26001GWRIS		DICK LEDGERWOOD&SONS	Cert	7/3/1978	IR	35	GARFIELD	11.0N 44.0E 16	SE/SW	1	WELL	150.0	162.8	25.0	25	0	0	0.00	Alpowa Creek Basin
1253	G3-26438GWRIS		DICK LEDGERWOOD/SONS	Cert	1/17/1980	IR	35	GARFIELD	11.0N 44.0E 16	S2/SE	1	WELL	100.0	64.5	15.0	15	0	0	0.00	Alpowa Creek Basin
1296	G3-28504GWRIS		WEST LYLE&MARIE	Cert	7/25/1988	IR,DS	35	ASOTIN	11.0N 45.0E 19	NE/SE	1	WELL	20.0	8.0	1.5	1.5	0	0	0.00	Alpowa Creek Basin

Anatone Area Ground Water Certificates

	Department of Ecology Information														Field Survey Results				
HDR ID	**File #**	**Certificate #**	**Person**	**Document Type**	**Priority Date**	**Purpose**	**WRIA**	**County**	**TRS**	**QQ/Q**	**Src**	**1stSrc**	**Qi (gpm)**	**Qa (ac-ft)**	**Irrigated Acres**	**Actual Irrigated Acres***	**Head of Cattle***	**Head of Horse***	**Livestock Months***	**Creek Basin**
119	G3-*09487CWRIS	06614	MALLORY M O	Cert	5/29/1968	IR,DS	35	ASOTIN	08.0N 45.0E 26		1	WELL	50.0	14.5	5.0	1	0	0	0.00	Anatone Area

Asotin Creek Sub-basin Ground Water Certificates

	Department of Ecology Information														Field Survey Results				
HDR ID	**File #**	**Certificate #**	**Person**	**Document Type**	**Priority Date**	**Purpose**	**WRIA**	**County**	**TRS**	**QQ/Q**	**Src**	**1stSrc**	**Qi (gpm)**	**Qa (ac-ft)**	**Irrigated Acres**	**Actual Irrigated Acres***	**Head of Cattle***	**Head of Horse***	**Livestock Months***	**Creek Basin**
86	G3-*05530CWRIS	04960	SHUSS L H / V	Cert	3/21/1960	IR,DS	35	ASOTIN	10.0N 46.0E 20		1	WELL	50.0	25.6		1	0	0	0.00	Asotin Creek Basin
102	G3-*07585CWRIS	05239	PALMER C W	Cert	4/26/1965	IR,DS	35	ASOTIN	10.0N 46.0E 20	SW/NE	1	WELL	10.0	4.0		1	0	0	0.00	Asotin Creek Basin
111	G3-*09084CWRIS	06599	PARSONS J M	Cert	12/6/1967	ST,IR	35	ASOTIN	09.0N 45.0E 05		1	WELL	10.0	5.0	1.0	1	0	0	0.00	Asotin Creek Basin
1200	G3-20525CWRIS		BERRY JAMES WILLIAM	Cert	9/18/1972	IR,DM	35	ASOTIN	10.0N 46.0E 20	W2/NE	1	WELL	70.0	16.4	3.0	2	0	0	0.00	Asotin Creek Basin
1216	G3-23230CWRIS		BURNOM MARK W	Cert	5/31/1974	IR,DS	35	ASOTIN	10.0N 45.0E 24	SW/SE	1	WELL	40.0	38.2	8.0	1	0	0	0.00	Asotin Creek Basin
1228	G3-24201CWRIS		ROOT CLARENCE D	Cert	1/4/1975	IR,DS	35	ASOTIN	10.0N 45.0E 24	SW/SE	1	WELL	10.0	5.7	1.0	1	0	0	0.00	Asotin Creek Basin
1254	G3-26443GWRIS		BARKLEY JACK D	Cert	2/1/1980	IR	35	ASOTIN	08.0N 45.0E 29	NE/SE	1	WELL	200.0	222.0	60.0	0	0	0	0.00	Asotin Creek Basin
1285	G3-28272C		Powe Donald	Cert	10/22/1986	IR,DS	35	ADAMS	08.0N 45.0E 22	SW/NW	2	Well 2	30.0	57.3	16.0	1	0	0	0.00	Asotin Creek Basin

Claims

Alpowa Creek Sub-basin Ground Water Claims

	Department of Ecology Information															Field Survey Results				
HDR ID	File #	Certificate #	Person	Document Type	Priority Date	Purpose	WRIA	County	TRS	QQ/Q	Src	1stSrc	Qi (gpm)	Qa (ac-ft)	Irrigated Acres	Actual Irrigated Acres*	Head of Cattle*	Head of Horse*	Livestock Months*	Creek Basin
136	G3-000238CL		FLERCHINGER ORVILLE E.	Claim L	1/1/1900	ST,DG	35	GARFIELD	11.0N 43.0E 32		1		15.0	4.0		0	65	0	6.00	Alpowa Creek Basin
152	G3-001370CL		FEIDER FRANCIS A.	Claim L	1/1/1912	ST,DG	35	GARFIELD	12.0N 44.0E 33	N2/N2	1		2.0	411.0		0	0	0	0.00	Alpowa Creek Basin
209	G3-006315CL		TAYLOR JAMES O.	Claim L	1/1/1947	ST,IR	35	GARFIELD	12.0N 44.0E 29		1		25.0	39.5	0.5	0.5	0	0	0.00	Alpowa Creek Basin
267	G3-010050CL		WASSARD JANE B.	Claim L	1/1/1955	ST,DG	35	GARFIELD	12.0N 44.0E 30	SW/SW	1		6.0	9.7		0	0	0	0.00	Alpowa Creek Basin
268	G3-010051CL		WASSARD JANE B.	Claim L	1/1/1917	ST,DG	35	GARFIELD	12.0N 44.0E 31	NW/NW	1		10.0	16.1		0	0	0	0.00	Alpowa Creek Basin
269	G3-010153CL		GALE WEATHERLY & SONS INC	Claim L		ST,DG	35	ASOTIN	10.0N 43.0E 24		1		2.0	1.0		0	0	0	0.00	Alpowa Creek Basin
270	G3-010155CL		GALE WEATHERLY & SONS INC	Claim L		ST	35	ASOTIN	10.0N 43.0E 24		1		800.0	1.0		0	0	0	0.00	Alpowa Creek Basin
342	G3-023910CL		YOCHUM HAROLD	Claim L	11/1/1908	ST,DG	35	ASOTIN	11.0N 45.0E 32	NE/SE	1		11.0	2.5		0	0	0	0.00	Alpowa Creek Basin
343	G3-023911CL		YOCHUM HAROLD	Claim L		ST	35	GARFIELD	10.0N 43.0E 21	SE/SW	1		1.0	0.5		0	0	0	0.00	Alpowa Creek Basin
374	G3-027628CL		DAVIS RACHEL J.	Claim L		ST	35	GARFIELD	12.0N 44.0E 32		1		10.0	2.0		0	0	0	0.00	Alpowa Creek Basin
377	G3-027928CL		MULLARKY LILY	Claim L		ST,IR	35	ASOTIN	10.0N 43.0E 23	SW/NE	1		10.0	5.0	1.0	1	0	0	0.00	Alpowa Creek Basin
510	G3-054949CL		DUCKWORTH GARY L.	Claim L		ST	35	GARFIELD	10.0N 42.0E 10		1	WELL	5.0	0.4		0	25	0	3.00	Alpowa Creek Basin
522	G3-055430CL		LANDKARNMA LYLE E.	Claim L	11/1/1972	ST,DG	35	GARFIELD	11.0N 43.0E 26	SE/SW	1	WELL	25.0	25.0		0	0	0	0.00	Alpowa Creek Basin
527	G3-055568CL		MAGALLON ESTHER	Claim L	2/1/1943	ST,IR	35	GARFIELD	11.0N 44.0E 19	SE/SW	1	WELL	14.0	3.0	1.5	1.5	0	0	0.00	Alpowa Creek Basin
535	G3-056587CL		PARIS GERALD L.	Claim L	6/1/1969	ST,IR	35	GARFIELD	11.0N 43.0E 24	SW/SE	1	WELL	10.0	6.0	1.5	1.5	0	0	0.00	Alpowa Creek Basin
545	G3-057908CL		FITZSIMMONS C. W.	Claim L	1/1/1948	ST,DG	35	GARFIELD	11.0N 43.0E 21	NE/NE	1	DRILLED WELL	5.0	80.0		0	No Cows	0	0.00	Alpowa Creek Basin
546	G3-057909CL		FITZSIMMONS C. W.	Claim L	4/1/1968	ST,DG	35	GARFIELD	11.0N 43.0E 15		1	DRILLED WELL	15.0	240.0		0	No Cows	0	0.00	Alpowa Creek Basin
547	G3-057910CL		FITZSIMMONS C. W.	Claim L		ST,DG	35	GARFIELD	11.0N 43.0E 15	SW/NW	1	DRILLED WELL	10.0	160.0		0	No Cows	0	0.00	Alpowa Creek Basin
548	G3-057911CL		FITZSIMMONS C. W.	Claim L		ST	35	GARFIELD	11.0N 43.0E 22		1		5.0	240.0		0	No Cows	0	0.00	Alpowa Creek Basin
551	G3-058254CL		WOLF JOE	Claim L		ST,DG	35	ASOTIN	10.0N 44.0E 29	NW/NW	1	WELL	10.0	16.1		0	No Cows	0	0.00	Alpowa Creek Basin
553	G3-058268CL		WOLF JOE	Claim L		ST	35	GARFIELD	10.0N 42.0E 25	SW/NE	1	WELL	1.0	1.6		0	No Cows	0	0.00	Alpowa Creek Basin
554	G3-058272CL		WOLF JOE	Claim L		ST	35	GARFIELD	10.0N 42.0E 36	NE/NW	1	WELL	5.0	8.1		0	No Cows	0	0.00	Alpowa Creek Basin
628	G3-070761CL		AMANDA FITZSIMMONS EST.	Claim L	1/1/1900	ST,DG	35	GARFIELD	11.0N 43.0E 15	NW/NE	1	WELL	0.5	0.8		0	0	0	0.00	Alpowa Creek Basin
629	G3-070762CL		AMANDA FITZSIMMONS EST.	Claim L	1/1/1900	ST,DG	35	GARFIELD	11.0N 43.0E 15	NW/NE	1	WELL	1.0	1.6		0	0	0	0.00	Alpowa Creek Basin
707	G3-093546CL		FLERCHINGER JOHN W	Claim L		ST,DG	35	GARFIELD	10.0N 43.0E 17		1	WELL	6.0	1.0		0	0	4	12.00	Alpowa Creek Basin
708	G3-093547CL		FLERCHINGER JOHN W	Claim L		ST,DG	35	GARFIELD	10.0N 43.0E 17		1	WELL	6.0	1.0		0	0	see id 707	0.00	Alpowa Creek Basin
709	G3-093548CL		FLERCHINGER JOHN W	Claim L		IR,DG	35	GARFIELD	10.0N 43.0E 17		1	WELL	8.0	1.5		0	0	see id 707	0.00	Alpowa Creek Basin
710	G3-093549CL		FLERCHINGER STEVE	Claim L	7/1/1925	ST,DG	35	GARFIELD	09.0N 42.0E 01	NW/NE	1	WELL	10.0	1.0		0	15	0	9.00	Alpowa Creek Basin
743	G3-096673CL		BEALE DUANE	Claim L		ST	35	GARFIELD	11.0N 43.0E 23	NW/NW	1	WELL	7.0	0.6		0	40	0	6.00	Alpowa Creek Basin
748	G3-097651CL		GILBERT JOHN V	Claim L	11/1/1935	ST	35	GARFIELD	11.0N 43.0E 14	NE/SW	1	WELL	4.0	0.5		0	No Cows	0	0.00	Alpowa Creek Basin
755	G3-098371CL		YOCHUM ROGER W	Claim L		ST,DG	35	ASOTIN	10.0N 44.0E 20	SE/NE	1	WELL	2.0	1.0		0	0	0	0.00	Alpowa Creek Basin
756	G3-098372CL		YOCHUM ROGER W	Claim L		ST	35	ASOTIN	10.0N 43.0E 27	NE/NE	1	WELL	1.0	1.0		0	No Cows	0	0.00	Alpowa Creek Basin
757	G3-098373CL		YOCHUM ROGER W	Claim L		ST	35	ASOTIN	10.0N 43.0E 27	NE/NE	1	WELL	1.0	1.0		0	No Cows	0	0.00	Alpowa Creek Basin
792	G3-103497CL		WOLF JOE	Claim L		ST	35	GARFIELD	10.0N 43.0E 19	SW/SW	1		0.5	0.8		0	No Cows	0	0.00	Alpowa Creek Basin
858	G3-116405CL		KILLINGSWOTH GORDON W	Claim L	9/1/1943	ST,DG	35	GARFIELD	11.0N 43.0E 13	NW/SW	1	WELL	5.0	2.0		0	25	0	6.00	Alpowa Creek Basin
859	G3-116406CL		KILLINGSWOTH GORDON W	Claim L	10/1/1910	ST,DG	35	GARFIELD	11.0N 43.0E 13	NW/SW	1	WELL	5.0	2.0		0	see id 858	0	0.00	Alpowa Creek Basin
860	G3-116407CL		KILLINGSWOTH GORDON W	Claim L	10/1/1942	ST,DG	35	GARFIELD	11.0N 43.0E 13	NW/SW	1	WELL	2.0	1.0		0	see id 858	0	0.00	Alpowa Creek Basin
861	G3-116408CL		KILLINGSWOTH GORDON W	Claim L	7/1/1941	ST,DG	35	GARFIELD	11.0N 43.0E 13	SW/SW	1	WELL	2.0	1.0		0	0	0	0.00	Alpowa Creek Basin
879	G3-118519CL		FEIDER THEODORE A	Claim L	1/1/1906	ST,DG	35	GARFIELD	12.0N 44.0E 27	NE/SE	1	WELL	10.0	16.1		0	50	0	6.00	Alpowa Creek Basin
880	G3-118520CL		FEIDER THEODORE A	Claim L	1/1/1906	ST	35	GARFIELD	12.0N 44.0E 27	SE/SE	1		3.0	4.8		0	see id 879	0	0.00	Alpowa Creek Basin
881	G3-118521CL		FEIDER THEODORE A	Claim L	1/1/1906	ST	35	GARFIELD	12.0N 44.0E 34	SW/NE	1		3.0	4.8		0	see id 879	0	0.00	Alpowa Creek Basin
882	G3-118522CL		FEIDER THEODORE A	Claim L	1/1/1906	ST	35	GARFIELD	12.0N 44.0E 34	NW/SE	1		3.0	4.8		0	see id 879	0	0.00	Alpowa Creek Basin
883	G3-118523CL		FEIDER THEODORE A	Claim L	1/1/1906	ST	35	GARFIELD	12.0N 44.0E 34	SE/SW	1		3.0	4.8		0	see id 879	0	0.00	Alpowa Creek Basin
884	G3-118524CL		FEIDER THEODORE A	Claim L	1/1/1906	ST	35	GARFIELD	11.0N 44.0E 03	NE/NW	1		3.0	4.8		0	see id 879	0	0.00	Alpowa Creek Basin
885	G3-118525CL		FEIDER THEODORE A	Claim L	1/1/1906	ST	35	GARFIELD	12.0N 44.0E 34	SW/SE	1		2.0	3.2		0	see id 879	0	0.00	Alpowa Creek Basin
886	G3-118526CL		FEIDER THEODORE A	Claim L	1/1/1906	ST	35	GARFIELD	11.0N 44.0E 02	SW/SW	1		2.0	3.2		0	see id 879	0	0.00	Alpowa Creek Basin
928	G3-121887CL		TRAUTMAN EMMA F	Claim L		ST	35	ASOTIN	10.0N 43.0E 22	NW/SE	1	WELL	2.0	1.0		0	0	0	0.00	Alpowa Creek Basin
977	G3-129949CL		FITZGERALD FRANCIS	Claim L		ST	35	ASOTIN	10.0N 43.0E 15	SW/SE	1		15.0	1.0		0	40	0	6.00	Alpowa Creek Basin
978	G3-129950CL		FITZGERALD FRANCIS	Claim L		ST	35	ASOTIN	10.0N 43.0E 14	NE/SW	1		10.0	1.0		0	see id 978	0	0.00	Alpowa Creek Basin
979	G3-129951CL		FITZGERALD FRANCIS	Claim L		ST,DG	35	GARFIELD	10.0N 43.0E 31	NE/SE	1	WELL	10.0	1.0		0	see id 977	0	0.00	Alpowa Creek Basin
981	G3-129954CL		FITZGERALD FRANCIS	Claim L		ST,DG	35	GARFIELD	10.0N 43.0E 31	SW/SE	1		3.0	0.3		0	see id 977	0	0.00	Alpowa Creek Basin
996	G3-133366CL		FEIDER FRANCIS A	Claim L	6/10/1974	ST,IR	35	GARFIELD	12.0N 44.0E 33		1	SPRING	6.0	9.7	1.0	1	0	0	0.00	Alpowa Creek Basin
1034	G3-140184CL		DIXON FRANK R	Claim L		ST	35	GARFIELD	10.0N 43.0E 05		1		2.0	0.5		0	30	0	9.00	Alpowa Creek Basin
1035	G3-140185CL		DIXON FRANK R	Claim L		ST	35	GARFIELD	10.0N 43.0E 04		1		5.0	1.6		0	see id 1034	0	0.00	Alpowa Creek Basin
1036	G3-140186CL		DIXON FRANK R	Claim L		ST	35	GARFIELD	10.0N 43.0E 05		1	SPRING	4.0	1.0		0	see id 1034	0	0.00	Alpowa Creek Basin
1118	G3-151018CL		ROBINSON K W	Claim L		ST,DG	35	ASOTIN	10.0N 43.0E 12	NW/NW	1		13.0	1.0		0	0	0	0.00	Alpowa Creek Basin
1119	G3-151064CL		ROBINSON K W	Claim L		ST	35	ASOTIN	10.0N 43.0E 02		1		12.0	1.0		0	20	0	6.00	Alpowa Creek Basin
1130	G3-152195CL		ROBINSON MAY	Claim L		ST	35	ASOTIN	10.0N 43.0E 15	SE/SW	1		15.0	1.0		0	see id 1119	0	0.00	Alpowa Creek Basin
1173	G3-158565CL		LEDGERWOOD RICHARD	Claim S		ST,IR	35	GARFIELD	11.0N 44.0E 07		1	WELL	unknown	unknown		0	0	0	0.00	Alpowa Creek Basin
1174	G3-158570CL		LEDGERWOOD RICHARD	Claim S		ST,IR	35	GARFIELD	11.0N 44.0E 17		1	WELL	unknown	unknown		0	0	0	0.00	Alpowa Creek Basin
406	G3-036128CL		WEISSENFELS ROLAND W.	Claim S		DG, IR	35	GARFIELD	11.0N 44.0E 20		1		unknown	unknown		0	0	4	12.00	Alpowa Creek Basin
438	G3-043431CL		PARIS GERALD L.	Claim S		ST,DG	35	GARFIELD	11.0N 43.0E 24		1		unknown	unknown		0	20	0	6.00	Alpowa Creek Basin

Anatone Area Ground Water Claims

	Department of Ecology Information															Field Survey Results				
HDR ID	File #	Certificate #	Person	Document Type	Priority Date	Purpose	WRIA	County	TRS	QQ/Q	Src	1stSrc	Qi (gpm)	Qa (ac-ft)	Irrigated Acres	Actual Irrigated Acres*	Head of Cattle*	Head of Horse*	Livestock Months*	Creek Basin
183	G3-003821CL		ROSTAIN DAWN	Claim L	8/15/1968	IR,DG	35	ASOTIN	08.0N 45.0E 26		1		35.0	2.0	1.0	1	0	0	0.00	Anatone Area
257	G3-009384CL		COOPER MRS. EARL	Claim L	1/1/1907	ST,DG	35	ASOTIN	08.0N 45.0E 26	NE/SE	1		10.0	2.0		0	0	0	0.00	Anatone Area
433	G3-043134CL		SARGEANT ROBERT J.	Claim L		IR,DG	35	ASOTIN	08.0N 45.0E 26		1	WELL	15.0	0.8	1.0	1	0	0	0.00	Anatone Area
530	G3-055858CL		BLAIR ROBERT D.	Claim L	7/22/1969	DG,IR	35	ASOTIN	08.0N 45.0E 26		1	WELL	20.0	16.0	0.5	0.5	0	0	0.00	Anatone Area
769	G3-099055CL		JENSEN ROBERT J	Claim L		IR,DG	35	ASOTIN	07.0N 45.0E 03		1	WELL	40.0	64.0	10.0	0.5	0	0	0.00	Anatone Area
831	G3-113374CL		BARKLEY JACK D	Claim L	11/1/1952	ST,DG	35	ASOTIN	07.0N 45.0E 04	SE/SW	1	WELL	5.0	1.0		0	0	0	0.00	Anatone Area
875	G3-118137CL		SANGSTER ROBERT C	Claim L	3/1/1920	ST	35	ASOTIN	08.0N 45.0E 26	SW/NE	1	WELL	2.0	1.0		0	0	0	0.00	Anatone Area
876	G3-118138CL		SANGSTER ROBERT C	Claim L	12/1/1954	ST,DG	35	ASOTIN	08.0N 45.0E 26	SW/SE	1	WELL	15.0	1.0		0	0	0	0.00	Anatone Area
901	G3-119443CL		HOUGH ROBERT G	Claim L	4/1/1959	IR,DG	35	ASOTIN	08.0N 45.0E 26		1	WELL	17.5	4.5	3.0	0.5	0	0	0.00	Anatone Area
1145	G3-152674CL		NELSON WILLIAM H	Claim L		IR	35	ASOTIN	08.0N 45.0E 26		1	WELL	25.0	40.4	1.5	1.5	0	0	0.00	Anatone Area
1180	G3-159993CL		HOUGH GARALD L	Claim L	5/10/1972	IR,DG	35	ASOTIN	08.0N 45.0E 26		1	WELL	15.0	4.0	1.0	1	0	0	0.00	Anatone Area

Asotin Creek Sub-basin Ground Water Claims

	Department of Ecology Information															Field Survey Results				
HDR ID	File #	Certificate #	Person	Document Type	Priority Date	Purpose	WRIA	County	TRS	QQ/Q	Src	1stSrc	Qi (gpm)	Qa (ac-ft)	Irrigated Acres	Actual Irrigated Acres*	Head of Cattle*	Head of Horse*	Livestock Months*	Creek Basin
166	G3-003240CL		BOLICK E. D.	Claim L	8/1/1905	ST,IR	35	ASOTIN	09.0N 46.0E 20	SE/SE	1		3.5	5.7	1.0	1	0	0	0.00	Asotin Creek Basin
190	G3-004347CL		SANGSTER JAMES J.	Claim L	8/1/1935	ST,DG	35	ASOTIN	08.0N 45.0E 23		1		5.0	4.5		0	40	0	6.00	Asotin Creek Basin
194	G3-004555CL		OSBORN CLAUD C.	Claim L	8/1/1967	ST,DG	35	ASOTIN	08.0N 45.0E 33		1		20.0	5.5		0	0	0	0.00	Asotin Creek Basin
212	G3-006525CL		MULLINS TED	Claim L		ST	35	ASOTIN	10.0N 45.0E 23		1		5.0	1.0		0	350	0	6.00	Asotin Creek Basin
226	G3-006940CL		STOLL WAYNE F.	Claim L		ST	35	ASOTIN	10.0N 43.0E 34	SE/SW	1		5.0	3.0		0	0	0	0.00	Asotin Creek Basin
233	G3-007961CL		VOGAN HARRY	Claim L	1/1/1934	IR	35	ASOTIN	09.0N 45.0E 06	SE/SE	1		10.0	12.0	3.0	0.5	0	0	0.00	Asotin Creek Basin
234	G3-008048CL		LONG LESTER R.	Claim L	7/1/1946	ST,DG	35	ASOTIN	09.0N 45.0E 09	NW/SW	1		11.0	3.0		0	0	0	0.00	Asotin Creek Basin
246	G3-008761CL		PARSONS WAYNE	Claim L	1/1/1900	ST,DG	35	ASOTIN	09.0N 44.0E 25	SE/NW	1		11.0	3.0		0	0	0	0.00	Asotin Creek Basin
255	G3-009268CL		WATKINS GEORGE E.	Claim L		IR,DG	35	ASOTIN	08.0N 45.0E 10		1		30.0	48.0	1.0	1	0	0	0.00	Asotin Creek Basin
326	G3-017779CL		BERRY JAMES W.	Claim L		ST,DG	35	ASOTIN	10.0N 46.0E 20		1		35.0	3.0		0	0	0	0.00	Asotin Creek Basin
335	G3-021101CL		BEARD LEO R.	Claim L		IR,DG	35	ASOTIN	10.0N 45.0E 24	NE/SE	1		5.0	8.0	1.0	1	0	0	0.00	Asotin Creek Basin
336	G3-021102CL		BEARD LEO R.	Claim L		ST,IR	35	ASOTIN	10.0N 45.0E 24	SE/SE	1		500.0	800.0	40.0	4	0	0	0.00	Asotin Creek Basin
340	G3-022985CL		POLUMSKY LAWRENCE	Claim L	1/1/1912	ST	35	GARFIELD	09.0N 43.0E 05	NW/NW	1		1.0	1.0		0	0	0	0.00	Asotin Creek Basin
349	G3-024433CL		HODGES JOHN	Claim L	8/1/1920	ST,DG	35	ASOTIN	09.0N 45.0E 31	SW/SW	1		11.5	3.0		0	0	0	0.00	Asotin Creek Basin
350	G3-024443CL		"PARSONS CLAUD, EST OF"	Claim L	1/1/1921	ST,DG	35	ASOTIN	09.0N 44.0E 14	NE/SW	1		21.0	5.0		0	0	0	0.00	Asotin Creek Basin
405	G3-036088CL		PARKER THOMAS F.	Claim S		DG, IR	35	ASOTIN	10.0N 45.0E 23		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
441	G3-044722CL		COLEMAN ROBERT S.	Claim S		ST,DG	35	ASOTIN	07.0N 45.0E 04		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
458	G3-046336CL		HOUGH HAROLD	Claim S		ST,DG	35	ASOTIN	10.0N 46.0E 20		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
470	G3-048936CL		REEVES DUANE	Claim S		ST,DG	35	ASOTIN	08.0N 44.0E 02		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
588	G3-063651CL		WN. ST. DEPT. NAT. RSO.	Claim L	7/1/1949	ST,DG	35	ASOTIN	08.0N 45.0E 16	NE/NW	1	WELL	50.0	1.0		0	0	0	0.00	Asotin Creek Basin
650	G3-077044CL		BAKER ERNEST E.	Claim S		ST,DG	35	ASOTIN	08.0N 45.0E 15		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
651	G3-077046CL		BAKER ERNEST E.	Claim S		ST,DG	35	ASOTIN	08.0N 45.0E 14		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
652	G3-077047CL		GUSTASON HAROLD	Claim S		ST,DG	35	ASOTIN	08.0N 45.0E 11		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
681	G3-087096CL		STOREY GERALD G.	Claim S		ST,DG	35	ASOTIN	10.0N 45.0E 31		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
694	G3-089501CL		HANSEN FLORENCE	Claim L		ST,DG	35	ASOTIN	10.0N 45.0E 11	NE/SE	1	WELL	20.0	40.0		0	0	0	0.00	Asotin Creek Basin
706	G3-093216CL		SCHLEE FARMS INC	Claim L		ST,DG	35	ASOTIN	08.0N 44.0E 05	NW/NW	1	WELL	10.0	12.0		0	0	0	0.00	Asotin Creek Basin
774	G3-100364CL		BARKLEY JACK D	Claim L	3/1/1930	ST,DG	35	ASOTIN	09.0N 46.0E 28	NW/NW	1	WELL	5.0	1.0		0	0	0	0.00	Asotin Creek Basin
780	G3-100825CL		APPLEFORD TRACY	Claim L	8/1/1900	ST,DG	35	ASOTIN	08.0N 46.0E 07		1	WELL	10.0	2.0		0	0	0	0.00	Asotin Creek Basin
800	G3-106519CL		MULLINS TED	Claim S		ST,IR	35	ASOTIN	10.0N 45.0E 24		1		unknown	unknown		0	0	0	0.00	Asotin Creek Basin
821	G3-111459CL		SCHLEE FARMS INC	Claim L	10/1/1906	ST,DG	35	ASOTIN	09.0N 44.0E 30	NE/SE	1	WELL	10.0	4.0		0	0	0	0.00	Asotin Creek Basin
828	G3-112165CL		REEVES STANLEY	Claim L		ST,DG	35	ASOTIN	08.0N 45.0E 10	N2/SE	1	WELL	5.0	1.0		0	0	0	0.00	Asotin Creek Basin
833	G3-113388CL		BARKLEY JACK D	Claim L	3/1/1971	ST,DG	35	ASOTIN	09.0N 46.0E 28	NW/NW	1	WELL	5.0	1.0		0	0	0	0.00	Asotin Creek Basin
874	G3-118136CL		SANGSTER ROBERT C	Claim L	7/1/1935	ST,DG	35	ASOTIN	08.0N 45.0E 34	SW/NW	1	WELL	13.0	1.0		0	0	0	0.00	Asotin Creek Basin
905	G3-120109CL		WATSON FARMS INC	Claim L	1/1/1971	ST,DG	35	ASOTIN	09.0N 46.0E 17		1	WELL	1.5	2.4		0	0	0	0.00	Asotin Creek Basin
907	G3-120112CL		WATSON FARMS INC	Claim L	1/1/1917	ST	35	ASOTIN	09.0N 46.0E 08	SE/NE	1	WELL	7.0	11.0		0	0	0	0.00	Asotin Creek Basin
908	G3-120113CL		WATSON FARMS INC	Claim L	1/1/1971	ST,DG	35	ASOTIN	09.0N 46.0E 08	SE/NE	1	WELL	1.5	2.4		0	0	0	0.00	Asotin Creek Basin
931	G3-122137CL		HALSEY DWIGHT W	Claim L	1/1/1925	ST,DG	35	ASOTIN	09.0N 46.0E 19		1	WELL	2.5	4.0		0	0	0	0.00	Asotin Creek Basin
932	G3-122138CL		HALSEY DWIGHT W	Claim L	1/1/1925	ST,DG	35	ASOTIN	09.0N 45.0E 26		1	WELL	2.0	3.2		0	0	0	0.00	Asotin Creek Basin
933	G3-122139CL		HALSEY DWIGHT W	Claim L	1/1/1925	ST	35	ASOTIN	09.0N 46.0E 30		1	WELL	1.0	1.6		0	0	0	0.00	Asotin Creek Basin
934	G3-122406CL		REYNOLDS DON L	Claim L	5/1/1939	IR,DG	35	ASOTIN	08.0N 45.0E 34		1	WELL	20.0	32.0	10.0	0	0	0	0.00	Asotin Creek Basin
935	G3-122407CL		REYNOLDS DON L	Claim L	4/1/1939	IR,DG	35	ASOTIN	08.0N 45.0E 34		1	WELL	20.0	32.0	10.0	0	0	0	0.00	Asotin Creek Basin
1010	G3-135049CL		PETTY WILBUR	Claim L		ST,DG	35	ASOTIN	08.0N 45.0E 02	NE/SE	1	WELL	12.0	3.0		0	0	0	0.00	Asotin Creek Basin
1011	G3-135098CL		BROWNE DOUGLAS W	Claim L		ST,DG	35	ASOTIN	08.0N 45.0E 02		1	WELL	10.0	3.0		0	0	0	0.00	Asotin Creek Basin
1018	G3-137158CL		BROWNE DOUGLAS W	Claim L	8/1/1938	ST,DG	35	ASOTIN	08.0N 46.0E 06	NE/NE	1	WELL	5.0	1.0		0	0	0	0.00	Asotin Creek Basin
1022	G3-138775CL		HEDT IRVIN W	Claim L	1/1/1904	ST	35	ASOTIN	09.0N 43.0E 11		1		7.0	0.5		0	0	0	0.00	Asotin Creek Basin
1023	G3-138777CL		HEDT IRVIN W	Claim L	9/1/1906	ST,DG	35	ASOTIN	09.0N 43.0E 13		1	WELL	10.0	1.0		0	0	0	0.00	Asotin Creek Basin
1024	G3-138778CL		HEDT IRVIN W	Claim L	7/1/1904	ST	35	ASOTIN	09.0N 43.0E 23		1		9.0	0.8		0	0	0	0.00	Asotin Creek Basin
1025	G3-138779CL		HEDT IRVIN W	Claim L	6/1/1904	ST	35	ASOTIN	09.0N 43.0E 26		1		7.0	0.5		0	0	0	0.00	Asotin Creek Basin
1043	G3-140643CL		CONWAY MARY E	Claim L		IR,DG	35	ASOTIN	10.0N 45.0E 22		1	WELL	50.0	30.0	7.5	0.5	0	0	0.00	Asotin Creek Basin
1087	G3-148964CL		PARSONS LESTER	Claim L	5/1/1974	ST,IR	35	ASOTIN	09.0N 44.0E 11	NE/SW	1	WELL	20.0	32.0	20.0	0	0	0	0.00	Asotin Creek Basin
1088	G3-148965CL		PARSONS LESTER	Claim L	5/1/1974	ST,IR	35	ASOTIN	09.0N 44.0E 13	SE/SW	1	WELL	20.0	32.0	20.0	0	0	0	0.00	Asotin Creek Basin
1089	G3-148966CL		PARSONS LESTER	Claim L	10/1/1959	ST	35	ASOTIN	09.0N 44.0E 13	SE/SW	1	WELL	2.0	3.0		0	0	0	0.00	Asotin Creek Basin
1090	G3-148967CL		PARSONS LESTER	Claim L		ST,DG	35	ASOTIN	09.0N 44.0E 14	SE/SW	1	WELL	12.0	4.0		0	0	0	0.00	Asotin Creek Basin
1091	G3-148968CL		PARSONS LESTER	Claim L	4/1/1910	ST,DG	35	ASOTIN	09.0N 44.0E 24	SW/NW	1	WELL	35.0	14.0		0	0	0	0.00	Asotin Creek Basin
1092	G3-148969CL		PARSONS LESTER	Claim L	9/1/1943	ST,DG	35	ASOTIN	09.0N 44.0E 14	SE/NW	1	WELL	11.0	2.5		0	0	0	0.00	Asotin Creek Basin
1093	G3-148974CL		WALTER FRED	Claim L	9/1/1942	ST,DG	35	ASOTIN	09.0N 44.0E 25	SW/NE	1	WELL	11.0	3.0		0	0	0	0.00	Asotin Creek Basin
1123	G3-152187CL		HOSTETLER BYRON	Claim L	1/1/1915	ST,DG	35	ASOTIN	08.0N 45.0E 16	NE/NW	1	WELL	20.0	1.0		0	110	0	6.00	Asotin Creek Basin
1124	G3-152189CL		WEISS FRENCH	Claim L		ST,DG	35	ASOTIN	08.0N 44.0E 10	SE/SE	1	WELL	5.0	2.0		0	20	0	6.00	Asotin Creek Basin
1125	G3-152190CL		WEISS FRENCH	Claim L		ST	35	ASOTIN	08.0N 44.0E 15	SE/SW	1		4.0	3.0		0	0	0	0.00	Asotin Creek Basin
1126	G3-152191CL		WEISS FRENCH	Claim L		ST	35	ASOTIN	08.0N 44.0E 15	SW/NW	1		4.0	1.0		0	0	0	0.00	Asotin Creek Basin
1127	G3-152192CL		WEISS FRENCH	Claim L		ST,DG	35	ASOTIN	08.0N 44.0E 11	NW/NW	1	WELL	50.0	2.0		0	20	0	6.00	Asotin Creek Basin
1128	G3-152193CL		WEISS FRENCH	Claim L		ST	35	ASOTIN	08.0N 44.0E 11	NW/NW	1	WELL	5.0	2.0		0	0	0	0.00	Asotin Creek Basin
1129	G3-152194CL		WEISS FRENCH	Claim L	5/1/1900	ST	35	ASOTIN	08.0N 44.0E 03		1	UNNAMED SPRING	3.0	2.0		0	0	0	0.00	Asotin Creek Basin
1131	G3-152196CL		PETTY WILBUR	Claim L		ST	35	ASOTIN	08.0N 45.0E 03	NE/SE	1	WELL	2.0	1.0		0.5	30	0	6.00	Asotin Creek Basin
1134	G3-152200CL		HOUSER & SON INC	Claim L		ST	35	ASOTIN	10.0N 45.0E 07		1	WELL	6.0	0.5		0	0	0	0.00	Asotin Creek Basin
1136	G3-152202CL		HOUSER & SON INC	Claim L	1/1/1901	ST	35	ASOTIN	11.0N 45.0E 33		1		5.0	0.5		0	0	0	0.00	Asotin Creek Basin
1137	G3-152203CL		HOLLENBECK NORMA J	Claim L	1/1/1900	ST,DG	35	ASOTIN	09.0N 46.0E 21	NW/NW	1	WELL	4.0	2.0		0	0	0	0.00	Asotin Creek Basin
1178	G3-159191CL		JENKINS DAVID G	Claim L		IR,DG	35	ASOTIN	10.0N 46.0E 19	NE/SW	1		77.0	63.2	11.0	5	0	0	0.00	Asotin Creek Basin
1181	G3-159997CL		EHNDERICKSON CARL	Claim L		ST,DG	35	ASOTIN	08.0N 45.0E 02		1	WELL	6.0	2.0		0	100	0	6.00	Asotin Creek Basin
1189	G3-161234CL		GOLD ROBIN L	Claim L		IR,DG	35	ASOTIN	10.0N 46.0E 20		1	WELL	10.0	4.0	4.0	2	0	0	0.00	Asotin Creek Basin
1190	G3-161235CL		GOLD ROBIN	Claim L		IR,DG	35	ASOTIN	10.0N 46.0E 20		1	WELLS	3.0	3.0	7.0	5	0	0	0.00	Asotin Creek Basin
1326	G3-300699CL		ROGERS RALPH	Claim		ST,IR	35	ASOTIN	08.0N 45.0E 32		1	WELL	6.0	11.0	5.0	0.5	0	0	0.00	Asotin Creek Basin