City of Pateros

Starr Road Property Feasibility Study

December 2016

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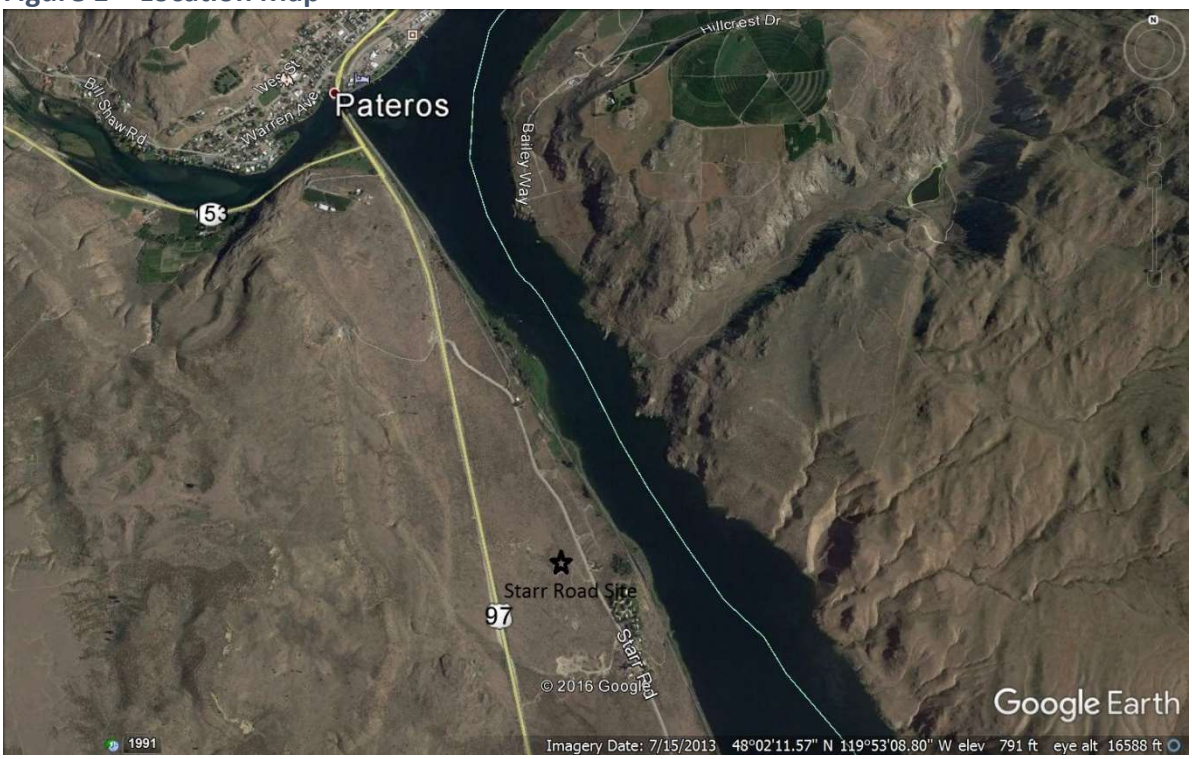
Executive Summary

Development of the Starr Road site is an important piece of Pateros's work towards economic recovery and revitalization. After years of static economic activity and the widespread devastation caused by the 2014 Carlton Complex Fires, the development of the 16.6-acre former landfill site has the potential to bring new revenue streams and new jobs to the City of Pateros.

Figure 1 – Location Map



The results of this study find that the feasibility of developing the Starr Road site is dependent on the City's ability to identify and secure grant dollars for initial development and additional grants and low interest loans for subsequent improvements. The cost of constructing needed infrastructure is not directly supported by the revenues the site can potentially generate, however, the City desires to pursue the project as it provides opportunities for businesses to locate in the community that at present do not exist.

Given the fact that at least one business is ready to lease a piece of the site and construct a metal building to house equipment and supplies, a phased development of the site as noted in the Action and Marketing Strategies section of this report be implemented.

Introduction and Background

A year after celebrating its centennial, Pateros was hit by the 2014 Carlton Complex firestorm that, at the time, was the largest wildfire in Washington State history.

Nestled between apple orchards and the Columbia River, Pateros is the smallest of the Census designated “cities” in Okanogan County. Its proximity to larger cities like Chelan (20 miles) and Omak (36 miles) make it seem an ideal bedroom community, and according to the US Census’ American Community Survey projections for 2015, the population of Pateros is approximately 668 people, 70% of whom are under the age of 55.

The City of Pateros is blessed with a wide range of opportunities. The city’s downtown fronts on the Columbia and Methow Rivers, with much of the riverfront developed as City Parks or owned by the Douglas County PUD. The community is located at the cross roads of two major highways (US 97 and SR 153) and serves as the eastern gateway to the North Cascades Scenic Highway portion of the Cascade Loop Scenic Byway through the Methow Valley, as well the southern gateway to the Okanogan Trails Scenic Byway to the Okanogan Valley and Canada. The City is also served by the Cascade and Columbia River Railroad, a short line from Wenatchee to Oroville.

Over the last decade, the City has completed a variety of planning efforts to identify strategies and projects to strengthen and stabilize the local economy through expansion of commercial opportunities in the downtown area. Throughout most of these efforts a common desire for year-round family wage jobs was articulated. In 2012/13 the City began to consider options for potential development of the City’s former landfill site for light industrial, commercial and/or recreational uses.

The intent of this report is to summarize the City’s efforts to date and provide the City Council and potential funding sources with information on the feasibility for development at the former landfill as a means to attract jobs and revenue to the community.

A History of Commerce

Before Washington became a state, Lee Ives and his family immigrated from the Kittitas Valley to a site near the confluence of the Columbia and Methow rivers, which they homesteaded in the late 1880's. They shared this area with Native American Indians and Chinese placer miners.

A community established as a result of this settlement and was known as Ives, or Ives Landing. In 1894, Ives built a large hotel on his property. The hotel included eighteen (18) rooms for travelers and a large dining room overlooking the Columbia River. About 1900 Lt. Charles Nosler, a veteran of the Spanish-American War, purchased the town site of Ives Landing and renamed it Pateros in honor of a town in the Philippine Islands.

Pateros became known as the "Gateway to the Methow Valley" due to its strategic location along the highway leading up from Wenatchee, and its status as a railroad shipping point. The landing also became a stop for Riverboats plying the Columbia River between Wenatchee and Riverside. The area around Pateros became an important apple growing region, and thousands of boxes were shipped from here. The town boasted of several apple packing sheds and commerce was brisk.

In the mid-1960's, the construction of Well's Dam forced the relocation of Pateros to higher ground, eliminating the former downtown and much of the existing commercial and industrial areas.

Traditions Continue

While the community was relocated to higher ground and rebuilt the basic economic drivers suffered and the community and economy has taken nearly 50 years to recover. The build-out of Pateros envisioned by planners at the time of relocation was slowed by downturns in the tree fruit industry, listing of salmon and steelhead as threatened and endangered species and other forces beyond local control.

However, the Pateros of today closely resembles the community of the past. A large hotel and adjacent restaurant with a view of the confluence of the Columbia and Methow Rivers dominates the downtown, tree fruit processing and shipping is a growing industry and US 97 and SR 153 along with the railroad still provide important connections to outside markets as well as access to the area for visitors. Unfortunately, both agriculture and tourism are subject to a variety of factors (e.g. fishing regulations, consumer preferences, weather, disasters, etc…) that cause some economic instability and primarily employ seasonal service or farm workers.

The Community

The incorporated limits of Pateros encompass 377 individual parcels covering approximately 387 acres of land and water (119.3 acres) with another 36 parcels covering approximately 138.23 acres in the adopted Urban Growth Area. According to 2014 Okanogan County Assessor’s records for land use, just over 80.38 percent of the total acreage is developed land. There are vacant lots scattered throughout the city but many of those listed as "vacant" are commonly used as large yards, gardens or storage. So, the 19.62 percent of vacant land could be a great deal less than what is actually calculated. These figures do not include the two large cold storage facilities constructed on undeveloped property in 2015.

Starr Road Feasibility Project

As a result of the City's desire to encourage and support job and revenue generating opportunities, a member of the City Council began an informal process of contacting a variety of businesses to gauge their interest in the Starr Road property. These initial efforts identified 3 local businesses that would be willing to sign leases for use of the property if it were developed. These uses include: contractor equipment and materials storage; and, limited sheet metal fabrication.

At the same time the City moved forward with annexation of the property and updated the Land Use Element of the Pateros Comprehensive Plan and Zoning Code to include the Starr Road property in the new "Mixed Use" land use designation and zoning district. In addition, the City worked with the Department of Ecology to determine the status of and any potential limitations on use of the former landfill, began preliminary investigations into water, sewer, power and access and prepared some conceptual plans for the property that included a recreational vehicle park and area for light industrial and/or commercial businesses.

The end result of these efforts was a clear understanding that development of the property would require outside funding assistance and that any such assistance would require a feasibility analysis to support the funding requests. Thus, in early 2014, the City submitted an application to the Washington Community Economic Revitalization Board (CERB) for a $50,000 grant to be matched with a previously approved $12,500 Planning Only Grant (POG) from the Community Development Block Grant Program (CDBG). The City's CERB request was approved, as fate would have it, on the day that the Carlton Complex Wildfire roared out of the mountains into the community destroying 40 homes, disrupting the power and water supply and causing millions in damages. Here two years later, the City has finally made it through the initial phases of what will be a very long term recovery effort and has thus been able refocus attention on the Starr Road Project.

The primary intent of the project is to verify the feasibility and economic benefits of the project and to develop a working plan to address infrastructure requirements and development tasks. The scope of work for the effort follows:

1. Determine economic feasibility of developing parcel
2. Survey and delineate existing cells of the landfill site
    a. Determine appropriate disposal of masonry and concrete on site?
    b. Would it be feasible to grind concrete and use as road base?
3. Determine appropriate use of land.
    a. Plan and delineate commercial and recreation lots.
    b. Is it buildable or only useable for surface storage?
    c. Can cells be used for commercial and/or recreation?
    d. Is the split of commercial and recreation appropriate and/or feasible?
4. Plan development infrastructure.

a Location of roads, ingress, and egress
b Electric needs and location
c Water needs, source, and location of lines.
d Sewer
e Security and safety needs – lighting, fencing, visibility for commercial and recreational use.

5. Assess impacts on neighbors and mitigation options if appropriate.

The following sections answer these questions and provide the desired information.

Starr Road Property

Between Highway 97 and the Columbia River, the Starr Road site is ripe for reclamation and repurposing. The Starr Road property was acquired by the community in 1979 as the site for a solid waste landfill which opened in 1980 and closed in 1987. The property, Assessor's Parcel Number 2923120015, is 16.60 acres lying west of Starr Road (Okanogan County Road 1525, classified as local access) approximately 2 miles south of the City. There are no structures on the property which slopes up from Starr Road to a boulder strewn and sparsely vegetated benchland that comprises the majority of the site. The northern end of the property provides nice views down to the Columbia River and north to City and mountains beyond.

Access to the property is off of Starr Road which intersects with US 97 both to the north and south. A short primitive access road was improved in 2015 to facilitate grinding and removal of concrete dumped on the site, minor grading and stockpiling of boulders. There is no water source on the property, no sewer or septic or power, although the Okanogan PUD has a 3-phase primary power line and fiber optic cable along Starr Road.

Figure 2 – Site Photo

The site is currently zoned as Mixed Use, which under the City's code, means the site is open to "a combination of uses within the same building or site as a part of an integrated development project with functional interrelationships and coherent physical design." The property adjoining to the north and west is owned by Department of Natural Resources and to the south and across Starr Road by private parties with only the parcel to the east across Starr Road developed with a single-family residence.

A survey of the property at the time of landfill closure showed that the landfill cell is limited to 2.5 acres in the center of the property. While the landfill has been closed, and approved for development by the Department of Ecology, the City must complete the items noted in the letter from Ecology to complete the formal closure process (see letter in Attachment A). A recent survey of the property with the location of landfill cells in included as Attachment B and a report on the closure process is included as Attachment C.

A formal Cultural Resources Survey was conducted on the property by Plateau Archeological Investigations in October 2016. The report noted:

> *"The cultural resource survey of the Starr Business District and RV Development Project is intended to identify potential archaeological resources and potential historic properties in the Project Area prior to ground disturbing activities. The pre-field research revealed 12 previously recorded cultural resources, one archaeological district, and four previously conducted cultural resource surveys within 1.0 mile of the Project Area. None of the sites or surveys are located within the Project Area"*
>
> *"No pre-contact or historic-era cultural materials or features were located during the subsurface probing of the Project Area. Although 45OK2150 is located within the Project Area, the site does not meet the eligibility requirements for listing on the National Register of Historic Places. Thus, Plateau recommends that the proposed undertaking will result in* ***No Historic Properties Affected****, and no further archaeological investigations are recommended prior to, or during, execution of this project."*

A copy of the full report is included as Attachment D.

An investigation into the availability of groundwater in the project area was completed by Varela Associates in 2015. The investigation determined that there was insufficient data from test wells (drilled and monitored as part of the operation and closing of the landfill) and other existing wells in the area to determine the potential for a source of water for development of the Starr Road property. The Technical Memorandum prepared by Varela provided a

recommendations and cost estimate ($257,000) for locating and drilling a test/production well in the area. A copy of the Technical Memorandum is included as Attachment E.

Regional Availability of Land for Light Industrial/Business/RV Uses

An important part of determining the feasibility of developing the Starr Road property is determining what other properties in the region are available. The area encompassed in this analysis includes the City and the southern portion of Okanogan County, including Brewster and Twisp, northern Chelan County including the city of Chelan and northern Douglas County including the city of Bridgeport. A review of the regulatory environment and availability of suitable land for each of the incorporated communities and Counties follows:

Cities

- Pateros – The City adopted an updated Land Use Element and Land Use Designations Map amending the City of Pateros Comprehensive Plan in 2014. At the same time the City completed and adopted a substantial update to its zoning code. The most significant change related to the Starr Road Project was the creation of a "mixed use" land use designation and zoning district. This designation/district was applied to the newly annexed Starr Road property as well as portions of the community previously zoned for commercial uses. The "mixed use" designation/district provides for a variety of light industrial, commercial and recreational uses.

  As previously noted, the City has limited available private land designated and zoned for industrial or non-retail commercial uses within the contiguous corporate limits. Table 1 contains ownership and parcel data within the contiguous corporate limits for "central business", "mixed use" and "industrially" designated and zoned property classified as undeveloped by the Okanogan County Assessor's DOR Code (6/16).

Table 1 – Pateros Undeveloped Industrial/Commercial Land

			Developed			Undeveloped			
Designation /Zoning	# of Parcels Total	Total Acres	# of Parcels	Acres	% of Total Acres	# of Parcels	Acres	% of Total Acres	Owned by Public Entity (% of acreage)
Central Business District	39	14.2	32	12.4	87%	7	1.8	13%	72%
Mixed Use	12	12	11	8.5	71%	1	3.5	29%	100%
Industrial	13	53.1	9	43.2	81%	4	9.9	19%	81%
TOTALS	64	79.3	52	64.1	81%	12	15.2	19%	

The total market value[1] for the undeveloped Central Business District parcels is $133,000 for an average per acre price of $70,000. The total market value[1] for undeveloped Industrial parcels is $18,900 for an average per acre price of $9,947. The only Mixed Use parcel listed as undeveloped has improvements valued at over $1.3 million.

A review of real estate websites found only one listing for a commercial property in Pateros. The property, zoned Central Business District, is the existing tavern with an asking price of $375,000. No listings could be found for either developed or undeveloped mixed use or industrially zoned properties.

- Brewster – Brewster adopted an updated Land Use Element and Land Use Designations Map for its Comprehensive Plan in 2014.The City's Comprehensive Plan and Zoning Code provide for three zoning districts, Commercial/Industrial, Heavy Industrial and Airport Industrial that permit a wide range of industrial, light industrial and other retail and non-retail commercial uses. Table 2 contains ownership and parcel data within the contiguous corporate limits for "Commercial/Industrial" and "Heavy Industrial" designated and zoned property classified as undeveloped by the Okanogan County Assessor's DOR Code (6/16).

Table 2 – Brewster Undeveloped Industrial/Commercial Land

			Developed			Undeveloped			
Designation /Zoning	# of Parcels Total	Total Acres	# of Parcels	Acres	% of Total Acres	# of Parcels	Acres	% of Total Acres	Owned by Public Entity (% of
Commercial/ Industrial	140	65.08	99	43.95	68%	41	21.13	32%	16%
Heavy Industrial	33	37.43	22	27.98	75%	11	9.45	25%	10%
Airport Industrial	5	60.28	4	60.20	99.9%	1	.08	0.1%	100%
TOTALS	178	162.79	125	132.13	81%	53	30.66	19%	

The total market value[2] for the undeveloped Commercial/Industrial parcels is $1,465,500 for an average per acre price of $68,930. The total market value[1] for the undeveloped Heavy Industrial parcels is $259,600 for an average per acre price of $27,471.

[1] - according to Okanogan County Assessor May 30, 2016 assessed market value.
[2] - according to Okanogan County Assessor May 30, 2016 assessed market value.

The majority of the undeveloped properties in both zoning districts are owned by various companies and individuals affiliated with Gebbers Farms Incorporated and are generally related to the existing fruit processing and storage facilities complex and/or existing commercial uses leaving little property available for purchase and development.

The property zoned Airport Industrial is contained within the City's Anderson Field municipal airport and is listed as developed by the Okanogan County Assessor. The total market value[3] for the Airport Industrial parcels is $232,800 for an average per acre price of $3,862. While the City is not seeking to sell any of the property, it is open to the leasing of ground for development of aviation related uses and some light industrial and/or commercial uses compatible with the operation of the facility for general aviation. However, lack of adequate water on the site limits development potential to uses that require little to no water at the present time.

A review of real estate websites found no listings for commercial or industrial property for sale in Brewster.

- Twisp – Twisp has recently released a draft update to the Land Use Element of the Town of Twisp Comprehensive Plan. The proposed update does not include any changes to the Land Use Designations and subsequently the Zoning Map. The City's Comprehensive Plan and Zoning Code provide for two zoning districts, C3 and Industrial that provide for a wide range of industrial, light industrial and other retail and non-retail commercial uses. Table 3 contains ownership and parcel data within the contiguous corporate limits for "C3" and "Industrial" designated and zoned property classified as developed or undeveloped by the Okanogan County Assessor's DOR Code (6/16).

Table 3 – Twisp Undeveloped Industrial/Commercial Land

			Developed			Undeveloped			
Designation /Zoning	# of Parcels Total	Total Acres	# of Parcels	Acres	% of Total Acres	# of Parcels	Acres	% of Total Acres	Owned by Public Entity (% of acreage)
C3	18	96.4	16	15.8	16%	2	80.6	84%	0%
Industrial	24	64.6	20	63.4	98%	4	1.2	2%	58%
TOTALS	42	161.0	36	78.2	49%	6	81.8	51%	

[3] - according to Okanogan County Assessor May 30, 2016 assessed market value.

The total market value[4] for the undeveloped C3 parcels is $356,000 for an average per acre price of $4,417. The total market value[5] for the undeveloped Heavy Industrial parcels is $120,200 for an average per acre price of $10,167.

The undeveloped properties in the C3 Zone, the former site of the Wagner and subsequently Crown Zellarbach lumber mills, are owed by a local private corporation. Primary water (including reservoir), sewer and street infrastructure was constructed through these parcels by a partnership between the landowner and Town in the late 1990's. To date no development plans have been approved and no development taken place.

As can be seen from the data in Table 3, a significant portion of land zoned Industrial has been developed with the majority of undeveloped ground owned by the Town adjacent to and part of the Twisp Municipal Airport property. The property at the airport does not have access to water or sewer and the Town presently has no long-range plan for extensions of water or sewer to serve the site, although a small well on-site does provide limited irrigation and domestic uses. It is also important to note that there are also 6 parcels of land zoned Industrial that were designated as "Common Areas" during the platting process prior to annexation into the Town. These parcels are not developable and therefore not included in this analysis.

A review of real estate websites found no listings for commercial or industrial property in Twisp.

- Bridgeport - Bridgeport recently adopted an update to the City of Bridgeport Comprehensive Plan. The update eliminated the General Industrial Land Use Designation and zoning district but left a small area designated for light industrial uses. The City plan and zoning code contains a Traffic Commercial Zone which provides for service commercial and limited light industrial uses. Table 4 contains ownership and parcel data within the contiguous corporate limits for "LI" and "TRC" designated and zoned property classified as developed or undeveloped by the Douglas County Assessor's DOR Code (6/14).

[4] - according to Okanogan County Assessor May 30, 2016 assessed market value.
[5] - according to Okanogan County Assessor May 30, 2016 assessed market value.

Table 4 – Bridgeport Undeveloped Industrial/Commercial Land

			Developed			Undeveloped			
Designation /Zoning	# of Parcels Total	Total Acres	# of Parcels	Acres	% of Total Acres	# of Parcels	Acres	% of Total Acres	Owned by Public Entity (% of acreage)
LI	31	29.30	24	19.31	66%	7	9.99	34%	0%
TRC	143	25.98	67	14.53	56%	76	11.45	44%	2%
TOTALS	174	55.28	91	33.84	61%	83	21.44	39%	

The total market value[6] for the undeveloped LI parcels is $53,700 for an average per acre price of $1,833. The total market value[7] for the undeveloped Traffic Commercial parcels is $503,300 for an average per acre price of $19,373.

The number of undeveloped parcels, particularly in the Traffic Commercial Zone (TRC), understates the true opportunities for development as many of the parcels with a DOR Code signifying some form of current use are actually vacant buildings in a variety of states of repair. The majority of properties in both zones have access to city utilities, adjoin State Route 173 and enjoy low power rates through the Douglas PUD.

A review of real estate websites found one listing for an undeveloped parcel zoned for residential use but right on the border of the City's Light Industrial Zone. The 2.88 acre parcel is listed at $99,000.

- Chelan - Chelan adopted the City of Chelan Comprehensive Plan in 2014. The City plan and zoning code contains a Warehouse-Industrial (W-I) Zone which provides for service commercial and light industrial uses as well as adopted the plan for the Apple Blossom Center, a mixed used development on the northern edge of the community adjoining the W-I zoned area. Table 5 contains ownership and parcel data within the contiguous corporate limits and Urban Growth area "W-I" and Apple Blossom Center designated and zoned property classified as developed or undeveloped by the Chelan County Assessor's DOR Code (8/16). It is important to note that the data in the Table, while based on Assessor's records, is not as accurate as the other communities analyzed as a result of the consultant being unable to translate GIS data. Another note is that the Chelan Airport, operated by the Port of Chelan County, is also available for some commercial and/or light

[6] - according to Douglas County Assessor May 30, 2014 assessed market value.
[7] - according to Douglas County Assessor May 30, 2014 assessed market value.

industrial uses that are primarily related aviation. As with the airports in Brewster and Twisp, the lack of water, specifically fire flow limits the type and size of development, although in the case of the Chelan Airport, the City and Port District are working on plans to extend City water to the facility which will eliminate this issue.

Table 5 – Chelan Undeveloped Industrial/Commercial Land

			Developed/Committed			Undeveloped			
Designation /Zoning	# of Parcels Total	Total Acres	# of Parcels	Acres	% of Total Acres	# of Parcels	Acres	% of Total Acres	Owned by Public Entity (% of acreage)
W-I	57	536.03	46	409.65	76.42%	11	126.38	23.58%	35.37%
Apple Blossom Center	43	198.73	12	123.75	62.26%	31	75.00	37.74%	49.91%
TOTALS	100	734.76	58	533.40	72.59%	42	201.38	27.41%	

The total market value[8] for the undeveloped W-I parcels is $537,308 for an average per acre price of $4,251. According to the information obtained by the consultant there are no undeveloped parcels with any value listed in the Chelan County Assessor's database within the Apple Blossom Center Planned Development, however, a web search found a website devoted to marketing lots within the Apple Blossom Center development. Attachment E contains copies of information from the website.

A review of real estate websites found two listings for undeveloped parcel zoned W-I, one parcel, 9 acres in size is listed at $2,300,000, while the other, 38.02 acres in size is listed at $2,250,000. Given the infrastructure already in place, parcels in the Apple Blossom Center development are likely priced a bit higher, although no prices are listed on their website.

Counties

- Okanogan - Okanogan County is not required to plan under the Growth Management Act and is has recently adopted an updated zoning code. The majority of the County outside of the Methow Valley has historically been zoned "Minimum Requirement District", which as it sounds, contains limited regulation of land uses. The new zoning code, which has been appealed, generally maintains the same type of approach. As a result, myriad types of commercial and industrial uses are ether allowed outright or require a conditional use permit in most of the County outside of the Methow Valley. However, such developments

[8] - according to Chelan County Assessor August 20, 2016 assessed market value.

would have to rely on individual wells and septic systems which greatly limits the type and size of such uses. Water specifically is an issue in that water rights are limited, expensive and time consuming and most commercial and industrial uses are not permitted under the exempt well statutes.

- Chelan – Chelan County is planning under the Growth Management Act which significantly limits commercial and industrial developments outside of incorporated municipalities and adopted Urban Growth Areas. As a result, the analysis of available service commercial and industrial lands was primarily limited to the City of Chelan and it's UGA. However, there is a cluster of existing industrial and commercial buildings in Chelan Falls at the junction of US 97 and SR 150. Anecdotal evidence suggests these facilities are being used for a variety of uses at present and at least in once instance, an existing tenant, a Pateros based spray foam insulation and roofing contractor, is being forced out by the landowner.

- Douglas - Douglas County is planning under the Growth Management Act which significantly limits commercial and industrial developments outside of incorporated municipalities and adopted Urban Growth Areas. As a result, the analysis of available service commercial and industrial lands was primarily limited to the City of Bridgeport and it's UGA. However, there is a cluster of existing industrial and commercial buildings on the Bridgeport Bar along SR173 as well as relatively new complexes of cold storage buildings.

Summary

While the analysis finds that there are appropriately designated and zoned undeveloped parcels within the larger study area, such properties are very limited within the Pateros area and those properties that do exist are not necessarily available for development. The exception is the Apple Blossom Center in Chelan, 14 miles to the south of Pateros. However, the cost of the parcels in this development limits the viability of the types of businesses that Pateros is seeking to serve.

Another factor to consider is the recent Hirst v Whatcom County decision[9] that, while still being analyzed, will limit the ability to develop commercial and light industrial uses in unincorporated areas. Shifting of the burden for proof of legal water for development from the Department of Ecology to the counties will force development into communities with existing water rights and utilities because of the uncertainty and expense of meeting the yet to be determined requirements in the unincorporated areas. In the end, it makes sense for the City to examine the costs of various levels of development needed to make the Starr Road property available to take advantage of the requests by private parties to locate a variety of uses on the property.

[9] - Hirst v Whatcom County – Washington State Supreme Court Decision, October 6, 2016

Identification of Targeted Businesses and Industries

Given the infrastructure constraints of the Starr Road site—principally the unknown availability water—there **are** limits to the types of development that can take place. At least initially, tenants must have no requirement for water both as a matter of need and as a matter of safety, ruling out many industrial and/or service commercial uses.

Per recommendation of the City of Pateros, five major uses were looked into: Recreational Vehicle Park, contractor/personal storage businesses, plastics recycling, shipping container refurbishing, and soy products. While each potential use was considered, the site is large enough to accommodate more than one type of business, depending on the level of infrastructure development.

Recreational Vehicle Park

The City is ideally located to take advantage of travelers with recreational vehicles on US 97 as well as visiting the Methow Valley and Lake Chelan, the increasing number of anglers coming to the area to fish for Salmon and Steelhead and for longer term stays desired by workers on large projects at Wells Dam, Okanogan PUD powerline and planned warehouse projects in the area.

With an aging baby boomer population and an increasingly mobile millennial workforce, Recreation Vehicles (RV's) are becoming more popular than ever. A 2011 survey conducted by the Recreation Vehicle Industry Association (www.rvia.org) estimates that more than 9 million American households now own some form of an RV—8.5% of the total number of US households—their highest rates yet. The industry predicts this growth trend will continue. RV ownership rates are growing fastest among 35 to 44-year-olds, and overall, new RV sales are expected to increase by at least 5-10% in 2016.

Citing desires to "experience nature and outdoor activities and enjoy quality family time," save money on vacation costs, and take "more short 'mini' vacations" to one of the nations' 16,000 campgrounds, the average RV owners are families with median incomes above $62,000 per year.

But as the demographics change, so do the demands of the RV owners. Wi-Fi is a frequent request: a survey of WA State Park overnight guests revealed the two most suggested improvements were "Wi-Fi and an espresso machine." Campgrounds and parks are putting in game spaces, holding yoga classes, and staging live entertainment in order to attract the new type of RV and camping traveler.

The City's only true RV park closed in 2009 and was replaced with the Howard's Lakeside Inn. The City does permit RV's to park along the park side of Lakeshore Drive (no hookups available) and is in the process of developing RV spaces (with hookups) at the winter boat launch area in the north end of the City, with an RV dump site completed in 2015. The potential for an RV Park on the Starr Road property was one of the City's initial ideas.

Survey Results

Approximately 26 RV-accommodating parks/resorts exist within a fifty-mile radius of the Starr Road site. These locations vary in everything from their ownership (private v. public), to their size, amenities, opening dates and more (see Figure 3). Below is a summary compiled from online research and phone interviews.

- There are more than 500 full hookups (electric, water and sewer) and over 300 partial hookup RV sites within a 50-mile radius of Pateros.
- Most of the parks are open seasonally. Of the publicly owned parks only two—Bridgeport State Park and Wenatchee Confluence State Park—are open year around.
- Nineteen of the twenty-six parks have immediate (read: less than 1/3 mile) access to recreation such as fishing, boating, hiking, biking, etc.
    - Proximity to water seemed to be the most common factor in determining where a park would be located
- All but one location has access to a shower. Some showers require payment, others are free
- Nearly all surveyed parks have an event or gathering space. This could include a covered shelter, fire pits, picnic tables, etc.
- The most common length of stay is 2-3 nights. However, parks that are not in immediate proximity to recreation and/or are not located in a desirable tourism area will most likely attract either very short (1-2 nights) or considerably longer (10+ stays)
    - E.g., Margie's RV Park in Riverside and Riverbend RV Park in Twisp
- During the busy season, some of the lesser-known RV parks will get overflow from tourists who were not able to find space in their desired destination, such as Chelan or Winthrop
    - E.g., Bridgeport Marina and RV Park
- Only one site, Carl Precht Memorial RV Park in Omak, does not have an attendant on-site for checking people in and out
- Only two parks—Beebe Bridge Park and Carl Precht Memorial RV Park do not take reservations. The remainder of the parks are a combination of reservation-only and reservations + first-come-first-serve.
- Some of the Parks themselves have become the destination: many parks have loyal return customers, can be booked up to nine months in advance, and have become hot spots for people to host parties and group getaways

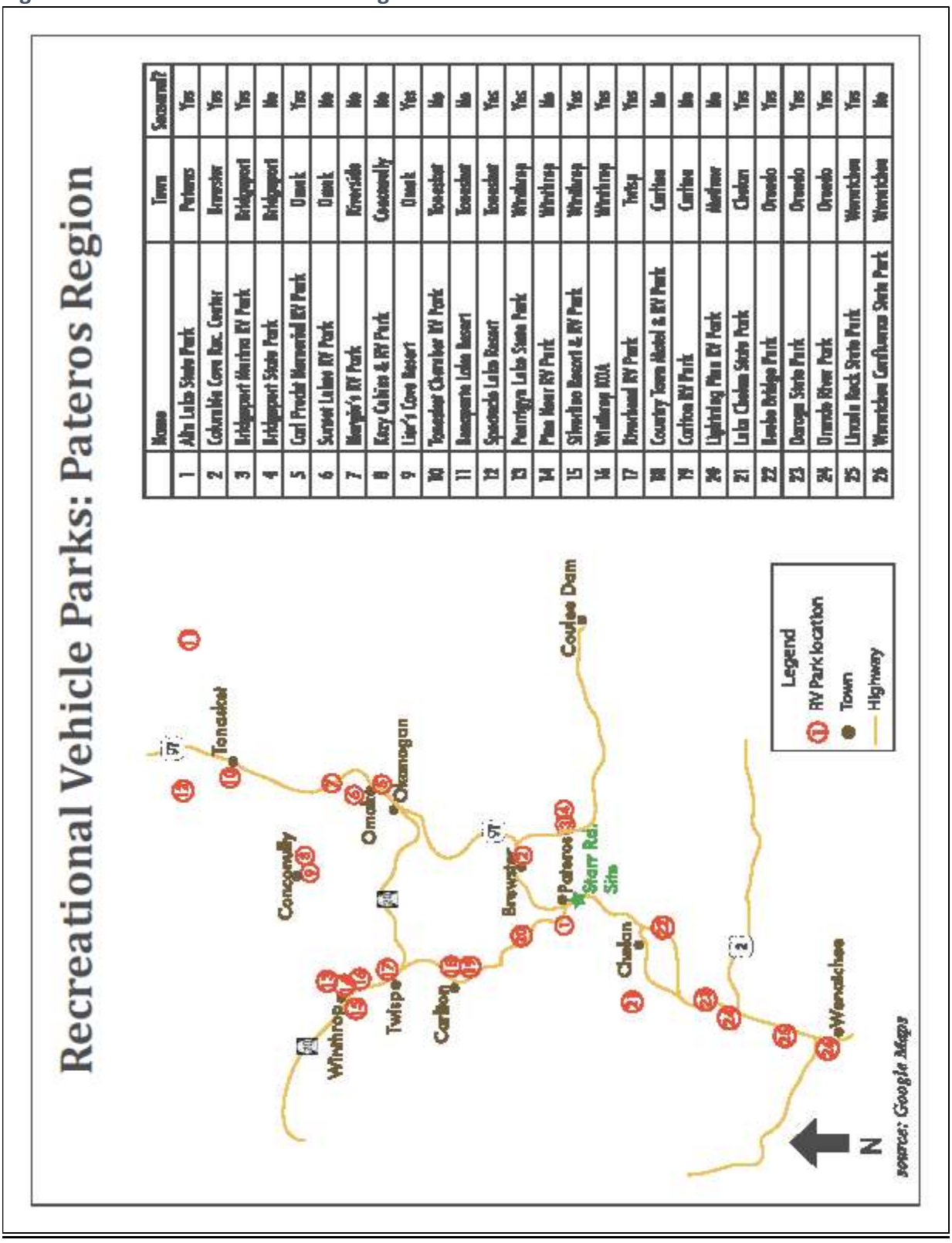
There is a supply shortage that Pateros could capitalize on—specifically those wanting longer-term stays. Several RV Parks in the region—Bridgeport Marina RV Park (19 miles from Starr Road site) Lightning Pines RV Park (16 miles from Starr Road site)—shared a need for more RV sites that offer longer-term stays for short-term and seasonal workers. Between road construction and fire rehabilitation projects, upgrades to the Wells Dam, PUD powerline project, orchard labor and others, temporary and seasonal workers are increasingly seeking affordable accommodations that don't require a year-long lease. The owner of Lightning Pines

RV Park explained that he has recently started taking month-to-month occupants and routinely turns down 5-6 calls per week from other seasonal workers looking for a spot to park their RVs.

The recreation-focused parks are only open part of the year, have restrictions on length-of-stay and tend to book up far in advance, eliminating them as an option for these types of residents. In fact, only five of the regional RV parks surveyed are open year-round *and* allow occupants to stay for longer than 30 days. These parks are also the ones with the fewest number of spaces available.

The results of the survey indicate that an RV park with the ability to operate year-round and provide for longer term stays is a viable option for the Starr Road property providing adequate water is available.

Figure 3 – RV Parks in the Pateros Region



	Name	Town	Seasonal?
1	Alta Lake State Park	Pateros	Yes
2	Columbia Cove Rec. Center	Brewster	Yes
3	Bridgeport Marina RV Park	Bridgeport	Yes
4	Bridgeport State Park	Bridgeport	No
5	Carl Precht Memorial RV Park	Omak	Yes
6	Sunset Lakes RV Park	Omak	No
7	Margie's RV Park	Riverside	No
8	Easy Cabins & RV Park	Conconully	No
9	Lee's Cove Resort	Omak	Yes
10	Tonasket Chamber RV Park	Tonasket	No
11	Bonaparte Lake Resort	Tonasket	No
12	Spectacle Lake Resort	Tonasket	Yes
13	Pearrygin Lake State Park	Winthrop	Yes
14	Pine Near RV Park	Winthrop	No
15	Silverline Resort & RV Park	Winthrop	Yes
16	Winthrop KOA	Winthrop	Yes
17	Riverbend RV Park	Twisp	Yes
18	Country Town Motel & RV Park	Carlton	No
19	Carlton RV Park	Carlton	No
20	Lightning Plus RV Park	Methow	No
21	Lake Chelan State Park	Chelan	Yes
22	Beebe Bridge Park	Orondo	Yes
23	Daroga State Park	Orondo	Yes
24	Orondo River Park	Orondo	Yes
25	Lincoln Rock State Park	Wenatchee	Yes
26	Wenatchee Confluence State Park	Wenatchee	No

Storage – contractor, personal, mini

Several of the businesses expressing interest in locating on the Starr Road property are local contractors seeking a secure location to store equipment and potentially stockpile materials. A brief survey of the project area found there is one storage facility in Pateros with nine more within a 30-mile radius. However, none of the facilities provide the type of equipment storage or material stockpiling that businesses approaching the City are seeking. In the past, several months, a Pateros based spray foam insulation and roofing company has inquired about the availability of the land for construction of a shop building to store their equipment and materials. The company presently houses its equipment and supplies in an old fruit warehouse in Chelan Falls, but has been given notice to vacate the premises as the owner has decided to put the structure to another use. Letters from businesses that are interested in locating on the Starr Road property when it is available are contained in Attachment G.

Given the level of interest expressed by private businesses over the past several years, it is very likely that use of the Starr Road property for these types of uses is feasible and many have limited requirements for water and sewer.

Container refurbishing

A member of the City Council as well as former Mayor identified the potential for using the site as a location for refurbishing shipping containers for residential and/or retail purposes. The councilmember has visited several existing companies in the business on the west side of the Cascade Mountains and talked about the potential for development of a refurbishing facility in the Pateros area. The effort is driven in part by the lack of housing in the community and region which was greatly exacerbated by the historic wild land fires in 2014 and 2015. While there are no commitments by any businesses at present, the site lends itself to this type of use, the industry is growing and the City has explored the potential for developing a container based retail/residential project in downtown. This type of use would involve on-site employees which would require both water and septic and potentially fire flow.

Plastic recycling

The same council member has also visited and contacted firms that recycle plastics and found there is a potential for this industry. At present most plastics are recycled in either southern California or the southeastern US and the Department of Ecology has recently begun an effort to encourage the location of a facility in Washington State. While that effort is focused west of the Cascades, the availability and cost of land and power may result in the industry looking east of the Cascades. The council member attended a trade show in Germany and visited an operating facility in the state of Georgia as part of the effort to identify the potential and determine site needs. This use would be attractive not only in the investment and jobs created but also the potential for catalyzing a “cluster” of new businesses that use the recycled products. However, this type of use would involve on-site employees which would require water, septic and fire flow.

Soy products

Another potential industry the City has had contact with entails processing of soy beans into tofu and related products. In 2013 the City established a sister city relationship with Pateros, Philippines and in 2014 the Mayor and the council member, who has been instrumental in seeking out potential tenants for the Starr Road property, traveled to the Philippines to attend a celebration. During the trip, City officials met with the owner of a soybean processing company who expressed interest in expanding his operation to the US. While this type of use would be attractive, it would require the most extensive infrastructure in terms of water and sewer.

Summary

An analysis of the types of opportunities being explored for the Starr Road property finds that there are three tiers of enterprises, each requiring progressively more infrastructure and improvements. While the City has been approached by businesses wanting to locate at the site, the ability to enter into any agreements depends on the availability of basic infrastructure including power, access and security. These are referred to as Tier 1 prospects. Research on the feasibility of dedicating a portion of the parcel to an RV Park certainly showed promise, especially if a percentage of the sites are available for long-term occupancy and winter use. However, development of the RV park requires water, sewer and telecommunications in addition to the basic power, access and security. Potential uses, such as an RV park, which require the full range of infrastructure are referred to as Tier 3 prospects. Finally, Tier 2 prospects are potential uses such as shipping container refurbishing or equipment repair that require more than the basic infrastructure but not necessarily the full range.

In order to determine the feasibility of locating any business on the site, some estimates of the cost to provide infrastructure is required. The next section contains cost estimates for three development scenarios.

Estimated Costs of Development

The following assumptions were used to develop a range of cost estimates for development of the Starr Road property for varying levels of use.

Assumptions/Description

Road Standards - road shall meet City requirements for City street, minimum of two 11' travel lanes, 2' shoulder on one side, 5' shoulder for bike lane/pedestrian path on the other

Power - PUD has three phase mainline along Starr Road, power put underground with risers at each development site, power also needs to run between RV sites, with single meters on long term sites.

Telecommunication – bury conduit for fiber

Water Supply - cost includes property acquisition and source development costs for well. Ideal available water would be 150-300gpm, however the availability of water will be the limiting factor on the types of uses permitted on the site. A Technical Memorandum on water availability is included as Attachment E.

Water lines - depends on development scenario - minimum required for intended uses

Water Storage - need and amount of storage driven by supply, fire flow requirements and prospective uses. Uses will likely have no more than 25 to 30 employees, RV park up to 24 spaces, 8 available for long term and winter use and a tent camping area.

On-site septic - that all sewage will be handled by individual systems for most uses or group system for RV park

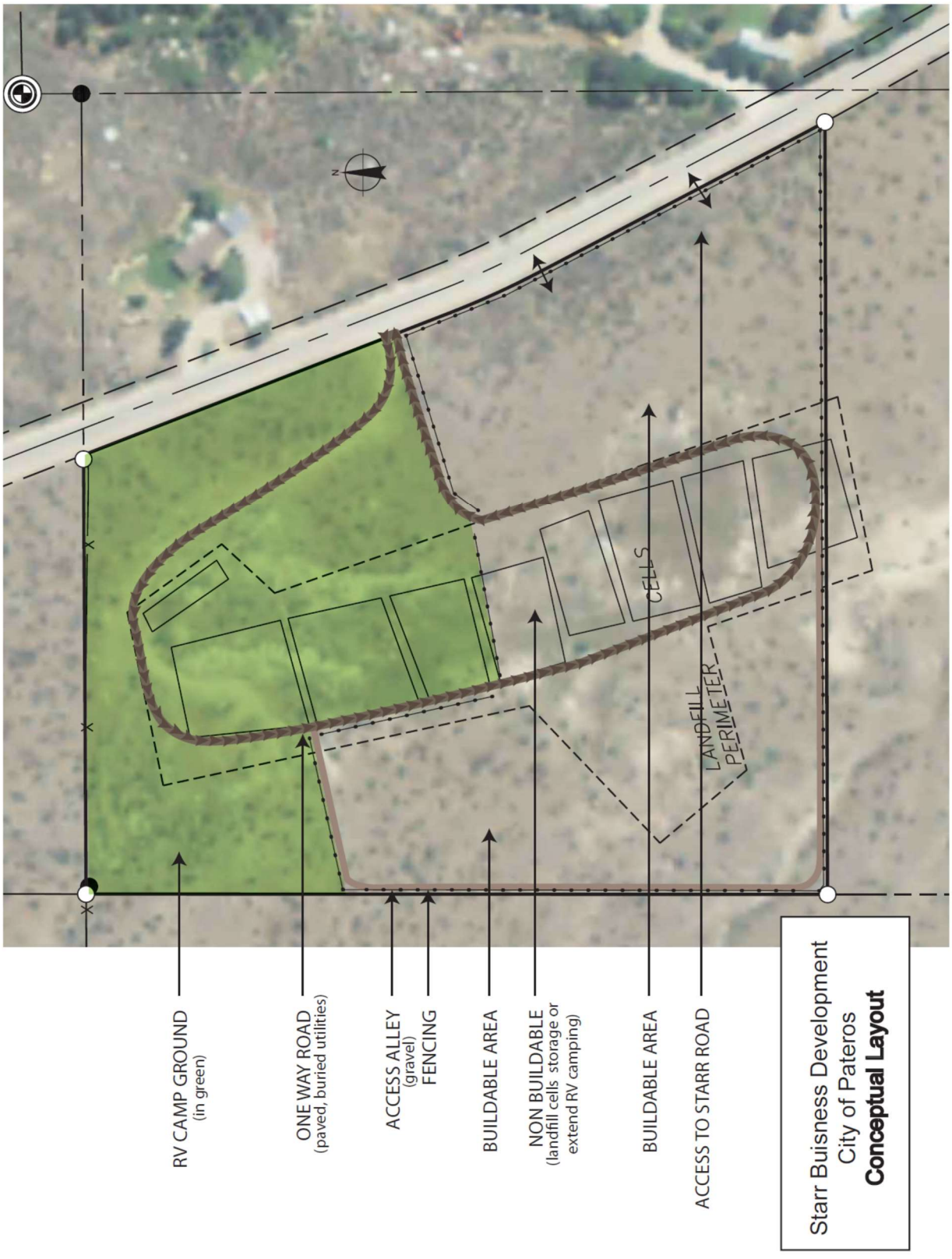
Security fence - that security fence will be required around area designated for light industrial and commercial uses.

Security lighting - security and safety lighting will be required for all uses. Lighting shall be LED and minimize off-site glare.

Landscaping/irrigation - that when water is available the site will require landscaping (especially the RV park), while primarily to be xeriscape, there will be the need to plant some trees and shrubs for shade.

In order to develop the estimates a preliminary site plan has been prepared with the assumption that an RV park will be one of the uses of the site. The conceptual site plan used to develop the cost estimates follows.

Figure 4 – Conceptual Site Plan



City of Pateros Starr Road Feasibility Study Cost Estimates

Tier 1 - Business Prospects

Infrastructure Item	Required	Linear Feet	Square Yards	Unit Price	Lump Sum	Subtotal	System Cost	Total
Road	X		7,900	$100.20		$790,188		$792,188
Power	X	1,400		$33.66		$47,125		$47,125
Telecommunications	X				$24,375	$24,375		$24,375
Water supply		0	0	0	0	0	0	0
Water lines		0	0	0	0	0	0	0
Water storage		0	0	0	0	0	0	0
On-Site septic system		0	0	0	0	0	0	0
Security fence	X	2,900		$42.31		$122,688		$122,688
Security lighting/landscape	X				$81,250	$81,250		$81,250
Landscaping/Irrigation		0	0	0	0	0	0	0
TOTAL								**$1,067,626**

Tier 2 - Business Prospects

Infrastructure Item	Required	Linear Feet	Square Feet	Unit Price	Lump Sum	Subtotal	System Cost	Total
Road	X		7,900	$100.28		$790,188		$792,188
Power	X	1,400		$33.66		$47,125		$47,125
Telecommunications	X				$24,375	$24,375		$24,375
Water supply	X				$1,075,000	$1,075,000		$1,075,000
Water lines	X				$450,000	$450,000		$450,000
Water storage		0	0	0	0	0	0	0
On-Site septic system		0	0	0	0	0	0	0
Security fence	X	2,900		$42.31		$122,688		$122,688
Security lighting	X				$81,250	$81,250		$81,250
Landscaping/Irrigation	X				$20,000	$20,000		$20,000
TOTAL								**2,612,626**

Tier 3 - Business Prospects

Infrastructure Item	Required	Linear Feet	Square Feet	Unit Price	Lump Sum	Subtotal	System Cost	Total
Road	X		7,900	$100.28		$790,188		$792,188
Power	X	1,400		$33.66		$47,125		$47,125
Telecommunications	X				$24,375	$24,375		$24,375
Water supply	X				$1,075,000	$1,075,000		$1,075,000
Water lines	X				$450,000	$450,000		$450,000
Water storage[10]	X				$1-3.5 million	$1-3.5 million		$1-3.5 million
On-Site septic system	X				$250,000	$250,000		$250,000
Security fence	X	2,900		$42.31		$122,688		$122,688
Security lighting	X				$81,250	$81,250		$81,250
Landscaping/Irrigation	X				$20,000	$20,000		$20,000
Rv Park	X				$750,000	$750,000		$750,000
TOTAL								**$3,612626-$7,112,626**

Each of the estimates assumes the required improvements are completed all at once, e.g. the entire road system is constructed at the same time. However, it is also possible for the required road(s), fencing, water distribution system etc… to be built in phases as the City secures funding and agreement(s) in place for businesses to locate on the site.

The estimates do not include the possibility that the City could "build-to-suit" structures for committed tenants. Estimates for a metal building range from $25 per square foot for a basic storage structure to $200 per square foot for a fully finished building (insulation, restrooms, office space, etc…).

[10] - Cost estimates for Water storage range from $1-2 million for an on-site 350,000 gallon reservoir to $3.5 million for transmission main and booster from the City

In order to understand the potential financial impact of developing the site, the table below provides several financing scenarios for the infrastructure required to serve each tier of potential businesses.

Table 4 – Financing Improvements 100% Loan

	Project Estimate	Annual Payment @ 1.375% 40 Year Term	Annual Payment @ 2% 20 Year Term	Annual Payment @6% 30 Year Term
Tier 1	$1,067,626	$34,752	$64,812	$76.812
Tier 2	$1,545,000	$50,280	$93,792	$111.156
Tier 3 (inc RV Park)				
Onsite Septic and Water Storage[11]	$2,500,000	$81,360	$151,764	$179,868
Onsite Septic and Connection to City Water	$4,500,000	$146,460	$273,180	$323,760
5000 sq ft Metal Building	$250,000	$8,136	$15,180	$17,988

Table 5 – Financing Improvements 50% Loan – 50% Grant

	Project Estimate	Annual Payment @ 1.375% 40 Year Term	Annual Payment @ 2% 20 Year Term	Annual Payment @6% 30 Year Term
Tier 1	$1,067,626	$17,376	$32,406	$38,411
Tier 2	$1,545,000	$25,140	$46,896	$55,578
Tier 3				
Onsite Septic and Water Storage[12]	$1,750,000	$40,680	$75,882	$89,934
Onsite Septic and Connection to City Water	$3,750,000	$73,230	$136,590	$161,880
5000 sq ft Metal Building	$250,000	$4,068	$7,590	$8,994

The following section provides projections of potential revenues following development of the Starr Road property.

[11] - assumes $1.5 million for reservoir
[12] - assumes $1.5 million for reservoir

Estimated Revenues

One of the key factors determining the feasibility of developing the site is whether the return is worth the investment. In the case of developing the Starr Road site the direct financial return to the City will depend on the type of infrastructure in place and how the site is developed. This analysis examines two general options. Option One is the City installs required infrastructure and leases ground to private interests to construct buildings and related improvements. Option Two the city installs required infrastructure and constructs buildings and related improvements that are rented to private enterprises.

In Option One, Tier 1 types of uses will be limited to paying a basic lease charge, leasehold tax (6.25% City share) and potentially a PUD bill for power (City will receive a 6% utility tax), while Tier 2 and 3 business would additionally pay property tax on buildings and related improvements and bills for water and/or sewer (including a 6% utility tax).

In Option Two, Tier 1 types of uses will be limited to paying a basic rental charge and potentially a PUD bill for power (City will receive a 6% utility tax), while Tier 2 and 3 businesses would pay a monthly rental fee depending on the size of building and type of related improvements and also for water and/or sewer (including a 6% utility tax). The RV Park would be part of the City's park system with revenue generated through camp site charges, water/sewer bills and any concessions.

In addition to dollars generated through leases, taxes, charges or rental fees, another, and in many ways more important return to the community, is the retention or creation of jobs by the businesses that chose to locate at the site. People working at or visiting the site are likely to patronize businesses in the community and potentially chose to live in Pateros. These activities will support other ongoing community efforts to increase retail options and available housing in the community. It has been difficult for Pateros to create more retail and housing opportunities without a proven demand and it is hard to create jobs when existing retail and housing don't necessarily support it. However, it is a serious challenge to place numbers on this type of return given the vagaries of the marketplace.

Revenues – Option One

The following table provides a summary of the anticipated rates and charges a business would pay to locate on the Starr Road Property and construct their own buildings:

Table 6 - Rates and Charges – Option One

Lease per sq ft annual[13]	Leasehold Tax[14]	Utility Tax-Power	Personal Property Tax	Water - monthly	Utility Tax-Water	Sewer – monthly	Utility Tax-Sewer	RV site Charges		
								Daily	Weekly	Monthly
$0.08 – 0.15	6.25%	6%	2.458413	$48.29	6%	$44.79	6%	$45 hook up $15 dry or tent camping	$35	$25

Three scenarios have been developed to examine to potential revenues from the Starr Road Project where buildings are privately constructed and owned on land leased from the City. There is one scenario for each Tier of business prospects.

Projected Revenues -Tier 1

This scenario assumes three businesses locate on the property, two constructing their own buildings, with infrastructure limited to access, power, fiber and security fencing/lighting.

Table 7 - Scenario 1 – Leased Ground

Businesses	**Sq ft Leased**	**Lease per sq ft annual**	**Lease Subtotal annual**	**Improve-ment Value**	**Personal Property Tax**	**Lease-hold Tax**	**Lease-hold Subtotal**	**Utility Tax-Power[15] annual**	**TOTAL annual**
1. Limited to outdoor storage	10,000	$0.08	$800	$0.00	$0.00	6.25%	$50.00	$28.80	$878.80
2. Limited to steel building to protect equipment and supplies	15,000	$0.08	$1,200	$60,000	$148.00	6.25%	$75.00	$28.80	$1,451.30
3. Limited to steel building to protect equipment and supplies	20,000	$0.08	$1,600	$150,000	$369.00	6.25%	$100.00	$28.80	$2,097.56
						Potential Annual Revenue			**$4,227.67**

Projected Revenues -Tier 2

This scenario assumes four businesses, three constructing their own buildings with two served with water, locate on the property with the addition of water to the site and enhanced landscaping. The projection also assumes consumption of electricity and water will be limited to base rates. No revenue is estimated for tax on internet access.

[13] - lease rate dependent on type of use – Tier 1: $0.08/sq ft, Tier 2: $0.09-0.12/sq ft, Tier 3: $0.15/sq ft

[14] - City share – 12.5% total with State receiving half tax applied to annual lease amount

[15] - based on a 6% utility tax on a base rate of $40/month for small general service 2016 Okanogan PUD

Table 8 - Scenario 2 – Leased Ground

Businesses	Sq ft Leased	Lease per sq ft annual	Lease Subtotal annual	Improve-ment Value	Lease -hold Tax	Lease-hold Subtotal annual	Personal Property Tax annual	Utility Tax-Power[16] annual	Water monthly	Utility Tax-Water (6%)	Water Subtotal annual	Sewer monthly	Utility Tax-Sewer (6%)	Sewer Subtotal annual	TOTAL annual
1. Limited outdoor storage	10,000	$0.08	$800	$0.00	6.25%	$50.00	$0.00	$28.80	$0.00	6%	$0.00	$0.00	6%	$0.00	$878.80
2. Steel building	15,000	$0.09	$1,350	$60,000	6.25%	$84.00	$148.00	$28.80	$0.00	6%	$0.00	$0.00	6%	$0.00	$1,610.68
3. Steel building connected to water[17]	20,000	$0.10	$2,000	$150,000	6.25%	$125.00	$369.00	$28.80	$48.29	6%	$614.25	$44.79	6%	$569.73	$3,706.54
4. Steel building connected to water[14]	25,000	$0.10	$2,500	$250,000	6.25%	$156.00	$615.00	$28.80	$48.29	6%	$614.25	$44.79	6%	$569.73	$4,483.63
														Potential Annual Revenue	**$10,679.65**

Projected Revenues -Tier 3

This scenario assumes the same four businesses as the Tier 2 projection with the addition of a privately built and operated RV Park with 24 full hookups, 8 dry/tent sites, 8 sites designed for year-round use and the availability of fire flow for the entire site. The projection also assumes consumption of electricity, water and sewer will be limited to base rates. No revenue is estimated for tax on internet access.

[16] - based on 6% utility tax base rate of $40/month for small general service 2016 Okanogan PUD

[17] - connected to City owned and operated on-site septic system

Table 9 - Scenario 3 – Leased Ground

Businesses	Sq ft Leased	Lease per sq ft annual	Lease Subtotal annual	Improve-ment Value	Lease -hold Tax (6%)	Lease-hold Subtotal annual	Property Tax	Utility Tax-Power[18] annual	Water monthly	Utility Tax-Water (6%)	Water Subtotal annual	Sewer monthly	Utility Tax-Sewer (6%)	Sewer Subtotal annual	TOTAL annual
1. Limited outdoor storage	10,000	$0.10	$800	$0.00	6.25%	$63.00	$0.00	$28.80	$0.00	6%	$0.00	$0.00	6%	$0.00	$1,091.30
2. Steel building	15,000	$0.12	$1,500	$60,000	6.25%	$113.00	$148.00	$28.80	$0.00	6%	$0.00	$44.79	6%	$569.73	$2,511.03
3. Steel building connected to water/sewer	20,000	$0.15	$3,000	$150,000	6.25%	$188.00	$369.00	$28.80	$48.29	6%	$614.25	$44.79	6%	$569.73	$4,212.78
4. Steel building connected to water/sewer	25,000	$0.15	$3,750	$250,000	6.25%	$234.00	$615.00	$28.80	$48.29	6%	$614.25	$44.79	6%	$569.73	$4,962.78
5. RV Park	100,000	$0.15	$15,000	$400,000	6.25%	$938.00	$983.00	$28.80	$48.29	6%	$614.25	$44.79	6%	$569.73	$16,600.04
													Potential Annual Revenue		**$29,337.92**

[18] - based on 6% utility tax on base rate of $40/month for small general service 2016 Okanogan PUD

Revenues – Option Two

With this option the city constructs and rents buildings as demand warrants and develops and operates an RV Park. Assumptions and projections for this scenario are presented in the following tables.

Table 10 - Rates and Charges – Option Two

Rental rate per sq ft annual[19]	Utility Tax-Power	Water - monthly	Utility Tax-Water	Sewer – monthly	Utility Tax-Sewer	RV site Charges		
						Daily	Weekly	Monthly
$0.08 – 0.60	6%	$48.29	6%	$44.79	6%	$45 hook up $15 dry or tent comping	$35	$25

Rather than generating 3 scenarios for this option, Table 11 contains revenue projections for a variety of uses, building sizes and utility connections that provide a baseline for a range of potential revenues. Table 12 provides revenues revenue projections for a city owned and operated RV Park.

Table 11 - Scenario 1 – City Construct and Rent

Businesses	**Sq ft rented**	**Rent per sq foot Annual**	**Subtotal Rent**	**Utility Tax-Power[20] annual**	**Water monthly**	**Utility Tax-Water (6%)**	**Water Subtotal annual**	**Sewer monthly**	**Utility Tax-Sewer (6%)**	**Sewer Subtotal annual**	**TOTAL annual**
1. Limited outdoor storage	10,000	$0.08	$800	$28.80	$0.00	6%	$0.00	$0.00	6%	$0.00	$828.80
2. Steel building	15,000	$0.50	$7,500	$28.80	$0.00	6%	$0.00	$44.79	6%	$569.73	$8,098.53
3. Steel building connected to water	20,000	$0.60	$12,000	$28.80	$48.29	6%	$614.25	$44.79	6%	$569.73	$13,212.78
4. Steel building connected to water/sewer	25,000	$0.60	$15,000	$28.80	$48.29	6%	$614.25	$44.79	6%	$569.73	$16,212.78
										Potential Annual Revenue	$38,352.89

[19] - rental rate dependent on type of use – Tier 1: $0.08/sq ft, Tier 2: $0.50/sq ft, Tier 3: $0.60/sq ft

[20] - based on 6% utility tax on base rate of $40/month for small general service 2016 Okanogan PUD

Table 11 – City-Operated RV Park

Type of Site	# of Spaces	Year-Round	Season (8 months)	Number of Potential days/weeks/ months	Occupancy Rate	Occupied days/weeks/ months	Projected Revenue
RV – full hookup by the day[21]	24	0	24	3226 single stays	70%	2258 single days	$101,610
RV – full hookup by the week[22]	24	0	24	115 weekly stays	70%	80 weekly stays	$19,600
full hookup by the month[23]	8	8	0	97 monthly stays	80%	78 monthly stays	$58,500
RV – dry, tent camping[24]	8	0	8	1344 single stays	50%	670 single stays	$10,050
						Projected Annual Revenue	**$189,760**

A review of the options and projected revenue finds that generating significant revenues from the project will requires a substantial investment in infrastructure. The projections show that generation of sufficient revenues to cover development costs does not occur until the site has Tier 3 infrastructure. This does not necessarily mean the project is not feasible, it means that an Action Strategy should be created for the incremental development of the Starr Road property as funding is available and agreements are reached with private enterprises.

[21] - assumes 80% of site uses will be on daily basis @ $45/day
[22] - assumes 20% of site uses will be on a weekly basis @ $35/day
[23] - assumes all 8 sites used for monthly rental @750/month
[24] - assumes dry and/or tent sites @$15/day

Action and Marketing Strategies

The strategies for development and marketing of the property are closely allied in that the property should not be marketed to Tier 2 or 3 businesses until a firm plan is in place to engineer and construct required improvements - primarily the water system. As a result, the action strategy is broken into three parts. It should be noted that each part of the strategy may be implemented in phases (e.g. access, fencing, etc…. limited to the minimum required to serve a committed tenant)

Action Strategies

Part 1 - Action Strategy to prepare property for development

1. Complete requirements for final landfill closure
2. Finalize site development plan delineating open space, industrial/business sites and RV park site
3. Complete grading of site for planned uses
4. Construct access road(s) and install conduit and boxes for power and telecommunications as needed to serve committed tenant(s)
5. Fence all or portion of site depending needs of committed tenant(s)
6. Install security lighting and minor landscaping
7. Construct building(s) to suit committed tenant

Part 2 – Action Strategy to continue development

1. Implement recommendations from Technical Memorandum on water
2. Continue construction of access road(s) and install conduit and boxes for power and telecommunications as needed to serve committed tenant(s)
3. Continue fencing portions of site depending needs of committed tenant(s)
4. Install additional security lighting and minor landscaping
5. Construct building to suit committed tenant(s)
6. Acquire property or easement for development of well
7. Install water distribution system
8. Install on-site septic systems as needed
9. Install landscaping for buffering between uses and screen from neighboring residential uses

Part 3 – Action Strategy to complete development

1. Complete construction of access road(s) and install conduit and boxes for power and telecommunications as needed to serve committed tenant(s)
2. Complete fencing portions of site depending needs of committed tenant(s)
3. Install additional security lighting and minor landscaping
4. Construct building to suit committed tenant(s)

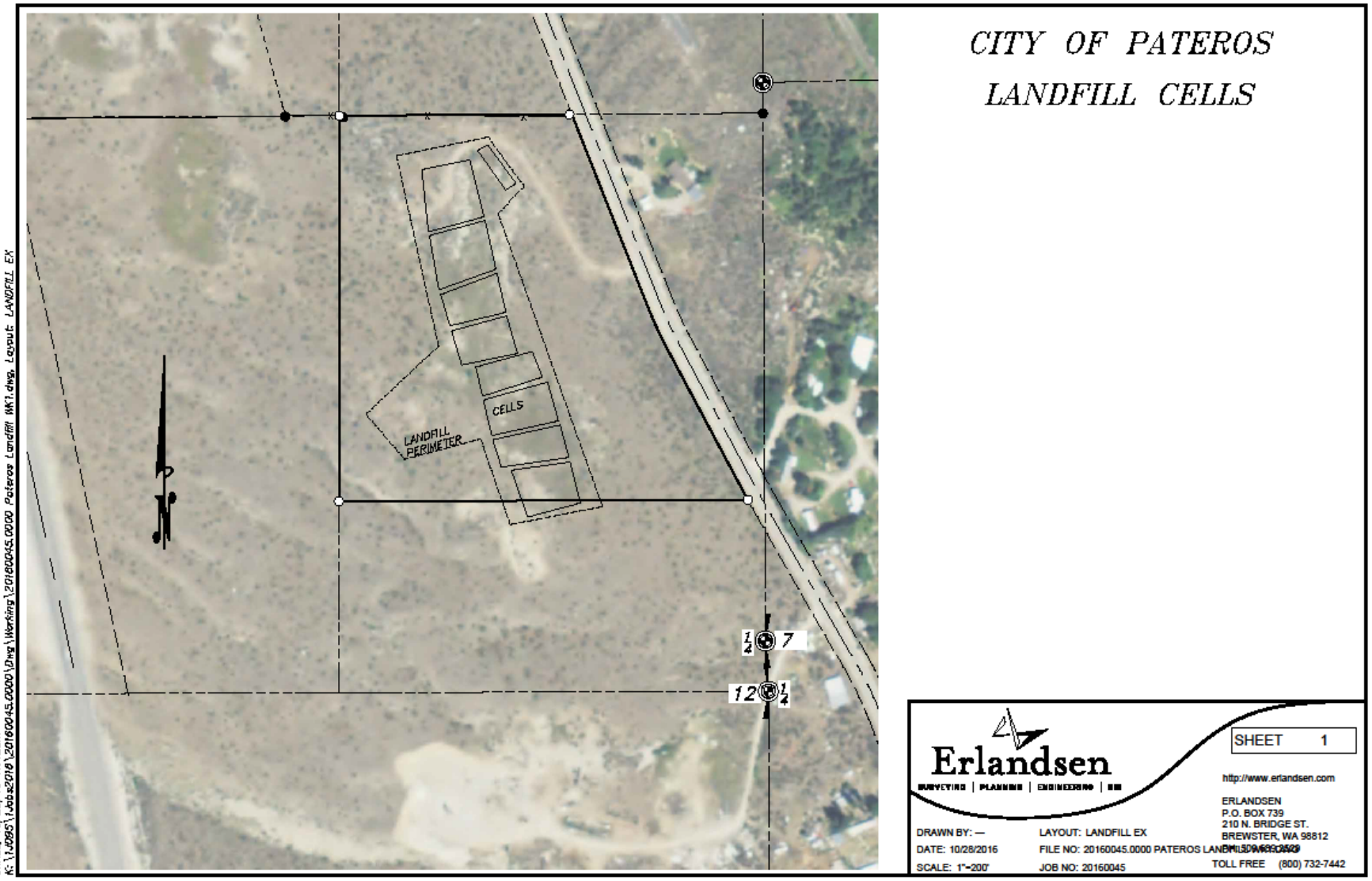
5. Design and construct reservoir sized to fit anticipated development or construction booster state and extension from City system
6. Design and construct RV Park

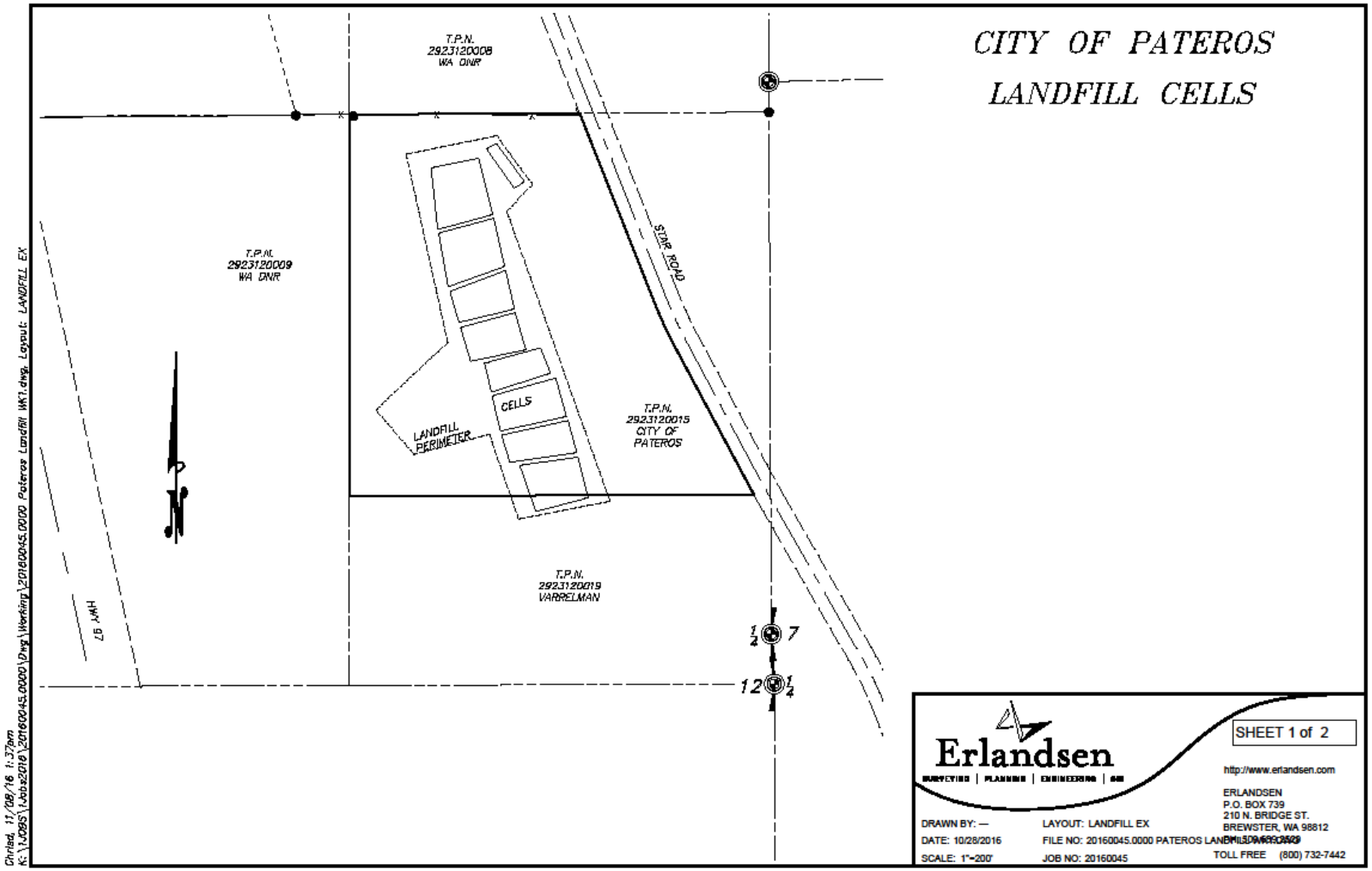
Marketing Strategy

The City intends to market the site through county and regional economic development organizations, word of mouth through the local business community and placement of ads in regional and statewide media. The City has been relatively successful in generating interest in the property, enough that this feasibility study was warranted.

The key to the marketing strategy is that it is tied to the action strategies with the City's initial efforts focused on businesses and uses that do not require any infrastructure beyond access, power, and security.

Attachment B – Landfill Maps

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CULTURAL RESOURCES REPORT COVER SHEET

Author: Matthew Marino and David A. Harder

Title of Report: Cultural Resource Survey of the Starr Business District and RV Development Project, City of Pateros, Okanogan County, Washington

Date of Report: October 31, 2016

County(ies): Okanogan Section: 12 Township: 29 North Range: 23 East

Quad: Pateros 1982 (photorevised 1989) Acres: 16.6

PDF of report submitted (REQUIRED) ☒ Yes

Historic Property Inventory Forms to be Approved Online? ☐ Yes ☒ No

Archaeological Site(s)/Isolate(s) Found or Amended? ☒ Yes ☐ No

TCP(s) found? ☐ Yes ☒ No

Replace a draft? ☐ Yes ☒ No

Satisfy a DAHP Archaeological Excavation Permit requirement? ☐ Yes # ☒ No

DAHP Archaeological Site #:
45OK2150

- Submission of PDFs is required.
- Please be sure that any PDF submitted to DAHP has its cover sheet, figures, graphics, appendices, attachments, correspondence, etc., compiled into one single PDF file.
- Please check that the PDF displays correctly when opened.

Cultural Resource Survey of the Starr Business District and RV Development Project, City of Pateros, Okanogan County, Washington

By:
Matthew Marino and David A. Harder

PLATEAU
ARCHAEOLOGICAL INVESTIGATIONS, LLC

October 2016

Cultural Resource Survey of the Starr Business District and RV Development Project, City of Pateros, Okanogan County, Washington

Prepared for:

Varela & Associates

601-A W Mallon Avenue

Spokane, WA 99201

By:

Matthew Marino and David A. Harder

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October 2016

ABSTRACT

Cultural Resource Survey of the Starr Business District and RV Development Project, City of Pateros, Okanogan County, Washington

The City of Pateros has secured funding through the State of Washington Department of Commerce, Community Economic Revitalization Board (CERB) to assist with an economic feasability study to convert a former landfill site to a business district and recreational vehicle park. The development would allow for overnight camping in RVs and tents, a Pateros Public Works storage facility, and RV and boat storage. Several parcels would also be prepared for commercial use and development. Since this is a state funded source, the project proponent must meet the requirements of Executive Order 05-05 and consider the potential impacts to historic properties prior to project execution. As such, Varela & Associates, Inc., the engineering firm designing and managing the project, has commissioned Plateau Archaeological Investigations, LLC to conduct a cultural resource investigation.

The Area of Potential Effect covers approximately 16.6 acres and lies in Section 12 of Township 29 North, Range 23 East, Willamette Meridian. Anticipated impacts include excavations, compaction of sediments, and other ground disturbing construction activities.

The cultural resource survey of the Starr Business District and RV Development Project is intended to identify potential archaeological resources and potential historic properties in the Project Area prior to ground disturbing activities. The pre-field research revealed 12 previously recorded cultural resources, one archaeological district, and four previously conducted cultural resource surveys within 1.0 mile of the Project Area. None of the sites or surveys are located within the Project Area.

Fieldwork procedures were designed to identify areas of moderate to high probability for pre-contact and historic cultural resources. Pedestrian survey covered the entire Project Area, and the archaeologists excavated twenty-two subsurface shovel probes. During pedestrian survey, the archaeologists located a historic debris scatter (45OK2150) that dates from the mid 1940s to the late 1950s. This site is not related to the landfill, which was in use between 1980 and 1987.

No pre-contact or historic-era cultural materials or features were located during the subsurface probing of the Project Area. Although 45OK2150 is located within the Project Area, the site does not meet the eligibility requirements for listing on the National Register of Historic Places. Thus, Plateau recommends that the proposed undertaking will result in **No Historic Properties Affected**, and no further archaeological investigations are recommended prior to, or during, execution of this project.

KEY INFORMATION

PROJECT

Cultural Resource Survey of the Starr Business District and RV Development Project, City of Pateros, Okanogan County, Washington

LOCATION

Starr Road, south of the City of Pateros, Okanogan County, Washington

USGS QUADS

Pateros, Washington 7.5 minute, 1982 (photorevised 1989)

LEGAL LOCATION OF PROJECT

Section 12 of Township 29 North, Range 23 East

PROJECT DATA

0 Previously recorded historic property
1 New historic site located and recorded

AUTHORS

Matthew Marino and David A. Harder

MANAGING AGENCY

Washington Department of Commerce Community Economic Revitalization Board

PROJECT UNDERTAKEN AND REPORT PREPARED FOR

Varela & Associates, Inc.

FIELD NOTE DISPOSITION

Archived at the office of Plateau Archaeological Investigations LLC, Pullman.

PRINCIPAL INVESTIGATOR

David A. Harder, M.A.

DATE

October 31, 2016

CERTIFICATION OF RESULTS

I certify that this investigation was conducted and documented according to Secretary of Interior's Standards and Guidelines and that the report is complete and accurate to the best of my knowledge.

Signature of Reporter

October 31, 2016
Date

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PROJECT DESCRIPTION

The City of Pateros (City), located in Okanogan County (Figure 1), is planning an economic feasability study to convert a former landfill site to a business district and recreational vehicle park. The development would allow for overnight camping in RVs and tents, areas for a Pateros Public Works storage facility, and RV and boat storage (Appendix A). Several parcels would also be prepared for commercial use and development. The Area of Potential Effect (APE), hereafter referred to as the Project Area, covers approximately 16.6 acres (ac) and lies in Section 12 of Township 29 North, Range 23 East, Willamette Meridian (Figure 2). Anticipated impacts include excavations, compaction of sediments, and other ground disturbing construction activities.

The City has secured funding through the State of Washington Department of Commerce, Community Economic Revitalization Board (CERB) to assist with this study. Since this funding is a state capital source, the project proponent must meet the requirements of Executive Order 05-05 and consider the potential impacts to historic properties prior to project execution. As such, Varela & Associates, Inc., the engineering firm designing and managing the project, has commissioned Plateau Archaeological Investigations, LLC (Plateau) to conduct a cultural resource investigation.

STATEMENT OF OBJECTIVES

The cultural resource survey of the Starr Business District and RV Park Development Project is intended to identify potential archaeological resources and potential historic properties in the Project Area prior to ground disturbing activities. The pre-field research was designed to identify any known cultural properties located in or near the Project Area. Fieldwork procedures were designed to identify areas of moderate to high probability for Native American and Euro-American cultural resources. This report describes the pre-field research, cultural resource survey, and field results for the project.

LOCATION AND GENERAL ENVIRONMENTAL SETTING

The Project Area is located in southern Okanogan County at the northern edge of the Columbia Basin physiographic province, which is characterized by flat-lying basalt flows that are incised by rivers and drainages. Structurally, the province lies between the Rocky Mountains and the Cascade Range of Washington and Oregon, and consists of flat to moderately hilly topography that is punctuated with the steepest terrain along canyons cut by rivers. Several distinctive landscapes within the region have been recognized including the Channeled Scablands with features that resulted from Pleistocene-era mega-floods ranging in size from small stream-like trenches to large coulees measuring miles wide and hundreds of feet deep (Alt and Hyndman 1984). Glacial till and outwash overlain by finer grain aeolian sediments characterize the northern fringes of the Columbia Basin, while rolling hills of loess cover the areas to the south and east that were not glaciated. Elevations in this region range from 200 feet (ft) (61 meters [m]) above mean sea level (AMSL) near the Columbia River to over 4,500 ft (1,371.5 m) AMSL in the area of outlying ridges and low mountains (Fenneman 1946; Hunt 1967).

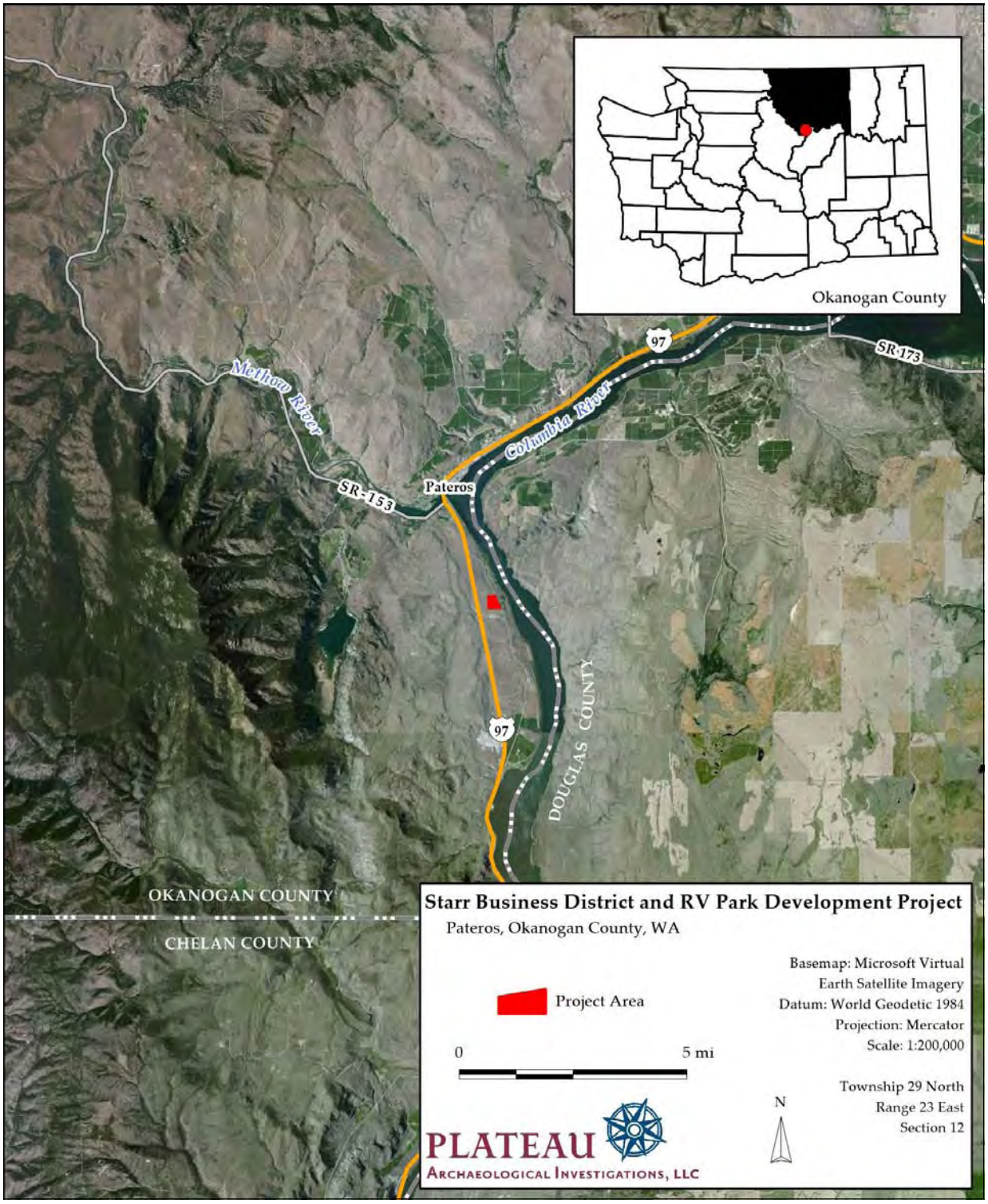

Figure 1. The Project Area located in southern Okanogan County.

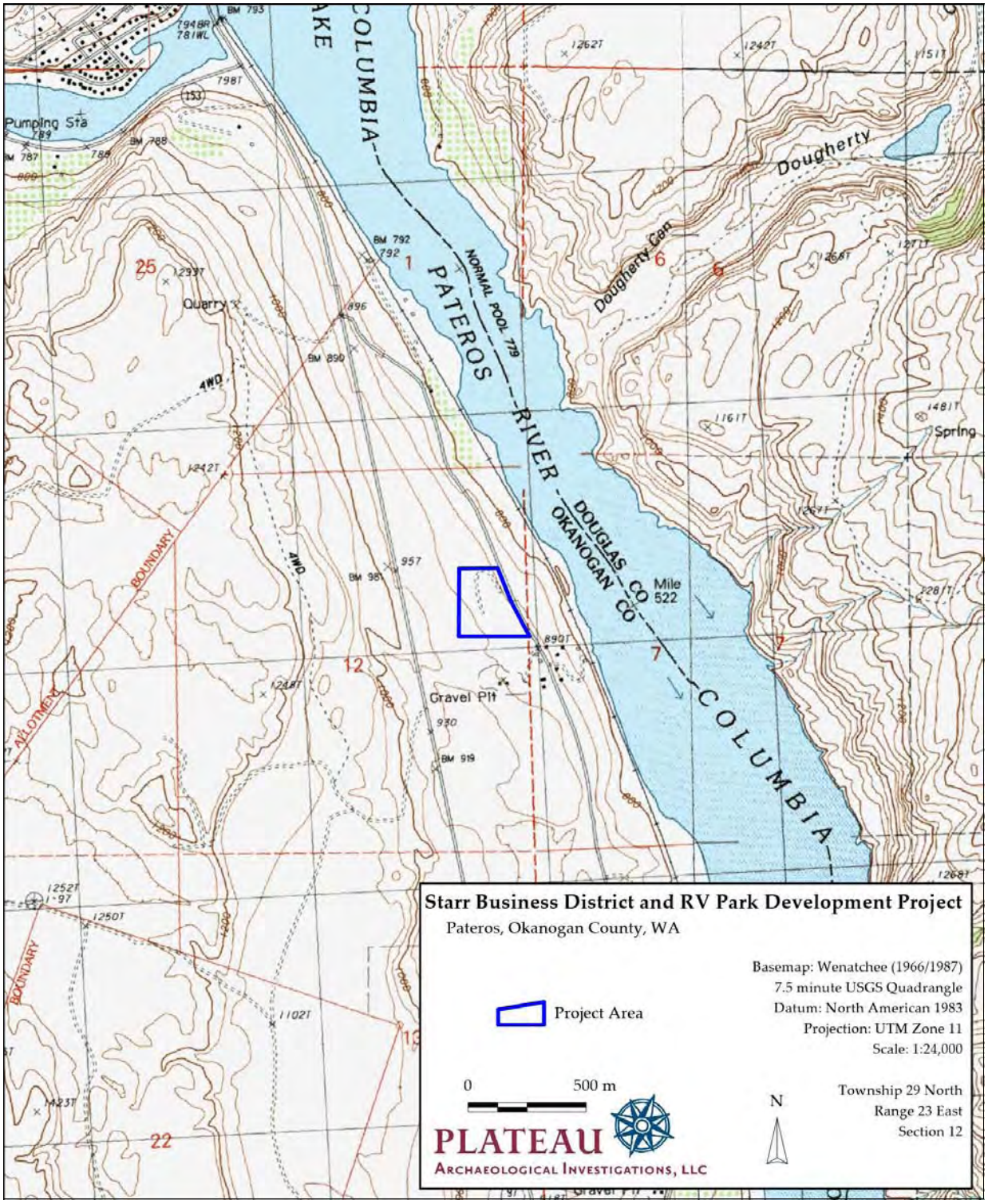

Figure 2. The Project Area shown on a portion of the Pateros USGS topographic map.

In this arid country, water has played an important role in the past and continues the role in the present. South and southeast of the Project Area is the region serviced by the Columbia Basin Project, an irrigation project developed by the United States Bureau of Reclamation using water impounded by Grand Coulee Dam. The Project Area, however, served as grazing land in the past, and the nearby loess hilltops provide farm ground managed under the dryland method of agriculture.

The Project Area lies within the Columbia River Valley, which flows from the Rocky Mountains in Canada to the Pacific Ocean near Astoria, Oregon. The Project Area varies in elevation from 899 to 932 ft (274 to 284 m) AMSL. According to the Natural Resources Conservation Service (NRCS) (2016), there is one soil type identified in the Project Area—Cashmont sandy loam (0-25% slopes). A typical profile for Cashmont soils includes sandy loams between 0-8 inches (in) (0-20 centimeters [cm]) below surface (B.S.) over gravelly sandy loams between 8-60 in (20-152 cm) B.S. (NRCS 2016).

The predominant draw for Native American and Euro-American populations in this region was, and still is, the extensive river systems. The most significant environmental feature is the Columbia River, which flows for more than 1,200 miles (mi) (2,000 kilometers [km]) from the base of the Canadian Rockies in southeastern British Columbia to the Pacific Ocean at Astoria, Oregon. Ten major tributaries–the Kootenay, Okanogan, Wenatchee, Spokane, Yakima, Snake, Deschutes, Willamette, Cowlitz, and Lewis rivers–complete the system. The Columbia River lies 837 ft (255 m) directly east of the Project Area, and its confluence with the Methow River is 8,268 ft (2,520 m) north of the Project Area.

Lying to the east of the Pacific Crest, the Project Area is subject to the rainshadow effect. The flood plains and valleys receive relatively little precipitation, nonetheless, as the topography rises the vegetation regimes reflect a rise in effective rainfall. The Columbia River Valley south of the Okanogan Highlands is within the *Artemisia tridentata—Agropyron* climatic climax vegetation zone. This indicates that native vegetation in an undisturbed context should consist predominately of mountain big sagebrush (*Artemisia tridentata*) and bluebunch wheatgrass (*Agropyron spicatum*). Other grasses such as needle grasses (*Stipacomata* and *S. thurberiana*) and bottlebrush squirreltail (*Sitanion hystrix*) may also be present (Daubenmire 1988). Cottonwood (*Populus trichocarpa*) and willow (*Salix* sp.) are present along the stream edges. The forest habitats nearest the Project Area are over five miles away, but contain ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), and larch (*Larix occidentalis*) in association with grassy and shrubby understories (Daubenmire and Daubenmire 1968).

The Project Area and surrounding habitats contain an abundance of wildlife. This area is within the Canadian Life zone as defined by Merriam in 1892 (Dalquest 1948:27). Many species of animals were historically available to Native Americans. The following lists a few of the more discernible creatures: elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), mountain goats (*Oreamnos americanus*), bighorn sheep (*Ovis canadensis*), black bear (*Ursus americanus*), racoon (*Procyon lotor*), marten (*Martes americana*), fisher (*Martes pennanti*), shorttail weasel (*Mustela erminea*), longtail

weasel (*Mustela frenata*), mink (*Mustela vison*), striped skunk (*Mephitis mephitis*), badger (*Taxidea taxus*), river otter (*Lutra canadensis),* coyote (*Canis latrans*), red fox (*Vulpes fulva*), cougar/mountain lion (*Felis concolor*), lynx (*Lynx canadensis),* bobcat (*Lynx rufus*), hoary marmot (*Marmota caligata*), golden-mantled squirrel (*Citellus lateralis*), ground squirrels (*Citellus* sp.), northern flying squirrel (*Glaucomys sabrinus*), red squirrel (*Tamiasciurus hudsonicus*), bushytail woodrats (*Neotoma cinerea*), porcupine (*Erethizon dorsatum*), snowshoe hare (*Lepus americanus*), and possibly cottontail (*Sylvilagus nuttalli*). Several other species may have been present in the region in the past such as wolverine (*Gulo luscus*), wolves (*Canis lupus*), grizzly bear (*Ursus horribilis*), and even the occasional bison (B*ison bison*) (Burt and Grossenheider 1961; Dalquest 1948).

This region also plays host to several species of economically important fish, fowl, and game birds. Fish in the major drainages of the region include: sturgeon (*Acipenser*), whitefish (*Prosopium* sp.), suckers (*Pantosteus* sp., *Catostomus* sp.), bullheads (*Cottus* sp.) and anadromous fish such as salmon (*Oncorhynchus* sp.), and steelhead (*Oncorhyncus mykiss*) (Lothson 1977).

Some of the more apparent birds include: Swarth blue grouse (*Dendragapus obscures pallidus*), Columbian ruffed grouse (*Bonasa umbellus affinis*), Columbian sharp-tailed grouse (*Pedioecetes phasianellus*), western sage grouse (*Centrocercus urophasianus phaios*), mallard duck (*Anas platyrhynchos platyrhynchos*), western harlequin duck (*Histrionicus histrionicus pacificus*), American common merganser (*Mergus merganser americanus*), the lesser snow goose (*Chen hyperborean hyperborea*), and the Great Basin Canada goose or "honker" (*Branta canadensis moffitti*). Seasonally available birds such as Gadwall (*Anas strepera*), wood duck (*Aix sponsa*), redhead (*Aythya americana*), and the northern ruddy duck (*Oxjura jamaicensis rubida*) reside in the region in the summer. Winter game birds include canvasback (*Aythya valisineria*), and American greater scaup (*Aythya marilane arctica*) (Lothson 1977).

Rainfall in the Project Area is limited by the rain shadow of the Cascade Mountains. Even so, the valley yields an abundance of crops due to irrigation and other modern farming practices. The yearly precipitation average recorded at the Chief Joseph Dam weather station is 10.24 in. The mean seasonal temperatures are 22.6° Fahrenheit (F) in winter and 55.9° F in summer. Extreme temperatures of -19° F and 110° F have been recorded (Western Regional Climate Center 2016).

PRE-FIELD RESEARCH

Pre-field research consisted of the review of known archaeological resources within a 1.0-mi (1.6-km) radius of the Project Area as inventoried at the Washington State Department of Archaeology and Historic Preservation (DAHP) on their electronic Washington Information System for Architectural and Archaeological Records Data (WISAARD) database. This database includes recorded archaeological resources, historic property inventories (HPIs), National Register of Historic Properties (NRHP) and Washington Heritage Register (WHR) properties, identified cemeteries, and previously conducted cultural resource surveys found throughout the state of Washington. Plateau also conducted cartographic analysis of landform, topography, soils, and

proximity to water using topographic maps. Secondary historic resources, on file at the DAHP and the Plateau office in Pullman, were consulted to identify any known cultural resources. This search allows for the identification of previously recorded historic and archaeological resources within or near the project's APE. In addition, available survey and overview reports were consulted as were ethnographic accounts of the region to help identify any known Traditional Cultural Places (TCP).

PREVIOUS ARCHAEOLOGICAL RESEARCH

The WISAARD background included Sections 01, 11, 12, 13, and 14 of Township 29 North, Range 23 East, Sections 06, 07, and 18 of Township 29 North, Range 24 East, and Allotments 25 and 26 within the Indian Allotment Boundary marked on the Pateros topographic map (U.S. Geological Service 1989). This search revealed 12 previously recorded archaeological sites and one archaeological district within 1.0 mi (1.6 km) of the Project Area (Table 1). Eight sites are located south of the Columbia River in Douglas County, and none are located within the Project Area. The WISAARD also shows one historic property within this search radius located at 258 Starr Road. This property was determined not eligible for listing on the NRHP in 2010 (DAHP 2016).

Table 1. Previously Recorded Cultural Resources within 1.0 mi (1.6 km) of the Project Area.

Site Number	Site Type	Recorder(s)
45DO63	Habitation (inundated)	Bishop (2008e); Stallard (1957)
45DO67	Pre-contact lithic scatter	Bearcub-Marchand (2007a); Sanger (1963)
45DO68	Pre-contact lithic scatter	Chesmore (1980a)
45DO381H	Historic farm/homestead	Patterson (1980)
45DO383	Pre-contact lithic scatter	Bishop (2008a, 2008b); Griffin (1980a)
45DO470	Pre-contact lithic scatter	Bearcub-Marchand (2007b); Griffin (1984)
45DO472A	Pre-contact lithic scatter	Bearcub-Marchand (2008); Griffin (1985)
45DO1079	Pre-contact isolate	Kassa (2015)
45OK419	Pre-contact lithic scatter	Bearcub (2008a); Bishop (2008c); Griffin (1980b)
45OK426	Pre-contact camp	Bearcub (2008b); Bishop (2008d); Griffin (1980c)
45OK428	Pre-contact lithic scatter	Chesmore (1980b)
45OK1404	Pre-contact cairn	Bearcub (2008c, 2008d)
45DT35	Lake Pateros Archaeological District	Cackowski (1982)

Site 45OK426 lies 1,837 ft (560 m) north of the Project Area. This site is a short term occupation which was originally described as a scatter of lithic debris and a few bits of mussel shell in a lag deposit (Griffin 1980c). Flakes, shell fragments, scrapers, and fire-modified rocks were observed at the site, but it was described as extensively eroded, as a majority of the site is submerged at normal water levels. No *in-situ* deposits were found during excavation of this site, but the SHPO determined it eligible for listing on the National Register (Bearcub 2008b; Griffin 1980c).

Site 45OK428 lies 3,117 ft (950 m) south of the Project Area. This site is a pre-contact camp and lithic scatter containing cobble and pebble tools, a projectile point fragment, basalt cores, numerous basalt flakes, and a few small cryptocrystalline (CCS) flakes. The site is on the low terrace along the bank of the Columbia River, and is typically submerged during normal water levels.

The WISAARD background search revealed four previously conducted cultural resource surveys (Table 2). None of these surveys included the Project Area.

Table 2. Previously Conducted Cultural Resource Surveys within 1.0 mi of the Project Area.

Author(s)	Project	County	Results
Root and Ferguson (2006)	Victor Bailey Property	Douglas	45DO707
Roulette et al. (2011)	Last-Mile Project	Okanogan	No resources recorded
Lewis and Naumann (2015)	Wells Hydroelectric Project Arch. Monitoring	Chelan, Douglas, Okanogan	1 new isolate, 9 existing site boundaries changed
Marino and Harder (2015)	Pateros Water Source Project	Okanogan	No resources recorded

REGIONAL PREHISTORIC BACKGROUND

Although a number of archaeological survey and excavation projects exist for the region, an integrated synthesis is still needed. Due to this, the archaeological sequence for the Wells Reservoir/Lower Okanogan Valley is, as yet, poorly understood. In general, settlement patterns of the region are believed to have followed the same trend as elsewhere in the Columbia Plateau. This chronology describes changes in settlement systems, artifacts, and subsistence strategies for pre-contact societies, and divides those into five phases; the Okanogan Phase (12,000 to 6,000 B.P.), the Indian Dan Phase (6,000 to 3,000 B.P.), the Chiliwist Phasae (3,000 to 900 B.P.), and Cassimer Bar Phase (900 B.P to Euroamerican Contact) (Pokotylo and Mitchell 1998).

During the ethnographic period, people of the Plateau lived in egalitarian societies with little or no slavery or caste systems. Their villages were autonomous and their leaders influenced others through charismatic actions or persuasive speech. In winter, peoples lived along major rivers in earth or mat lodges at semi-permanent villages. Their villages were situated in relatively warm locations that were protected from the harsh elements and their lodges were semi-subterranean (Ray 1939:135).

Villages and food procurement followed seasonal change. Permanent villages were situated in valley bottoms and along major rivers, not so much for the natural resources they offered but more for the protection the valleys had from inhospitable winter conditions. Winter habitation sites were occupied during the coldest months of the year. People probably settled in for the winter in mid- or late-October. During the next four or five months they relied upon stored foods and any game that could be taken. In early spring, winter supplies began to dwindle and people began making forays to gather emergent root crops (Nelson 1973). Summer camps were situated in the uplands

where hunting, berry picking, and root digging occurred. Task groups often went to specific areas to hunt, to quarry toolstone, to collect berries, or to gather other resources such as tules to make mats (Aikens 1993:90).

The ethnography of the Columbia Plateau is much more complex with a wider cultural diversity than can be summarized here. Ethnographic studies by Angelo Anastasio (1972), Franz Boas and James Teit (1996), Verne F. Ray (1936, 1939, 1942), Allan H. Smith (1988), Leslie Spier (1936), and others offer the reader a more thorough examination of the native culture.

REGIONAL HISTORIC BACKGROUND

Contact with peoples on the west coast of the continent was well established by the end of the eighteenth century by British, Spanish, and Russian trading vessels that made regular visits to the coastline. These trading expeditions began the first contact between aboriginal groups and outside cultures. The historic record of the area, though, really begins when Lewis and Clark journeyed through the region in 1805.

In 1809, Oregon Territory (later Washington Territory) saw an influx of trappers and fur traders, beginning with the Canadian owned Northwest Company as they made their way into the region and built Spokane House, located near the confluence of the Spokane River and Hangman Creek. Two years later, the American owned Pacific Fur Company built Fort Okanagan. These two companies struggled against one another for fur trade business until 1812 when the Pacific Fur Company holdings were sold to the North West Company. Soon the London-based Hudson's Bay Company and the North West Company were amalgamated under the British Crown. In 1816, Donald McKenzie, formerly in the employ of the North West Company, braved the suggestion that Spokane House be abandoned as it failed to address promoting trade into the interior (Meinig 1968). After two years of negotiations, Fort Walla Walla (Nez Perce) was constructed in 1818 by the Hudson's Bay Company.

Due to the increasing numbers of emigrants, the Oregon Territory was officially established in 1848. By 1850, nearly 12,000 emigrants had passed through the Plateau region along the Oregon Trail (Beckham 1998; Walker and Sprague 1998). With the establishment of the Oregon Territory, federal involvement proliferated. Treaties between Indian tribes and the new state and federal governments were soon underway, but were difficult to maintain in light of the rapid influx of miners following the several gold and precious metal "rushes" and settlers who were eager for property. The introduction of disease and other stresses introduced by the new settlers caused mistrust and, eventually, warfare. Several battles took place in the Oregon Territory between 1855 and 1858.

During this period of unrest, efforts were made to limit the incursion of emigrants and others into Indian territories. Prohibition of settlement was strictly maintained, and General Wool pointed out "the army cannot furnish guards to farm houses dotted among hostile tribes" (Meinig 1968:165).

The settlement prohibition was only a temporary solution to inevitability. People settled and volunteer militias attacked indiscriminately and fueled the fire under uncertain relations with tribes. The unrest culminated with Colonel Wright's campaign in 1858 that resulted in the executions and murders of sixteen Indians including a Yakama chief named Owhi and his son, Qualchan (Beckham 1998).

While Wright's campaign was underway, Major R.S. Garnett led approximately 300 soldiers on a sweep from Fort Simcoe up through the Yakima country, through Wenatchee and as far as the Similkameen River. Garnett's sweep resulted in the summary executions of ten Indians suspected of having attacked miners and the loss of one private, who was lagging behind the company and was presumably shot by an Indian (Wilson 1990:62). These unfortunate turns brought about a new life for the Native American tribes of Washington—the reservation.

The first were the Cayuse, Walla Walla, and Umatilla reservations. After the Whitman Massacre in 1847 where a small group of Cayuse attacked the Whitman Mission near Walla Walla, killing the Whitmans and twelve others, five members of the Cayuse tribe, including their chief, Tiloukaikt, were later tried for the murders and subsequently hung in Oregon City. In 1855, the U.S. Government and the tribes signed the Treaty Council of 1855 at Waiilatpu, which ceded more than 6.4 million ac in what is now northeastern Oregon and southeastern Washington. The tribes, in return, were given 172,000 ac of land—the Umatilla Indian Reservation—that would become their permanent homeland. The tribes reserved their right to fish, hunt, and gather traditional foods and medicines throughout the ceded lands.

In 1859 the U.S. Army moved forces from the Yakima Valley to the Colville area. A post named "Harney's Depot" was set up northeast of the present city of Colville. It quickly became known as Fort Colville. This military post was distinguished from the fur trading post by its "American" spelling. Fort Colville provided a base for boundary commissioners who surveyed the American/Canadian border and the Army was responsible for moving Indians onto reservation land. The post was finally abandoned in 1885 for Fort Spokane (Bohm and Holstine 1983).

Fort Okanogan, located at the confluence of the Columbia and Okanogan Rivers, was founded by the Pacific Fur Company in 1811. The fort was the first American-owned settlement in what is now Washington, although its ownership soon passed to the North West Company when the Pacific Fur Company sold out its assets and posts to its rival in 1813. Hudson's Bay Company Governor, Sir George Simpson, commented during an 1841 visit to Fort Okanogan, approximately 10 mi (16.4 km) northwest, that the outpost facilitated more as a transport business than for fur trade (Meinig 1968). Due to the decline of the transport business in the area, the Hudson's Bay Company abandoned the fort in 1860. Lake Pateros inundated the fort in 1967.

Settlement of the region by non-Indians began around 1856 and continued in a relatively slow fashion as pioneers and a few government officials settled in the area through 1885. In 1886, the Moses Reservation—whose southeast corner was located at the mouth of the Okanogan River (5

mi [8 km] northeast of the project area)—was dissolved, and the area opened to occupation by non-Indians. The area was quickly inhabited by miners, stockmen, lumbermen, farmers, merchants, and others until Okanogan County's population reached 1,467 people in 1890 and almost 13,000 in 1910 (Wilson 1990). With the increasing populations and movements of goods, transportation became a major business in the Okanogan valley. Through this era of population growth, transportation alternatives changed from walking to horses and stage lines. A multitude of ferries serviced the many rivers and creeks beginning around 1865. Stern wheeled steam ships plied the larger rivers when river flow allowed. Railroads were established in the region in the early 1900s, but it was not until 1913 that the Great Northern Rail line between Oroville and Pateros was operable (Wilson 1990). The railroads increased the reliability and frequency of travel and transport that caused the demise of the stern wheelers. The economy and population quickly grew with this increase in transportation. Ranching, agriculture, mining, and logging became major economic concerns.

The Colville Reservation was first established in 1872. The tribes of the territory were originally provided with property north of Spokane on April 9, 1872. The area was bounded, generally, by the Columbia, Spokane and Pend Oreille rivers. This property was soon "exchanged" for property west of the original reservation which is bounded by the Columbia River on the south and east and by the Okanogan River on the west. The north boundary was the British possession. This included 2.9 million ac of property. Twenty years later, the north half of the Colville Reservation (totaling 1.5 million ac) was restored to public domain and opened for settlement by non-Indians. In 1896 the Colville Reservation was made up of over ten distinct Tribes (Reichwein 1988:296), including the Colville, Moses Columbia, Okanogan, Lakes, Sanpoil, Nespelem, Wenatchi, Entiat, Chelan, Methow, Palus, and the Chief Joseph band of the Nez Perce. The southwest corner of the Colville Reservation lies at the mouth of the Okanogan River, 5 mi (8 km) northeast of the Project Area.

The works of Briley (1986) and Waring (1936) depict biographical information concerning two men, Francis Streamer and Guy Waring during the early 1870s and 1880s, and their indirect mediation on behalf of the tribes during the turmoil caused by encroaching settlers on the native Okanogan peoples.

Francis Marion Streamer, a commercial editor for the *Omaha Daily Herald*, writer, newspaperman, diarist, philosopher, schoolteacher, confidant of Indian chiefs, semi-official scout for the military, notary public, and "oft drunk," arrived in Washington territory during the early 1870s (Briley 1986:17-19). Mr. Streamer moved among the Indian trails visiting with Chief Moses and friends. He maintained that "[for] seventeen years Chief Moses and myself have stood firm together, he confiding in me and General Howard all the wrongs done him and his people" (Briley 1986:139). Mr. Streamer maintained visits with Chief Moses at his winter headquarters, located between Nespelem and the "San Poil River," on the reservation, during the Chiefs latter years remarking that this was a place "where he could be at ease and have extended food and bed" (Briley 1986:92).

Mr. Streamer's affiliation with the *Omaha Daily Herald* greatly influenced others on behalf of Chief Moses, which was better representative of events in the west. For example, a letter sent to the General Land Office concerning the swindling nature of land grabbers eyeballing "unimproved lands" (Indian land claims) and illegally passing money under the table was quickly referred to the Commissioner of Indian Affairs. Soon after, Special Agent Gordon of Tennessee sent out Secretary Lamar to investigate the Wenatchee and Okanogan Indian Affairs in 1887 (Briley 1986:117-118).

Guy Waring's journal is a three-year record of his "pioneer journeys" to and from the Okanogan region (Waring 1936). Waring moved with his wife and three step-children from New York City to Portland, Oregon in 1884, working in the comptroller's office as a clerk. Waring soon journeyed to a ranch he would buy from Mr. Wellington, west of Oroville near Palmer Lake. Waring gradually adopted the life of a store-man and cattleman, interacting with the local Okanogan tribal members almost daily through cattle round-ups on the Colville Reservation, the Okanogan Valley, and once attending Sarsupekins [Chief Sarsopkin] church service on the Chief's ranch. Waring left his ranch for Boston, eventually returning to the Methow Valley in 1891 (Waring 1936).

Both Streamer and Waring likely utilized trails and roads depicted in Waring (1936) and Anglin's (1995:xv) texts. Waring's (1936) publication depicts a wagon route beginning at the Sprague depot railroad, continuing northwest eventually crossing the Columbia River, passing through Old Fort Okinakane [Okanogan], and continuing along the west side of the Okanogan River to the mouth of the Similakamene [Similkameen] River (Anglin 1995). Anglin (1995) depicts a New Caledonia/Cariboo Trail dated as established in 1810. The New Caledonia/Cariboo Trail began at Fort Okanogan (at the mouth of the Okanogan River) and ran along the east side of the Okanogan River north toward McLoughlin Canyon into Canada (Anglin 1995:xv).

City of Pateros

Pateros was originally established as Ive's Landing circa 1886 by Lee Ives. Ives began farming near the confluence of the Columbia and Methow rivers. He was not alone, and there were a reported 50 Native American structures and 20 Chinese miners in the area. In 1900, Charles Nosler acquired most of the townsite, and renamed the town to Pateros, after a town in the Philippines. In 1903, the city consisted of four commercial establishments and nine residences, and the town was sold to J.C. Steiner. Steiner vigorously promoted the town, making Pateros the principal rail shipping point between Oroville and Wenatchee. Pateros was officially incorporated on May 1, 1913.

In 1967, the Wells Dam was constructed on the Columbia River several miles downstream from Pateros. The reservoir created by the Wells Dam, named Lake Pateros, flooded much of the original city. Much of modern Pateros was destroyed by the Carlton Complex wildfire on July 17 and 18, 2014. No injuries or fatalities were reported, but at least 95 homes in the area were reported destroyed, along with at least one business.

Project Area

The 1899 cadastral map for Township 29 North, Range 23 East (McMicken 1899) depicts an unimproved road and a two trail. The road, trending north to south, enters the center of Section 12 and heads south where it passes by a house before exiting into the NW¼ of the NE¼ of Section 13. The first trail separates from this road in Section 01 and heads south into the west half on Section 12. It terminates in the NE¼ of the SW¼ of Section 12. A second trail enters the NE¼ of Section 12 and terminates just south of the northern section boundary. The Columbia River is shown in its narrow, pre-dam alignment. No built environments (i.e., homesteads, agricultural fields, trails, or roads) are shown directly within the Project Area (McMicken 1899).

The 1934 atlas shows State Highway 10 in the present alignment of U.S. 97, and the Great Northern Railway in its present alignment. A dirt road is shown splitting from Highway 10 in the center of the northern boundary of Section 12 and heading southwest where it crosses the center of Section 11. Starr Road is not yet mapped, but the Project Area passes through land owned by the Holland Land Company and Lee Cooper. The Columbia River is shown in its narrow, pre-dam alignment (Metsker 1934).

A 1952 aerial photograph shows Starr Road and State Highway 10 (U.S. 97) in their present alignments. The surrounding areas are undeveloped, with orchards lining portions of the Columbia River (NETR 2016a). Starr Road is mapped on the 1957 Brewster topographic map, with no other built environments depicted within the Project Area (USGS 1957).

The path that currently intersects the north half of the Project Area is depicted on the 1989 Pateros topographic map (USGS 1989). This path may have provided access to the Pateros Landfill, which was in operation within the Project Area from August 1, 1980 to May 1, 1987. The landfill was located on 30.1-ac parcel, but only 2.7 ac were used for landfilling activities. The majority of deposited waste consisted of household waste from the City of Pateros, but some construction waste from the demolition of the Pateros High School was also deposited here. The Pateros Landfill was capped in 1989 (Erlandsen & Associates 1989).

A 1991 aerial photo shows U.S. 97 as an expanded two lane highway. Disturbances are apparent within the Project Area, which are likely the result of the 1989 landfill capping. The Columbia River is also shown in its present engorged state (NETR 2016b).

According to the Bureau of Land Management (2016), the Project Area falls within portions of land patents filed by William Cooper in 1907, Wallace V. Glover in 1908, Newton J. Ward in 1909, William Oxstien in 1912, James W. Eustuse in 1913, Archie E. Eustus in 1915, and Louisa Jack in 1961.

TRADITIONAL CULTURAL PLACES

Traditional Cultural Places (TCP) are important for the "role the property plays in a community's historically rooted beliefs, customs and practices" as stated in the *National Register Bulletin 38* (U.S. Department of the Interior 1990). Although these properties can be difficult to identify and evaluate, an initial search of pertinent publications can be helpful toward identifying the types of properties that may be expected. The *National Register Bulletin 38* goes on to state that "examples of properties possessing such significance include:

- a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;
- a rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
- an urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;
- a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
- a location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity."

As noted above, the Project Area falls within the southern lands traditionally occupied by the Methow, with the Sinkayuse to the south, the Okanogan immediately to the east, the Chelan to the west. All Middle Columbia River Salishan groups were roughly bounded in territory along the Columbia River and its economic base, which shaped lifeways. Winter villages and camps were located primarily along major waterways. None are noted in the ethnographic literature within the Project Area, however, dozens of villages or place names are depicted along the Columbia and Methow rivers. The closest of these villages, *nxencin* ("bluff at the mouth of the river"), was located at the confluence of the Methow and Columbia rivers and was likely the principal village of the Methow culture group (Ruby et al. 2010:184; Miller 1998:254).

Due to the ritual and daily lives of the Methow, the proximity of the village, and natural resources within the Project Area, activities likely extended with regularity toward the Project Area. Additionally, this area would have afforded the Sinkayuse, who were immediately south, access to the portions of the Columbia River adjacent to the Project Area. Major trade centers in the area fell in every direction, with substantial locations as near as Brewster, Waterville, and Soap Lake to the south, the mouths of the Wenatchee River and Icicle Creek to the southwest, and Kettle Falls to the northeast (Miller 1998:255).

According to legend, Coyote's eight-section house on the Columbia River across from Brewster, just northeast of the Project Area, had a menstrual house nearby. Coyote's house, said to have been a large pile of rocks at this site, is adjacent to a small, pointed hill, which served as the menstrual house for Coyote's group (Mandelbaum 1938:110-112). This TCP is considered by past and present Methow and Southern Okanogan to be directly related to rites of puberty and coming of age.

Among the Middle Columbia River Salishans, menstrual taboos were powerful, and menstruating women were prone to negative effects of men's powers, and vice versa. For this reason, menstrual huts would be utilized from the time of the rite of passage through menopause. When accompanying men on hunts, women would build menstrual wickiups for the eventuality, and were to avoid sweathouses, as menstruation represented a permanent threat to male's vitality, luck, and power (Mandelbaum 1938:111-112).

In the ethnographic record, upon her first menstruation, a female would prepare to go into isolation in a menstrual house like Coyote's menstrual house near the Project Area. Her hair was bound into two rolls that were tucked behind her ears, and she was instructed that touching her head would cause her to become bald. After she donned a plain garment, she entered a wickiup that would be approximately 100 meters from the rest of the village's structures where she was expected to live for ten days (in the Southern Okanogan rite). During this period, the girl would transform into a woman, dancing and praying to the Day, Dawn, Sun, and Coyote, washing in running water and running up hills with rocks falling from a girdle, which would help to prepare her for eventual child birthing (Mandelbaum 1938:111). According to some accounts, the woman was brought dog salmon (*Oncorhynchus keta*), which she raised on poles and offered to Coyote. By this offering and by jumping up and down in the door of the wickiup singing, "take pity on me, Coyote!" the woman acknowledged her debt and payment to Coyote for the people's gift of salmon (Mandelbaum 1938:110).

Numerous collections of published legends were consulted to identify points of legendary significance within the Project Area. These include publications by Clark (1969), Edmonds and Clark (1989), Erdoes and Ortiz (1984), Mourning Dove (1990), O'Connell (2003). In addition to these narratives, several extensive TCP reviews related to the Columbia River have been conducted by the Confederated Tribes of the Colville Reservation. While no TCPs were located within the Project Area, numerous tales and place names associated with the Columbia River are indicative of a complex and expansive body of landscape narratives that have not been published, or were not otherwise located in this review. This review, therefore, should not be considered conclusive, but instead reflective of the complex relationship between culture groups and landscape, and an acknowledgment that not all potential resources may be identified herein. If additional information is required on sacred places or TCP information that is not publically accessible, it is highly recommended that one consult with the Confederated Tribes of the Colville Reservation for access to more in-depth or esoteric bodies of knowledge of nearby cultural landscapes.

EXPECTED PROPERTIES

Previous archaeological investigations correlate Native American sites with relatively flat terrain, well drained soils, within proximity to water, and areas with sweeping vistas. Major rivers, such as the Columbia, provided corridors where animals and people moved across the landscape. It is along these rivers that ethnographers and archaeologists have documented large village sites.

Villages and small campsites manifest themselves by low to moderate densities of stone tools which are concentrated in one or more loci, housepits, hearths, and middens. As this area was traversed by multiple bands of Native Americans partaking in seasonal activities, it is also possible that exotic lithic material might be present among the artifact assemblage. Visits through this area may manifest themselves as isolated finds. Typically an item lost or discarded, an "isolate," provides important information about the types of areas exploited by past populations but is not considered eligible for listing on the NRHP.

The DAHP's predictive model assigns a very high probability for encountering cultural resources in the Project Area, and a cultural resource survey is advised (DAHP 2015).

FIELD METHODS

Survey work was completed in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716, September 29, 1983) and under the supervision of Principal Investigator, David Harder. A utility locate was commissioned prior to fieldwork under ticket number 16208962. Plateau archaeologists Adam Sackman and Alexander New completed the field investigation on July 13 and 14, 2016. Survey conditions were favorable, with partly cloudy skies and temperatures in the mid 80s F.

All fieldwork was completed in a manner consistent with Washington State Senate Bill 5282 amending RCW 27.53.030, and included inspection techniques to identify both surface and subsurface archaeological resources. Survey was conducted along the entire Project Area, and pedestrian survey was completed with two-crew transects spaced at 10-m intervals. Following pedestrian survey, archaeologists excavated subsurface shovel probes as 40-cm round holes. Sediment was removed in arbitrary 10-cm levels and the spoils were screened through ¼ inch wire mesh. Sediment characteristics were recorded on standardized forms with the color, composition, and degree of compaction noted. The archaeologists took representative photographs of the Project Area, and recorded location data on a handheld GPS unit.

PROJECT RESULTS

The Project Area is located on an ancient alluvial cobble and gravel bar along the western bank of the Columbia River near River Mile 522. The bank has a gradual slope of 2 to 5 degrees with localized areas of large boulders. Vegetation in the Project Area consists of low sage, bunch grass, and the occasional Ponderosa pine.

The pedestrian survey of the Project Area was completed with fourteen transects (Figure 3). Ground visibility varied throughout the Project Area with nearly 90 percent visibility within the highly disturbed areas, 70 percent within the impacted staging areas, and up to 45 percent in the undisturbed areas.

Disturbances within the Project Area include an access road leading north and west from Starr Road, large open excavated pits, a large capped landfill that is no longer in use, and staging areas with public utility goods, road gravel, and remnant building materials for the City of Pateros (Figure 4). Around 75 percent of the ground surface within the Project Area is disturbed. The southwestern and southeastern boundaries of the Project Area appear to be the least disturbed. No subsurface utilities were marked by the utility locate.

During the pedestrian survey the archaeologists located site 45OK2150 (temporarily designated PAI-1610), a historic debris scatter located in the northwest portion of the Project Area (see Figure 3, Appendix B). Identified within this debris scatter were over 100 pieces of tin cans, coffee cans, tobacco tins, ceramic hotel ware (Figure 5), paint cans, beer cans, 10 glass jars, 30 glass bottles (Figure 6), and scattered pieces of slag and metal fragments (Figure 7). Time-diagnostic artifacts suggest that the site dates from the mid 1940s to the late 1950s (Table 3). Currently, areas around the site are being utilized for staging of materials by the City of Pateros (Figure 8).

Following pedestrian survey, the archaeologists excavated twenty-two subsurface probes throughout the Project Area (Table 4, see Figure 3). Subsurface probing was targeted in areas with less surface disturbances. Probe 16 and Probe 17 were placed within the boundary of the capped landfill to confirm that disturbances in this area penetrate below the ground surface. Probes reached from 20 to 70 cm B.S. before terminating in impenetrable cobbles. The average depth of subsurface probes was 46 cm B.S.

Two distinct soil profiles were revealed during subsurface probing of the Project Area. Profile I consists of a yellowish brown (10YR5/4) compact sandy loam with angular gravels over a dark yellowish brown (10YR4/4) compact sandy loam with large cobbles. This profile was observed throughout the Project Area in locations with no subsurface disturbances, and matches the expected soil profile derived from the NRCS (2016).

Profile II was found only in Probe 16 and Probe 17 within the boundary of the capped landfill (see Figure 3). This profile consists of a brown (10YR5/3) sand with rounded cobbles.

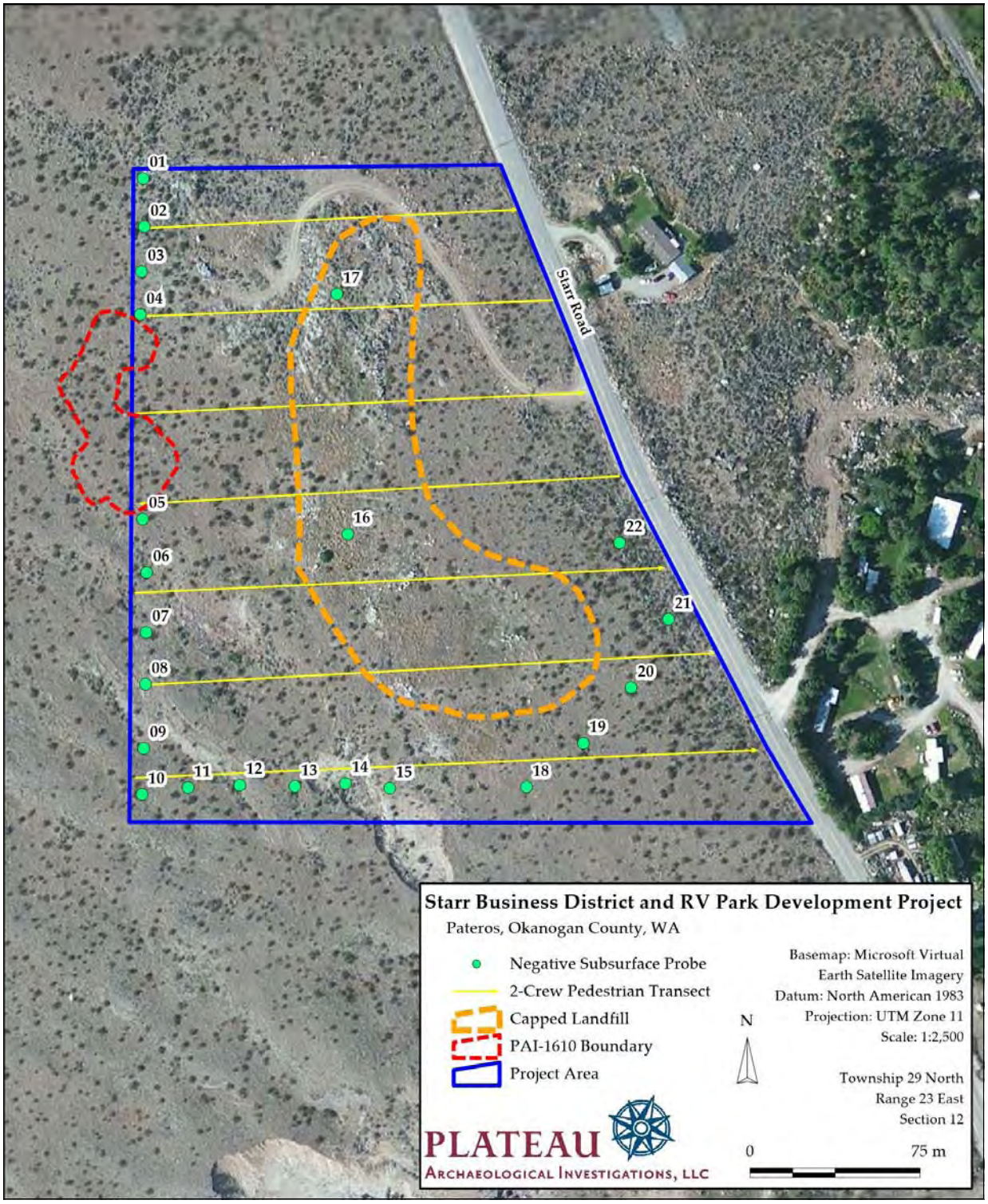

Figure 3. The Project Area, capped landfill boundary, subsurface probes, pedestrian transects, and 45OK2150 shown on an aerial photograph.

Figure 4. Overview of the Project Area showing the gravel road and boulder concentrations.

Figure 5. Base of coffee mug manufactured by Mayer China in 1950.

Figure 6. Base of glass bottle manufactured by Glass Bottle Co. in 1952.


Figure 7. Scatter of metal parts and fragments observed on ground surface within 45OK2150.

Table 3. Time-diagnostic artifacts from 45OK2150.

Quant	Color	Function	Manufacturer	Year(s) of Manufacture
1	Clear	Alcohol/Wine	Northwestern Glass Co.	1931-1960s
1	Brown	Bottle	Glass Containers Inc.	1952
1	White	Coffee Mug	Mayer China	1950
1	Clear	Canning Jar	Hazel-Atlas, Oakland Plant	1931-1970
1	Clear	Tumbler Jar	Owens Illinois Glass Co.	1950
1	Brown	Bottle	Owens Illinois Glass Co.	1952
1	Clear	Bottle	Owens Illinois Glass Co.	1953
1	Clear	Unknown	Owens Illinois Glass Co.	1952
1	Clear	Bottle	Owens Illinois Glass Co.	1959
1	Clear	Soda Bottle	Owens Illinois Glass Co.	1949
1	Brown	Cone Top Bottle	Owens Illinois Glass Co.	1952
3	Brown	Beer Bottle	Obear-Nester Glass Co.	1954
1	Green	Unknown	Anchor-Hocking Glass Co., Connellsville Plant	1945

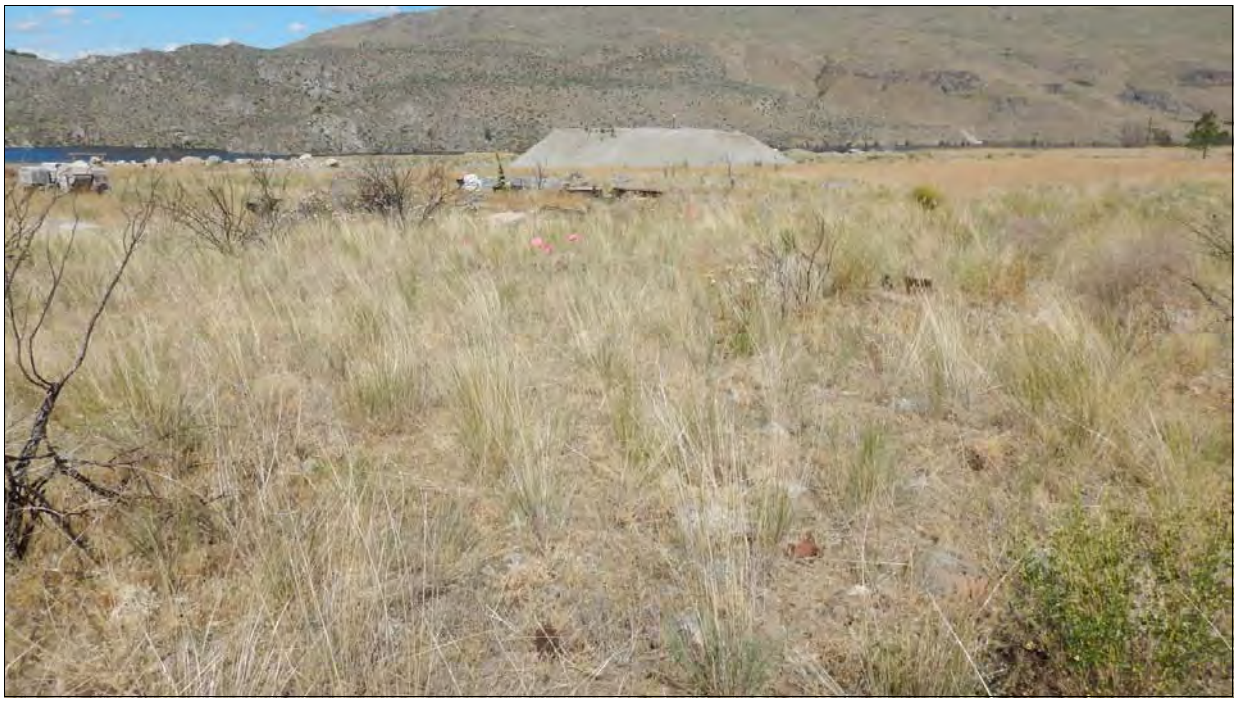

Figure 8. Overview of 45OK2150 showing staging area for gravel pile.

Table 4. Subsurface Probe Results.

Probe	Easting (m)	Northing (m)	Depth (cm)	Results
01	284607	5323553	41	Negative
02	284607	5323531	20	Negative
03	284604	5323512	42	Negative
04	284603	5323493	49	Negative
05	284599	5323402	50	Negative
06	284600	5323379	46	Negative
07	284598	5323352	50	Negative
08	284597	5323329	52	Negative
09	284594	5323301	28	Negative
10	284593	5323281	56	Negative
11	284613	5323283	53	Negative
12	284636	5323283	70	Negative
13	284660	5323281	30	Negative
14	284683	5323281	60	Negative
15	284702	5323278	44	Negative
16	284689	5323391	44	Negative
17	284690	5323497	51	Negative
18	284763	5323275	29	Negative
19	284789	5323293	54	Negative
20	284811	5323317	45	Negative
21	284829	5323346	46	Negative
22	284809	5323381	56	Negative

NAD83 UTM Zone 11N

RECOMMENDATIONS AND MANAGEMENT PLAN

The field investigations of the Starr Business District and RV Development Project resulted in the identification of 45OK2150, a historic debris scatter. Plateau archaeologists identified all diagnostic artifacts, and concluded that the materials within the accumulation date from the mid 1940s to the late 1950s (Appendix B). Subsequent subsurface probing near the site boundaries indicates that the site is wholly expressed on the ground surface. The field investigation and post-field analysis has maximized the research potential for this historic scatter, and the site does not meet the eligibility requirements for listing on the National Register of Historic Places. Thus, Plateau recommends that this site is not eligible for listing on the NRHP, and the proposed undertaking will result in **No Historic Properties Affected.** No further archaeological investigations are recommended prior to, or during execution of the Starr Business District and RV Development Project.

The results and recommendations in this document concern the specified area of potential effect. The proponent is advised that the results and recommendations reported herein do not apply to areas of potential effect altered or expanded post the cultural resource survey. A supplementary cultural resource review will be necessary should the area of potential effect be altered or changed, as per 36 CFR 800.4.

If human remains, suspected human remains, or any items suspected to be related to a human burial are encountered during any aspect of the project, it is imperative that operations cease immediately within 200 ft (61 m) of the find. The area around the discovery will be secured and the Okanogan County Sheriff and the State Historic Preservation Officer should be contacted at once. For further guidance, please refer to the ***Guidelines for the Inadvertent Discovery of Human Skeletal Remains on Non-Federal and Non-Tribal Lands in the State of Washington*** (DAHP 2014).

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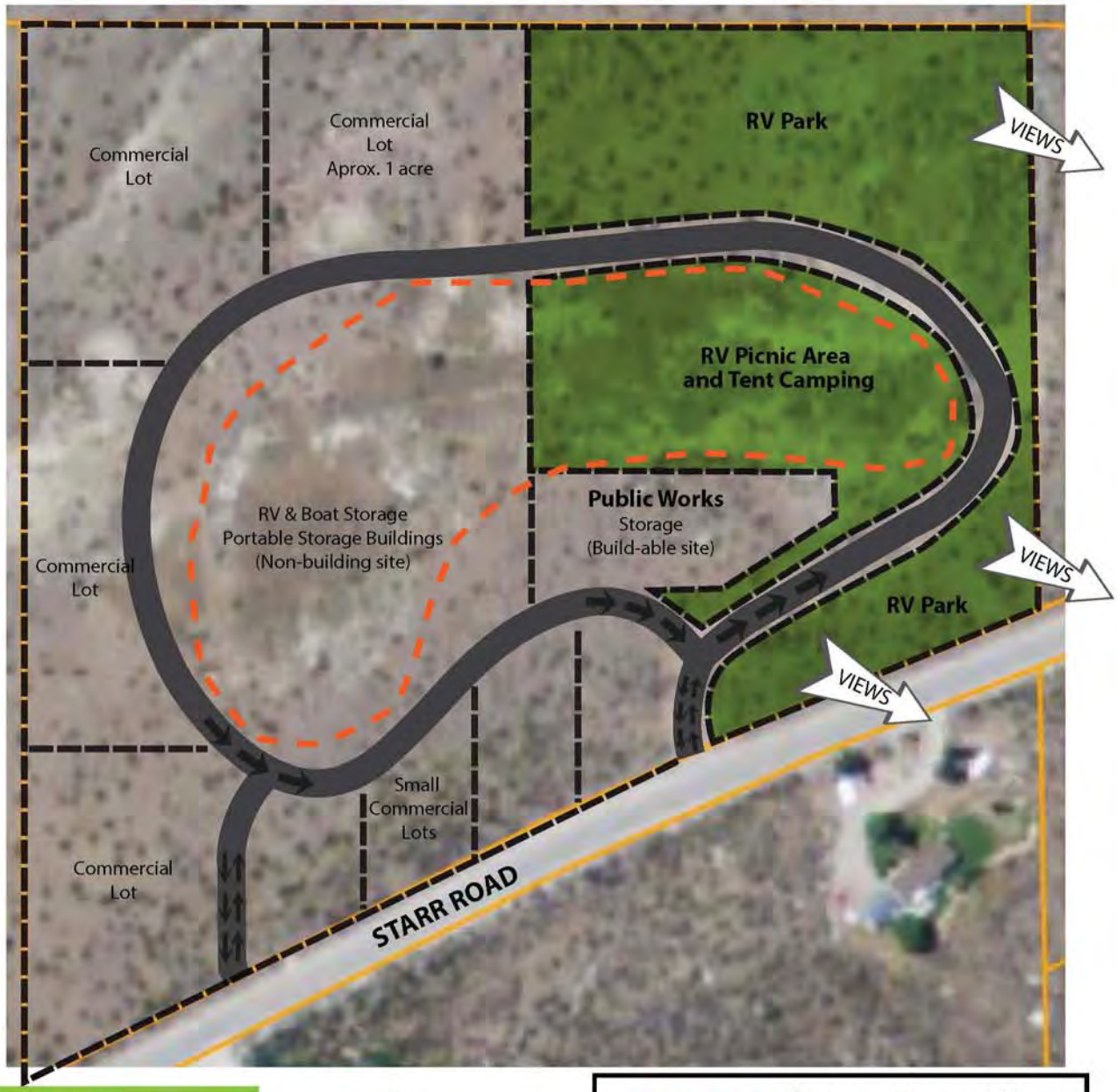
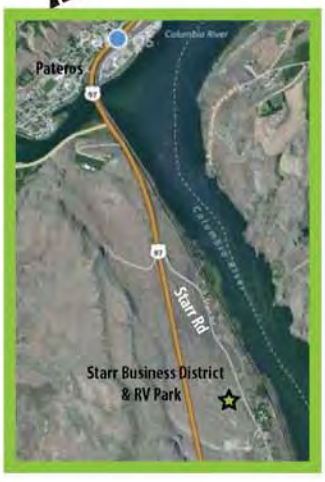
APPENDIX A: PROJECT PLAN MAP





Notes:
16.6 Acre City Owned Site

Commercial lots outside **landfill cells and are build-able**

Public Works site would be an alternative storage site to the triangle property on industrial way

Aprx. Location of **Landfill Cells**

RV Park

Large Commercial Lots aprx. 1 acre
Small Commercial Lots aprx. 1/2 acre

Starr Business District & Starr Road RV Park

Concept Development Plan

APPENDIX B: SITE FORM

STATE OF WASHINGTON
ARCHAEOLOGICAL SITE INVENTORY FORM

Smithsonian No.: 45OK2150
***County:** Okanogan

***Date:** July 15, 2016 ***Compiler:** Matthew Marino **Human Remains?** ☐ **DAHP Case No.:**

SITE DESIGNATION

Site Name: 45OK2150
Field/ Temporary ID: PAI-1610
***Site Type(s):** Historic Debris Scatter

SITE LOCATION

***USGS Quad Map Name(s):** Pateros (1966/1987)
***Legal Description: T** 29 N **R** 23 E **Section(s):** 12
Quarter Section(s): NW SE NE
***UTM: Zone** 11 **Easting** 284587 **Northing** 5323452
Latitude: 48.028 **Longitude:**-119.889 **Elevation (ft/m):** 926 ft/282 m
Other Maps: **Type:**
Scale: **Source:**
Drainage, Major: Columbia River **Drainage, Minor:** None **River Mile:** 522
Aspect: East **Slope:** 3 degrees

***Location Description:** The site is located south of Pateros, roughly 670 feet (204 meters) west of Starr Road, on an upper terrace above the Columbia River.

Directions** *(For Relocation Purposes):** From Pateros, travel south on Interstate 97 and exit left onto Starr Road. Follow this south for about 1 mile to a dirt path off the west side of the road. The site is located about 623 feet (190 meters) directly west of the intersection of this path with Starr Road.

***Mandatory Information for Official Smithsonian Number designation.** *Revised 2/2015*

SITE DESCRIPTION

***Narrative Description:** The site is a historic debris scatter with numerous bottle bases with trademarks, ceramics, and other historic materials. The site has been impacted by the historic land use patterns of this area; it served as a landfill from 1980 to 1987, and is now in use as a staging area for the City of Pateros.

***Length:** 88 m *__Direction:__ north-south x ***Width:** 50 m *__Direction:__ east-west

***Method of Horizontal Measurement:** GIS *__Depth:__ surface

***Method of Vertical Measurement:** Shovel probes confirmed no subsurface deposits.

***Vegetation** *(On Site)*:** low sagebrush **Local Landforms:** Upper terrace of Columbia River

Water Resources *(Type)*: Columbia River **Distance:** 460 m **Permanence:** Year-round

CULTURAL MATERIALS AND FEATURES

***Narrative Description:** The site consists of over 100 pieces of tin cans, coffee cans, tobacco tins, ceramic hotel ware, paint cans, beer cans, 10 glass jars, 30 glass bottles, and scattered pieces of slag and metal parts. Time-diagnostic artifacts include the following:

Quant	Color	Function	Manufacturer	Year(s) of Manufacture
1	Clear	Alcohol/Wine	Northwestern Glass Co.	1931-1960s
1	Brown	Bottle	Glass Containers Inc.	1952
1	White	Coffee Mug	Mayer China	1950
1	Clear	Canning Jar	Hazel-Atlas, Oakland Plant	1931-1970
1	Clear	Tumbler Jar	Owens Illinois Glass Co.	1950
1	Brown	Bottle	Owens Illinois Glass Co.	1952
1	Clear	Bottle	Owens Illinois Glass Co.	1953
1	Clear	Unknown	Owens Illinois Glass Co.	1952
1	Clear	Bottle	Owens Illinois Glass Co.	1959
1	Clear	Soda Bottle	Owens Illinois Glass Co.	1949
1	Brown	Cone Top Bottle	Owens Illinois Glass Co.	1952
3	Brown	Beer Bottle	Obear-Nester Glass Co.	1954
1	Green	Unknown	Anchor-Hocking Glass Co., Connellsville Plant	1945

***Method of Collection:** None collected

***Location of Artifacts:** In place

SITE AGE

***Component:** Historic *__Dates:__ mid 1940s to late 1950s

***Dating Method:** Diagnostic artifacts **Phase:** **Basis for Phase Designation:**

SITE RECORDERS

Observed by: Alex New and Adam Sackman **Address:** PO Box 714 Pullman, WA 99163

***Date Recorded:** July 13, 2016

***Recorded by:** Alex New and Adam Sackman

***Organization:** Plateau Archaeological Investigations ***Organization Phone Number:** 509-332-3830

***Organization Address:** PO Box 714 Pullman, WA 99163 ***Org. E-mail:** info@plateau-crm.com

Date Revisited: N/A **Revisited By:** N/A

SITE HISTORY

***Previous Archaeological Work:** None

LAND OWNERSHIP

Site straddles parcel boundary:

***Owner:** City of Pateros	WA State Department of Natural Resources
***Address:** PO Box 8, Pateros, WA 98846	PO Box 47014, Olympia, WA 47014
***Tax Lot/ Parcel No:** 2923120015	2923120009

RESEARCH REFERENCES

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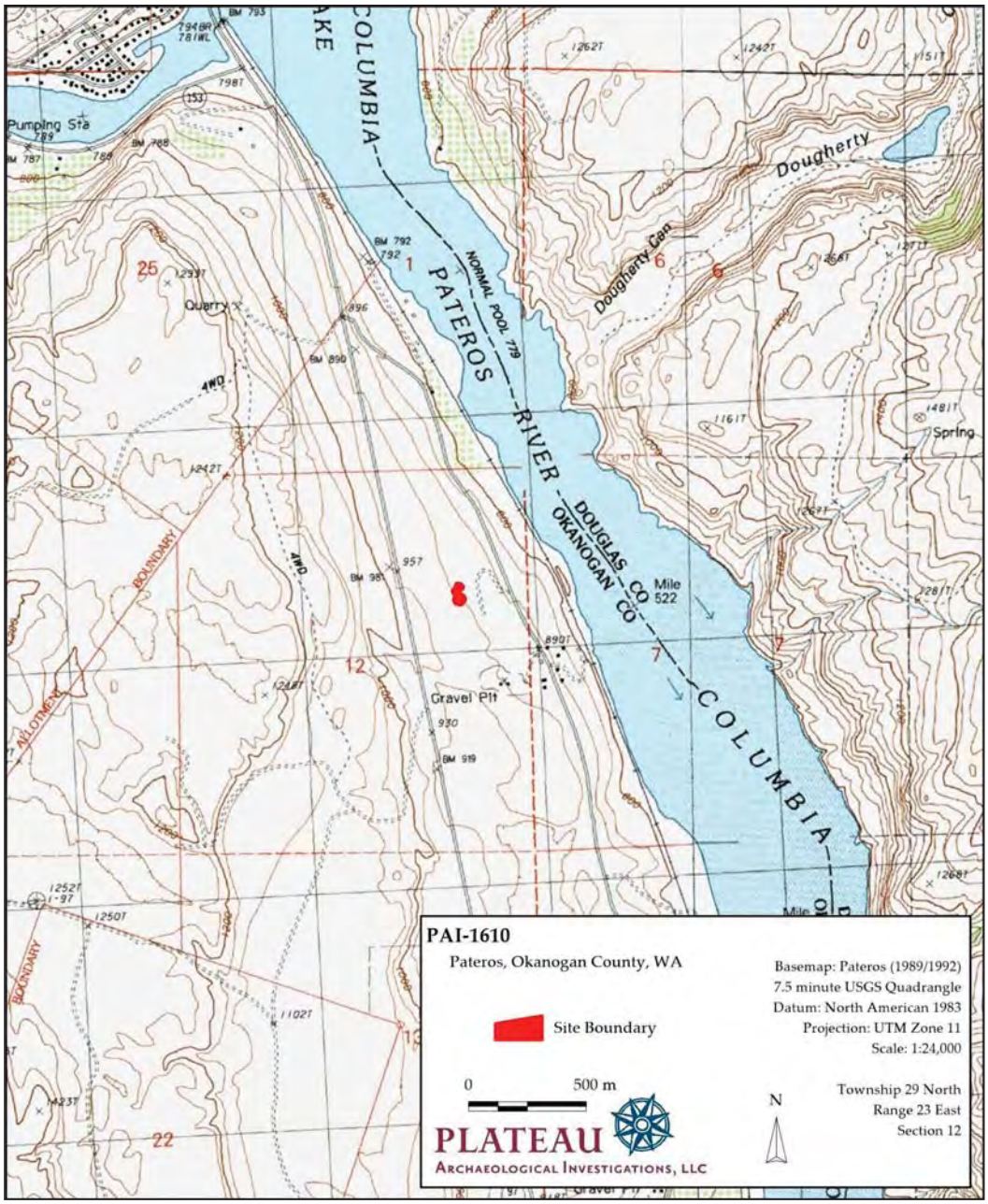
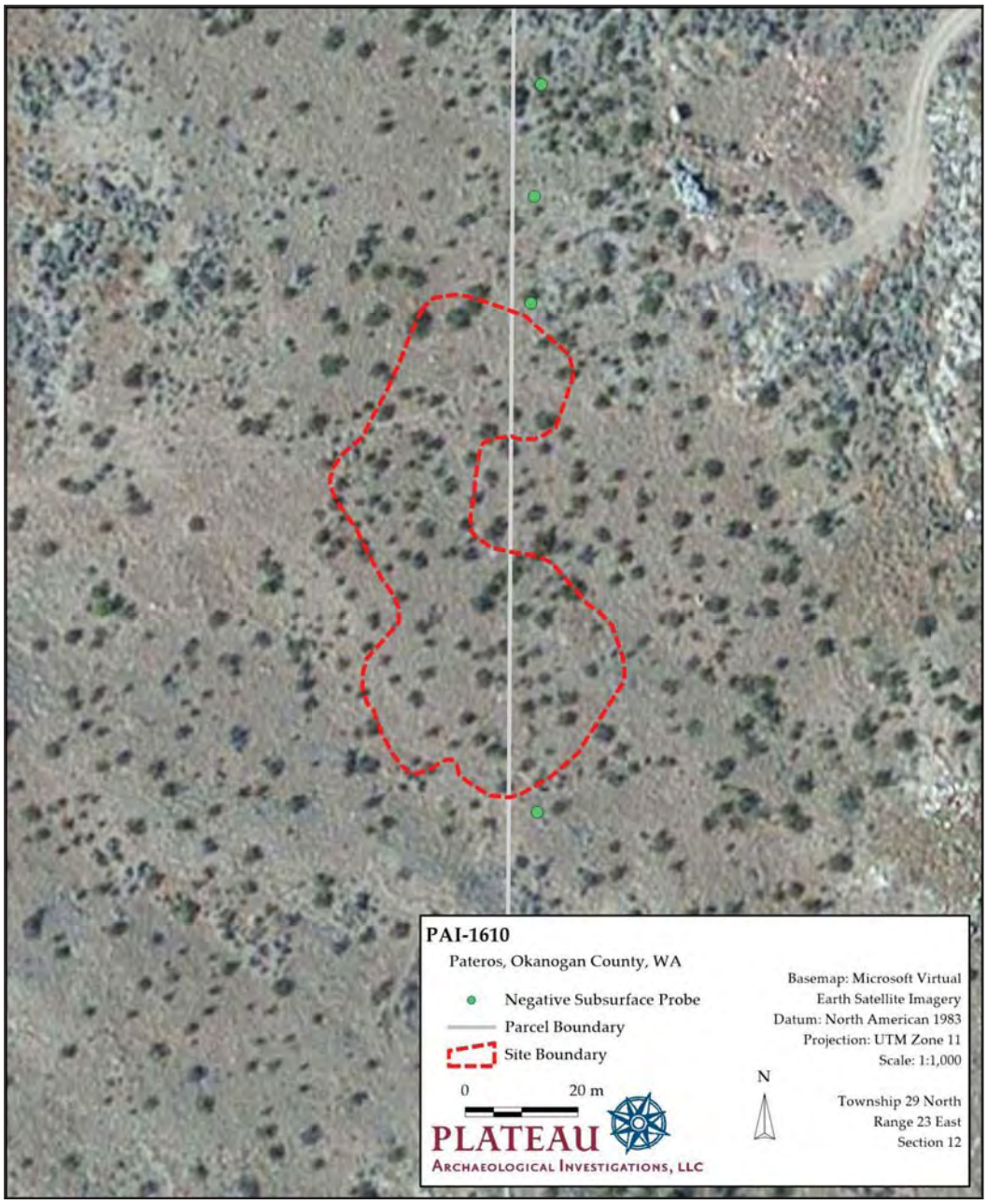
***Mandatory Information for Official Smithsonian Number designation.** *Revised 2/2015*

USGS MAP



Mandatory Information for Official Smithsonian Number designation. *Revised 2/2015*

SKETCH MAP



Mandatory Information for Official Smithsonian Number designation. *Revised 2/2015*

PHOTOGRAPH(S)

Figure 1. Overview of site showing abundance of metal fragments throughout.

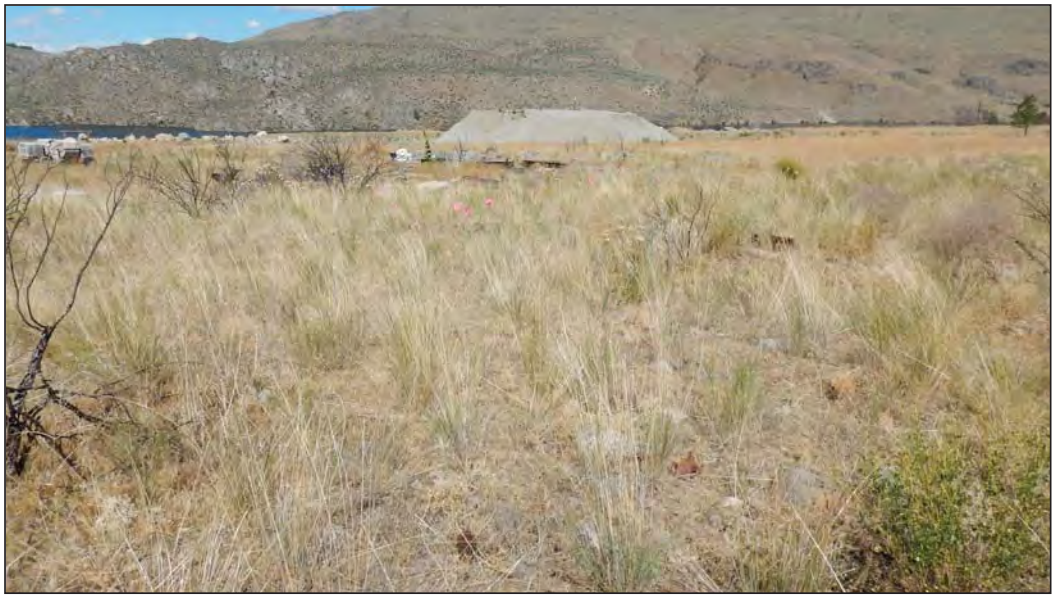
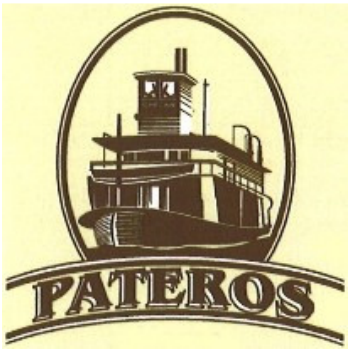


Figure 2. Overview of site showing gravel staging area in use by City of Pateros.

Figure 3. Base of glass bottle manufactured by Glass Containers Inc. in 1952.


Figure 4. Base of glass bottle manufactured by Northwestern Glass Co.

Figure 5. Base of coffee mug manufactured by Mayer China in 1950.



City of Pateros

GROUNDWATER INVESTIGATION

Technical Memorandum Report
May 1, 2015

VARELA & ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT
PLANNING • DESIGN • MANAGEMENT • INSPECTION

City of Pateros

GROUNDWATER INVESTIGATION

Technical Memorandum Report
May 1, 2015

Officials for the City of Pateros

MAYOR
George Brady

CITY ADMINISTRATOR
Jord Wilson

CLERK-TREASURER
Kerri Wilson

CITY COUNCIL
Adam Fritz
Ryan Greene
Christine Perry
Carlene Anders
Megan Sherrard

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Technical Memorandum Report
Groundwater Investigation
May 1, 2015

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Appendix

Figure 1 - Starr Rd Groundwater Exploration Area
Figure 2 - North Groundwater Area
Existing Water System Map (From Water System Plan)
Project Cost Estimates
Hydrogeologic Evaluation, City of Pateros Water System, GeoEngineers, April 2, 2015

City of Pateros

Groundwater Investigation
Technical Memorandum Report
May 1, 2015

1. BACKGROUND

The City of Pateros August 14, 2014 Water System Plan (WSP) was adopted by the City on August 18, 2014 and approved by the Washington State Department of Health (DOH) on September 29, 2014. The WSP documents two primary and significant water supply deficiencies: manganese (Mn) concentrations from 5 to 15 times the maximum contaminant Level (MCL) and supply capacity that is currently barely able to meet peak water demands. The WSP sets forth a systematic plan, referred to in the plan as Water System Improvements Investigative Planning, to investigate these conditions and provide the City a basis for selecting effective solutions for implementation. The groundwater investigation reported herein is one of the elements of this plan.

As an initial step to obtain background information regarding groundwater Mn concentrations in the general area the City obtained and analyzed water samples from a number of existing wells located in and around Pateros, including an area in the vicinity of property about two miles south of town owned by the City referred to herein as the Starr Rd groundwater investigation area (or the Starr Rd area). See **Figure 1**.

The City is interested in evaluating the potential for municipal groundwater supply in the Starr Rd. area for three reasons:

- Manganese levels are low in the wells sampled in this area so this area is being considered for a well or wells to replace existing city wells with excessive Mn levels. This area was identified in the WSP as a potential location for replacement wells.
- The area is presently served by several very small water systems that could potentially be better served by a city owned system. Consolidation of systems is typically considered desirable by the State of Washington Department of Health (DOH). As a result the city has obtained a DOH DWSRF Small System Consolidation grant to evaluate the feasibility of this.
- While a new well(s) in the Starr Rd area cannot be sited on the City property because a now closed landfill is located on the site, the City is evaluating use of this property as a commercial park, which could be served by a city well. The city has obtained a CERB grant to evaluate the economic feasibility of this.

2. PURPOSE AND SCOPE

The purpose of this groundwater investigation is twofold:

- evaluate the potential for drilling a groundwater test well in an area along Starr Rd. about two miles south of town in the general vicinity of property owned by the city
- evaluate the potential for installing a small diameter monitoring well in the general vicinity of the city's existing wells to aid in judging if the observed high Mn levels in the city wells are well based or aquifer based
- provide a recommended implementation plan and project budget estimates to aid in project planning and financing

The hydrogeologic evaluation for this investigation was conducted by GeoEngineers Inc. and reported in the report titled *Hydrogeologic Evaluation, City of Pateros Water System* dated April 2, 2015, included in the **Appendix** this TM report.

The scope of work performed for this investigation is summarized as follows:

- Hydrogeologic reconnaissance of the Starr Rd area and the existing city well field including obtaining and reviewing available well logs, water quality data and existing City Well 1 downhole video and site visits
- Development of a preliminary conceptual model of the shallow (above bedrock) hydrostatigraphy underlying the Starr Rd. area
- Review anticipated regulatory considerations for potential siting of a new groundwater well in the Starr Rd area relative to water rights and to the closed landfill
- Development of preliminary design and cost estimates for drilling and testing a test well in the Starr Rd area, including general location criteria, and for a small diameter monitoring well in the general vicinity of the existing city wells
- Determine the City's existing well alternatives and preliminary estimated costs
- This Technical Memo (TM) report of findings and recommended plan

3. GROUNDWATER SUPPLY CAPACITY CRITERIA

For this purposes of this groundwater investigation the following preliminary well capacity criteria is used:

<u>For Present City Water Service Area per August 2014 WSP</u>

a) If additional water rights Qi can be obtained:
   - 665 gpm per well x 3 wells (based on 3 wells, any two of which can meet 20 yr MDD of 1,330 gpm
b) If additional Qi cannot be obtained (20 yr. MDD must be reduced 17%):
   - 548 gpm per well x 3 wells (based on 3 wells, any of which two can meet current and reduced 20 year MDD of 1095 gpm (Qi)
c) If additional Qi cannot be obtained and/or if funding is not available to develop 3 new wells, then the highest priority for supply is to replace the existing wells with 2 new wells with capacity approximately equal to the existing wells (500-600 gpm) and with water quality meeting regulatory requirements including manganese, and reduce peak demand starting with the cemetery, which currently uses approximately 17% of total city water production [(1).]

<u>For Starr Rd Service Area</u> (see attachments for preliminary water demand estimates)

d) Minimum 150-200 gpm well, plus backup well if feasible
   Based on consolidation of all present small system services into a City system
e) Maximum 300 gpm
   Based on future potential buildout of the area currently served by small systems

<u>Summary of Well Design Capacity Criteria</u>

Present water service area -

Preferred, per WSP:
3 wells at 550 - 665 gpm each
(pumping rates 548 gpm until/unless additional Qi is eventually obtained)

Minimum, if funding not available for 3 wells:
2 wells at min. 550 gpm pumping rate each [(2)]

Well(s) in the South Area (Starr Rd) -	150 - 300 gpm to serve Starr Rd area 550-665 gpm per above to serve existing City water service area [3]

(1) See WSP. Current MDD is affected by high cemetery water use due to lack of automated irrigation system. Due in part to the city's current Qi water rights limitations, an integral component of the water supply improvements project should include installation of such a system to conserve water and water rights.
(2) Well capacity (hydrogeologic) design should be for up to 665 gpm if feasible even if additional Qi cannot be obtained for this project, in case Qi can be increased in the longer term future.
(3) See note (2) above

4. SUMMARY OF HYDROGEOLOGIC EVALUATION

4.1. GENERAL

- Based on similarity of hydrogeologic conditions the study area was divided into a North Area (generally the City of Pateros itself) and South Area (the area in the general vicinity of Starr Rd and the city parcel on which the old landfill is located). A total of 31 Water Well Reports ("well logs") were obtained and reviewed. See Fig xxx.

- The stratigraphy of both areas consist largely of free draining glacial/alluvial sands and gravels. Aquifers of this nature are usually relatively susceptible to water quality degradation from point and non-point sources because they frequently lack an overlying low permeability unit and are often characterized by a relatively shallow depth to the groundwater table.

- Well logs in the South Area generally indicate a higher frequency of layers of silt and/or clay, as well as silt and/or clay within the matrix of sand and gravel zones. It is therefore interpreted that the South Area could have less potential for high capacity wells than the North Area. Topographic relief in the South Area is high compared to the area around existing City Well 1 and 2, thus depth to groundwater is expected to vary considerably with location. Few area wells penetrate to bedrock, so depth to bedrock is not well indicated in either study area.

- It is likely that the aquifers in both areas are in general hydrogeologic continuity with Lake Pateros. The degree of continuity and direction of groundwater flow could vary with season and location, as well as Lake Pateros water level, groundwater recharge conditions, and lakebed permeability.

4.2. WATER RIGHTS

We spoke with Teresa Mitchell at the Washington State Dept. of Ecology (ECY) in Yakima and also one of the Okanogan County Water Conservancy Board members regarding water rights issues and process related to new or replacement City of Pateros wells. The following was indicated.

- A replacement well(s) for Wells 1 and 2 is permitted using the streamlined administrative process in RCW 90.44.100 (no Water Right Change required) if the well(s) are located in the quarter-quarter section specified in Permit G4-33051P for the existing wells. Coordination will be with Avery Richardson at Ecology (Central Region) to determine specific requirements and time lines for new well construction and aquifer to meet the requirements for being eligible for WAC 90.44.100. The time line for a replacement well(s) under WAC 90.44 is expected to be on the order of two months.

- If a Change process is required it is expected to take 6 months (potentially up to 12 months) and should be submitted to the Okanogan County Conservancy Board.

- Assuming ECY concludes the aquifer system in the Starr Rd area meets the hydrogeologic requirements for adding a new point of withdrawal to the existing City water rights, the City could add a well(s) in this area and expand the service area, provided that the new service area is included in the City's DOH-approved Water System Plan. While the city's WSP shows a new well in this area it does not specifically show the Starr Rd area as part of the City's Water Service Area. An amendment to the WSP would therefore likely be required to serve this area in order to utilize the City's existing water rights.
- An increase to the City's current total annual (Qa) water right or instantaneous (Qi) water right or Q would be considered a new water right. ECY indicated it is doubtful a request for additional water would be successful or acted upon in a reasonable timeframe.

5. EXISTING CITY WELLS AND WATER SUPPLY

5.1. DESCRIPTION AND CONDITION

City water supply is provided by two wells located within the corporate boundaries. See Figure 1. The wells were drilled in 1964 and 1965. Both well pumps are line shaft turbine types with fixed speed driven 40 hp motors. The pumps and motors were installed new in 2013 as part of an energy efficiency project by the city. Well 1 1 current pumping rate is roughly 520 gpm; Well 2 is assumed to be about the same. With both wells operating this is approximately equivalent to the City's current 1,095 gpm instantaneous water right (Qi). Available well information indicates the following.

Formation units and depths	**Well 1**	**Well 2**
Sandy silt	0 - 27 ft	0 - 27ft
One or more large rocks (boulders?)	27 -32ft	27 – 42ft
Clay and gravel	32 -82ft	42 – 70ft
Gravel and sand	82 – 107ft	70 – 112ft
Static water level (2/26/15)	6 ft	assumed same as Well 1
Static water level (1964)	61ft*	60 ft*

* prior to fill to raise the City elevation for Wells Dam construction

Well Construction		
12" casing	0 - 77ft	0 – 77ft
10" casing	77 – 107ft	72 – 107ft
Casing perforations	82 – 107ft	87 – 112ft
Surface seal	none recorded	none recorded

Condition

A downhole well video conducted in 2013 was reviewed. Observations are summarized as follows.

- The steel casings appear to be in fair to poor condition, with heavy scaling and nodule growth
- Weld condition cannot be evaluated due to scale obscuring the welds
- Scaling, nodules and presumed deterioration increase in the probable area of the casing perforations; heavy scaling obscures identification of any perforations
- Remaining structural service life of the casings cannot be judged due to being obscured by scaling and tubules, but they are likely well corroded.

- Visible corrosion byproducts blockage of Well 1 casing perforations and its roughly 82% reduction in specific capacity suggest that the remaining service life of both wells is limited.

Well 2 has not been videoed to ascertain condition, but its condition would be expected to be similar to Well 1.

5.2. GEOLOGIC CONDITIONS AND PERFORMANCE

- Both wells are located approximately 650 feet from Lake Pateros. This proximity, apparent control of groundwater levels by lake pool levels, and reported geologic conditions suggest a hydraulic connection between the wells and Lake Pateros.

- Well 1 performance recorded at the time of drilling was 1,350 gpm with 19 feet of drawdown (specific capacity of 70 gpm/ft of drawdown). Informal measurements taken in February 2015 indicate drawdown exceeded 50 ft at 520 gpm (specific capacity of 12 gpm/ft), a reduction of 82%. The water level fully recovered in less than 2-1/2 minutes after shutdown. These observations are consistent with the observed condition of the well.

- The above suggests that the transmissivity of the aquifer adjacent to the wells is relatively high and much of the observed drawdown can be attributed to well inefficiency resulting from casing and/or adjacent formation blockages due to corrosion and deposition of minerals and/or formation fines. This is not uncommon in wells of this age and construction.

5.3. WATER QUALITY

- Recorded data from 1988 to 2013 indicate that a dramatic increase in manganese (Mn) levels in the well field occurred sometime between 1997 and 2003. Levels increased from a low of 0.013 mg/l in 1991 to a high of 0.730 mg/l in 2007 (the secondary Maximum Contaminant Level (MCL) for Mn is 0.05 mg/l). Every analysis conducted since 1994 has significantly exceeded the MCL. After 2003 Mn concentrations have exceeded the MCL by at least a factor of four.

- The relatively low Mn levels in tested area wells, albeit not generally of the same depth as the city wells, suggest that the source of high Mn levels in the city wells may not be widespread.

- The nature of the formations overlying the aquifer, previous commercial and industrial land uses, proximity of SR 97 and other roadways and proximity to a rail line suggest a point source of contamination is possible.

- The downhole video survey of Well 1 indicated it is heavily fouled with scale and possibly biofouling from mineral bacteria. This, together with City observation of (presumably bacterial) slime on the pumps when recently removed and replaced, suggests that bioaccumulation of manganese by bacteria within the wells could be contributing to the observed manganese exceedances, possibly after reaching a “tipping point” between the 1997 and 2003 Mn data points.

6. WATER SUPPLY IMPROVEMENT ALTERNATIVES

Alternatives available to the City to address current Mn contamination and limited remaining well service life are as follows. Note that treatment is not considered in this groundwater investigation because development of groundwater supply of adequate water quality, if proven feasible, was chosen over treatment of existing City groundwater supply.

Alternative 1 – Well Rehabilitation

Advantages

- No water rights change required
- Probably less cost than well replacement depending on rehabilitation methods, cost, results and cost of building replacement if needed for well access

Disadvantages

- No assurance that rehab will mitigate current manganese contamination, and a greater chance of a recurrence if present contamination is caused by well-centered Mn bacteria proliferation that is largely removed by rehab.
- Both wells will need to be out of service during rehab to allow use of chemicals to optimize results
- The existing wells are 50 years old and likely have limited remaining service life even if rehab is successful
- Even if rehab is successful, the perforated casing construction of the wells would make them susceptible to future scaling and deposition compared to a well with a well screen properly designed for the source aquifer
- The existing wells could be damaged or structurally fail during rehab due to advanced corrosion

Comments

- If rehabilitation of the existing wells is chosen and is successful, the system still needs at least one new well of roughly the same capacity as the existing wells in order to shut the wells down for rehab, and to meet the city's supply reliability criteria as set forth in the city's adopted 2014 Water System Plan (see **Section 3** herein)

Alternative 2 – Construct New Wells

Advantages

- Potential for reduction of current Mn concentrations if the observed Mn concentrations are related to a localized contamination source or intra-well bioaccumulation
- Likely greater service life and hydraulic efficiency than the existing wells
- Likely slower rate of mineral scaling, corrosion and biofouling due to the reduced entrance velocities resulting from properly designed well screens; therefore longer service life and lower future periodic well maintenance/rehab costs to restore capacity
- The existing wells can remain in service during new well construction
- Presumably better well access assuming overhead power lines can be avoided at a new site(s)
- Eliminates risk of damage to and loss of one or both of the existing wells during rehabilitation efforts

Disadvantages

- Cost of new well is likely greater than rehabilitation of an existing well
- A new site must be located and acquired if an existing city-owned site is not selected
- Other contaminants may be encountered at a new site due to past or current land uses
- There is no assurance that Mn contamination will be less at a new site
- Water right change will be required if the selected site(s) are not within the same ¼, ¼ Section as the existing wells. See **Figure 2**.

Alternative 3 – Construct two new wells and rehabilitate one or both of the existing wells

- Same advantages and disadvantages as above.
- Could be less cost to result in three city wells if two new ones are constructed and one or both of the existing wells are successfully rehabilitated rather than constructing three new wells and abandoning the two existing wells

6.1. ALTERNATIVE SELECTION AND IMPLEMENTATION PLAN

6.1.1. Recommended Water Supply Alternative

Based on the advantages and disadvantages summarized above it is recommended the City pursue construction of at least two new wells as described in Alternative 1 above. Depending on the outcome in terms of capacity and water quality of the new wells, and if financially feasible funding is available, either a third new well is needed to meet the City's adopted reliability criteria (see WSP), or an attempt to rehabilitate one or both of the existing wells could be considered.

Due to current water rights Qi limitations it is also recommended that water use efficiency be optimized, and since the cemetery uses approximately 17% of total city water production (see WSP) installation of an automated irrigation system should be installed as an integral part of water supply and storage improvements. Similarly, equalizing storage should be installed in the project with the goal of limiting peak pumping rate to MDD in order to stay within current Qi, and peak demand reduction will be an important part of this.

6.1.2. Data Gaps

Much information is unavailable regarding the city's existing wells and groundwater conditions in the general vicinity of these wells. Current unknowns include:

- What is the source(s) of Mn in the existing wells? Where is it located? Is it ongoing?
- Do Wells 1 and 2 have surface seals?
- Is there a lower zone in the glacial/alluvial or bedrock aquifer systems near Wells 1 and 2 that could provide a sustainable groundwater source of adequate water quality?
- What are the hydraulic gradient and groundwater flow conditions within the glacial/alluvial aquifer within and surrounding the City, including seasonal variation?

Resolution of these data gaps would take significant budget and time, requiring extensive subsurface exploration, monitoring well installations and groundwater monitoring and analysis. Given limited budget and timeframe the implementation plan summarized below provides a path forward intended to cost and time effectively provide information upon which to base the development of new groundwater supply, with the goal of avoiding the need to provide water treatment to remove manganese contamination.

6.1.3. Implementation Plan

Based on the findings reported in this this groundwater investigation TM and the City's 2014 Water System Plan (WSP) the recommended plan to implement water supply improvements consists of the following elements. These elements are consistent with the improvements and implementation plans in Sections 5 and 6 of the WSP.

1. Conduct a groundwater investigation based on available information (completed with this TM)
2. Obtain funding for supply/storage improvements implementation (steps 3 – 7 below)
3. Drill a test well in the Starr Rd area. See **Section 7**.
4. Drill one or more small diameter monitoring wells within City limits to evaluate whether Mn contamination is widespread or just within the existing wells and immediate formation. See **Section 8**.
5. Develop new water supply per the identified criteria, based on the results of steps 2 and 3 above
6. Increase water storage capacity to mitigate peak water demand that must be provided by city wells (i.e., limit required supply capacity to MDD instead of PHD by increasing equalizing storage)
7. Implement water use efficiency improvements starting with installation of an automated irrigation system at the cemetery

7. STARR ROAD GROUNDWATER EXPLORATION AREA

7.1. HYDROGEOLOGIC POTENTIAL

Existing data is insufficient to interpret variation in aquifer characteristics and anticipated well yield, however available well logs, topography and surficial geologic conditions suggest the following.

- The presence of silt and clay noted on a number of well logs in the Starr Rd area indicates that developing a well of several hundred gallons per minute in this area could be challenging.

- The glacial/alluvial aquifer appears to widen and potentially thicken to the south, indicating that the potential for a relatively high yielding well could increase to the south.

- The glacial/alluvial aquifer thins to the west where it ultimately pinches out as the bedrock rises, indicating the potential for a relatively high yielding well increases with proximity to the lake.

7.2. STARR ROAD LANDFILL

The Starr Rd area contains the former City of Pateros landfill. According to the Draft Closure Plan (Erlandsen & Associates, 1989) the landfill was operated by the city for disposal of domestic garbage from 1980 to 1987, as well as disposal of demolition material and "minimal agricultural chemicals". Additional concrete demolition material has recently been placed on the site. Final approved closure documents have not been located. The draft closure report indicates the landfill comprised 2.7 acres of a 30 acre parcel owned by the City. The City sold a portion of this land and currently owns approximately 17 acres upon which the landfill is located, as shown on **Figure 1**. The closure report indicates that at that time the closest residence was located about 700 feet from the nearest portion of the landfill. Two monitoring wells were installed at the landfill site as part of the closure process. Water quality test results from these monitoring wells from 1995 to 2014 provided by the city and Okanogan County Health Department were reviewed. Information indicates at least one of the monitoring wells are frequently dry. Though logs for these wells were not located, this suggests that the well(s) are screened across a perched aquifer or a very limited thickness of the unconfined aquifer system.

Available monitoring well water quality data suggests an increasing trend in groundwater nitrate concentrations over time, which reinforces the concept of locating a test well at distance from Starr Road Landfill boundaries. However, uncertainty in monitoring well construction makes it difficult to correlate landfill site monitoring well test results with anticipated water quality in an area production well.

Evaluation of the potential for present or future groundwater quality impacts from the old landfill is not within the scope of this investigation. WAC Chapter 173-161-171 requires that a water supply well must have a minimum setback of 1,000 feet from the boundary of a permitted or previously permitted solid waste landfill, as defined by the landfill permit. Location of a Starr Rd area test well site as far as practical from the former landfill and as close to Lake Pateros as other regulatory considerations allow would be expected to reduce the risk of groundwater quality impacts from the landfill.

7.3. SITE SELECTION PARAMETERS

Test/production well site selection for the Starr Road area should be based on the following considerations (not necessarily in order of priority). This Groundwater Investigation TM provides findings and recommendations relative to considerations 1 and 2 below upon which subsequent investigation into considerations 3 through 7 can be based.

1. Hydrogeologic potential (see 5.1 above)
2. Regulatory parameters (water rights, distance to surface water and the abandoned landfill)
3. Availability of well site and right-of-way for pipeline
4. Availability and cost of providing electric power
5. Pipeline distance to service area (existing/future Starr Rd services and existing/future City service areas)
6. Wellhead protection conditions (risks from on-site sewer systems, abandoned landfill, railroad tracks and roads, other land uses
7. Cultural resources conditions
8. Effects of Chelan County PUD policies related to the Wells Dam Project Area boundary

7.4. STARR RD AREA GROUNDWATER PLAN

The recommended steps for groundwater exploration in the Starr Rd. area are as follows. These steps are listed generally in order of sequence, except

1. Coordinate with:
   - DOH and Okanogan County Health Department re well siting, site approval, sanitary control area (SCA) survey and wellhead protection area including landfill
   - ECY and Okanogan County Water Conservancy Board re a water rights change to add a point(s) of withdrawal in the Starr Rd area to the city's existing water rights and obtaining a permit to drill a test well.

2. Select a new well site (or several sites prioritized in order of preference) based on input from DOH, County Health and ECY and the parameters in 5.3 above. Pending their input the new well site should be a minimum: 1,000 feet from the Starr Rd landfill boundaries, 200 feet from surface water and 100 feet from other potential sources of contamination.

3. Prior to drilling, obtain rights to utilize the selected site(s) should adequate groundwater supply be determined, including transmission main right-of-way. Obtain legal advice regarding the preferred method of accomplishing this in advance of test/production well drilling.

4. Design and drill a test/production well, including pumping test/aquifer analysis and quality testing/analysis. Based in part on the potential for finer grain formation characteristics in the Starr Rd area, diameter should be 10" or 12" depending on desired capacity and pump type. A 10" diameter well should be adequate to install a 3,600 rpm submersible pump of 500 gpm or more (approximately 8"diameter pump and motor). An 1800 rpm line shaft pump (with surface mounted motor) would likely require a 12" well for more than about 300 gpm capacity. Depth will likely vary with site elevation. Assuming an approximate ground elevation of 850, well depth would likely be in the range of 125ft to 175ft.

5. If successful, at the conclusion of the above process the city should have data upon which to base a request to DOH and ECY to add the well as a new source and/or make a decision whether or not to proceed with another test/production well in the Starr Rd area.

7.5. COST ESTIMATE

Recommended budget estimate for test/production well design, construction and testing are as follows.

Starr Rd Area 10" Test/Production Well Budget Estimate [1]

Description	Estimated Cost	Comments
Construction inc tax	$108,000	based on 200 ft depth
Land/ROW, legal costs	30,000	
Environmental, Cultural Resources	20,000	
Engineering, hydrogeology, lab costs [2]	72,000	
Contingency (25%)	27,000	
Total Budget Estimate	**$257,000**	

(1) Does not include costs for pump, pump station, power extension or transmission main

(2) Includes water rights assistance, site selection assistance, design/construction docs, bid period, construction engineering and administration, construction and pumping test observation, analysis and reporting/recommendations

8. NORTH AREA

8.1. SITE SELECTION PARAMETERS

It is recommended that two sites be selected and ranked for potential new production well locations in the general vicinity of the existing city wells. One small diameter monitoring well (2") should be drilled at the highest ranked site to (1) confirm the presence of the glacial/alluvial aquifer, and (2) evaluate groundwater quality under static (non-pumped) conditions, and (3) to evaluate whether Mn contamination is likely widespread or just within the existing wells and immediate formation. Aquifer capacity cannot be determined from the monitoring wells, but such wells can cost-effectively disclose water quality problems, with the limitation that pumping a production well at a monitoring well site could result in water quality different than the monitoring well. The possibility of drilling a monitoring well at a second site would be considered when the results of the first monitoring well are known. Production/monitoring well site selections should be based on the following considerations (not necessarily in order of priority).

1. Minimum 200 feet from Wells 1 and 2. See **Figure 2**.
2. Minimum 200 feet from surface water. See **Figure 2**.
3. In a location where the City can control a minimum 100 foot diameter Sanitary Control Area (SCA)
4. Within the same ¼, ¼ section as Wells 1 and 2 if feasible, but this is not critical unless ECY or the Water Conservancy Board indicates a problem with a water rights change to new point(s). See **Figure 2**.
5. Availability and cost of providing electric power
6. Wellhead protection conditions (risks from current and previous land uses, railroad tracks and roads). See **Figure 2**.
7. Property availability, good well access, no overhead power obstructions. See **Figure 2** for parcels currently owned by the City.

8.2. NORTH AREA GROUNDWATER PLAN

The recommended steps for groundwater exploration in the City area are as follows. These steps are listed generally in order of sequence.

1. Coordinate with:
   - DOH and Okanogan County Health Department re well siting, site approval, sanitary control area (SCA) survey and wellhead protection area
   - ECY and Okanogan County Water Conservancy Board re a water rights change to add a point(s) of withdrawal to the city's existing water rights and obtaining a permit to drill a test well if the selected site(s) are not in the same ¼, ¼ section as Wells 1 and 2.

2. Select and rank two potential new well sites

3. Prior to drilling a monitoring well, obtain rights to utilize the selected site(s) should adequate groundwater supply be indicated by a subsequent test/production well, including transmission main right-of-way. Obtain legal advice regarding the preferred method of accomplishing this in advance of monitoring well drilling.

4. Drill and install a 2" monitoring well at the first ranked site. Well depth would likely be in the range of 100ft to 150ft.

5. Measure static groundwater levels at the monitoring well, Well 1 or 2 and the irrigation district well across the highway, as well as Lake Pateros pool elevation. Collect a water sample and analyze water quality.

6. Analyze resulting data, estimate groundwater flow direction and hydraulic gradient within the aquifer; characterize groundwater/surface water interaction.

7. The goal of the above process is to provide the city data upon which to base a decision to drill a test/production well at this site, and/or a monitoring well at another site, and to obtain ECY/DOH approval to add a new well(s) at an appropriate site(s).

8. If the results of the above steps are positive, drill test/production wells at the indicated site(s) and develop the supply

8.3. NORTH AREA COST ESTIMATES

Recommended budget estimate for monitoring well design, construction, testing and analysis are as follows. For comparison purposes, the budget estimate for a 12" test/production well is also shown below.

North Area 2" Monitoring Well Budget Estimate

Description	Estimated Cost	Comments
Monitoring well drilling	$26,000	100-150ft depth
Lab costs	2,000	
Site environmental review re potential for groundwater impacts from previous site vicinity land uses	6,000	
Environmental and Section 106 process	15,000	
Engineering and hydrogeology [1]	37,000	
Contingencies (15% of all other costs)	12,000	
Total Budget Estimate – 1 Monitoring Well	**$98,000**	

[1] Includes site selection assistance, water rights assistance, well data analysis and report/recommendations

North Area 12" Test/Production Well Budget Estimate [1]

Description	Estimated Cost	Comments
Construction inc tax	$96,000	based on 150 ft depth
Land/ROW, legal costs	30,000	
Environmental, Cultural Resources	5,000	most included in monitoring well
Engineering, hydrogeology, lab costs [2]	77,000	
Contingency (25%)	24,000	
Total Budget Estimate, 12" Test/Production Well	**$232,000**	

(1) Does not include costs of pump, pump station, power extension or transmission main

(2) Includes design/construction docs, bid period, construction engineering and administration, construction and pumping test observation, lab costs, analysis and reporting/recommendations

9. GROUNDWATER IMPROVEMENTS PLAN OVERVIEW AND BUDGET ESTIMATE

9.1. PROJECT PLAN

Based on the findings and recommendations of the groundwater investigation summarized in this TM report, the recommended groundwater development project should consist of the following principle elements. This plan is substantially consistent with the plan outlined in the City's adopted August 2014 Water System Plan.

1. Obtain funding to conduct investigative planning tasks (funding has been obtained)
2. Conduct investigative planning to the extent financially feasible with obtained funding
    - Groundwater investigation (completed with this TM)
    - Reservoir siting feasibility investigation (will be completed shortly). Although not strictly a part of groundwater development, a storage increase will reduce the peak instantaneous pumping rate required to mitigate water rights limits. See **Section 3**.
    - Cultural resource surveys and environmental reviews (currently in progress)
    - Financial planning and project implementation funding applications (in progress)
3. Coordinate with ECY and DOH re well sites and water rights.
4. Drill Starr Rd test/production wells, North Area monitoring well(s).
5. Drill test/productions wells at locations selected based on the results of the above.
6. Construct pump station(s) and transmission main(s)
7. Construct new reservoir and implement water use efficiency to reduce required peak demand well pumping rates. See **Section 3** of this TM.

9.2. COST ESTIMATES

Groundwater project budget estimate figures are shown below. See Appendix for **Figures 1 and 2** and detailed cost estimates.

Currently unknown variables will significantly affect the cost of a supply transmission main (T-main) from the Starr Rd area to the City water distribution system. Identification and evaluation of these variables and determination of feasibility are not within the scope of this Groundwater Investigation TM. The preliminary cost figures shown in the table below for a transmission main from the Starr Rd area to the city are based on broad assumptions for rough order of magnitude figures to indicate the approximate T-main scope and financing levels needed. The unknown variables include well site location(s) and resulting T-main length, selection of route and alignment, well pump and T-main hydraulics, county, state and private rights-of-way/easements, County and WSDOT franchises and permits, river crossing method, railroad considerations if applicable, soils conditions, surface replacement costs and other considerations. It is therefore recommended a predesign report and cost estimates be prepared prior to a decision to design and construct a transmission main to connect a well(s) in the Starr Rd area to the city distribution system.

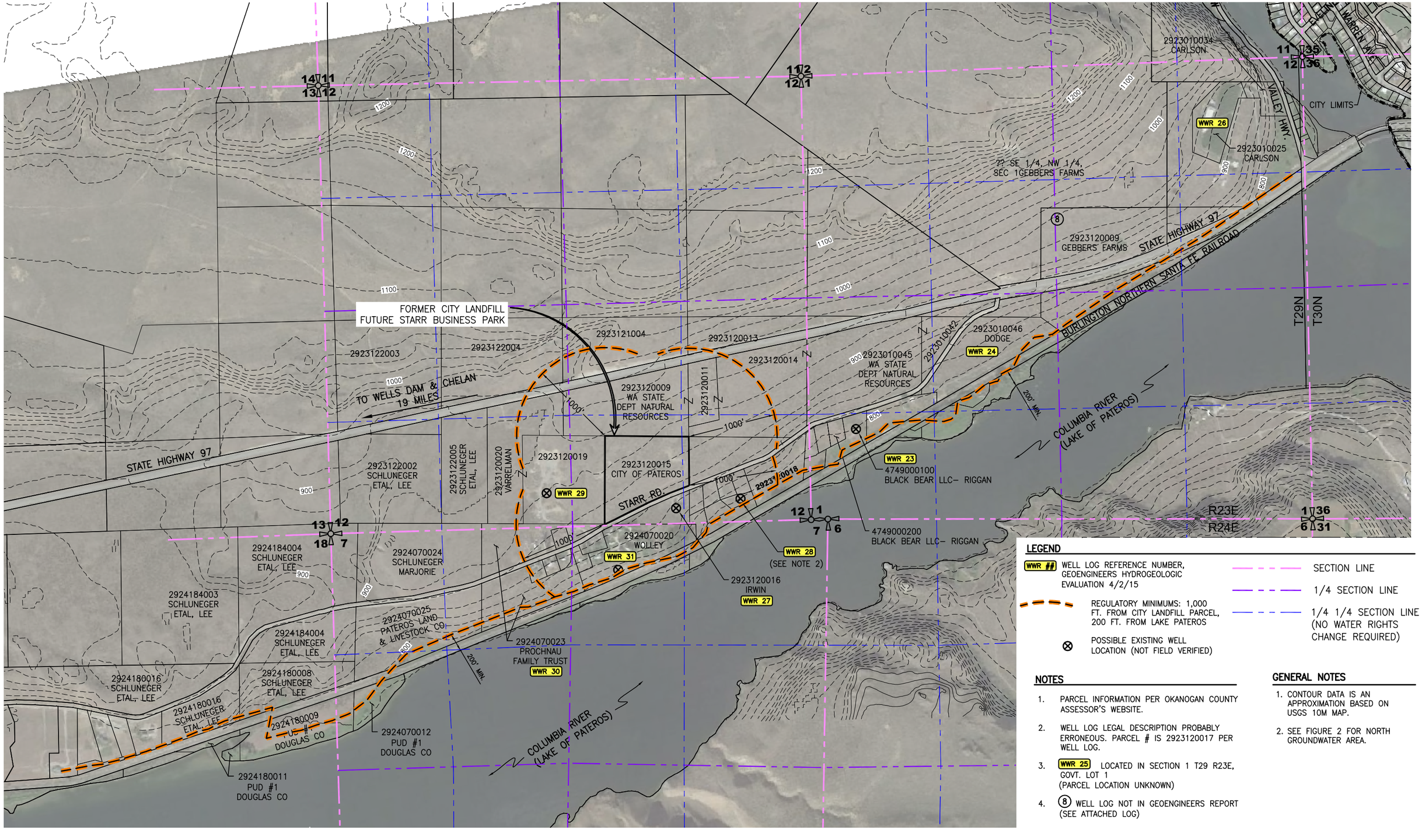
Groundwater Improvements Cost Estimate

Description	Estimated Cost [1]	Comments
Groundwater Investigation and Wells		
Investigative Planning	$136,000	
Starr Rd Area test/production well	257,000	
North Area monitoring well	98,000	See Section 8.3 for cost estimate details
Allowance for second North Area monitoring well	98,000	See Section 8.3 for cost estimate details
North Area test/production well	232,000	
Second test/production well	232,000	(2)
Allowance for unsuccessful test well drilled but not completed	116,000	(3)
Subtotal, groundwater investigation and wells	**$1,169,000**	
Well Pump Stations and Transmission Main(s) (for 2 production wells)		
Pump station for 1 well, and 800 lf T-main	1,018,000	(4)
Pump station for 1 well and 800 lf T-main	1,018,000	(4)
Auxiliary power for 1 well pump station	120,000	(7)
Abandon existing wells and remove building	50,000	
Subtotal, 2 well pump stations and total 1,600 LF Transmission main	**$2,206,000**	
Total Groundwater Supply Improvements Budget Estimate	**$3,375,000**	
Additional cost for transmission main from Starr Rd area well(s) to City distribution system (6)	**$2.1M - $3.3M**	9,000 lf – 15,000 lf (5)
Total groundwater supply improvements preliminary estimate if new City supply is located in the Starr Rd area North of the 1,000ft landfill buffer zone	**$5.5M**	Assumes approximately 9,000 lf transmission main (6)
Total groundwater supply improvements preliminary estimate if new City supply is located in the Starr Rd area South of the 1,000ft landfill buffer zone	**$6.7M**	Assumes approximately 15,000 lf transmission main (6)

(1) Includes construction, taxes, hydrogeology, engineering, archaeological, environmental, land/ROW acquisition, legal costs and 20-25% contingency.
(2) Assumes one of the first two test/production wells does not provide adequate quantity or quality and thus the net outcome is two production wells meeting the criteria included in **Section 3** herein.
(3) Budget allowance for a test/production well drilled but not completed due to poor aquifer formation conditions, assumes 50% of the cost of a completed well is expended.
(4) Based on North Area wells and T-mains. Assumes Starr Rd area pump stations would be similar. See (5).
(5) The total length of main from a well site(s) in the Starr Rd area to the City distribution system could vary approximately from 9,000 to 15,000 feet depending on whether the well site(s) are north or south of the 1,000 ft landfill buffer zone and how far the site(s) are from Starr Rd. See **Figure 1**.
(6) See discussion in 9.2 above
(7) Figure adapted from FEMA Hazard Mitigation budget estimate

9.3. WATER TREATMENT

If adequate quantity and quality of groundwater cannot be developed the option of manganese reduction treatment could be considered, although high capital and annual costs generally make this option undesirable for small cities. Installation of a manganese treatment system would be expected to cost in the range of $1,500,000 - $2,000,000. Annual operation and maintenance costs have not been estimated but would substantially increase current annual water system costs for treatment system operational labor, chemicals and sludge disposal.



LEGEND

- WWR ## — WELL LOG REFERENCE NUMBER, GEOENGINEERS HYDROGEOLOGIC EVALUATION 4/2/15
- REGULATORY MINIMUMS: 1,000 FT. FROM CITY LANDFILL PARCEL, 200 FT. FROM LAKE PATEROS
- ⊗ POSSIBLE EXISTING WELL LOCATION (NOT FIELD VERIFIED)
- SECTION LINE
- 1/4 SECTION LINE
- 1/4 1/4 SECTION LINE (NO WATER RIGHTS CHANGE REQUIRED)

NOTES

1. PARCEL INFORMATION PER OKANOGAN COUNTY ASSESSOR'S WEBSITE.
2. WELL LOG LEGAL DESCRIPTION PROBABLY ERRONEOUS. PARCEL # IS 2923120017 PER WELL LOG.
3. WWR 25 LOCATED IN SECTION 1 T29 R23E, GOVT. LOT 1 (PARCEL LOCATION UNKNOWN)
4. (8) WELL LOG NOT IN GEOENGINEERS REPORT (SEE ATTACHED LOG)

GENERAL NOTES

1. CONTOUR DATA IS AN APPROXIMATION BASED ON USGS 10M MAP.
2. SEE FIGURE 2 FOR NORTH GROUNDWATER AREA.

571303-Starr Rd Area Well Log

SCALE:	AS SHOWN
DESIGNED:	MJV
DRAWN:	TVP
CHECKED:	MJV
APPROVED:	MJV
PROJ. NO.:	57-13-03
DATE:	4/28/15

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF PATEROS, WASHINGTON

GROUNDWATER INVESTIGATION TECHNICAL MEMO REPORT
STARR RD. GROUNDWATER EXPLORATION AREA

FIGURE
1

SCALE: 0 400 800

LEGEND

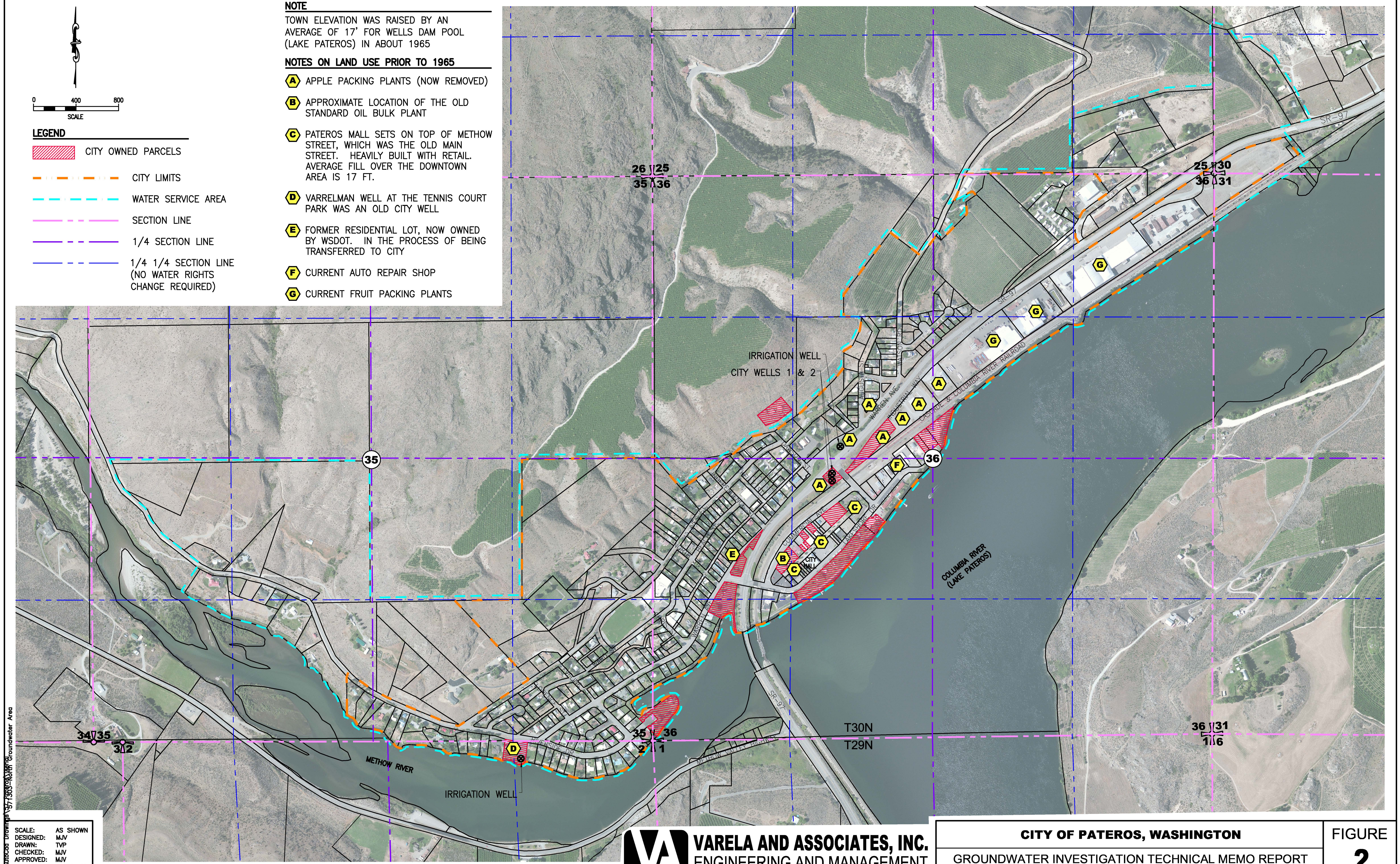
- CITY OWNED PARCELS
- CITY LIMITS
- WATER SERVICE AREA
- SECTION LINE
- 1/4 SECTION LINE
- 1/4 1/4 SECTION LINE (NO WATER RIGHTS CHANGE REQUIRED)

NOTE

TOWN ELEVATION WAS RAISED BY AN AVERAGE OF 17' FOR WELLS DAM POOL (LAKE PATEROS) IN ABOUT 1965

NOTES ON LAND USE PRIOR TO 1965

- (A) APPLE PACKING PLANTS (NOW REMOVED)
- (B) APPROXIMATE LOCATION OF THE OLD STANDARD OIL BULK PLANT
- (C) PATEROS MALL SETS ON TOP OF METHOW STREET, WHICH WAS THE OLD MAIN STREET. HEAVILY BUILT WITH RETAIL. AVERAGE FILL OVER THE DOWNTOWN AREA IS 17 FT.
- (D) VARRELMAN WELL AT THE TENNIS COURT PARK WAS AN OLD CITY WELL
- (E) FORMER RESIDENTIAL LOT, NOW OWNED BY WSDOT. IN THE PROCESS OF BEING TRANSFERRED TO CITY
- (F) CURRENT AUTO REPAIR SHOP
- (G) CURRENT FRUIT PACKING PLANTS



SCALE:	AS SHOWN
DESIGNED:	MJV
DRAWN:	TVP
CHECKED:	MJV
APPROVED:	MJV
PROJ. NO.:	57-13-03
DATE:	4/28/15

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF PATEROS, WASHINGTON

GROUNDWATER INVESTIGATION TECHNICAL MEMO REPORT
NORTH GROUNDWATER AREA

FIGURE
2

N

0 400 800
SCALE

LEGEND

- UGA BOUNDARY, RETAIL WATER SERVICE AREA, WATER RIGHTS PLACE OF USE AREA, FUTURE WATER SERVICE AREA
- EXISTING SERVICE AREA
- CITY LIMITS
- 4"W PVC(1994) — WATER MAIN w/PIPE SIZE & MATERIAL IF KNOWN
- RESERVOIR
- WELL
- WATER VALVE
- FIRE HYDRANT
- RAILROAD
- CONTOUR
- 1200 — CONTOUR (INDEX)

ORCHARDS
SECTION 25
SECTION 30
SR 97 TO BREWSTER 6 MILES
ORCHARDS
SECTION 36
ORCHARDS
EAST RESERVOIR 150,000 GAL. CONST. 1929
WEST RESERVOIR 150,000 GAL. CONST. 1948
R23E
R24E
WATSON RD
PRYOR DRIVE
SR 97
APPLE HOUSE
CHELAN FRUIT
BIG RIVER FRUIT
CASCADE AND COLUMBIA RIVER RAILROAD
CITY WASTEWATER TREATMENT PLANT
WELL No.2
WELL No.1
CITY HALL
LAKE PATEROS (COLUMBIA RIVER)
SECTION 35
CEMETARY
SCHOOL
SCHOOL PLAY FIELDS
COMMERCIAL AVE.
LAKESHORE DR
MEMORIAL PARK
WARREN AVE.
IVES STREET
MANSFIELD ST
FLORENCE ST
McCLUEY DR
METHOW PL
EVELINE ST
RIVERSIDE DR
PENINSULA PARK
STEELHEAD BAY
CASCADE AND COLUMBIA RIVER RAILROAD SR 97 TO CHELAN 5 MILES
T30N
T29N
METHOW RIVER
SECTION 2

571303-WSP-Figure 2 WSP

SCALE:	AS SHOWN
DESIGNED:	PCC
DRAWN:	TVS
CHECKED:	PCC
APPROVED:	MJV
PROJ. NO.:	57-13-03
DATE:	4/28/15

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF PATEROS, WASHINGTON

EXISTING WATER SYSTEM
(FIGURE 2 FROM WATER SYSTEM PLAN)

GROUNDWATER SUPPLY PROJECT BUDGET ESTIMATES for Groundwater Investigation TM May 2015 5/4/2015

57-13-03 & 01

Investigative Planning mjv

Note - does not include test/production wells or monitoring wells		
Financial planning and evaluations	$5,000	
Funding applications for investigative planning and project	25,000	
Groundwater investigation and site selections	35,000	
Reservoir siting feasibility investigation and site selection	15,000	
Reservoir site cultural resource survey	6,000	
Well site cultural resource surveys	10,000	
Investigative planning overall mg't., coord.anmd funding admin.	15,000	
Environmental review process	25,000	
Total, Investigative Planning		**$136,000**

Starr Rd Area Test/Production Well - assumed depth 200 ft

			unit price	qty
Contractor mobilization/admin.	$10,000			
14" or 16" drilled hole and temporary casing for surface sea	15,000		$250	60
10" drilled hole	19,600		$140	140
10" permanent casing	8,750		$50	175
10" Drive shoe	500			
10" telescope size well screen (25ft)	9,375		$375	25
8" well screen riser pipe and/or tail pipe	900		$60	15
Shoe cut	1,000			
14"-16" grout surface seal	3,600		$60	60
Well development	8,000		$200	40
Video camera inspection	1,500			
Furnish, install and remove test pump and test discharge piping	12,000			
Test pump well 84 hrs)	7,000		$250	28
Backfill drilled hole (chlorinated sand or gravel)	1,500		$75	20
Backfill drilled hole (bentonite)	1,500		$75	20
Subtotal	$100,225			
Tax (8%)	8,018			
Construction inc. tax but not contingency		**$108,243**		
Other project costs				
Site acquisition, legal costs	$30,000			
Environmental and Cultural Resource Survey	20,000			
Hydrogeology, lab costs	42,000			
Eng, admin, insp. (1)	30,000			
Contingency (25%)	27,061			
Subtotal, other project costs		**$149,061**		
Total Budget Estimate		**$257,304**		

(1) Includes water rights assistance, site selection assistance, design/construction docs, bid period, construction engineering and administration, construction and pumping test observation, analysis and reporting/recommendations

North Area 12" Test/Production Well - assumed depth 150 ft.

			unit price	qty
Contractor mobilization/admin.	$10,000			
16" drilled hole and temporary casing for surface sea	15,000		$250	60
12" drilled hole	13,500		$150	90
12" permanent casing	6,250		$50	125
12" Drive shoe	500			
12" telescope size well screen	10,000		$400	25
10" well screen riser pipe and/or tail pipe	900		$60	15
Shoe cut	1,000			
16" grout surface seal	4,500		$75	60
Well development	8,000		$200	40
Video camera inspection	1,500			
Furnish, install and remove test pump and test discharge piping	10,000			
Test pump well	6,000		$250	24
Backfill drilled hole (Chlorinated sand or gravel)	750		$75	10
Backfill drilled hole (bentonite)	750		$75	10
Subtotal	$88,650			
Tax	7,092			
Construction inc. tax but not contingencies		**95,742**		
Other project costs				
Site acquisition, legal costs	$30,000			
Environmental and Cultural Resource Survey	5,000		most costs in monitoring well costs	
Hydrogeology, lab costs	42,000			
Eng, admin, insp. (1)	35,000			
Contingency (25%)	23,936			
Subtotal, other project costs		**$135,936**		
Total Budget Estimate		**$231,678**		

(1) Includes water rights assistance, site selection assistance, design/construction docs, bid period, construction engineering and administration, construction and pumping test observation, analysis and reporting/recommendations

North Area Well Pump Station and 800 LF Transmission Main - for 1 well

Contractor mobilization/administration		$55,000	
Pump station bldg (for one well and line shaft pump)		100,000	
Site work		30,000	
Building piping, site piping		75,000	
Pump (1 line shaft)		50,000	
Chlorine injection system		7,500	
Electrical (for pump station bldg and one well pump)		175,000	
Telemetry system upgrade		30,000	
Extend elec service		15,000	assume utility pays for most
Transmission main - 800 lf		75,000	800 lf @$94/lf inc surface restoration, valves/fittings, misc
Misc		15,000	
	Subtotal	$627,500	
	Tax	50,200	
Construction inc. tax but not contingencies			**677,700**
	Other project costs		
	Site acquisition, legal costs	$30,000	for this second well site
	Environmental and Cultural Resource Survey	5,000	most included in well costs
	Eng, admin, insp. (25%)	169,425	
	Contingency (20%)	135,540	
	Subtotal, other project costs		**$339,965**
	Total Budget Estimate		**$1,017,665**
Add for auxilary power genset (inc 20% eng/insp/admin)			**$120,000** see FEMA Hazard Mitigation grant est

One North Area Well Pump Station if for 2 wells at the same site - if 1 line shaft/1 submersible, 1,600 LF Transmission Main

Contractor mobilization/administration		$75,000	
Pump station bldg (1 for both wells)		110,000	
Pitless unit for 1 well		15,000	
Site work		40,000	
Building piping, site piping		80,000	
Two pumps (1 line shaft and 1 sub)		80,000	
Chlorine injection system for 2 wells		10,000	
Electrical (for pump station bldg and two well pumps)		275,000	
Telemetry system upgrade		30,000	
Extend elec service		15,000	assume utility pays for most
Transmission main(s) - 1,600 lf		112,000	1,600 lf @$70/lf inc bedding, valves/fittings, misc
Surface restoration		60,800	HMA trench patch est 1.5 sy/lf @ $25/sy = $38/lf of pipe
Misc		15,000	
	Subtotal	$917,800	
	Tax	73,424	
Construction inc. tax but not contingencies			**991,224**
	Other project costs		
	Site acquisition, legal costs	inc in well estimate	
	Environmental and Cultural Resource Survey	inc in well estimate	
	Eng, admin, insp. (25%)	247,806	
	Contingency (20%)	198,245	
	Subtotal, other project costs		**$446,051**
	Total Budget Estimate		**$1,437,275**
Add for auxilary power genset (inc 20% eng/insp/admin)			**$120,000** see FEMA Hazard Mitigation grant est

Starr Rd. Area Well Pump Station, not including transmission main - for 1 well 40-60 hp submersible pump, 300+ gpm

Contractor mobilization/administration		$46,000	
Pump station bldg		85,000	
Site work		35,000	
Pitless unit for 10" well		15,000	
Building piping, site piping		65,000	
Pump (submersible 40-60 hp)		50,000	
Chlorine injection system		6,000	
Electrical (for pump station bldg and one well pump)		175,000	
Telemetry and well control system		15,000	
Extend elec service		15,000	assume utility pays for most
Transmission main		not included	see separate estimate
Misc		15,000	
	Subtotal	$522,000	
	Tax	41,760	
Construction inc. tax but not contingencies			**563,760**
	Other project costs		
	Site acquisition, legal costs	included in well estimate	
	Environmental and Cultural Resource Survey	included in well estimate	
	Eng, admin, insp. (25%)	140,940	
	Contingency (20%)	112,752	
	Subtotal, other project costs		**$253,692**
	Total Budget Estimate		**$817,452**

Starr Rd. Well Transmission Main: 1,500 lf to 5,000 lf T-main from well site(s) to a point aproximately 10,000 ft south of dist system connection (see Figure 1)

Contractor mobilization/administration	$20,000			If:	
Trenching, bedding backfill and pipe	82,500	12" pipe		1,500	$55 (1)
Replace unsuitable (bouldery) with imported backfil	31,050			1,350	$23 (2)
Rock excavation (disposal and imported backfill inc above)	28,875			525	$55 (3)
Surface restoration	28,800			1,500	$19 average (4)
Traffic control	5,000		5 days @ $1,000		
Fittings, misc	15,000				
Subtotal	$211,225				
Tax	16,898				
Construction inc. tax but not contingencies		**$228,123**	for 1500 LF		
Other project costs					
ROW, legal costs	$5,000				
Environmental and Cultural Resource Survey	$5,000				
Archaeological monitoring during construction if requirec	$6,000		8 working days @ $750/day		
Eng, admin, insp. (25%)	57,031				
Contingency (20%)	45,625				
Subtotal, other project costs		**$118,655**			
				Length (LF)	**Ave cost/LF**
Total Budget Estimate, 1,500 lf T-main		**$346,778**		1,500	$231
Add if T-main 6,000 lf long		$1,090,648		5,000	$218 (5), (6)
Total Budget Estimate, 6,000 lf T-main		**$1,437,426**			

(1) Assume 12" pipe and inst. $45/ft + bedding $7/ft =$52/lf + $3/l misc = $55/lf

(2) Imported b/f $30/cy x 0.75cy/lf over bedg. = $23/ft x 90% of length = $30,375 incl. haul/disposal of oversize mat'l

(3) Assume 35% of trench exc: 1/cy/lf x $55/cy = $55/lf x 1500lfx35% = $28,875 imported b/f after rock removal is already included above

(4) Assumes 1/4 lngth in pvm & 3/4 shldr etc: (1.2 sy/lf x $40/sy x 25% x 1500 lf) + (1.2sy/lf x $8/sy x 75% x 1500l) = $28,800 $19 ave per lf restoration cost for 1,500 lf

(5) Adjust to assume only 500lf of 6,000lf main on Starr Rd will be in pavementt:

(500lf x1.2 sy/lf $38/sy) +(5500lf x1.2 sy/lf x $8/sy)*(1.28) =	$75,600	$13	
inc tax + contingency (28%)	$96,768	$16	surface restoration cost/lf for 5,000 lf main
inc all other project costs:		$29	surface restoration cost/lf for 1,500 lf main
therefore deduct		$13	per lf to estimate 5,000 lf main cost

(6) Assume per lf cost will be 3% less due to larger project size and quantity

Starr Rd Well Transmission Main: 10,000 lf from Starr Rd Area to City Water Distribution System (see Figure 1)

Contractor mob/admin	$100,000				
Trenching, bedding backfill and pipe	520,000	12" pipe:		10,000	$52 (1)
Replace unsuitable (bouldery) with imported backfil	202,500			9,000	$23 (2)
Rock excavation (disposal and imported backfill inc above)	157,500			3,500	$45 (3)
Surface restoration	204,000			10,000	$20 average (4)
Traffic control	30,000			30 wkg days	$1,000 per day
Fittings, misc	20,000				
Methow River bridge crossing	100,000				
RR crossing, assume 1 at $75,000	75,000				
Misc (isolation valves, blow-off hydrants, other)	40,000				
Subtotal	$1,449,000				
Tax	115,920				
Construction inc. tax but not contingencies		**$1,564,920**		10,000 LF	
	Const cost per LF	$156			
Other project costs					
ROW, legal costs	$15,000				
Environmental and Cultural Resource Survey	$20,000				
Archaeological monitoring during construction if requirec	$22,500		30 working days @ $750/day		
Eng, admin, insp. (20%)	312,984				
Contingency (20%)	312,984				
Subtotal, other project costs		**$683,468**			
Total Budget Estimate		**$2,248,388**		10,000 LF	
	Project cost per LF	$225	(inc bridge and rr xings)		

(1) Assume 12" pipe and inst. $45/ft + bedding $7/ft =$52/lf (5% less than the 1,500 lf T-main est due to larger project)

(2) Imported b/f $30/cy x 0.75cy/lf over bedg. = $23/ft x 90% of length = $202,500 incl. haul/disposal of oversize mat'l

(3) Assume 35% of trench exc: 1/cy/lf x $45/cy = $45/lf x10,000lfx35% = $157,500 imported b/f after rock removal is already included above

(4) Assumes 25% lngth in pvm & 75% shldr etc: (1.2 sy/lf x $38/sy x 25% x 10,000 lf) + (1.2sy/lf x $8/sy x 75% x 10,000lf = $204,000 $20.40 ave per lf restoration cost for 10,000 lf

SUMMARY OF STARR RD TRANSMISSION MAIN COST RANGES - Compiled from the above two T-main estimates

	length	**project cost/ft**		**amount**
9,000 LF T-main (shortest likely, assumes well site is north of 1,000 landfill buffer zone)				
	9,000	$225	$2,023,549	
add 10% of fixed costs (river/RR xings, inc tax, other proj costs 55%) (1)	9,000	$3	$27,125	
Total	**9,000**	$228		**$2,050,674**
15,000 LF T-main (assumes well site(s) are south of 1,000 ft landfill buffer zone)				
first 9,000 lf including Methow river crossing etc per above	9,000	$225	$2,025,000	
6,000 lf at cost/lf for 5,000 lf main above	6,000	$218	$1,308,000	
Total	**15,000**			**$3,333,000**

(1) costs not affected by reducing total length