Water Demand Forecast for Future Permit-Exempt Wells in 24 Smaller Stream Basins of WRIA 16

Presented to the WRIA 16 Watershed Team
(formerly the WRIA 16 Planning Unit)
by Jefferson County with support from the members of the
WRIA 16 Water Demand Forecast Subcommittee

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Between March 2 until April 11, 2012, as the legislature struggled with how to balance the state budget, the WA Dept. of Ecology instituted a freeze for all Phase 4 Watershed activities. This freeze combined with questions surrounding the appropriate WRIA 16 sub-basin GIS layer delayed completion of this report. It remains in draft form pending future consideration by the Watershed Team and revision(s) to include updated datasets.

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TABLES

BACKGROUND

The WRIA 16 Watershed Team (formerly the WRIA 16 Planning Unit) has expressed its desire to be involved in discussions of a water management rule for WRIA 16 after Ecology completes its required consultation with the Tribes. At the October 6, 2011 meeting of the Watershed Team, Jim Pacheco of the WA State Dept. of Ecology presented an overview of recent flow monitoring of selected sub-basins draining to the western shores of Hood Canal. The collected data will be used to support development of the new water management rule and, potentially, the establishment of one or more groundwater reserves associated with these sub-basins.

In previous water management rules, such as the rule in WRIA 17, Ecology set aside groundwater reserves intended for future use, including future permit exempt wells. Reserves were based upon one to two percent of flow in streams during low flow periods. The amount is considered legally justified as an "overriding concern of the public interest." Thus, the expectation is that when instream flows are defined for WRIA 16, if the same legal justification is used, the groundwater reserves will be set based on one to two percent of the low flows observed in Ecology's stream survey work.

Ecology previously obtained physical habitat simulation (PHABSIM) data for the large streams in WRIA 16, but had not yet acquired flow data for many of the smaller sub-basins. Consequently, 24 of the smaller streams flowing to the western shore of Hood Canal were selected for spot monitoring during the three water years from 2009-2011.

The selected streams/stream locations are listed from north to south:

1. Fulton Creek
2. McDonald Creek
3. Turner Creek
4. Wolcott Creek
5. Walkers Creek
6. Unnamed 0439
7. Pierce Creek
8. Triton Beach
9. Finch Creek
10. Sund Creek
11. Lilliwaup Creek
12. Eagle Creek
13. Jorsted Creek
14. Waketickeh Creek
15. Sharer Creek
16. Mikes RV Park
17. Ayock Point
18. Little Lilliwaup Creek
19. North of Sund Creek
20. Miller Creek
21. Clark Creek
22. Hill Creek
23. Hoodcastle Road

Stream monitoring was conducted during one year of drought conditions (2009) followed by two years of median to high precipitation (La Niña conditions in 2010 and 2011). The WRIA 16 Watershed Team agreed that this data should generally be sufficient to characterize flows in these sub-basins. However, it was not possible for Ecology to monitor flow in "Unnamed 0439" Creek during this timeframe. The Watershed Team recommended that fish presence information be updated and potential water demand quantified prior to rule development. This report also recommends that Ecology collect flow data for the first time for "Unnamed 0439" Creek and continue to monitor other basins as feasible.

In response to the need for a better understanding of potential future water demand, the WRIA 16 Watershed Team decided to pursue a "build-out analysis" for the Ecology-monitored stream drainages and to translate the resulting information into forecasts for future water demand from possible new permit-exempt wells.

OVERVIEW

The purpose of this water demand forecast is to help meet the intent of the Watershed Planning/Management Act by working collaboratively with state, local, and tribal governments, along with public utility districts and citizens, to evaluate future water demand from permit-exempt wells.

The WRIA 16 Watershed Team discussed the concept and approach to this analysis over several meetings. Jefferson County was selected by the Watershed Team to develop this water demand forecast. A subcommittee of watershed team members contributed substantially to the process.

Subcommittee participants included:

Amy Georgeson, Mason County
Bill Graham, Jefferson County PUD #1
Jocelyne Gray, Mason County PUD #1
Constance Ibsen, Mason County Citizen
Randy Lumper, Skokomish Tribe
Doug Noltemeier, Jefferson County
Tami Pokorny, Jefferson County

Facilitator Susan Gulick of Sound Resolutions, Terra Hegy of WDFW, LaJane Schopfer of Mason County, and Colleen Zmolek of Jefferson County provided additional assistance.

In 2011, ESA Adolfson, an environmental consulting firm, developed assumptions for a parcel-based build-out analysis for use by Mason County to support elements of the Mason County Shoreline Master Program (SMP) Update (Appendix E).

These same assumptions were selected by the WRIA 16 Watershed Team to define the two-county analyses that form the basis of this report. The resulting maps and tables estimate 1) the numbers of potential new permit-exempt wells in each sub-basin and 2) the total water use in gallons per day from new permit-exempt wells in each sub-basin. A second run of the models removed selected critical areas from consideration for development and recalculated both figures for each of the sub-basins.

Doug Noltemeier of Jefferson County Central Services worked with staff and consultants at Mason and Jefferson counties to adapt the build-out models to current GIS layers and land use coding for each county. Summaries of the workflows, model flow charts, .xml and python files describe the model and are available in the appendices or by contacting tpokorny@co.jefferson.wa.us.

The models incorporate an Aquatic Units (AU) layer provided by Terra Hegy at WDFW to define the selected small drainage basins, or sub-basins. The AU layer represents the smallest sub-basin layer that could be identified and, in many cases, essentially corresponds with the actual small stream watershed. A column in the spot measurement data table (Appendix A) indicates whether this is the case for a particular stream sub-basin (0), or if it is larger than the target watershed (+) or smaller (-).Some AUs include additional small waterways and their associated drainage areas in the vicinity of the monitored stream.

The build-out model was run for all of the sub-basins selected for monitoring by Ecology. Parcels were included within the AU basin based on whether the geometric center (centroid) of the parcel or polygon

was located within the AU. The model yielded the number of parcels within each AU sub-basin coinciding with the six land use categories as defined by the ESA Adolfson for the Mason County SMP Update:

Residential Fully Built-out
Residential Underdeveloped
Vacant Dividable
Vacant Non-dividable
Commercial Fully Built-out
Commercial Underdeveloped

Water Service Areas (WSAs) were identified on build-out maps and water use from these public systems was excluded from the demand forecast calculations. It is assumed that all water needs within WSAs will be met by these public systems. Lands not likely to develop, such as public and tax exempt lands and rights-of-way, were also excluded from calculations and maps.

For each county, the model was run twice. In the first scenario, "Full Potential Build-Out," no critical area designations were taken into consideration when calculating the number of buildable parcels. In the second full potential build-out with "Critical Areas Removed," the geographical extent of selected critical areas (see below) was removed before calculations were made of the number of buildable parcels for each land use category.

Selected Critical Areas Used in the Build-out Models

Mason County	Jefferson County
FEMA Flood	FEMA Flood
Wetlands	Wetlands
Erosion Hazard	Erosion Hazard
	Seismic Hazard
	Landslide Hazard

The Full Potential Build-Out scenario intentionally over-estimates the number of buildable parcels in each land use category because not all land is developable whereas the Critical Areas Removed scenario intentionally under-estimates that figure because some critical areas contain areas that may buildable. Together, the two scenarios provide a range for the number of additional homes or businesses in each land use category that could be supplied water from new permit-exempt wells. The Watershed Team considers that a realistic scenario for the development of buildable parcels in each land use category would lie somewhere in between the two scenarios.

WATER DEMAND FORECAST

The Watershed Team estimated projected water use for both commercial and residential development. Parcels identified in the build-out analysis within a water service area were excluded from future water demand calculations. High, Medium, and Low estimates (in gallons per day) are used to provide a range of possible withdrawal rates for consideration.

Summary of Water Withdrawal Assumptions

	High	Medium	Low
Residential Lots	525 gpd	350 gpd	175 gpd
Commercial Lots	1500 gpd	750 gpd	150 gpd

The estimate for Residential High water use assumes little conservation or efficiencies, year-round use, some landscape irrigation, etc. The Low estimate assumes high conservation and a low percentage of year-round residents. For residential development, the Medium figure of 350 gpd was selected because this number is used by the state and many other agencies in western Washington. The Low estimate (175 gpd) is 50% less than the Medium rate (350 gpd), and the High estimate is 50% more (525 gpd) than the Medium rate.

Commercial use is more complicated because there is a wide range of water use depending on the type of business. For example, restaurants use much more water than a small retail shop that has a bathroom for employees only. The selected estimates for commercial parcels take into account that high water use commercial businesses—particularly those serving food and water and subject to Health Department requirements—will most likely be within a WSA and, consequently, are not included in the water demand forecast. The High estimate for commercial use does not assume that all new businesses served by permit-exempt wells will be high water users; otherwise the Commercial High use rate would likely be in the range of 2500 gpd or higher. The Commercial estimates are a Low of 150 gpd, Medium: 750 gpd, and High: 1500 gpd.

ASSUMPTIONS AND LIMITATIONS

The data used to develop this water demand forecast was assembled from many different sources and is variable in scale and accuracy. Much of the data is subject to change. As more reliable information becomes available, this model may be rerun to improve the forecasts. This report makes no assertions about the potential impacts of current or future water withdrawals on stream flows.

Water Use Assumptions

- One well per parcel.
- One connection per well.
- All water needs within WSAs are met without water from permit-exempt wells.
- Well development to be consistent with existing county policies.
- Water use estimates do not take into account potential rain water collections.
- WSAs are adequately permitted and have sufficient water rights and physical water to serve the entire service area at full build-out.
- WSA withdrawals will not prevent, physically or legally, the future development of permit exempt wells.
- This report does not include any special consideration of potential water use from group B systems.
- Future water demand for agriculture is assumed to be minimal in these small stream sub-basins.

Land Use Assumptions

- Parcel-based land-use codes, rather than zoning designations, were used to characterize parcels that are already developed. For example, if a parcel is zoned for 1 house per 20 acres, but is already developed at a level of 5 houses per 20 acres, the existing development (5 per 20) was used.
- Vacant Non-dividable parcels were assumed not to have any existing permit exempt well(s).

Geographical

- Critical area and WSA boundaries, and the data associated with land use and zoning information, is only as accurate as the data provided by Jefferson (June 2012) and Mason (January 2012) counties. This was assumed to be current and correct for the purpose of this report.
- Any lots not identified in the Jefferson or Mason County GIS parcel layers were not included in this analysis.
- Aquatic Units do not necessarily coincide with the small stream drainages of interest.
- Stream locations were digitized in 1997 from FEMA FIRM maps and they are not field verified.
- Parcel, zoning, sub-basin, WRIA and WSA boundaries do not necessarily coincide.
- Stream and shoreline buffers are not considered.

HOW TO VIEW THE MAPS

Build-out maps are provided in two sets: "Full Potential Build-Out" and full potential build-out with "Critical Areas Removed." For a summary of how the maps were developed, review the GIS workflow descriptions and model flow charts in the appendices. The complete model process is presented in the .xml and python files (available in electronic format only).

The maps depict the model's output in the form of the geographic distribution of the six land use categories as defined for the Mason County SMP build-out developed by ESA Adolfson (Appendix E). For both Mason and Jefferson counties, the same assumptions are used to create the maps. Parcels are categorized by the model and depicted as color coded polygons overtop an Olympic Peninsula water/land relief layer that displays in shades of brown or green.

Parcel and zoning information was preprocessed to eliminate ineligible data such as public lands, parks, long-term commercial forests, etc. according to the ESA protocol. All parcels remaining after data preprocessing were interpreted by the model, which then also excluded parcels that did not meet the various selection criteria for the six build-out categories or WSAs. There are a host of reasons why any given property might not qualify for categorization and consequently appear the same color as the underlying base layer. These reasons include layer attribute ambiguities and/or the locations of polygon centroids relative to parcel, zoning, sub-basin, WRIA and WSA boundaries as defined by the spatial analyses.

Parcels that were successfully categorized display on the maps as cross-hatched (existing development) or solid polygons (potential to be developed). For the second set of maps, the model merges selected critical areas into one layer. Portions of parcels within this layer are removed in the second set of maps and replaced by the critical areas designation – a light green color with repeating letter Rs (for "restricted") superimposed.

Comparisons of the two map sets provide *an indication* of the maximum degree to which select critical areas *could* affect the potential for development and the numbers of new permit-exempt wells.

Please Note:
Mason County has recently provided information about a planned development underway in the Finch Creek AU (#1211) just south of the Hwy 119 (Lake Cushman Road) that will create 18 new 5 to 20 acre lots anticipated to be individually served by permit-exempt wells. These parcels have not been fully defined, and existing Mason County map layers do not include them. For the purposes of this water demand forecast, they have been manually added to the relevant maps and to **Tables 1** and **2**. The anticipated parcels are not otherwise reflected in the model output.

FINDINGS

Summaries of the information produced by the build-out models in combination with the various water use estimates are summarized in the WRIA 16 Build-Out and Water Demand Forecasts **(Table 1)** and the WRIA 16 Comparison of Water Demand Forecasts with Relative Stream Aggradation and Habitat Condition Ratings from the River and Stream Impairment Analysis **(Table 2)**. It is also depicted in the map sets and frequency tables.

Four map sets were also produced:

Jefferson County – Full Potential Build-Out
Jefferson County – with Critical Areas Removed
Mason County – Full Potential Build-Out
Mason County – with Critical Areas Removed

DISCUSSION

Build-out and Water Demand Forecasts

For Jefferson County, both the Full Potential Build-out and the full potential build-out with Critical Areas Removed scenarios identified Turner Creek (AU 1246), Walkers Creek (AU 1250), Unnamed 0439 – Pleasant Harbor (AU 1251) and Pierce Creek (AU 1253) as having the greatest potential demand for new permit-exempt wells.

Residential water use at Full Potential Build-out and highest water use rates could exceed 30,000 gpd for each of these sub-basins. Medium withdrawal rates reduce this figure to between 20,000 and 25,000 gpd. In the Critical Areas Removed scenario, water withdrawals in Unnamed 0439 – Pleasant Harbor (AU 1251) would potentially decrease by about half. In Turner, Walker and Pierce Creek, the potential water use would decrease on the order of 70%.

In Mason County, the highest demands for new permit-exempt wells are anticipated in Ayock Point (AU 1270), Little Lilliwaup Creek (1275) and North of Sund Creek (AU 1276). In both scenarios, maximum water withdrawals at Full Potential Build-out range from 19,000 to almost 25,000 gpd for these sub-basins. Substantial water demand is also forecast for Finch Creek (AU 1211), Hoodcastle Road (AU 1284), Eagle Creek (AU 1215), Lilliwaup Creek (AU 1214) and Miller Creek (AU 1278). In Mason County, full potential build-out with Critical Areas Removed slightly influenced the number of potential new permit exempt wells for the Jorsted and Hill creek sub-basins only.

Aggradation

A *River and Stream Impairment Analysis for WRIA 16/14b* was prepared for the Watershed Team by Aspect Consulting, LLC in June of 2009. It characterizes the potential for stream impairment of many of the Ecology-monitored streams, examined aggradation potential, and provided population and source-based water use estimates and a water use estimate at build-out.

The Aspect report characterizes the relative potential for stream channel aggradation within WRIA 16/14b with a low, moderate or high rating. Stream aggradation is the accumulation of bedload in the stream channel causing reduced flows and impairments to fish habitat. The report found that the risk of stream aggradation is generally elevated for the many smaller independent streams flowing into Hood Canal due to high sediment supply to the stream channels, low sediment transport capacity, adverse changes in gradient and the presence of barriers. Proximity of roads in deforested areas also contributes to the risk of sedimentation in some drainages.

Of the Ecology-monitored sub-basins, all were rated as having a very high, high or moderate potential for stream aggradation. Two sub-basins, Walkers Creek and Miller Creek, received moderate ratings. However, the authors of the study note that the moderate rating for Miller Creek may be due to an absence of recent landslide activity from the GIS dataset used in the analysis. With improved and ground-truthed geospatial information, the rating for this site would likely be high or very high.

The report states, “Sedimentation issues are likely to persist in these streams if remedial actions are not undertaken.”

Relative Habitat Condition

Salmon habitat was also evaluated by Aspect from information contained in the WSCC Salmon and Steelhead Limiting Factors Analyses (Correa, 2003 and Kuttel, 2003). The authors point out that the small streams that do not have barriers to fish passage support coastal cutthroat trout populations and juvenile salmon that enter the streams from other systems to feed and seek refuge. Many significant fish habitat data gaps exist, but the authors assert that the factors that may have the greatest impact on the health of these smaller streams are road density (Correa, 2003) and percent impervious surface.

Table 1. WRIA 16 Build-Out and Water Demand Forecasts

		Scenario 1, Full Potential Build-out (high estimate)					Scenario 2, Critical Areas Removed (low estimate)				
Aquatic Unit Basin	ECY Monitored Creek	Potential # of Res. Permit-Exempt Wells	Potential # of Com. Permit-Exempt Wells	Water Use Estimates (residential or commercial)			Potential # of Res. Permit-Exempt Wells	Potential # of Com. Permit-Exempt Wells	Water Use Estimates (residential or commercial)		
				High (525 or 1200 gpd)	Medium (350 or 750 gpd)	Low (175 or 150 gpd)			High (525 or 1200 gpd)	Medium (350 or 750 gpd)	Low (175 or 150 gpd)
1224	Fulton Creek	6	2	5550	3600	1350	5	2	5025	3250	1175
1225	McDonald Creek	8	5	10200	6550	2150	7	5	9675	6200	1975
1246	Turner Creek	61	1	33225	22100	10825	12	0	6300	4200	2100
1248	Wolcott Creek	4	0	2100	1400	700	1	0	525	350	175
1250	Walkers Creek	52	2	29700	19700	9400	16	1	9600	6350	2950
1251	Unnamed 0439 Pleasant Harbor	60	1	32700	21750	10650	32	1	18000	11950	5750
1253	Pierce Creek	58	4	35250	23300	10750	15	3	11475	7500	3075
1257	Triton Beach	3	0	1575	1050	525	1	0	525	350	175
1211	Finch Creek*	26	0	13650	9100	4550	26	0	13650	9100	4550
1212	Sund Creek	6	0	3150	2100	1050	6	0	3150	2100	1050
1214	Lilliwaup Creek	11	0	5775	3850	1925	11	0	5775	3850	1925
1215	Eagle Creek	15	0	7875	5250	2625	15	0	7875	5250	2625
1216	Jorsted Creek	6	1	4350	2850	1200	5	1	3825	2500	1025
1222	Waketickeh Creek	5	0	2625	1750	875	5	0	2625	1750	875
1223	Sharer Creek	6	0	3150	2100	1050	6	0	3150	2100	1050
1262	Mike's RV Park	1	0	525	350	175	1	0	525	350	175
1270	Ayock Point	42	1	23250	15450	7500	42	1	23250	15450	7500
1275	Little Lilliwaup Cr.	47	0	24675	16450	8225	47	0	24675	16450	8225
1276	North of Sund Cr.	37	0	19425	12950	6475	37	0	19425	12950	6475
1278	Miller Creek	10	0	5250	3500	1750	10	0	5250	3500	1750
1279	Clark Creek	1	0	525	350	175	1	0	525	350	175
1282	Hill Creek	3	0	1575	1050	525	2	0	1050	700	350
1284	Hoodcastle Road	20	0	10500	7000	3500	20	0	10500	7000	3500
1285	Potlatch Creek	3	0	1575	1050	525	3	0	1575	1050	525

Table 2. WRIA 16 Comparison of Water Demand Forecasts with Relative Stream Aggradation and Habitat Conditions from the River and Stream Impairment Analysis

Aquatic Unit Basin	ECY Monitored Creek	Potential Range of # Res. Permit-Exempt Wells	Potential Range of # of Com. Permit-Exempt Wells	Potential for Aggradation (Aspect)	Relative Habitat Condition (Aspect)
1246	Turner Creek	12-62	0-0	very high	fair
1224	Fulton Creek	5-6	2-2	very high	fair
1225	McDonald Creek	7-8	5-5	high	poor
1248	Wolcott Creek	1-5	0-0	high	not rated
1250	Walkers Creek	16-56	1-2	moderate	poor
1251	Unnamed 0439 Pleasant Harbor	32-64	1-1	very high	not rated
1253	Pierce Creek	15-58	3-4	very high	not rated
1257	Triton Beach	1-3	0-0	very high	not rated
1211	Finch Creek*	26-26	0-0	very high	fair
1212	Sund Creek	6-6	0-0	very high	poor
1214	Lilliwaup Creek	11-11	0-0	high	poor
1215	Eagle Creek	15-15	0-0	high	fair
1216	Jorsted Creek	5-6	1-1	high	poor
1222	Waketickeh Creek	5-5	0-0	very high	poor
1223	Sharer Creek	6-6	0-0	very high	fair
1262	Mike's RV Park	1-1	0-0	very high	poor
1270	Ayock Point	42-42	1-1	very high	not rated
1275	Little Lilliwaup Creek	47-47	0-0	high	fair
1276	North of Sund Creek	37-37	0-0	very high	not rated
1278	Miller Creek	10-10	0-0	moderate	poor
1279	Clark Creek	1-1	0-0	very high	poor
1282	Hill Creek	2-3	0-0	high	fair
1284	Hoodcastle Road	20-20	0-0	high	not rated
1285	Potlatch Creek	3-3	0-0	high	insufficient data

* 18 anticipated residential permit-exempt wells were manually added to the potential range of residential wells in the Finch Creek sub-basin.

CONCLUSIONS

In thirteen of the Ecology-monitored sub-basins, forecasted water demand is anticipated to exceed ten new residential or two or more commercial permit-exempt wells. These sub-basins are:

1. Fulton Creek*
2. Turner Creek*
3. Walkers Creek*
4. Unnamed 0439 Pleasant Harbor
5. Pierce Creek
6. Finch Creek*
7. Lilliwaup Creek*
8. Eagle Creek*
9. Ayock Point
10. Little Lilliwaup Creek*
11. North of Sund Creek
12. Miller Creek*
13. Hoodcastle Road

Eight (*) of these 13 drainages, where our model output indicates that water demand will be relatively high, were also assessed for relative habitat condition in the stream impairment study. The lower reaches of six of these streams were rated either fair or poor for fish habitat quality.

Of the 24 small stream sub-basins in WRIA 16 that were monitored by Ecology, six (Potlatch Creek, Hill Creek, Clark Creek, Mike's RV Park, Triton Beach and Wolcott Creek) are anticipated to see fewer than five new permit-exempt wells for residential use. However all of these are rated high or very high for stream aggradation and Clark and Mike's RV Park are rated poor for relative habitat quality. This indicates that, under certain hydrogeologic conditions, even very low numbers of additional permit-exempt wells could potentially worsen already unsatisfactory stream conditions.

More information is needed to determine whether even current water use levels are sustainable in the face of aggrading stream channels and, if not, what might be done to retain fish habitat in these small, but important, sub-basins.

RECOMMENDATIONS AND NEXT STEPS

The Watershed Team supports the recommendations and next steps presented in the River and Stream Impairment Study such as actions to address stream aggradation. Identification, prioritization and remediation of the most susceptible areas would require additional high resolution imagery, updates to existing datasets, and a new assessment tool designed to take advantage of these improvements.

The study points out that, "While an immediate solution [to aggradation] may be required to maintain use of infrastructure or habitat at a site, a solution that addresses the sources of the sediment problem usually involves long term changes….many of the activities undertaken to address sediment aggradation issues are consistent with activities that also restore stream habitat." The difficulty and expense of addressing sediment and other small stream impairment issues underscores the importance of gaining a better understanding of the potential for stream impairments linked to new water uses – whether from permit-exempt or other withdrawals.

An especially cautious approach to water rule development is warranted for all of these smaller stream sub-basins despite the WRIA's relatively high annual rainfall.

Additional recommendations include:

- Revisit this model in advance of the development of a draft water management rule.
- As soon as possible, obtain permission to access and monitor "Unnamed 0439@Hwy 101" over a similar timeframe. This site was not accessible when the other drainages were monitored. However, it is located near the Pleasant Harbor Master Planned Resort and proposed golf course in a sub-basin where a relatively high number of residential permit-exempt wells (in the range of 32-60) and one commercial permit exempt well are anticipated.
- Consider additional flow monitoring of the remaining 23 streams.
- Re-assess flows in streams when sediment conditions or stream courses change due to extreme weather or debris events.
- Obtain hyperspectral and LiDAR imaging for WRIA 16/14b, especially where aggradation has been associated with the site or where streams were rated fair or poor for habitat quality in the Aspect report.
- Integrate improvements to relevant databases such as critical area extent and water system plan information.
- Obtain better fish passage and use information for these sub-basins.
- As needed, conduct detailed investigations of the hydrogeology of specific sub-basins to support better understanding of ground/surface water interactions and to assess the existing and potential impacts of groundwater withdrawals on streamflows.
- (Re-)Assess legal adequacy of WSA water rights at full build-out.
- Assess the impact of water service area at full build-out on physical water availability for new permit-exempt wells.
- Predict the impacts of full WSA and permit-exempt well use on stream flows.
- Consider using this model to forecast water demand for permit-exempt wells for the North Shore of Hood Canal and other sub-basins within and/or outside WRIA 16/14b in Mason and Jefferson counties.

APPENDICES

A. Hydrology Summary Flow Measurements for 9-19-10
   (with Aquatic Unit and Aquatic Unit vs. Sub-Watershed Information for 24 Streams)
B. Toe-width and PHABSIM Summary 10-18-11 with GPS Coordinates for 21 Streams
C. Individual Flow Measurements for 21 Streams (10-18-11):
   1270 – Ayock Point
   1279 – Clark Creek
   1215 – Eagle Creek
   1211 – Finch Creek
   1224 – Fulton Creek
   1282 – Hill Creek
   1284 – Hoodcastle Road
   1216 – Jorsted Creek
   1214 – Lilliwaup Creek
   1275 – Little Lilliwaup Creek
   1225 – McDonald Creek
   1262 – Mikes RV Park Creek
   1278 – Miller Creek
   1253 – Pierce Creek
   1285 – Potlatch Creek
   1223 – Sharer Creek
   1212 – Sund Creek
   1257 – Triton Beach Creek
   1222 – Waketickeh Creek
   1250 – Walkers Creek
   1248 – Wolcott Creek
D. WRIA 16 Washington State Stream Spot Measurements 11-17-11 for 22 Streams
E. ESA Memo 09-09-11 Mason County SMP Update – Parcel-based Buildout Analysis GIS Layer
F. Critical Areas Metadata
G. GIS Build-out Model Workflow Description - Mason County
H. Full Potential Build-out Frequency Table – Mason County
I. Critical Areas Removed Frequency Table – Mason County
J. Maps of 16 Stream Sub-basins with Full Potential Build-out in Mason County:
   1211 – Finch Creek Full Potential Build-out
   1212 – Sund Creek Full Potential Build-out
   1214 – Lilliwaup Creek Full Potential Build-out
   1215 – Eagle Creek Full Potential Build-out
   1216 – Jorsted Creek Full Potential Build-out
   1222 – Waketikeh Creek Full Potential Build-out
   1223 – Sharer Creek Full Potential Build-out
   1262 – Mike's RV Park Full Potential Build-out
   1270 – Ayock Point Full Potential Build-out
   1275 – Little Lilliwaup Full Potential Build-out
   1276 – North of Sund Creek Full Potential Build-out
   1278 – Miller Creek Full Potential Build-out
   1279 – Clark Creek Full Potential Build-out

1282 – Hill Creek Full Potential Build-out
1284 – Hoodcastle Road Full Potential Build-out
1285 – Potlatch Creek Full Potential Build-out

K. Maps of 16 Stream Sub-basins with Critical Areas Removed in Mason County:
1211 – Finch Creek Critical Areas Removed
1212 – Sund Creek Critical Areas Removed
1214 – Lilliwaup Creek Critical Areas Removed
1215 – Eagle Creek Critical Areas Removed
1216 – Jorsted Creek Critical Areas Removed
1222 – Waketikeh Creek Critical Areas Removed
1223 – Sharer Creek Critical Areas Removed
1262 – Mike's RV Park Critical Areas Removed
1270 – Ayock Point Critical Areas Removed
1275 – Little Lilliwaup Critical Areas Removed
1276 – North of Sund Creek Critical Areas Removed
1278 – Miller Creek Critical Areas Removed
1279 – Clark Creek Critical Areas Removed
1282 – Hill Creek Critical Areas Removed
1284 – Hoodcastle Road Critical Areas Removed
1285 – Potlatch Creek Critical Areas Removed

L. Mason County Sanitary Code – Title 6 (June 2012)
M. Group B Design and Construction Standards – Mason County
N. Where Should I Site My Well? – Mason County
O. GIS Build-out Model Workflow Description - Jefferson County
P. Full Potential Build-out Frequency Table – Jefferson County
Q. Critical Areas Removed Frequency Table – Jefferson County
R. Maps of 8 Stream Sub-basins with Full Potential Build-out in Jefferson County:
1224 – Fulton Creek Full Potential Build-out
1225 – McDonald Creek Full Potential Build-out
1246 – Turner Creek Full Potential Build-out
1248 – Wolcott Creek Full Potential Build-out
1250 – Walkers Creek Full Potential Build-out
1251 – Unnamed Pleasant Harbor Creek Full Potential Build-out
1253 – Pierce Creek Full Potential Build-out
1257—Triton Beach Creek Full Potential Build-out

S. Maps of Stream Sub-basins with Critical Areas Removed in Jefferson County:
1224 – Fulton Creek Critical Areas Removed
1225 – McDonald Creek Critical Areas Removed
1246 – Turner Creek Critical Areas Removed
1248 – Wolcott Creek Critical Areas Removed
1250 – Walkers Creek Critical Areas Removed
1251 – Unnamed Pleasant Harbor Creek Critical Areas Removed
1253 – Pierce Creek Critical Areas Removed
1257 – Triton Beach Creek Critical Areas Removed

T. Policy Statement # 96-01 2-Party Well Connections - Jefferson County
U. Policy 97-01 Rainwater Collection - Jefferson County
V. WRIA 16 Planning Unit Meeting Summary for October 6, 2011

BUILD-OUT MODEL

(digital only)

Models
ShapeFiles
Tables

Appendix A Hydrology Summary for 9-19-10 with Aquatic Unit and AU vs. (sub-) Watershed Information
flowing = stream observedd flowing - no measurement taken
inter =Intermittent: not flowing continuously but pools present at measurement site
dry = no flow or pools at measurement site
e = estimated stream flow;
j = juveniles present

AU v WS	AU	Stream Name	River Mile	Date and flow measurement (in cfs.)															
		Streams Listed in S to N orintation		4/16/09	6/18/09	7/21/09	8/19/09	9/17/09	10/13/09	12/3/09	2/18/10	3/17/10	4/20/10	5/18/10	6/15/10	7/19/10	8/5/10	8/19/10	9/2/10	9/16/10
0	1285	Potlatch Ck @ State Park 25' us of Hwy	0.2	flowing		0.24	0.25	0.25	0.15	0.38	0.91	1.36	0.92	0.97	1.31	0.83	0.79	0.81	0.66	0.55
+	1284	Unnamed @ Hoodcastle Rd						0.44	0.44	0.72	1.08	0.89	0.98	0.97	0.94	0.93	0.58	0.67	0.70	0.66
0	1282	Hill Ck @ Hwy 101	0.05	flowing	3.14	3.27	2.94	2.37	2.55	3.75	4.78	5.22	8.56	6.47	7.16	4.68	5.90	5.55	4.67	5.37
0	1211	Finch Ck abv diversion	0.25	flowing				11.56			43.97	29.84	23.98	24.14	22.43	18.88	15.92	15.71	15.90	16.38
0	1279	Clark Ck @ Hwy 101	0.05	dry	dry	dry	dry	dry	dry	0.15e	3.97	1.31	1.01	0.77	0.50	0.05	0.02	Dry	Dry	Dry
0	1278	Miller Ck @ Hwy 101	0.05	.5-1.0e	dry	dry	dry	dry	dry	3.02	17.96	10.33	3.84	2.10	1.67	Dry	Dry	Dry	Dry	Dry
0	1212	Sund Ck @ Hwy 101	0.05	.2e	dry	dry	dry	dry	dry	2.78	11.61	11.61	0.042	Dry	Dry	Dry	Dry	Dry	Dry	Dry
+	1276	#23b (Unnamed-0.2 mi N of Sund) @ Hwy 101					dry	dry	dry	.01e	0.52	0.44	0.42	0.00	Dry	Dry	Dry	Dry	Dry	Dry
+	1275	#23 (Little Lilliwaup) @ 120' us of Hwy 101	0.1	flowing	7.61	7.25	5.39	4.21	3.76	13.1	18.99	16.9	12.81	10.15	11.42	7.84	6.65	6.23	5.34	4.81
-	1214	Lilliwaup nr Hwy 101 - 0.4mi us of bridge	0.4	flowing	21.92	12.13	10.28	9.16	6.64	116.86	219.2	120.78	71.73	40.01	48.85	21.59	16.03	15.08	12.66	13.55
0	1215	Eagle Ck @ Hwy 101 abv access rd	0.05	flowing				2.81		28.6	53.63	27.57	16.41	13.55	12.58	8.30	6.28	7.16	6.49	6.06
+	1270	#23 (Ayock Pt) @ Hwy 101	0.1	0.3e		0.96	0.9	1.24	1.15		3.27	3.04	2.21	2.78	2.55	2.20	1.91	1.90	1.90	1.74
0	1216	Jorsted Ck @ Hwy 101	0.02	flowing				1.37		24.13	47.52	23.91	14.83	10.76	9.06	4.84	3.30	3.89	3.53	7.15
0	1222	Waketickeh @ Hwy 101 10'ds of bridge	0.02	10.0e	4.2	1.23	0.56	0.95	0.57	30.66	73.87	63.81	33.48	10.07	15.26	3.05	1.40	1.29	1.10	2.56
0	1262	#17 (Mikes RV park) @ Hwy 101	0.1	0.5e	1.04	1.08	0.59	0.67	0.28	4.57	9.72	5.97	3.11	1.76	1.95	2.09	0.87	0.72	0.55	0.63
0	1223	Sharer Ck (#14) @ Hwy 101	0.1	0.8e	.15e +j	dry - .01e us	dry - .01e us	dry - .02e us	dry - .02e us	9.63	17.22	10.41	3.58	1.65	2.61	0.39	0.19	0.04	0.10	0.11
+	1257	#12 (Triton Beach) @ WDFW access	0.05	1-1.5e		.01e +j	.01 us +j- dry ds	.004 us +j- dry ds	tidal - .04e abv	8.07	7.78	3.96	1.28	0.55	1.30	0.22	0.12	0.13	0.02	0.07
0	1224	Fulton Ck @ IFIM	0.25	29.5	flowing	flowing	flowing	1.09		33.6	65.97	79.08	56.74	14.81	22.32	3.42	1.48	0.83	1.10	1.43
0	1225	McDonald Ck @ Hwy 101	0.15		flowing +j	.1e +j - dry nr	dry - .01+j	dry - .003+j	dry - .01+j	4.71	11.95	5.73	1.91	1.15	2.24	0.74	0.00	0.00	Dry	Dry
+	1253	Pierce Ck @ Duckadush Rd	0.33													0.42	0.23	0.23	0.24	0.39
+	1251	Unnamed 0439 @ Hwy 101																		
0	1250	Walker Ck @ Hwy 101	0.1		flowing	.1e +j us-dry ds	.01 - dry ds	int -.05 us	int - .02e us + juvs	0.95	6.13	1.82	0.29	0.04	0.27	0.27	0.01	0.01	0.01	0.03
+	1248	Wolcott Ck @ Whitney Gardens	0.01														0.54	0.52	0.35	0.55
+	1246	Turner Creek	0.05													0.21	0.06	0.06	0.06	0.08

Appendix B

Hydrology Summary
10/18/2011
Pacheco

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Creek	10/18/2011	Habitat Study TW	Phabsim	GPS coords	
Potlatch Creek	0.73	x		47° 21' 43.5" N	123° 09' 32.2" W
unnamed @ Hoodcastle Rd	0.85			47° 21' 59.6" N	123° 09' 32.2" W
Hill Creek	5.22	x		47° 23' 37.7" N	123° 08' 43.0" W
Finch Creek	16.07	x	x	47° 24' 24.0" N	123° 08' 42.0" W
Clark Creek	0.00			47° 25' 11.0" N	123° 07' 51.0" W
Miller Creek	0.00			47° 25' 47.0" N	123° 07' 32.0" W
Sund Creek	0.00			47° 26' 27.0" N	123° 07' 13.0" W
Little Lilliwaup Creek	4.90	x		47° 27' 28.0" N	123° 06' 48.6" W
Lilliwaup Creek	23.81	x		47° 28' 08.0" N	123° 06' 56.2" W
Eagle Creek	25.38	x	x	47° 29' 08.0" N	123° 04' 45.0" W
Unnamed @ Ayock Pt	2.27	x		47° 30' 28.0" N	123° 03' 34.0" W
Jorsted Creek	5.01	x	x	47° 31' 32.0" N	123° 03' 05.0" W
Waketickeh Creek	10.67	x		47° 33' 29.3" N	123° 01' 33.1" W
Mike's RV Park Creek	1.37	x		47° 34' 05.0" N	123° 00' 55.0" W
Sharer Creek	1.11	x		47° 35' 56.0" N	123° 59' 29.0" W
Triton Beach Creek	0.52			47° 36' 49.0" N	123° 59' 02.0" W
Fulton Creek	9.04	x	x	47° 37' 15.0" N	122° 58' 55.0" W
McDonald Creek	0.89	x		47° 37' 41.0" N	122° 57' 39.0" W
Pierce Cr	0.31			47° 39' 20.2" N	12° 25' 62.4" W
Walker Creek	0.03	x		47° 40' 58.0" N	122° 54' 02.0" W
Wolcott	0.61			47° 41' 43.4" N	122° 53' 58.1" N
Turner Ck	0.22			47° 43' 22.0" N	122° 53' 07.0" W
Duck		x	x		
Dose		x	x		
Ham		x	x		

Corrections

Appendix C

Individual Flow Measurements for 21 Streams (10-18-11)

Discharge Measurements Notes

Creek Name	**Unnamed @ Ayock Pt**
Date	**18-Oct-11**
Time	**15:15**
GPS (NAD 83)	**47° 30' 28.0" N**
	123° 03' 34.0" W
Site description	**old well house and steep terrain 400' us**
River Mile	0.05
Total Discharge cfs	2.27

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
2.1	0	0	rew	0.01	0.00
2.5	0.13	0.05	0.001270249	0.06	0.00
3	0.22	0.33	0.015639767	0.11	0.04
3.5	0.27	1.28	0.073713012	0.13	0.17
4	0.25	1.95	0.110147939	0.13	0.25
4.5	0.28	1.48	0.090939902	0.14	0.21
5	0.3	1.43	0.094566035	0.15	0.21
5.5	0.32	1.61	0.111792925	0.16	0.25
6	0.3	2.18	0.142361561	0.15	0.32
6.5	0.25	1.42	0.080210294	0.13	0.18
7	0.25	1.65	0.131846876	0.18	0.30
8	0.2	1.32	0.112751811	0.19	0.26
9	0.1	0.73	0.03419477	0.11	0.08
10	0.05	0	0	0.04	0.00
10.5	0.05	0.05	0.000564861	0.03	0.00
11.2	0	0	LEW	0.00	0.00

Discharge Measurements Notes

Creek Name	**Clark Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 25' 11.0" N** **123° 07' 51.0" W**
Site description	
River Mile	0.1
Total Discharge cfs	0.00

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
			dry		
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
				#VALUE!	
			lew		

Discharge Measurements Notes

Creek Name	**Eagle Creek**
Date	**18-Oct-11**
Time	**16:00**
GPS (NAD 83)	**47° 29' 08.0" N**
	123° 04' 45.0" W
Site description	**downstream of bridge**
River Mile	0.05
Total Discharge cfs	25.38

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
3.5	0	0	REW	0.06	0.00
5	0.32	0	0	0.36	0.00
6	0.5	0.61	0.020010304	0.83	0.51
8	0.92	0.54	0.027422185	1.29	0.70
9	1.03	0.27	0.010838545	1.02	0.28
10	1.05	0.94	0.038567588	1.04	0.98
11	1	0.98	0.038422779	1.00	0.98
12	0.91	1.15	0.040273286	0.89	1.02
13	0.65	1.21	0.04589081	0.96	1.16
15	0.47	1.01	0.038504542	0.97	0.98
17	0.4	0.84	0.026810438	0.81	0.68
19	0.37	0.66	0.020610229	0.79	0.52
21	0.55	0.74	0.023181336	0.80	0.59
22	0.67	0.7	0.017135787	0.62	0.43
23	0.4	43	0.652332171	0.39	16.56
24	0.01	0	0	0.05	0.00
24.2	0	0	LEW	0.00	0.00

Discharge Measurements Notes

Creek Name	**Finch Creek**
Date	**18-Oct-11**
Time	**1:37**
GPS (NAD 83)	**47° 24' 24.0" N**
	123° 08' 42.0" W
Site description	**200' us of diversion**
River Mile	0.05
Total Discharge cfs	16.07

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
7	0	0	rwe	0.01	0.00
8	0.1	0.2		0.10	0.02
9	0.2	1.03	0.012820862	0.20	0.21
10	0.3	1.34	0.026061825	0.31	0.42
11	0.5	0.85	0.025128267	0.48	0.40
12	0.5	1.62	0.050412127	0.50	0.81
13	0.5	1.55	0.048836748	0.51	0.78
14	0.55	2.12	0.072568568	0.55	1.17
15	0.6	2.2	0.081297334	0.59	1.31
16	0.6	2.18	0.083950195	0.62	1.35
17	0.75	2.68	0.123011813	0.74	1.98
18	0.8	2.17	0.080188734	0.59	1.29
18.5	0.8	2.5	0.061264738	0.39	0.98
19	0.7	2.94	0.066329289	0.36	1.07
19.5	0.8	2.97	0.070471952	0.38	1.13
20	0.6	2.49	0.069736776	0.45	1.12
21	0.5	1.88	0.057771675	0.49	0.93
22	0.35	2.33	0.049848102	0.34	0.80
23	0.15	1.83	0.017795948	0.16	0.29
24	0	1.08	0.001260303	0.02	0.02
25.3			lwe	0.00	0.00

Discharge Measurements Notes

Creek Name	**Fulton Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 37' 15.0" N**
	122° 58' 55.0" W
Site description	**downed tree at orig site**
	measured at DS riffle
River Mile	0.06
Total Discharge cfs	9.04

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
11.9	0	0	rew	0.01	0.00
12.5	0.1	0.34		0.05	0.02
13	0.1	0	0	0.08	0.00
14	0.13	0.3	0.004478924	0.14	0.04
15	0.2	1.09	0.023807417	0.20	0.22
16	0.25	0.1	0.004492748	0.41	0.04
18	0.4	0.94	0.083164222	0.80	0.75
20	0.55	1.45	0.172383285	1.08	1.56
22	0.6	1.52	0.195413803	1.16	1.77
24	0.5	1.24	0.106277682	0.78	0.96
25	0.5	0.53	0.043227148	0.74	0.39
27	0.45	0.49	0.049447876	0.91	0.45
29	0.45	0.17	0.012572783	0.67	0.11
30	0.4	0.72	0.048272849	0.61	0.44
32	0.4	1.35	0.115705541	0.78	1.05
34	0.3	1.15	0.074717855	0.59	0.68
36	0.15	0.72	0.021200241	0.27	0.19
37	0.18	0.17	0.003407577	0.18	0.03
38	0.22	0.28	0.006657561	0.22	0.06
39	0.22	1.43	0.03241967	0.21	0.29
40	0.1	0.05	0.000566777	0.10	0.01
41	0	0	lew	0.01	0.00

Discharge Measurements Notes

Creek Name	**Hill Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 23' 37.7" N**
	123° 08' 43.0" W
Site description	**40' up stream of road crosing**
	2 bright 1 old chum observed
River Mile	0.05
Total Discharge cfs	5.22

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
1.8	0	0	rew	0.04	0.00
3	0.25	0.11	0.003624916	0.17	0.02
3.5	0.2	1.03	0.024068247	0.12	0.13
4	0.5	0.79	0.035973551	0.24	0.19
4.5	0.6	1.36	0.076596581	0.29	0.40
5	0.6	1.03	0.059862049	0.30	0.31
5.5	0.65	1.35	0.083313162	0.32	0.43
6	0.65	1.34	0.084301775	0.33	0.44
6.5	0.7	0.87	0.05577578	0.33	0.29
7	0.5	1.88	0.096872147	0.27	0.51
7.5	0.6	1.23	0.067800916	0.29	0.35
8	0.5	1.4	0.068783538	0.26	0.36
8.5	0.5	1.54	0.071971068	0.24	0.38
9	0.4	1.71	0.065572042	0.20	0.34
9.5	0.3	1.65	0.049430678	0.16	0.26
10	0.3	1.34	0.038537954	0.15	0.20
10.5	0.3	1.22	0.048244342	0.21	0.25
11.5	0.15	1.27	0.041090375	0.17	0.21
12.5	0.15	1.17	0.028180879	0.13	0.15
13.4	0	0	lew	0.02	0.00

Discharge Measurements Notes

Creek Name	**unnamed @ Hoodcastle Rd**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 21' 59.6" N**
	123° 09' 32.2" W
Site description	**abv hwy crossing**
River Mile	0.1
Total Discharge cfs	0.85

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
3.9	0	0	REW	0.00	0.00
4	0.25	1.44		0.05	0.07
4.3	0.35	1.98		0.10	0.20
4.6	0.35	2.22		0.10	0.23
4.9	0.3	1.51		0.09	0.13
5.2	0.2	1.95	LEW	0.06	0.12
5.5	0.15	1.5		0.05	0.07
5.8	0.1	0.78		0.04	0.03
6.3				0.01	0.00

Discharge Measurements Notes

Creek Name	**Jorsted Creek**
Date	**18-Oct-11**
Time	**3:40**
GPS (NAD 83)	**47° 31' 32.0" N**
	123° 03' 05.0" W
Site description	**upstream of normal site-15' above wood bridge**
River Mile	0.05
Total Discharge cfs	5.01

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
5.5	0	0	rew	0.02	0.00
6	0.32	0.24	on rock	0.24	0.06
7	0.48	0.61	0.0565874	0.47	0.28
8	0.52	0.76	0.079599409	0.53	0.40
9	0.6	0.84	0.10033715	0.60	0.50
10	0.67	0.98	0.128790448	0.66	0.65
11	0.65	0.94	0.121189602	0.65	0.61
12	0.6	1.07	0.129945039	0.61	0.65
13	0.62	1.05	0.126206958	0.60	0.63
14	0.5	0.95	0.097604038	0.52	0.49
15	0.5	0.76	0.074671827	0.49	0.37
16	0.44	0.54	0.045649962	0.42	0.23
17	0.25	0.46	0.024548139	0.27	0.12
18	0.2	0.06	0.002319156	0.19	0.01
19	0.1	0.05	0.001059829	0.11	0.01
20	0.05	0		0.09	0.00
23	0	0		0.02	0.00

Discharge Measurements Notes

Creek Name	**Lilliwaup Creek**
Date	**18-Oct-11**
Time	**12:00**
GPS (NAD 83)	**47° 28' 08.0" N**
	123° 06' 56.2" W
Site description	**50' down from small foot bridge-footbridge destroyed (.4 rm from Hwy 101)**
River Mile	0.4
Total Discharge cfs	23.81

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
1	0	0	rwe	0.01	0.00
1.5	0.2	1.12	0.004262076	0.09	0.10
2	0.25	0.9	0.004605876	0.12	0.11
2.5	0.25	0.76	0.003989135	0.13	0.10
3	0.25	0.6	0.003070584	0.12	0.07
3.5	0.2	0.52	0.002183526	0.10	0.05
4	0.15	0.48	0.001511672	0.08	0.04
4.5	0.1	0.1	0.000212579	0.05	0.01
5.1	0	0	0	0.01	0.00
12.2	0	0	0	0.06	0.00
14	0.25	0.01	0.000170588	0.41	0.00
16	0.2	0.54	0.014597084	0.64	0.35
19	0.55	0.96	0.061978558	1.54	1.48
22	0.6	0.77	0.057593134	1.78	1.37
25	0.6	0.68	0.052467621	1.84	1.25
28	0.7	0.77	0.067293031	2.08	1.60
31	0.75	0.49	0.045909168	2.23	1.09
34	0.75	0.82	0.078118808	2.27	1.86
37	0.8	0.85	0.071607595	2.01	1.71
39	0.9	1.03	0.078391749	1.81	1.87
41	1.05	1.18	0.104672799	2.11	2.49
43	1.25	1.24	0.127568334	2.45	3.04
45	1.25	1.25	0.128597111	2.45	3.06
47	1.05	0.73	0.063988872	2.09	1.52
49	0.8	0.18	0.015872558	2.10	0.38
52	0.9	0.1	0.011337541	2.70	0.27
55	1	0	0	2.06	0.00
56.6	0		lwe	0.20	0.00

Discharge Measurements Notes

Creek Name	**Little Lilliwaup Creek**
Date	**18-Oct-11**
Time	**2:02**
GPS (NAD 83)	**47° 27' 28.0" N**
	123° 06' 48.6" W
Site description	**upstream of inground pipe**
River Mile	0.1
Total Discharge cfs	4.90

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
1.3	0	0	rwe	0.00	0.00
1.5	0.05	0.3	0.003676647	0.06	0.02
2	0.75	0.64	0.043711243	0.33	0.21
2.5	0.8	0.64	0.051881569	0.40	0.25
3	0.8	0.93	0.075390404	0.40	0.37
3.5	0.75	1.48	0.115252658	0.38	0.56
4	0.8	1.96	0.118227167	0.30	0.58
4.25	0.75	1.95	0.075304233	0.19	0.37
4.5	0.75	1.99	0.110510039	0.27	0.54
5	0.6	1.68	0.10616317	0.31	0.52
5.5	0.6	1.09	0.065400904	0.29	0.32
6	0.5	1.52	0.077618095	0.25	0.38
6.5	0.4	1.6	0.066894542	0.20	0.33
7	0.375	1.32	0.048026196	0.18	0.24
7.5	0.2	0.92	0.020847097	0.11	0.10
8	0.2	0.65	0.012446981	0.09	0.06
8.5	0.1	0.75	0.00813841	0.05	0.04
9	0.05	0.1	0.000510645	0.03	0.00
9.5	0		lwe	0.00	0.00

Discharge Measurements Notes

Creek Name	**McDonald Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 37' 41.0" N**
	122° 57' 39.0" W
Site description	**just above bridge**
River Mile	0.05
Total Discharge cfs	0.89

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
2.3	0	0	rew	0.01	0.00
2.5	0.3	0.35	0.040985919	0.10	0.04
3	0.4	0.37	0.083523801	0.20	0.07
3.5	0.5	0.35	0.098761252	0.25	0.09
4	0.6	0.35	0.116044471	0.29	0.10
4.5	0.6	0.56	0.184486018	0.29	0.16
5	0.47	0.47	0.131627585	0.25	0.12
5.5	0.55	0.45	0.133962584	0.26	0.12
6	0.45	0.25	0.064371173	0.23	0.06
6.5	0.4	0.35	0.07653997	0.19	0.07
7	0.25	0.32	0.064335901	0.18	0.06
8	0.1	0.05	0.005361325	0.10	0.00
8.7	0	0	lwe	0.01	0.00

Discharge Measurements Notes

Creek Name	**Mike's RV Park Creek**
Date	**18-Oct-11**
Time	**4:30**
GPS (NAD 83)	**47° 34' 05.0" N**
	123° 00' 55.0" W
Site description	**17 m us of culvert**
	no chum pres
River Mile	0.1
Total Discharge cfs	1.37

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
3.7	0	0	rew	0.00	0.00
4	0.05	0	0	0.03	0.00
4.5	0.2	0.44	0.030176947	0.09	0.04
5	0.25	0.96	0.087787481	0.13	0.12
5.5	0.3	0.57	0.06254858	0.15	0.09
6	0.35	1.27	0.159686343	0.17	0.22
6.5	0.35	1.34	0.168487952	0.17	0.23
7	0.3	1.04	0.121256458	0.16	0.17
7.5	0.4	0.49	0.068332495	0.19	0.09
8	0.35	0.15	0.019546431	0.18	0.03
8.5	0.35	0.98	0.125462942	0.18	0.17
9	0.35	0.34	0.044305244	0.18	0.06
9.5	0.4	-0.13	-0.018723424	0.20	-0.03
10	0.4	0.78	0.110557359	0.19	0.15
10.5	0.3	0.2	0.020575191	0.14	0.03
11	0.05	0	0	0.05	0.00
12.1	0	0	lew	0.01	0.00

Discharge Measurements Notes

Creek Name	**Miller Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 25' 47.0" N**
	123° 07' 32.0" W
Site description	**70' up stream of road crosing**
River Mile	0.1
Total Discharge cfs	0.00

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
			dry		

Discharge Measurements Notes

Creek Name	**Pierce Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 39' 20.2" N**
	12° 25' 62.4" W
Site description	**upstream of Duckabush Rd crossing**
	chum present ds of culvert
River Mile	0.33
Total Discharge cfs	0.31

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
3.5	0	0	rew	0.00	0.00
4	0.01	0	0	0.01	0.00
4.5	0.1	-0.02	-0.003302954	0.05	0.00
5	0.2	0	0	0.09	0.00
5.5	0.2	0.02	0.007237955	0.11	0.00
6	0.375	0.36	0.209187106	0.18	0.06
6.5	0.4	0.58	0.387281587	0.20	0.12
7	0.5	0.33	0.257691602	0.24	0.08
7.5	0.43	0.2	0.141904704	0.22	0.04
8	0.4	0	0	0.40	0.00
10	0	0	lwe	0.10	0.00

Discharge Measurements Notes

Creek Name	**Potlatch Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 21' 43.5" N**
	123° 09' 32.2" W
Site description	**up stream of road crosing @ pool tailout below last set of trees**
River Mile	0.1
Total Discharge cfs	0.73

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
3.9	0	0	LEW	0.00	0.00
4	0.05	0	0	0.02	0.00
4.5	0.1	0.27	0.019560381	0.05	0.01
5	0.2	1.01	0.133428223	0.10	0.10
5.5	0.25	0.7	0.122305653	0.13	0.09
6	0.35	1.82	0.418822286	0.17	0.31
6.5	0.35	0.85	0.206470694	0.18	0.15
7	0.4	0.38	0.102020813	0.20	0.07
7.5	0.4	0.18	0.048325648	0.20	0.04
8	0.35	0.2	0.04858134	0.18	0.04
8.5	0.35	0	0	0.17	0.00
9	0.3	-0.04	-0.01210272	0.22	-0.01
10	0.25	-0.25	-0.063922815	0.19	-0.05
10.5	0.15	-0.26	-0.023489504	0.07	-0.02
10.9	0	0		0.01	0.00

Discharge Measurements Notes

Creek Name	**Sharer Creek**
Date	**18-Oct-11**
Time	**16:39**
GPS (NAD 83)	**47° 35' 56.0" N**
	123° 59' 29.0" W
Site description	
River Mile	0.05
Total Discharge cfs	1.11

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
2.9	0	0	rew	0.02	0.00
3.5	0.3	0	0	0.15	0.00
4	0.35	0.35	0.055362227	0.18	0.06
4.5	0.4	1.55	0.271444389	0.19	0.30
5	0.35	0.32	0.048266823	0.17	0.05
5.5	0.17	0.41	0.037522032	0.10	0.04
6	0.25	1.1	0.119311249	0.12	0.13
6.5	0.25	0.83	0.089087992	0.12	0.10
7	0.15	1.52	0.120215122	0.09	0.13
7.5	0.25	1.78	0.191056176	0.12	0.21
8	0.25	0.53	0.055390473	0.12	0.06
8.5	0.1	0.23	0.012343517	0.06	0.01
9	0.1	0		0.04	0.00
9.3			lwe	0.00	0.00

Discharge Measurements Notes

Creek Name	**Sund Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 26' 27.0" N**
	123° 07' 13.0" W
Site description	
River Mile	0.05
Total Discharge cfs	0.00

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
			dry		

Discharge Measurements Notes

Creek Name	**Triton Beach Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 36' 49.0" N**
	123° 59' 02.0" W
Site description	**measured downstream of culvert**
River Mile	0.05
Total Discharge cfs	0.52

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
3.3	0	0	rwe	0.01	0.00
3.5	0.5	0	0	0.15	0.00
4	0.3	0.01	0.003488029	0.18	0.00
4.5	0.6	0.07	0.037466247	0.28	0.02
5	0.55	0.32	0.175123133	0.28	0.09
5.5	0.65	0.08	0.048591858	0.32	0.03
6	0.6	0.29	0.169169428	0.30	0.09
6.5	0.6	0.25	0.140423254	0.29	0.07
7	0.47	0.3	0.140723947	0.24	0.07
7.5	0.48	0.29	0.127313075	0.23	0.07
8	0.3	0.23	0.071372299	0.16	0.04
8.5	0.3	0.19	0.052560995	0.14	0.03
9	0.2	0.16	0.030790881	0.10	0.02
9.5	0.1	0.03	0.002976853	0.05	0.00
10	0.025	0	0	0.02	0.00
10.7		0	lwe	0.00	0.00

Discharge Measurements Notes

Creek Name	**Turner Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 43' 22.0" N**
	122° 53' 07.0" W
Site description	**barely flowing-dificult to find spot to measure**
River Mile	0.05
Total Discharge cfs	0.22

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
0.9	0	0	rew	0.01	0.00
1.1	0.3	0.07	0.021625333	0.07	0.00
1.4	0.3	0.83	0.34188621	0.09	0.07
1.7	0.3	0.44	0.181240882	0.09	0.04
2	0.3	0.59	0.237964473	0.09	0.05
2.3	0.25	0.54	0.185359993	0.08	0.04
2.6	0.2	0.12		0.06	0.01
2.9	0.1	0		0.03	0.00
3.2	0	0		0.00	0.00

Discharge Measurements Notes

Creek Name	**Waketickeh Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 33' 29.3" N**
	123° 01' 33.1" W
Site description	**no flow at bridge-moved to upstream boulder riffle**
River Mile	0.01
Total Discharge cfs	10.67

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
1.7	0	0	rew	0.01	0.00
2	0.3	0	0	0.51	0.00
4	1	0	0	1.34	0.00
5	1.1	0.35	0.051261321	1.56	0.55
7	0.8	0	0	1.28	0.00
8	0.85	0.55	0.044143321	0.86	0.47
9	0.95	0.53	0.069551361	1.40	0.74
11	0.9	0.48	0.082111849	1.83	0.88
13	0.95	0.72	0.130760308	1.94	1.40
15	1.15	0.58	0.090723751	1.67	0.97
16	1.1	0.49	0.051384349	1.12	0.55
17	1.2	0.58	0.063200815	1.16	0.67
18	1	0.53	0.050921532	1.03	0.54
19	1	0.68	0.096406435	1.51	1.03
21	1.05	0.51	0.099195051	2.08	1.06
23	1	0.45		2.01	0.91
25	1	0.33		1.49	0.49
26	0.9	0.25		0.90	0.23
27	0.8	0		0.81	0.00
28	0.75	0		0.76	0.00
29	0.75	0.18		1.09	0.20
31	0.6	0		1.29	0.00
33.9	0	0	lew	0.22	0.00

Discharge Measurements Notes

Creek Name	**Walker Creek**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 40' 58.0" N**
	122° 54' 02.0" W
Site description	
River Mile	0.05
Total Discharge cfs	0.03

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
1.4	0	0	rew	0.00	0.00
1.7	0.1	0	0	0.02	0.00
1.9	0.2	0.34	0.272743847	0.03	0.01
2	0.2	0.53	0.589425706	0.04	0.02
2.3	0.15	0.09	0.137830447	0.05	0.00
2.8	0	0		0.01	0.00

Discharge Measurements Notes

Creek Name	**Wolcott**
Date	**18-Oct-11**
Time	
GPS (NAD 83)	**47° 41' 43.4" N**
	122° 53' 58.1" W
Site description	
River Mile	0.05
Total Discharge cfs	0.61

Station or Distance (use feet in decimal notation)	**depth**	**velocity**	**notes**	**Area-ft^2**	**Q**
0.5	0	0	rew	0.01	0.00
1	0.2	0.86	0.12372702	0.09	0.08
1.5	0.2	1.26	0.209760459	0.10	0.13
2	0.22	1.61	0.292844591	0.11	0.18
2.5	0.25	0.61	0.120356383	0.12	0.07
3	0.2	1.7	0.253311548	0.09	0.15
3.5	0	0	0	0.01	0.00

Appendix D

Washington State Stream Spot Measurements - WRIA 16

WRIA	Stream Name	River Mile	Date and flow measurement (in cfs.)																										
16	Streams Listed in S to N orintation		6/18/09	7/21/09	8/19/09	9/17/09	10/13/09	12/2/09	2/18/10	3/17/10	4/20/10	5/18/10	6/15/10	7/19/10	8/5/10	8/19/10	9/2/10	9/16/10	10/13/10	11/16/10	1/19/11	4/19/11	5/18/11	6/28/11	7/21/11	8/29/11	9/28/11	10/19/11	11/17/11
	(Potlatch Ck) @ State Park	0.2		0.24	0.25	0.25	0.15	0.38	0.91	1.36	0.92	0.97	1.31	0.83	0.79	0.81	0.66	0.55	0.37	0.58		0.98	1.64	1.42	1.70	1.03	0.77	0.73	
	Unnamed @ Hoodcastle Rd					0.44	0.44	0.72	1.08	0.89	0.98	0.97	0.94	0.93	0.58	0.67	0.70	0.66	0.56	0.61		1.54	1.17	0.93	0.95	0.89	0.71	0.85	
	Hill Ck @ Hwy 101	0.05	3.14	3.27	2.94	2.37	2.55	3.75	4.78	5.22	8.56	6.47	7.16	4.68	5.90	5.55	4.67	5.37	5.52	4.58		4.47	10.43	8.43	8.59	5.77	5.27	5.22	
	Finch Ck abv diversion	0.25				11.56			43.97	29.84	23.98	24.14	22.43	18.88	15.92	15.71	15.90	16.38	18.82	23.98		31.85	27.73	23.72	19.78	16.90	16.51	16.07	
	Clark Ck @ Hwy 101	0.05	0	0	0	0	0	0.15	3.97	1.31	1.01	0.77	0.50	0.05	0.02	0.00	0.00	0.00	0.00	0.03		1.70	1.54	0.76	0.29	0.00	0.00	0.00	0.00
	Miller Ck @ Hwy 101	0.05	0	0	0	0	0	3.02	17.96	10.33	3.84	2.10	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.39		9.41	4.87	0.30	0.00	0.00	0.00	0.00	0.00
	Sund Ck @ Hwy 101	0.05	0	0	0	0	0	2.78	11.61	4.15	0.042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.96		2.47	1.49	0.00	0.00	0.00	0.00	0.00	0.52
	(Little Lilliwaup) @ Hwy 101	0.1	7.61	7.25	5.39	4.21	3.76	13.1	18.99	16.9	12.81	10.15	11.42	7.84	6.65	6.23	5.34	4.81	5.57	8.90		18.22	13.17	9.95	8.92	5.73	4.62	4.90	
	Lilliwaup nr Hwy 101	0.4	21.92	12.13	10.28	9.16	6.64	116.86	219.2	120.78	71.73	40.01	48.85	21.59	16.03	15.08	12.66	13.55	35.47	71.84		71.84	63.27	26.42	19.23	10.80	19.45	23.81	
	Eagle Ck @ Hwy 101 abv access rd	0.05				2.81		28.6	53.63	27.57	16.41	13.55	12.58	8.30	6.28	7.16	6.49	6.06	12.19	17.80		25.13	21.23	9.87	10.28	7.82	7.95	25.38	14.60
	UN (Ayock Pt) @ Hwy 101	0.1		0.96	0.9	1.24	1.15		3.27	3.04	2.21	2.78	2.55	2.20	1.91	1.90	1.90	1.74	1.85	1.93		3.38	3.39	3.19	3.06	1.89	2.66	2.27	2.12
	Jorsted Ck @ Hwy 101	0.02				1.37		24.13	47.52	23.91	14.83	10.76	9.06	4.84	3.30	3.89	3.53	7.15	6.66	16.58		23.39	12.68	5.87	4.36	3.34	3.39	5.01	
	Waketickeh @ Hwy 101 10'ds of bridge	0.02	4.2	1.23	0.56	0.95	0.57	30.66	73.87	63.81	33.48	10.07	15.26	3.05	1.40	1.29	1.10	2.56	20.56	27.07		45.50	41.12	3.38	2.47	1.00	6.31	10.67	
	UN (Mikes RV park) @ Hwy 101	0.1	1.04	1.08	0.59	0.67	0.28	4.57	9.72	5.97	3.11	1.76	1.95	2.09	0.87	0.72	0.55	0.63	1.76	3.96		5.82	4.43	0.96	0.84	0.32	0.49	1.37	
	Sharer Ck (#14) @ Hwy 101	0.1	0.15	0.01	0	0	0	9.63	17.22	10.41	3.58	1.65	2.61	0.39	0.19	0.04	0.10	0.11	1.66	5.08		8.14	6.48	0.61	0.44	0.03	0.26	1.11	
	#12 (Triton Beach) @ WDFW access	0.05		0.01	0	0	0.04	8.07	7.78	3.96	1.28	0.55	1.30	0.22	0.12	0.13	0.02	0.07	0.73	3.03		5.55	4.64	0.17	0.06	0.01	0.27	0.52	
	Fulton Ck @ IFIM	0.25				1.09		33.6	65.97	79.08	56.74	14.81	22.32	3.42	1.48	0.83	1.10	1.43	21.72	27.12		46.18	55.74	14.64	2.51	0.40	19.95	9.04	30.41
	McDonald Ck @ Hwy 101	0.15		0	0	0	0	4.71	11.95	5.73	1.91	1.15	2.24	0.74	0.00	0.00	0.00	0.00	0.69	4.47	8.28	8.23	6.57	0.29	0.06	0.00	0.10	0.89	
	Pierce Ck @ Duckadush Rd	0.33												0.42	0.23	0.23	0.24	0.39	0.33	1.56	3.97	2.92	2.65	1.40	0.49	0.20	0.44	0.31	0.62
	Walker Ck @ Hwy 101	0.1		0.1	0.01	0.05	0.02	0.95	6.13	1.82	0.29	0.04	0.27	0.27	0.01	0.01	0.01	0.03	0.10	1.16	2.61	2.66	1.53	0.03	0.05	0.03	0.45	0.03	
	Wolcott Ck @ Whitney Gardens	0.01													0.54	0.52	0.35	0.55	0.57	0.77	1.06	0.61	0.87	0.75	0.61	0.22	0.53	0.61	0.79
	Turner Creek	0.05												0.21	0.06	0.06	0.06	0.08	0.12	2.14	4.58	3.79	2.38	0.56	0.44	0.09	0.14	0.22	0.46

ESA
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206.789.9658 phone
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memorandum

date September 9, 2011

to LaJane Schopfer, Jen Radcliff

from Teresa Vanderburg, Reema Shakra, Mike Leech

subject Mason County SMP Update - Parcel-based Buildout Analysis GIS Layer

We are starting to plan for the next phases of the SMP Update. One of the key layers that have been helpful in other jurisdictions is a parcel-based buildout analysis layer. We are hoping to get your help developing this layer for this project as it is an important tool to help estimate and describe the amount and the location of future development that may be allowed to occur within SMA jurisdiction under current regulations. It is also beneficial in allowing a community to test its development regulations – to get a glimpse of its possible future when all the remaining buildable land is developed to the maximum extent allowed under existing regulations. The build-out analysis will be used for multiple work products required under the Ecology grant: shoreline environment designation revisions, cumulative impact analysis report, and no-net-loss report. The build-out analysis will likely identify shoreline areas with varying degrees of development potential. Determining which areas have high or low development potential would inform the committees' and project team's review of existing environment designations. The build-out analysis would be used for the cumulative impact analysis and no net loss report to identify whether the proposed regulations would adequately protect existing ecological functions from future development, as projected by the build-out exercise.

There are many resources online for conducting a buildout analysis, but within the context of the SMP Update, it can be a more simplified effort. You may, however, find this tool useful for other planning applications/projects in the County. The results of the analysis would provide a geospatial tool for understanding development patterns along the shoreline in combination with the results of the inventory and characterization report. Below is a list of the possible categories and their descriptions:

Buildout Analysis Layer Categories (for Residential, Commercial and Industrial):

Category	**Description**	**Assumption**
Vacant Dividable	Undeveloped parcels that can be further developed.	If gross area / (2.5 * minimum lot size per zoning) > 1
Vacant Non-dividable	Lands which cannot be subdivided into multiple lots under current zoning regulations.	If gross area / (2.5 * minimum lot size per zoning) < 1
Underdeveloped (Occupied	Developed, but not to the density allowed for zoning (i.e. – a 40 acres	**Residential properties:** If existing dwelling units per acre /

Dividable)	parcel zoned R5 that has 1 residence but could be developed as 8 lots).	(.2 * allowed zoning density) ≤ 1 **Commercial/industrial properties:** If land value/improvement value > 1
Fully built out (Occupied Non-dividable)	Already developed at the density allowed by zoning (i.e. – a 5 acre parcel zoned R5 with a single family residence).	**Residential properties:** If existing dwelling units per acre / (.2 * allowed zoning density) > 1 **Commercial/industrial properties:** If land value/improvement value < 1
Not Eligible	Lands that are not likely to develop. This includes public lands such as state and county parks, tax exempt properties, right of ways, long term commercial forests, etc. as well as properties that have critical areas that would not meet the minimum size requirements for future development.	

Note: Numbers in table with yellow highlight are provided as examples. Determining whether a property is underdeveloped or dividable is based on assumptions established by the County.

This information can be derived by looking at what the Zoning categories are at a parcel level in combination with the parcel areas and the number of allowable dwelling units/acre for each zoning category. Below are the basic steps:

1. Identify appropriate data for analysis – This would include current parcels, zoning and critical areas layers
2. Remove critical areas from the analysis (areas of land that where development is not allowed based on critical areas regulations – wetlands, steep slopes, etc.) – recalculate areas for each parcel (OR Attribute these parcels as having Critical Areas)
3. Overlay zoning with parcels information
4. For residential properties, calculate existing density and lot size. Determine maximum density and minimum lot size based on each zoning category. Classify property as residential vacant dividable, residential vacant non-dividable, residential underdeveloped or residential fully built-out.
5. For commercial properties, calculate existing lot size. Determine minimum lot size based on each zoning category. Classify property as commercial vacant dividable, commercial vacant non-dividable, commercial underdeveloped or commercial fully built-out.
6. For industrial properties, calculate existing lot size. Determine minimum lot size based on each zoning category. Classify property as industrial vacant dividable, industrial vacant non-dividable, industrial underdeveloped or industrial fully built-out.
7. Create a new development category field and CODE parcels based on the above categories and descriptions.

Determine full build-out potential of vacant dividable and underdeveloped properties based on underlying zoning allowances. Meaning, the number of lots or dwelling units a vacant dividable or underdeveloped property could add.

Critical Areas Metadata

Mason Critical Area Layers

Erosion Hazard Areas:

This dataset depicts Erosion Hazard Areas in Mason County, or areas "underlain by soils which are subject to severe erosion when disturbed." This data set represents the Erosion Hazard Areas for Mason County, Washington, as defined in section 17.01.104 of the Mason County Resource Ordinance Revised June 16, 2009. This GIS shapefile is based on the USDA NRCS SSURGO Soils dataset and covers the entire county except for the Olympic National Park and Olympic National Forest.

Frequently_Flooded_Areas:

Frequently Flooded Areas of Mason County, Washington, as defined in section 17.01.090 of the Mason County Resource Ordinance, Revised June 16, 2009. This layer is essentially a subset of the Q3 Flood Data produced by the Federal Emergency Management Agency (FEMA).

Wetlands:

The present goal of the Service is to provide the citizens of the United States and its Trust Territories with current geospatially referenced information on the status, extent, characteristics and functions of wetlands, riparian, deepwater and related aquatic habitats in priority areas to promote the understanding and conservation of these resources. Supplemental_Information: The wetland maps were produced as topical overlays using U.S. Geological Survey topographic maps as the base. The hard copy product is a composite map showing topographic and planimetric features from the USGS map base and wetlands and deepwater habitats from the Service's topical overlay. Thus, the data are intended for use in publications, at a scale of 1:24,000 or smaller. Due to the scale, the primary intended use is for regional and watershed data display and analysis, rather than specific project data analysis. The map products were neither designed nor intended to represent legal or regulatory products. Comments regarding the interpretation or classification of wetlands or deepwater habitats can be directed to the U.S. Fish and Wildlife Service, Division of Federal Program Activities, Branch of Habitat Assessment <http://www.fws.gov/duspit/contactus.htm> These data were developed in conjunction with the publication Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31. Alpha-numeric map codes have been developed to correspond to the wetland and deepwater classifications described. These spatial data are not designed to stand alone. They form topical overlays to the U.S. Geological Survey 1:24,000 or 1:25,000 scale topographic quadrangles. Note that coastline delineations were drawn to follow the extent of wetland or deepwater features as described by this project and may not match the coastline shown in other base maps. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government. Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in Arc/INFO format, this metadata file may include some Arc/INFO-specific terminology.

This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the conterminous United States, Alaska, Hawaii, Puerto Rico and the Virgin Islands, and the Pacific Trust Territories. These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979). Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of

estuaries and near shore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery. By policy, the Service also excludes certain types of "farmed wetlands" as may be defined by the Food Security Act or that do not coincide with the Cowardin et al. definition. Contact the Service's Regional Wetland Coordinator for additional information on what types of farmed wetlands are included on wetland maps. National Wetlands Inventory (NWI) GIS data clipped for use for Mason County.

Jefferson Critical Areas

Erosion Hazards

CITATION:

- TITLE: Erosion Hazard
- SHAPE FILE NAME: erosion_ejc.shp
- SOURCE: Jefferson County Central Services GIS
- SOURCE COMMENT: Produced from the SCS Soils source coverage for soils types in Eastern Jefferson County. This composite layer does not give detailed attributes (other than an indicator field of YES or blank).
- COORDINATE SYSTEM: Washington State Plane North (5601), NAD83
- DATE OF SHAPE FILE UPDATE: 3/19/97

DESCRIPTION:

ABSTRACT: This layer depicts the areas designated as soil types having severe or very severe erosion hazard potential by the Soil Conservation Service. Polygons included in the layer were selected from the SCS Soils source data for specific soils types identified in the published SCS manual. The SCS Soils source coverage was created through digitizing paper maps created by the U.S. Department of Agriculture Soils Conservation Service for their soil survey of Jefferson County in the 1970's. Special conditions or standards may apply to development in areas subject to erosion hazards. Details should be obtained from the Department of Community Development.

Landslide Hazard Layer

CITATION:

- TITLE: Landslide Hazard CA
- SHAPE FILE NAME: landslide_ejc.shp
- SOURCE: Jefferson County Central Services GIS
- SOURCE COMMENT: This is a composite layer produced from the SCS Soils source coverage for soils types in Eastern Jefferson County, the Department of Ecology Coastal Zone Atlas of Jefferson County, and a review of topographic contours indicating steep slopes. This composite layer does not give detail attributes, but it does give an attribute with a rating factor which is a weighted probable problem rating based on severity of slope.
- COORDINATE SYSTEM: Washington State Plane North (5601), NAD83
- DATE OF SHAPE FILE UPDATE: 3/19/97

DESCRIPTION:

ABSTRACT: This layer depicts areas designated as soil types having severe or very severe building limitations for dwellings without basements by the Soil Conservation Service. Polygons included in the layer were selected from the SCS Soils source coverage for specific soils types identified in the published SCS manual. In addition, properties with known slide problems and properties with areas in excess of a 15% slope have been added (categorically 15%-30%, 30%-60%, >60%). Finally, parcels that had active slides in the winter of 1998/1999 as identified by the building official have been added and are represented by a "5" in the keysoils field. Special conditions or standards may apply to development in areas subject to landslide hazards. Details should be obtained from the Department of Community Development.

The SCS Soils source coverage was created through digitizing paper maps created by the U.S. Department of Agriculture Soils Conservation Service for their soil survey of Jefferson County in the 1970's.

Seismic Hazard

CITATION:

- TITLE: Seismic Hazard CA
- SHAPE FILE NAME: seismic_ejc.shp
- SOURCE: Jefferson County
- SOURCE COMMENT: This is a composite layer produced from the SCS Soils source coverage for soils types in Eastern Jefferson County, the Department of Ecology Coastal Zone Atlas of Jefferson County, Department of Natural Resources(DNR) maps depicting Compressibility of Earth Materials in Eastern Jefferson County, DNR Soil Survey, and a review of USGS quad maps. This composite layer does not give detail attributes (other than an indicator field of YES or blank).
- COORDINATE SYSTEM: Washington State Plane North (5601), NAD83
- DATE OF SHAPE FILE UPDATE: 3/18/97

DESCRIPTION:

ABSTRACT: This layer depicts the areas having a severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement, soil liquefaction, or surface faulting. Information was extracted from the various source layers based on queries that identified poorly drained soils with greater than 50% silt and very little course material; loose sand or gravel, peat, artificial fill and landslide materials; and soil units with a high organic content. Special conditions or standards may apply to development in areas subject to seismic hazards. Details should be obtained from the Department of Community Development.

The SCS Soils source coverage was created through digitizing paper maps created by the U.S. Department of Agriculture Soils Conservation Service for their soil survey of Jefferson County in the 1970's. DNR Soils came directly from the soils GIS data maintained by the Washington State Department of Natural Resources.

Wetlands

CITATION:

- TITLE: Wetlands
- SHAPE FILE NAME: wetlands.shp
- SOURCE: Jefferson County Central Services GIS

- SOURCE COMMENT: This is a composite layer produced from the digital USFW National Wetlands Inventory, the Department of Natural Resources (DNR) hydrography cover, and the Soil Conservation Service soils cover (hydric soils).
- COORDINATE SYSTEM: Washington State Plane North (5601), NAD83
- DATE OF SHAPE FILE UPDATE: 3/18/97

DESCRIPTION:

ABSTRACT: This layer shows areas which have a probability of being designated as wetlands using the Washington State Department of Ecology's Wetland Rating System. Included are all polygons identified by the USFW National Wetlands Inventory. Also included are Soil Conservation Service (SCS) soils and Washington State Department of Natural Resources Hydrography with significant soil inclusions and "wet spots".

The National Wetlands Inventory is maintained by the United States Department of the Interior Fish and Wildlife Service. The SCS Soils source coverage was created through digitizing paper maps created by the U.S. Department of Agriculture Soils Conservation Service for their soil survey of Jefferson County in the 1970's. DNR Hydrography is maintained by the Washington State Department of Natural Resources.

July 2001 Note - This abstract was written specifically for a theme only covering eastern Jefferson County. The data for the west side is from two other layers (westwetlands and wetsoil) used to create the paper west end map. The source of those layers is unclear. Sep 2001 Note - This data was updated with buffered arcs from the nwi_east coverage used to create the official paper map of east Jefferson County. All arcs coded as INCLUDED=YES were buffered by 60' and unioned with this shape file. The new polygons were coded as SOURCE=NWI Buffered Arcs-60'. The buffer distance was based on the estimated width of the arcs on the official paper map.

This data is for general planning purposes. Here is a quote from the FEMA Q3 user guide: “The Q3 Flood Data product can be a valuable tool to assist in screening property addresses within a GIS to determine flood risks. However, as the geographic processing performed to develop the Q3 Flood Data may introduce differences with the source hardcopy FIRMs, users must apply considerable care and judgment in the application of this product. For instance, the Q3 Flood Data may be overlaid on highly detailed large scale community base mapping data, but, if parcel level determinations are made, they must be prefaced with information about the accuracy of the data from which they are derived.”

Appendix G

GIS Build-out Workflow – Mason County

This applies to build-outs with and without critical areas removed. Critical areas require and additional step noted below.

Pre-processed layers:

Zoning – Populated zoning density field where densities exist
WRIA 16 and 14 HUC catchments combined
Shoreline Parcels (refined by LaJane with more precise land use – combined with zoning to create (ShorelineParZon)
Critical Areas = FEMA Flood, Wetlands merged together

Assumptions:

Parcel land use code takes priority over zoning designation for determining land use– what's on the ground vs. what can or should be there.

Process:

Add LU_Code to parcels and convert Landuse from text to numeric.

Reduce working set of parcels by selecting parcels with "IS_EXEMPT" = 'No' AND "LANDUSE" NOT LIKE '7%Recreational%' AND "LU_CodeNum" <> 41 AND "LU_CodeNum" <> 45 AND "LU_CodeNum" <> 46 AND "LU_CodeNum" <> 48 AND "LU_CodeNum" <> 81 AND "LU_CodeNum" <> 82 AND "LU_CodeNum" <> 83 AND "LU_CodeNum" <> 84 AND "LU_CodeNum" <> 85 AND "LU_CodeNum" <> 88 AND "LU_CodeNum" <> 92 AND "LU_CodeNum" <> 93

Add field "Acres" and calculate gross acres of parcels – Assessor acreage may differ.

41 = Railroad related
45 = Roads (Hwys, freeways, parkways, etc)
46 = Auto and parking
48 = Electric, gas and other utilities
81 = Farms and Agriculture
82 = Ag related, including animal related (vets)
83 = Other Ag. related
84 = Fishing and Shellfishing related
85 = Mining Related
88 = Designated Forest Lands
92 = Non-commercial Forest Reserve
93 = Water features (lakes, rivers, etc.)

Select Parcels that *have their center in* the WRIA boundary – boundary is not coincident between the two layers

Unselect parcels that are within existing water service areas.

Overlay (*Spatial Join)* parcels with zoning (one to many) to combine zoning and density values with parcels (ParZone)

Overlay (*Spatial Join)* ParZone with WRIA to capture catchment names (ParZoneCatch)

CRITICAL AREA OPTION
ParZoneCatch areas underlying critical layers are *erased*

Dissolve ParZoneCatch to remove duplicate parcel IDs from overlays on the following fields (all must match):PIN;IS_EXEMPT;ASSESS_LV;ASSESS_BV;LANDUSE;LAST_NAME;Acres;LU_CodeNum;DEV_CODE;Density;Catchment_Name to create ParZoneCentroid

Add Landuse_Group field to ParZoneCentroid layer and populate field with the following selections from the layer:

Calc Commercial/Industrial from "LU_CodeNum" = 21 OR "LU_CodeNum" = 24 OR "LU_CodeNum" = 25 OR "LU_CodeNum" = 34 OR "LU_CodeNum" >= 51 AND "LU_CodeNum" <= 59 OR "LU_CodeNum" >= 61 AND "LU_CodeNum" <= 64 OR "LU_CodeNum" = 69
Calc Vacant from "LU_CodeNum" > 90

Join (ShorelineParZon) to ParZoneCentroid to capture more precise shoreline land use data

Calc Residential from "Category" = 'Residential' OR "LU_CodeNum" >= 11 AND "LU_CodeNum" <= 14 OR "LU_CodeNum" = 16 OR "LU_CodeNum" >= 18 AND "LU_CodeNum" <= 20

Add Min_Lot_Acres field setting all values to 0, then calculate Acres/Density *density is from zoning layer where density values exist*

Add fields Factor and Category and populate Factor based on ESA assumptions from Mason County SMP build-out:

Residential = 1 / .2 * [Min_Lot_Acres]
Residential Fully Built Out = "Landuse_Group" = 'Residential' AND "Factor" > 1
Vacant = [Acres] / 2.5 * [Min_Lot_Acres]
Vacant Non-dividable = "Landuse_Group" = 'Residential' AND "Factor" < 1
Vacant Dividable = 'Residential' AND "Factor" > 1
Commercial/Industrial = [Unimproved_Land_Value] / [Improved_Land_Value] – if factor is null calc value = unimproved value
Commercial Underdeveloped = 'Commercial/Industrial' AND "Factor" > 1
Residential Underdeveloped = "Landuse_Group" = 'Residential' AND "Factor" <= 1
Commercial Fully Built Out = "Landuse_Group" = 'Commercial/Industrial' AND "Factor" < 1

Add field Acres and calculate current acreage of polygons
Select by Location WRIA catchments that intersect build-out polygons and dissolve on catchment name

Run a statistical *Frequency* on Build-out_MC_All to create a table of the number of catchment names by category and summarized by acreage

Add fields Current Gallons/Day and Future Gallons/Day

Calculate Cur_H2O = frequency * 350
Calculate Fut_H2O = Cur_H2O

Select "Category" LIKE '% Fully Built Out' OR "Category" = 'Vacant Non-Dividable'

Calculate Fut_H20 = 0

Appendix H Full Potential Build-out Frequency Table – Mason County

FREQUENCY	AU	Category	Acres
10	1211	Residential Fully Built Out	51.91477030520
5	1211	Residential Underdeveloped	4.13596711823
3	1211	Vacant Dividable	88.26803753400
1	1212	Residential Fully Built Out	2.63976905242
1	1212	Residential Underdeveloped	1.87603101293
1	1212	Vacant Dividable	11.10608298960
4	1212	Vacant Non-Dividable	2.66843882044
2	1214	Residential Fully Built Out	4.05852337734
1	1214	Residential Underdeveloped	0.57388654230
1	1214	Vacant Dividable	5.00576644126
9	1214	Vacant Non-Dividable	7.62337133367
2	1215	Residential Fully Built Out	37.25788694060
1	1215	Residential Underdeveloped	1.94586043753
8	1215	Vacant Dividable	133.70362107200
6	1215	Vacant Non-Dividable	10.76092516220
1	1216	Commercial Underdeveloped	16.56527894180
4	1216	Residential Fully Built Out	18.25495756370
3	1216	Residential Underdeveloped	3.25611648065
1	1216	Vacant Dividable	9.68049286320
2	1216	Vacant Non-Dividable	0.64421260732
1	1222	Residential Fully Built Out	6.51957549787
4	1222	Vacant Dividable	28.95144038660
1	1222	Vacant Non-Dividable	2.11468896330
3	1223	Residential Fully Built Out	19.91612727050
4	1223	Vacant Dividable	81.02507107120
2	1223	Vacant Non-Dividable	0.68429330486
1	1262	Vacant Non-Dividable	27.86953620210
1	1270	Commercial Underdeveloped	10.00750012410
8	1270	Residential Fully Built Out	16.21737075350
15	1270	Residential Underdeveloped	9.29893998602
15	1270	Vacant Dividable	108.92139395200
12	1270	Vacant Non-Dividable	7.75059043289
4	1275	Residential Fully Built Out	18.46976641000
4	1275	Residential Underdeveloped	7.34519009980
2	1275	Vacant Dividable	8.55720782357
41	1275	Vacant Non-Dividable	46.01190197080
15	1276	Residential Fully Built Out	65.54581184560
9	1276	Residential Underdeveloped	2.66493978563
10	1276	Vacant Dividable	50.80648221850
18	1276	Vacant Non-Dividable	19.85719476810
7	1278	Residential Fully Built Out	20.05848673980
1	1278	Residential Underdeveloped	2.67888380119
2	1278	Vacant Dividable	41.85620135110
7	1278	Vacant Non-Dividable	9.18164546772
1	1279	Residential Fully Built Out	3.21302789770
1	1279	Vacant Non-Dividable	1.82277015220
2	1282	Residential Fully Built Out	7.67744573503
2	1282	Vacant Dividable	35.61216505340
1	1282	Vacant Non-Dividable	0.69810177196
1	1284	Commercial Fully Built Out	0.83105962139
12	1284	Residential Fully Built Out	20.40526579230
9	1284	Residential Underdeveloped	11.63151920430
1	1284	Vacant Dividable	6.71600813580
10	1284	Vacant Non-Dividable	15.24096438560
2	1285	Residential Fully Built Out	3.81489450374
1	1285	Vacant Dividable	80.55097095170
2	1285	Vacant Non-Dividable	2.36254290728

Appendix I Critical Areas Removed Frequency Table – Mason County

FREQUENCY	AU	Category	Acres
10	1211	Residential Fully Built Out	51.91477030520
5	1211	Residential Underdeveloped	4.13596711823
3	1211	Vacant Dividable	88.26803753400
1	1212	Residential Fully Built Out	2.63976905242
1	1212	Residential Underdeveloped	1.87603101293
1	1212	Vacant Dividable	11.07152360390
4	1212	Vacant Non-Dividable	2.66843882044
2	1214	Residential Fully Built Out	2.49269694662
1	1214	Residential Underdeveloped	0.57388654230
1	1214	Vacant Dividable	5.00576644126
9	1214	Vacant Non-Dividable	5.48399840338
2	1215	Residential Fully Built Out	33.61324662680
1	1215	Residential Underdeveloped	1.94586043753
8	1215	Vacant Dividable	133.70362107200
6	1215	Vacant Non-Dividable	10.76092516220
1	1216	Commercial Underdeveloped	16.56527894180
4	1216	Residential Fully Built Out	12.06863283430
3	1216	Residential Underdeveloped	1.71862241259
1	1216	Vacant Dividable	9.68049286320
1	1216	Vacant Non-Dividable	0.04575551683
1	1222	Residential Fully Built Out	6.51957549787
4	1222	Vacant Dividable	28.95144038660
1	1222	Vacant Non-Dividable	2.11468896330
3	1223	Residential Fully Built Out	19.91612727050
4	1223	Vacant Dividable	81.02507107120
2	1223	Vacant Non-Dividable	0.68429330486
1	1262	Vacant Non-Dividable	27.86953620210
1	1270	Commercial Underdeveloped	9.27877645994
8	1270	Residential Fully Built Out	15.60512369840
15	1270	Residential Underdeveloped	6.32124746628
15	1270	Vacant Dividable	108.92139395200
12	1270	Vacant Non-Dividable	7.61814734617
4	1275	Residential Fully Built Out	18.46976641000
4	1275	Residential Underdeveloped	6.95029525037
2	1275	Vacant Dividable	7.25950693411
41	1275	Vacant Non-Dividable	45.90017097180
15	1276	Residential Fully Built Out	65.54581184560
9	1276	Residential Underdeveloped	2.66493978563
10	1276	Vacant Dividable	50.80648202090
18	1276	Vacant Non-Dividable	19.85719476810
7	1278	Residential Fully Built Out	20.05848673980
1	1278	Residential Underdeveloped	2.67888380119
2	1278	Vacant Dividable	41.85620135110
7	1278	Vacant Non-Dividable	9.18164546772
1	1279	Residential Fully Built Out	3.21302789770
1	1279	Vacant Non-Dividable	1.82277015220
2	1282	Residential Fully Built Out	7.49852613495
2	1282	Vacant Dividable	35.61216505340
1	1284	Commercial Fully Built Out	0.83105962139
12	1284	Residential Fully Built Out	17.48564506580
9	1284	Residential Underdeveloped	8.72884700660
1	1284	Vacant Dividable	6.71600813580
10	1284	Vacant Non-Dividable	14.99077889490
2	1285	Residential Fully Built Out	3.81489450374
1	1285	Vacant Dividable	80.55097095170
2	1285	Vacant Non-Dividable	2.36254290728

Appendix J

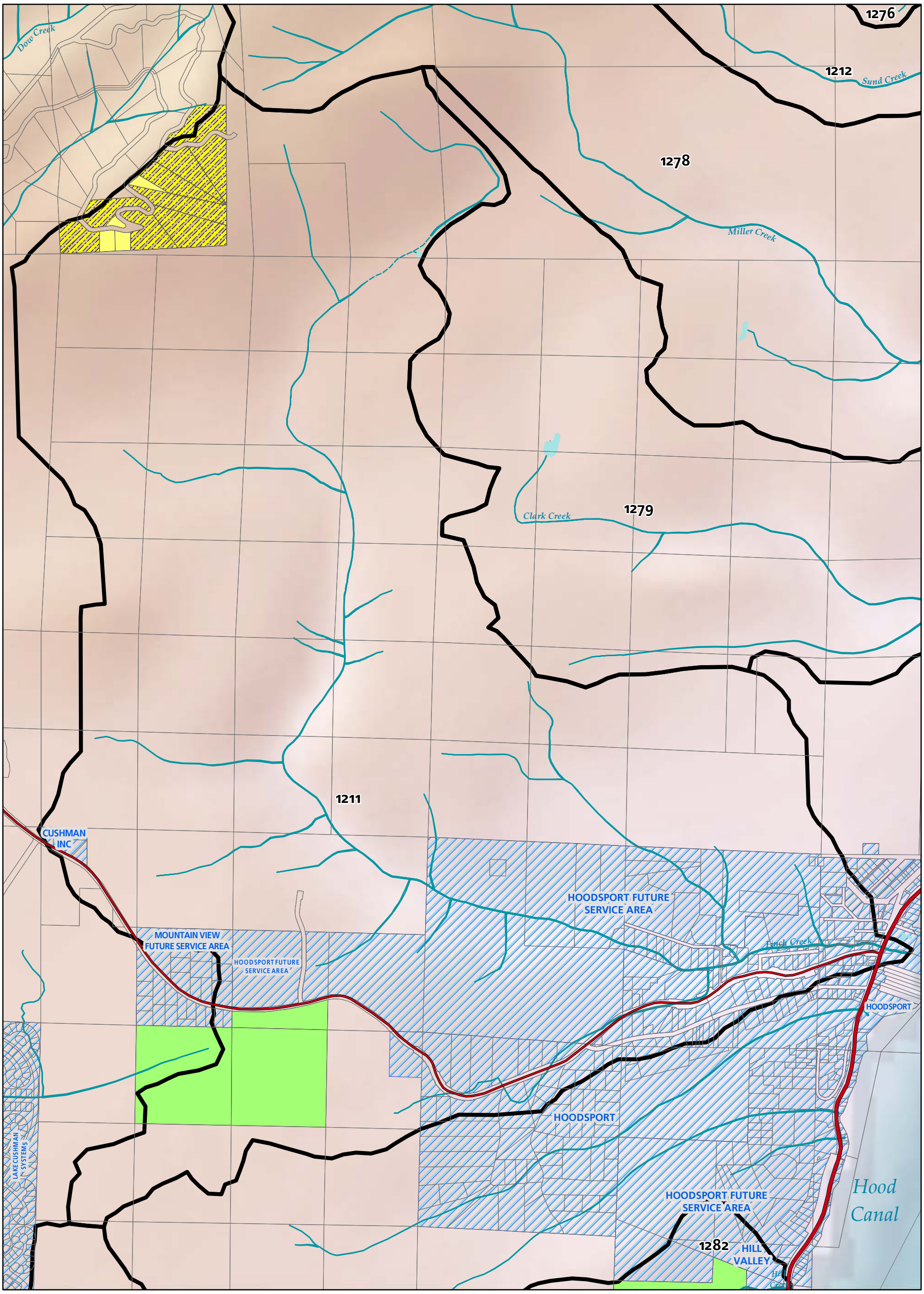
Maps of 16 Stream Sub-basins with Full Potential Build-out in Mason County

WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1211 -- Finch Creek

0 0.2 0.4 0.8 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

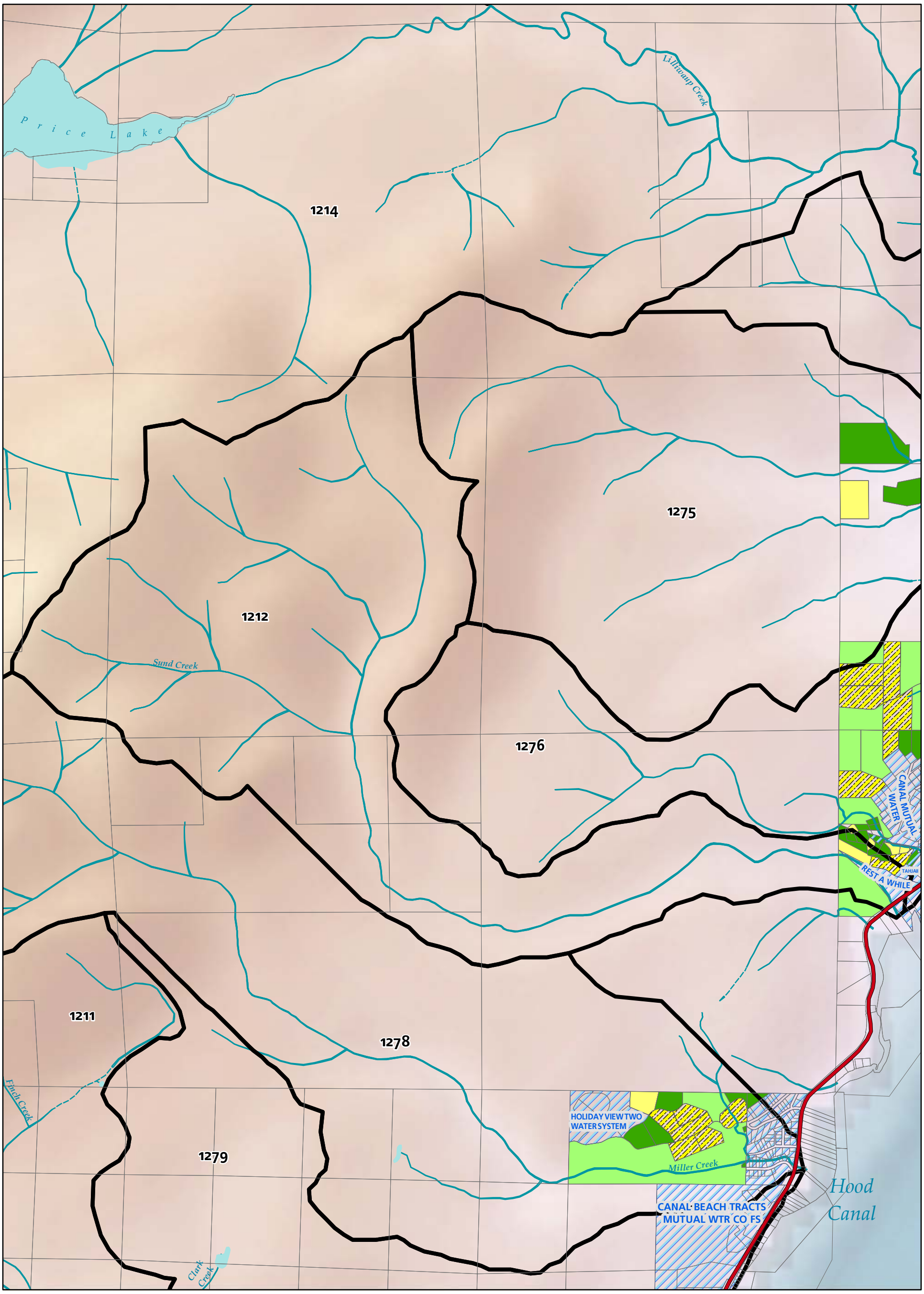
File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1212 -- Sund Creek

0 0.2 0.4 0.8 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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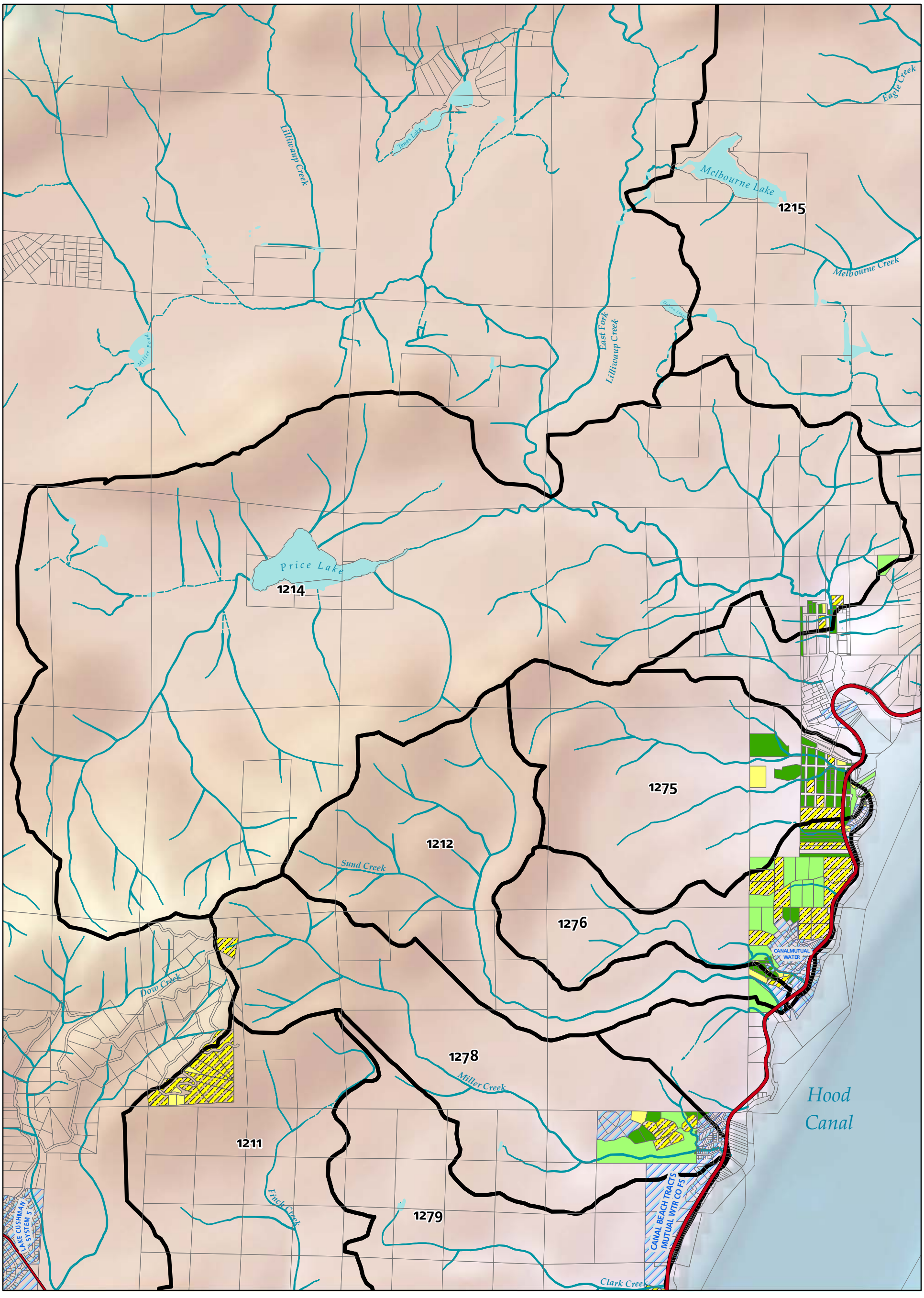
WRIA 16 Buildout Parcels w/o Critical Areas Removed Mason County Portion

Aquatic Unit 1214 -- Lilliwaup

0 0.375 0.75 1.5 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Area
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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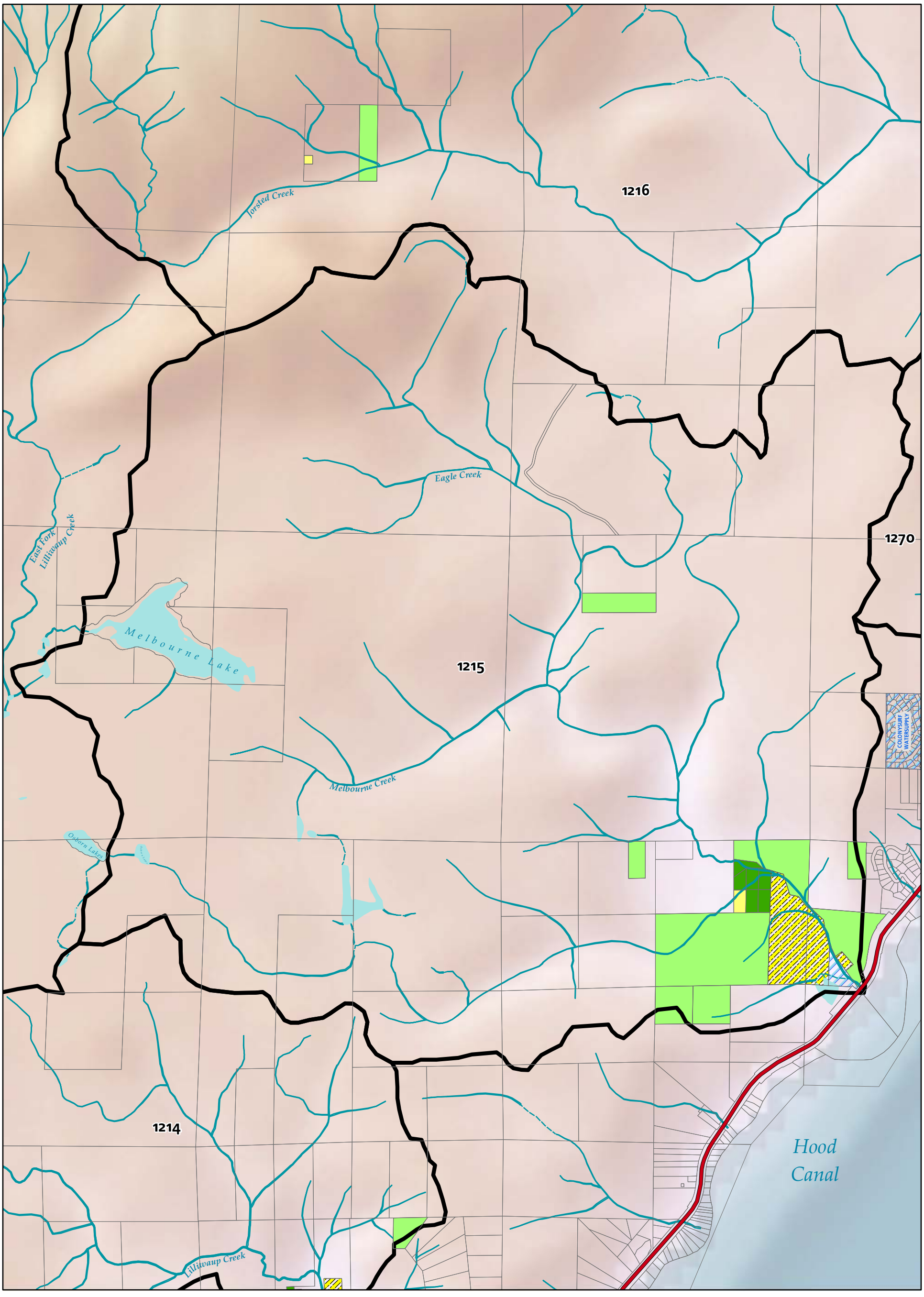
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1215 -- Eagle Creek

0 0.25 0.5 1 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Area
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable

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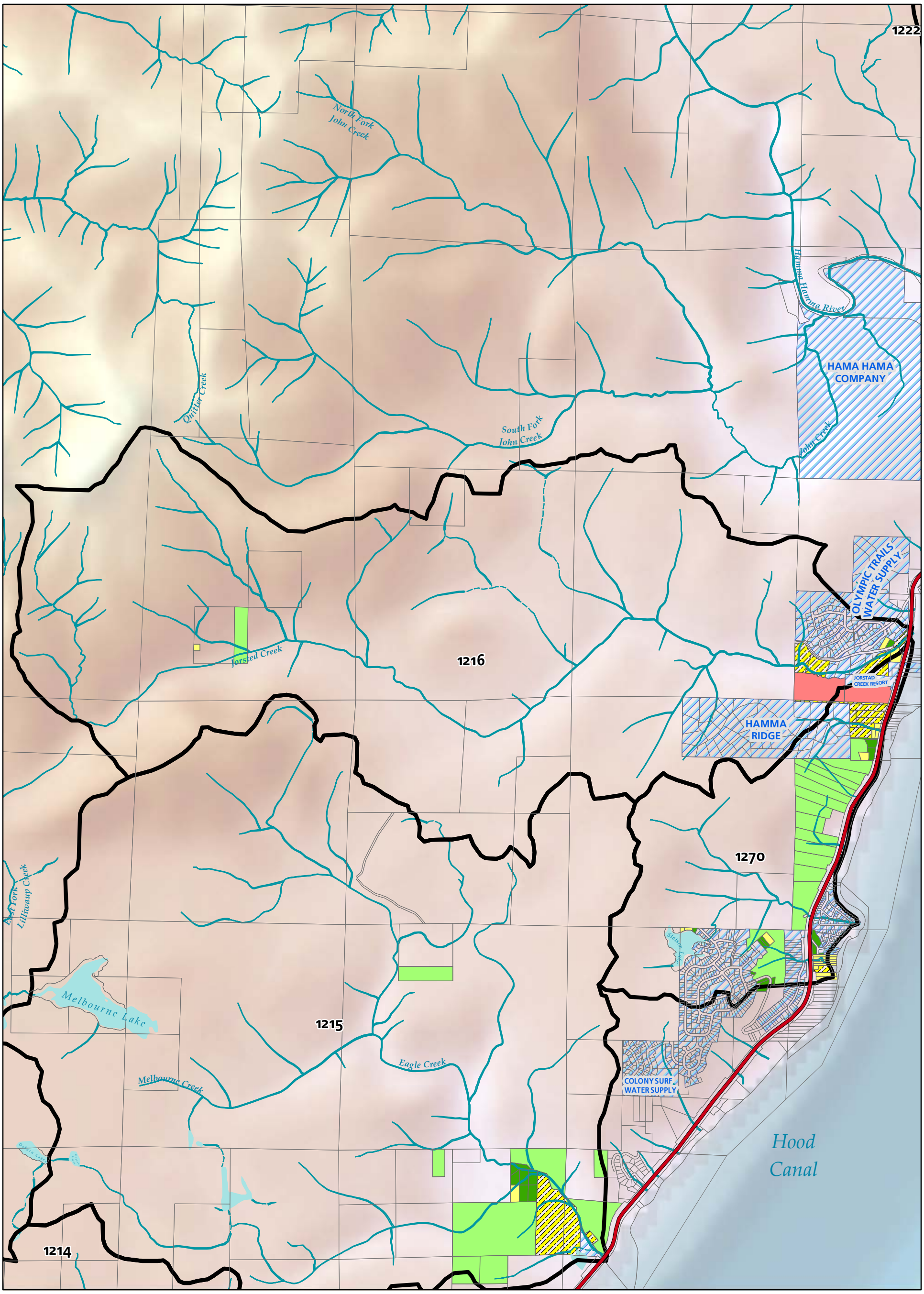
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1216 -- Jorsted Creek

0 0.35 0.7 1.4 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

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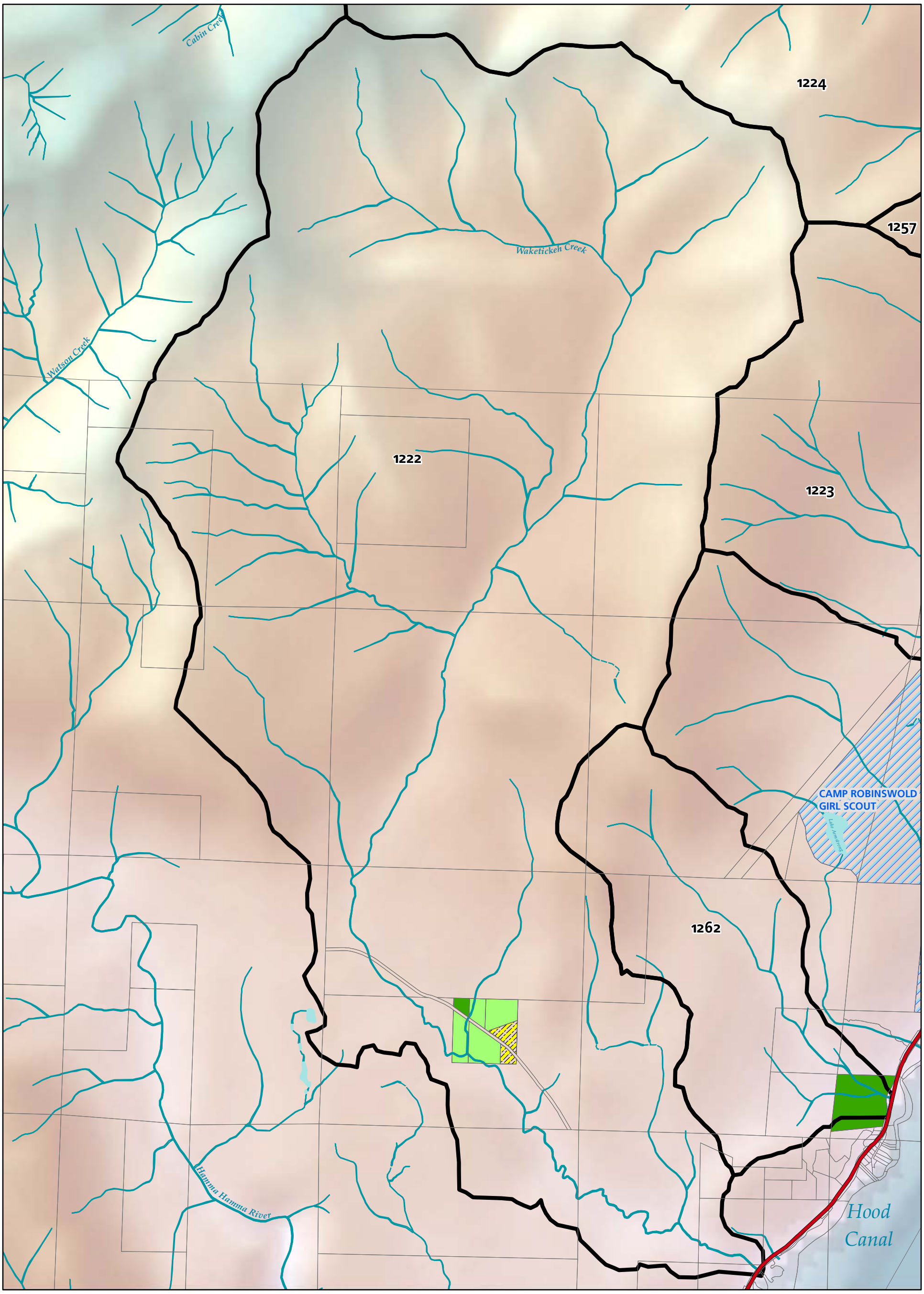
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1222 -- Waketickeh

0 0.3 0.6 1.2 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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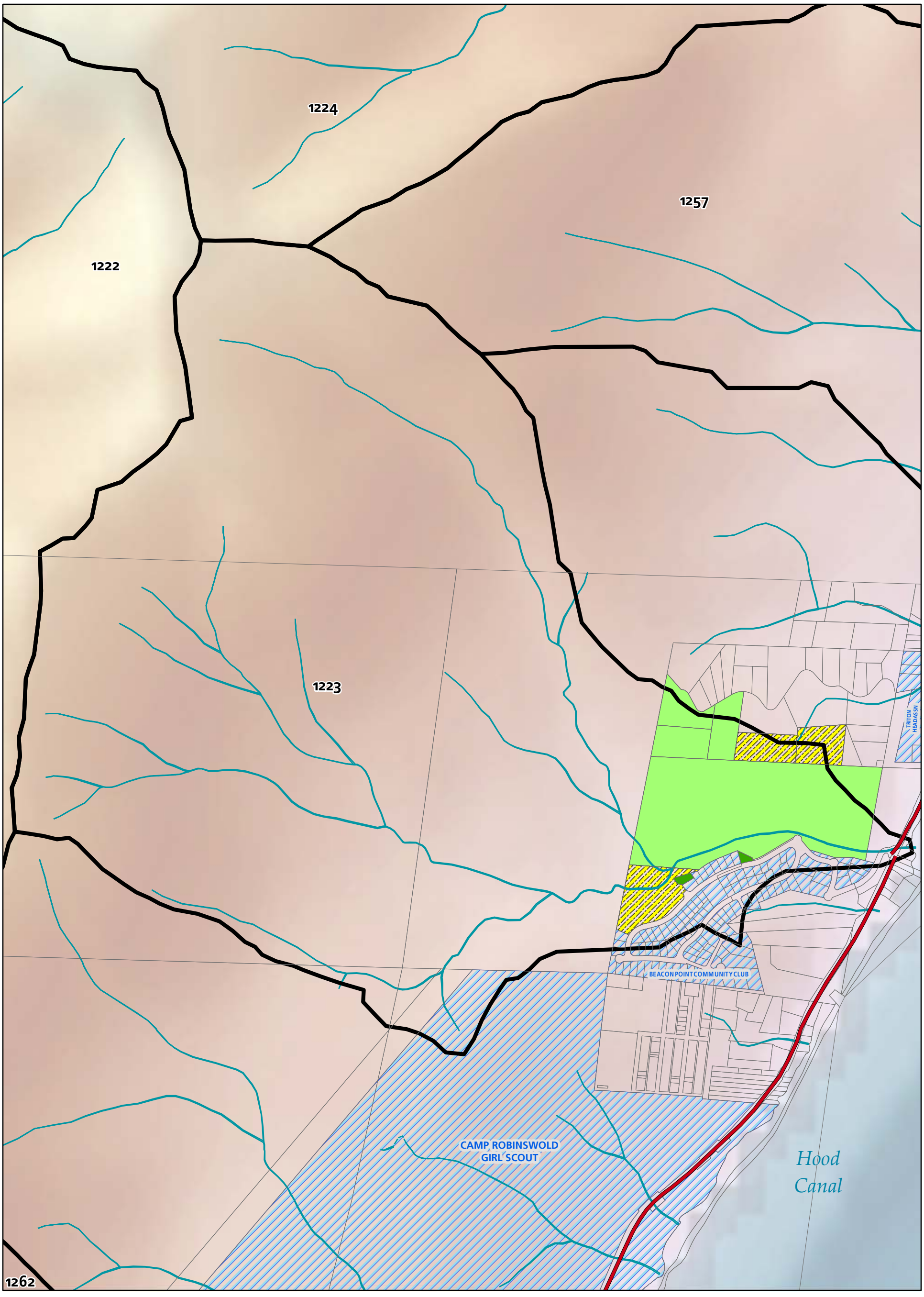
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1223 -- Sharer Creek (#14)

0 0.15 0.3 0.6 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1262 -- #17 (Mikes RV Park)

0 0.1 0.2 0.4 Miles

Draft

CAMP ROBINSWOLD
GIRL SCOUT

Lake Armstrong

1262

1222

Waketickeh Creek

Hood Canal

- Parcels
- Aquatic Unit
- Water Service Area
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable

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WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1270 -- #23 (Ayock Pt)

0 0.1 0.2 0.4 Miles

Draft

OLYMPIC TRAILS WATER SUPPLY
Jorsted Creek
JORSTAD CREEK RESORT
1216
HAMMA RIDGE
1270
1215
Hood Canal
AYOCK BEACH IMPROVEMENT
Stetson Lake
STETSONS COVE INC
COLONY SURF WATER SUPPLY

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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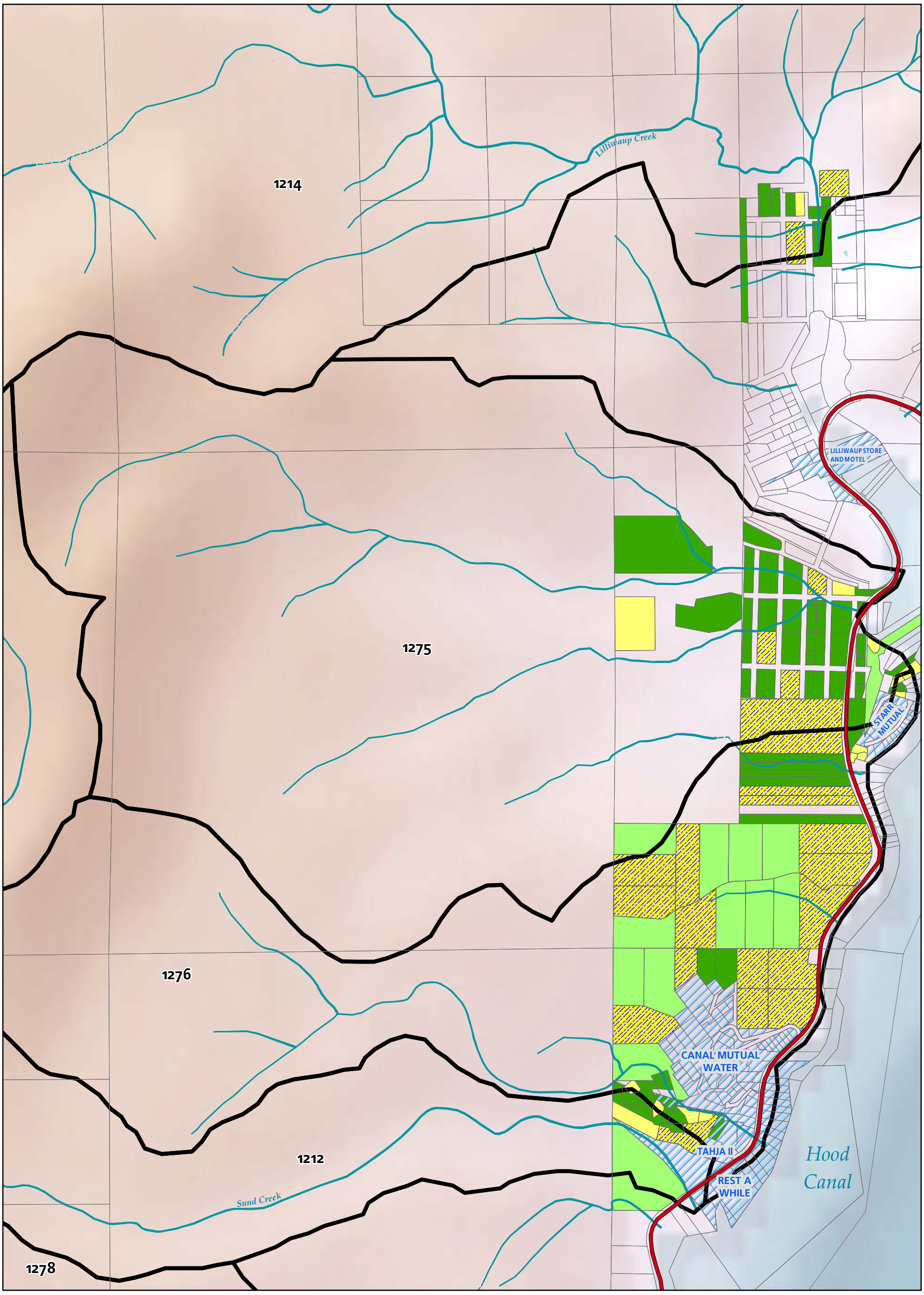
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1275 -- #23a ((Little Lilliwaup)

0 0.15 0.3 0.6 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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Coordinate System:
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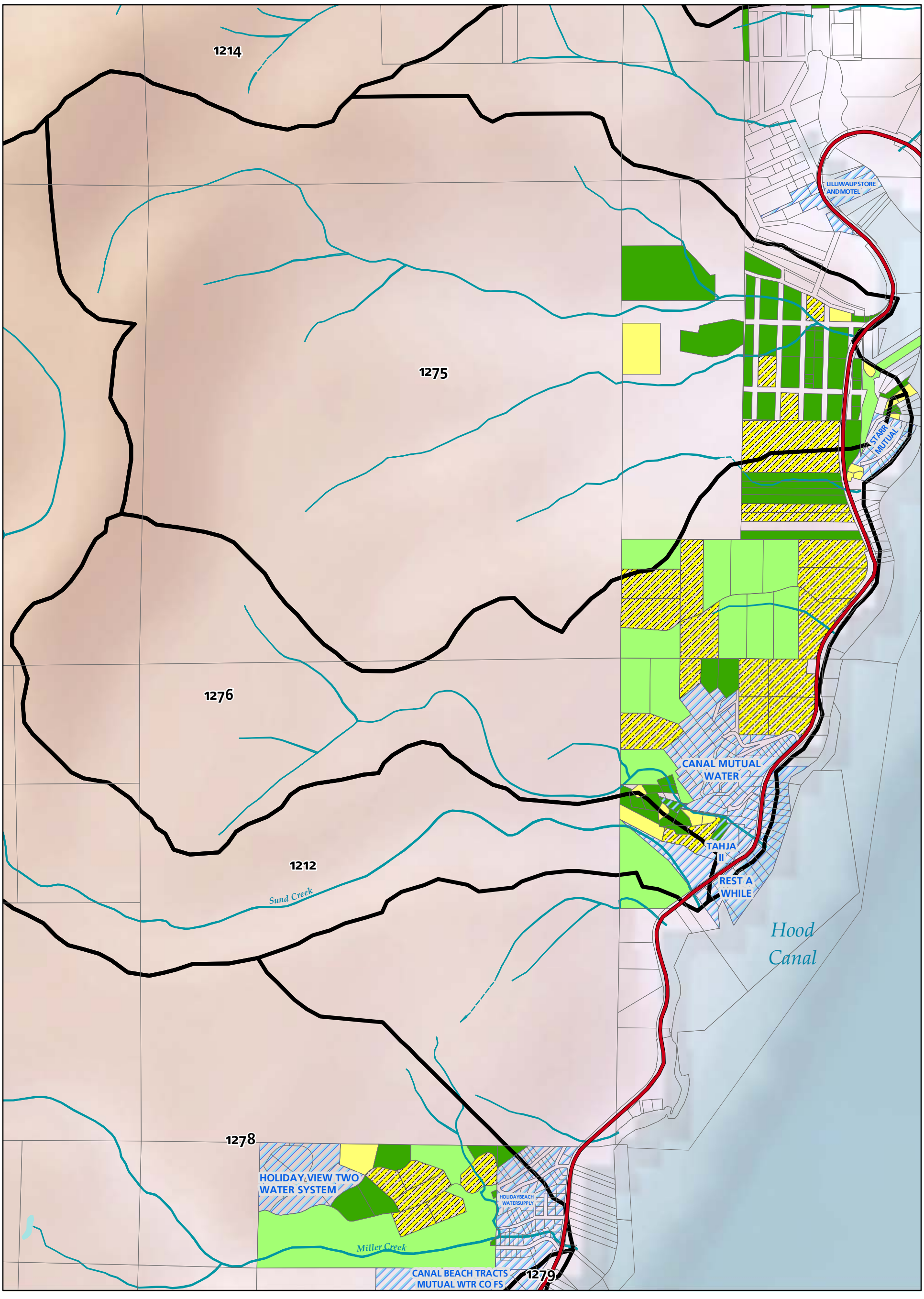
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1276 -- #23b (Unnamed)

0 0.15 0.3 0.6 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Area
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1278 -- Miller Creek

0 0.225 0.45 0.9 Miles

Draft

1214
1275
1212
1276
1278
1279
1211

Sund Creek
Finch Creek
Clark Creek
Miller Creek
Hood Canal

HOLIDAY VIEW TWO WATER SYSTEM
CANAL BEACH TRACTS MUTUAL WTR CO FS
HOODSPORTFUTURESERVICEAREA

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

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WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1279 -- Clark Creek

0 0.175 0.35 0.7 Miles

Draft

1275
1276
1212
Sund Creek
1278
HOLIDAY VIEW TWO WATER SYSTEM
Miller Creek
CANAL BEACH TRACTS MUTUAL WTR CO FS
1279
Clark Creek
Hood Canal
1211
HOODSPORT FUTURE SERVICE AREA
Finch Creek
HOODSPORT
SUNRISE MOTEL

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
Prepared By: Doug Nollenmeier, GISP
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WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1282 -- Hill Creek

0 0.175 0.35 0.7 Miles

Draft

CUSHMAN INC

MOUNTAIN VIEW FUTURE SERVICE AREA

HOODSPORT FUTURE SERVICE AREA

HOODSPORT FUTURE SERVICE AREA

Finch Creek

1211

HOODSPORT

HOODSPORT FUTURE SERVICE AREA

LAKE CUSHMAN SYSTEM 5

HILL VALLEY

Hill Creek

1282

No Name Creek

POTLATCH BEACH MUTUAL

Hood Canal

1284

CUSHMAN PLANT 2

TEN FOUR WATER SYSTEM

1285

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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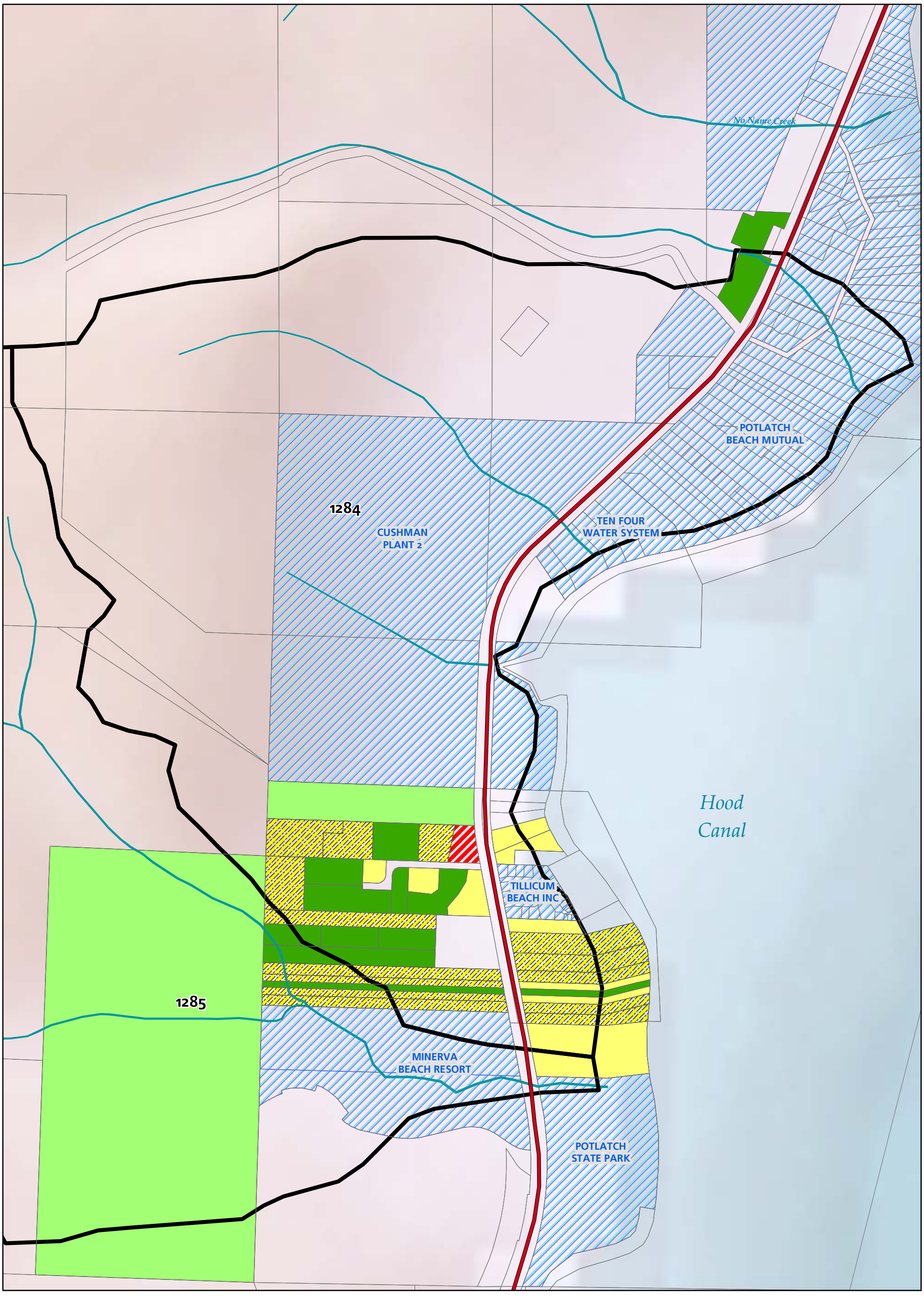
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1284 -- Unnamed

0 0.075 0.15 0.3 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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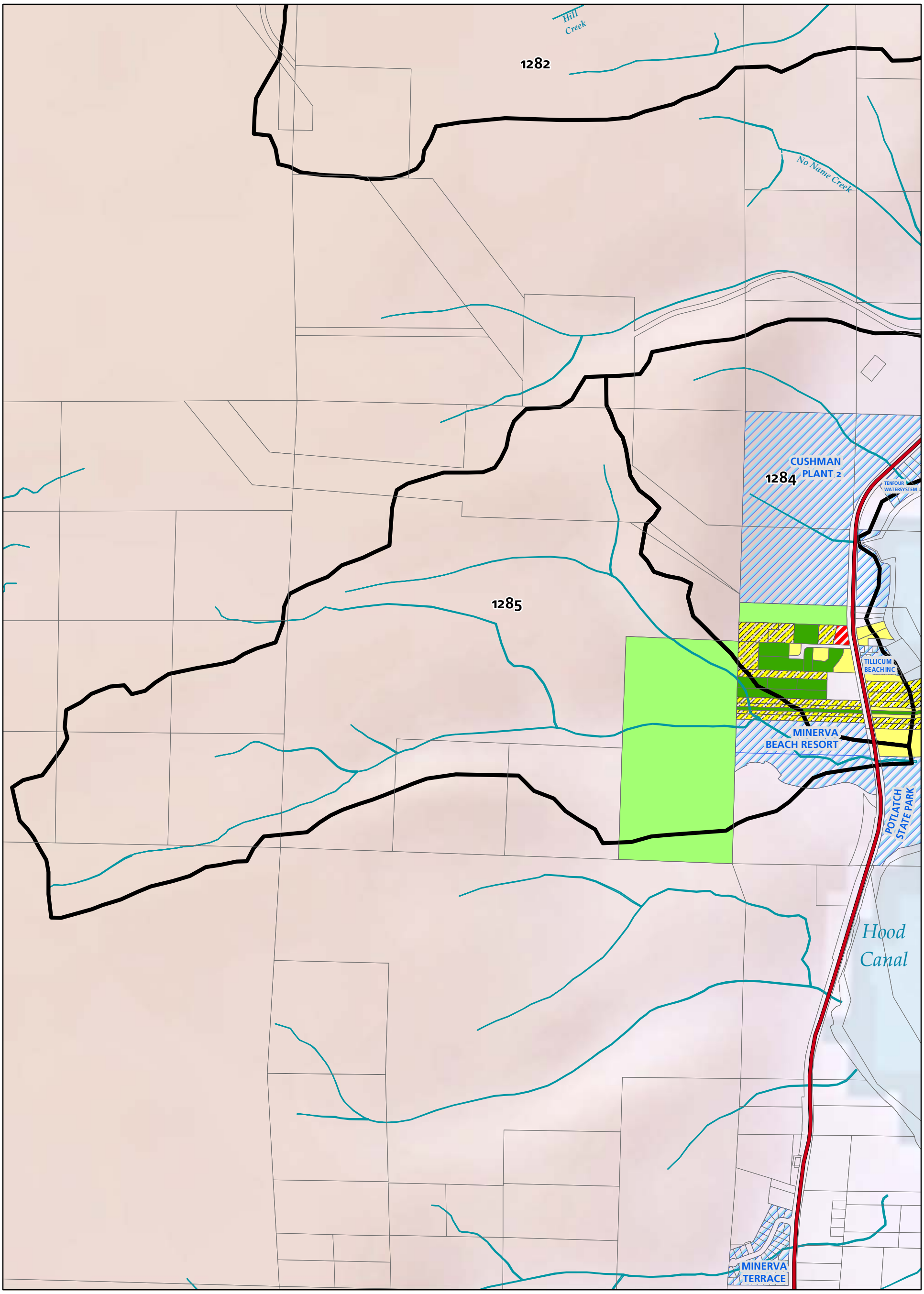
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Mason County Portion

Aquatic Unit
1285 -- Potlatch Creek

0 0.175 0.35 0.7 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_All.mxd
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Appendix K

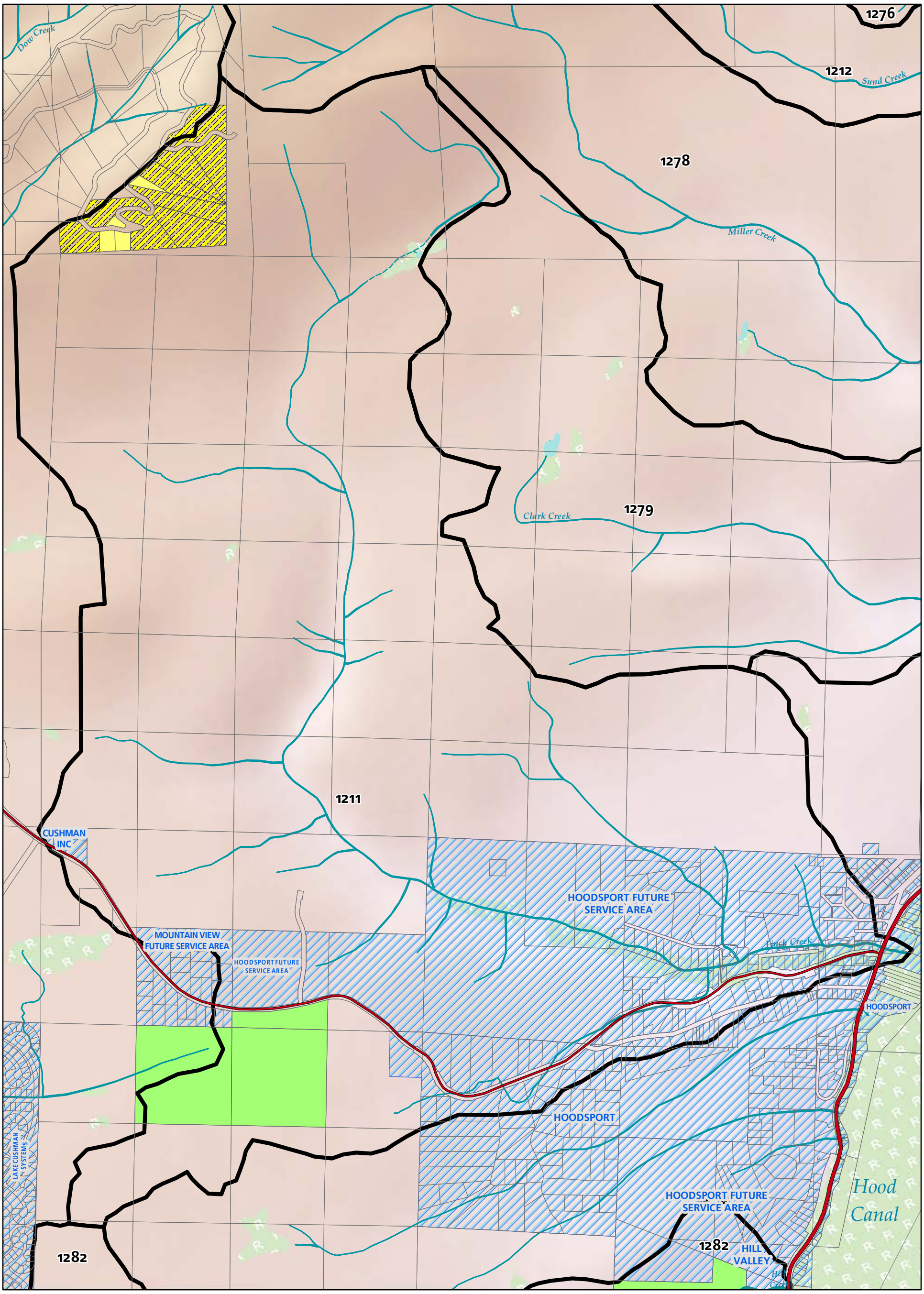
Maps of 16 Stream Sub-basins with Critical Areas Removed in Mason County

WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1211 -- Finch Creek

0 0.2 0.4 0.8 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Area
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable
- Critical Areas

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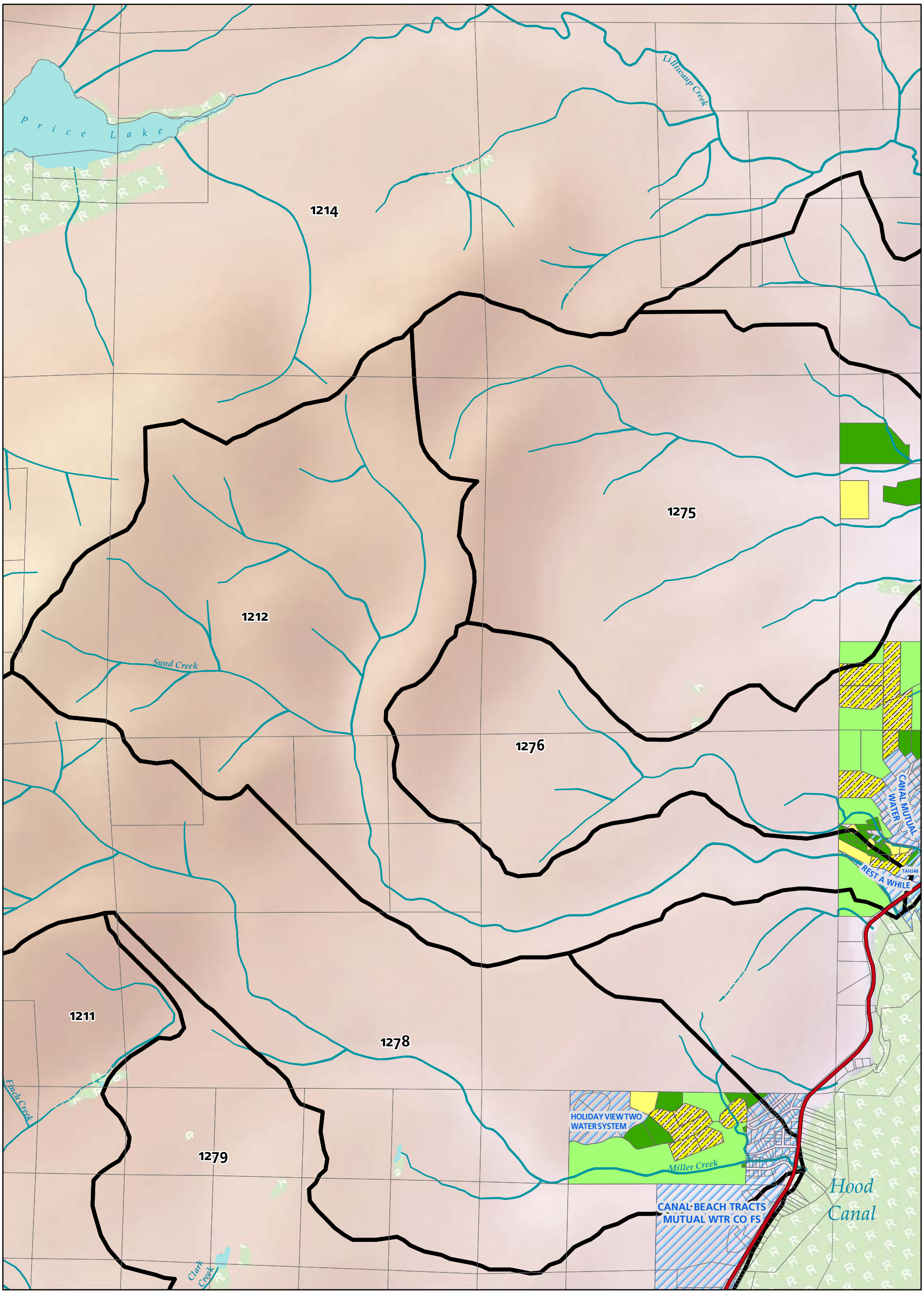
WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1212 -- Sund Creek

0 0.2 0.4 0.8 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Area
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable
- Critical Areas

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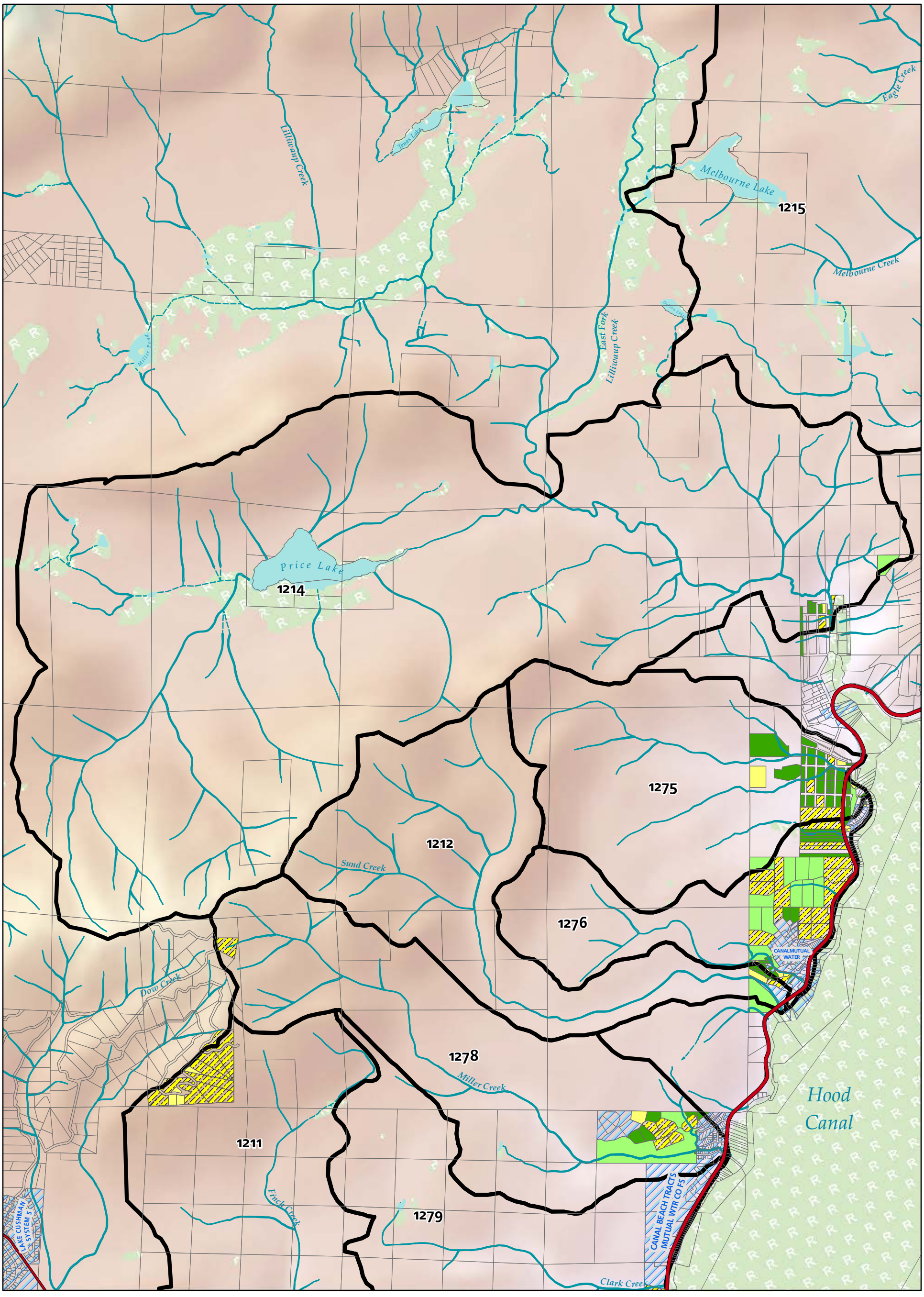
WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1214 -- Lilliwaup

0 0.375 0.75 1.5 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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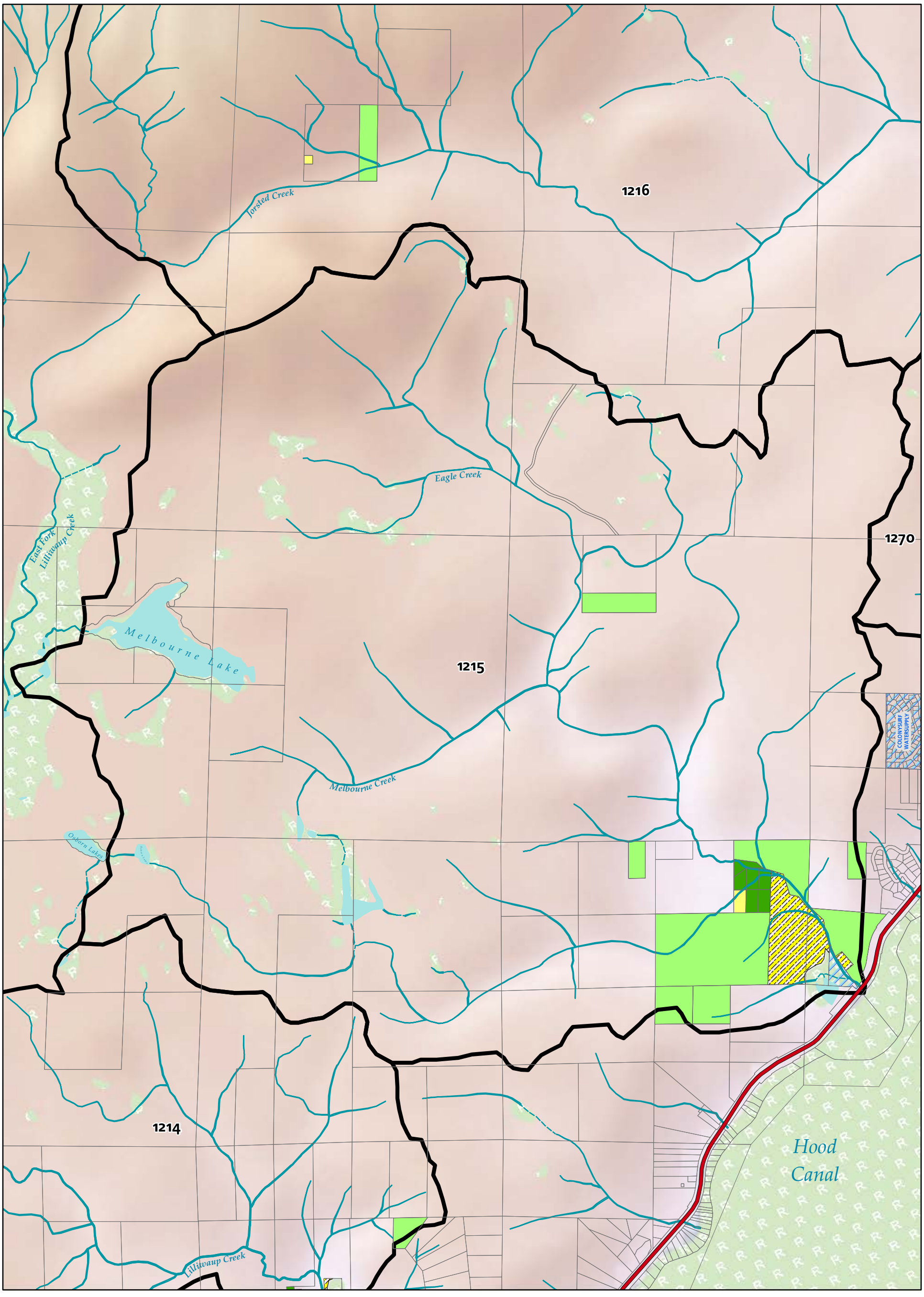
WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1215 -- Eagle Creek

0 0.25 0.5 1 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Area
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable
- Critical Areas

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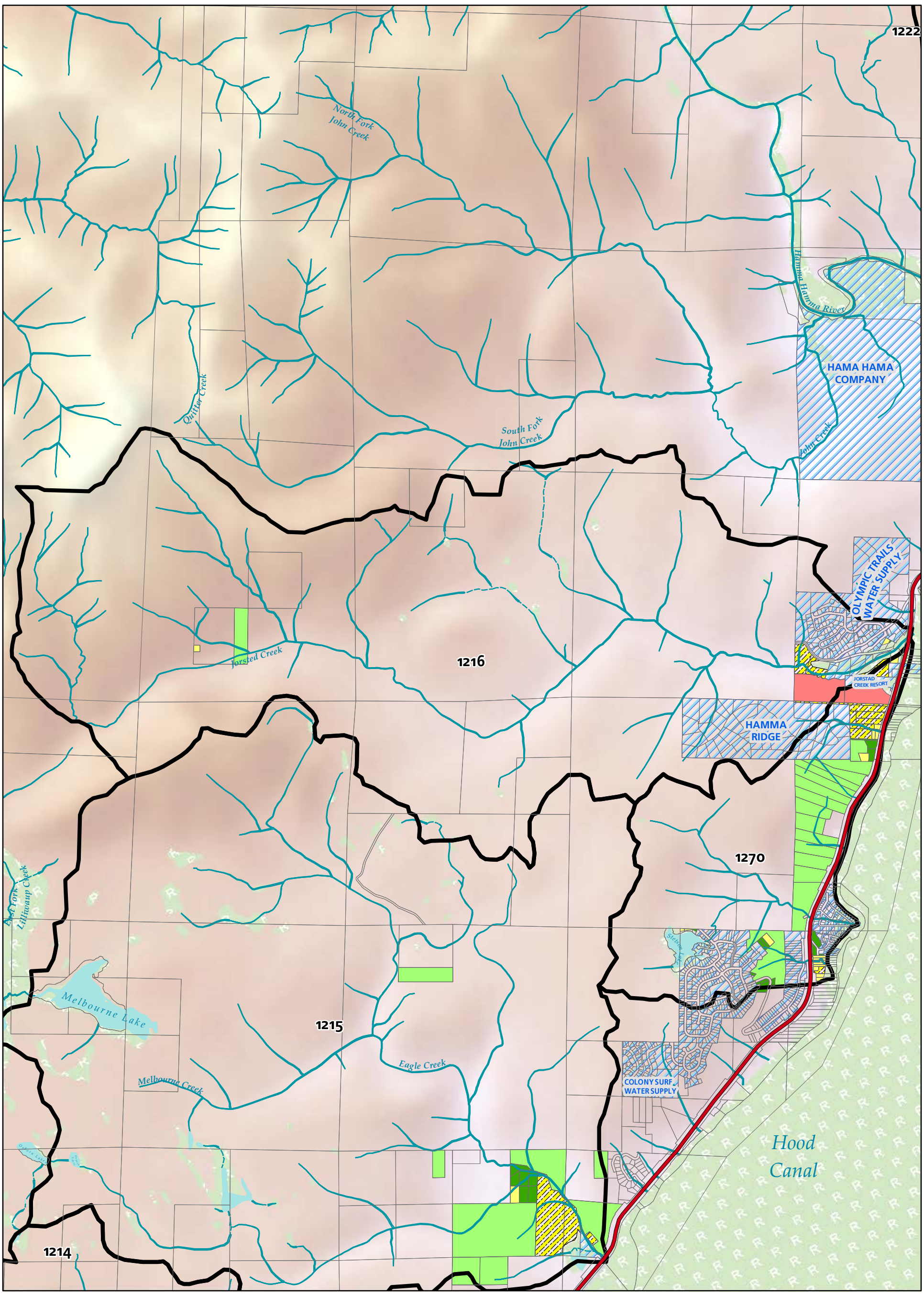
WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1216 -- Jorsted Creek

0 0.35 0.7 1.4 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1222 -- Waketickeh

0 0.3 0.6 1.2 Miles

Draft

Cabin Creek
Watson Creek
Waketickeh Creek
Hamma Hamma River
Hood Canal
Lake Armstrong
1224
1257
1222
1223
1262
CAMP ROBINSWOLD GIRL SCOUT

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1223 -- Sharer Creek (#14)

0 0.15 0.3 0.6 Miles

Draft

1224

1224

1257

1222

1223

TRITON HEADASSN

BEACON POINT COMMUNITY CLUB

CAMP ROBINSWOLD GIRL SCOUT

Hood Canal

1262

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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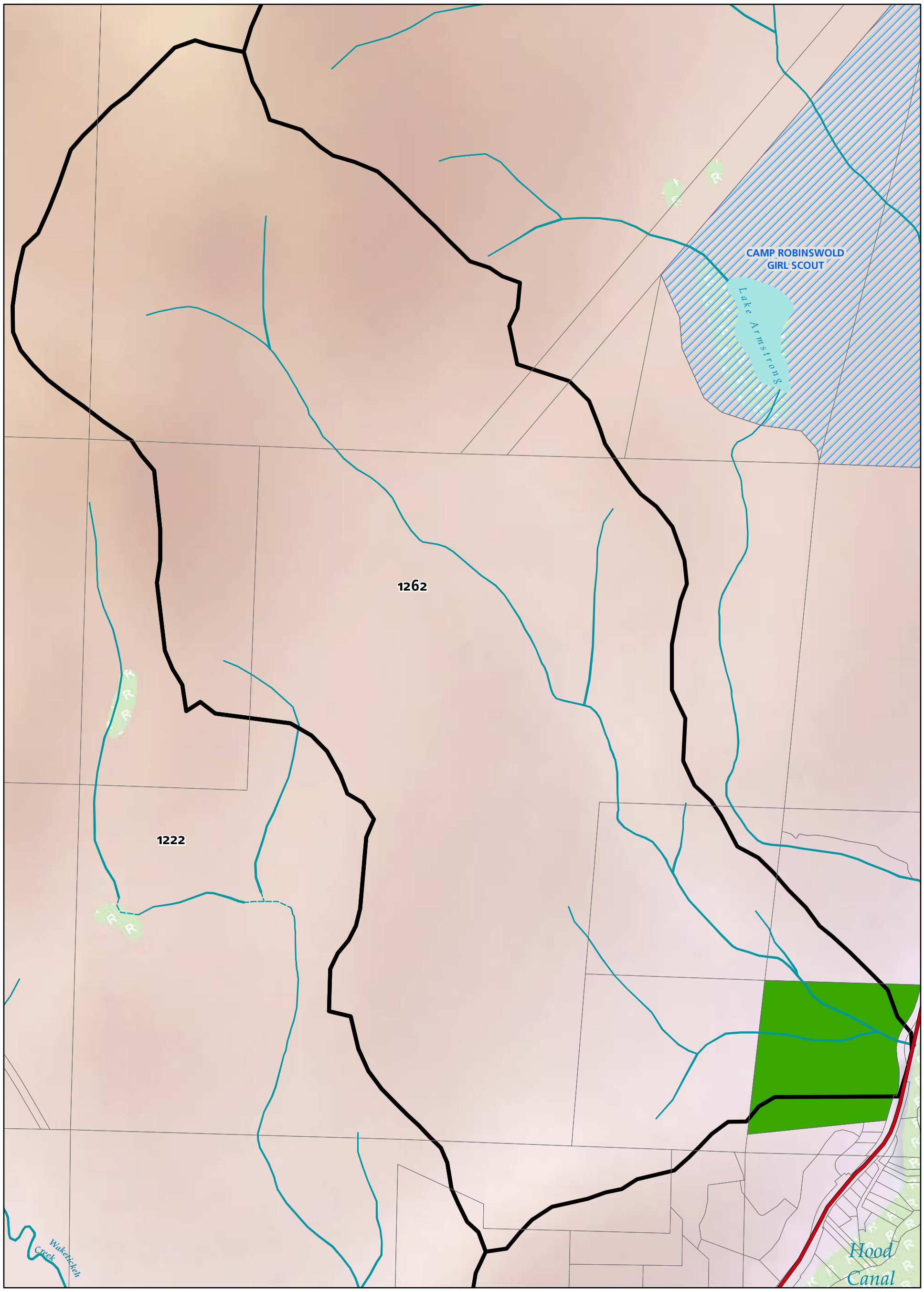
WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1262 -- #17 (Mikes RV Park)

0 0.1 0.2 0.4 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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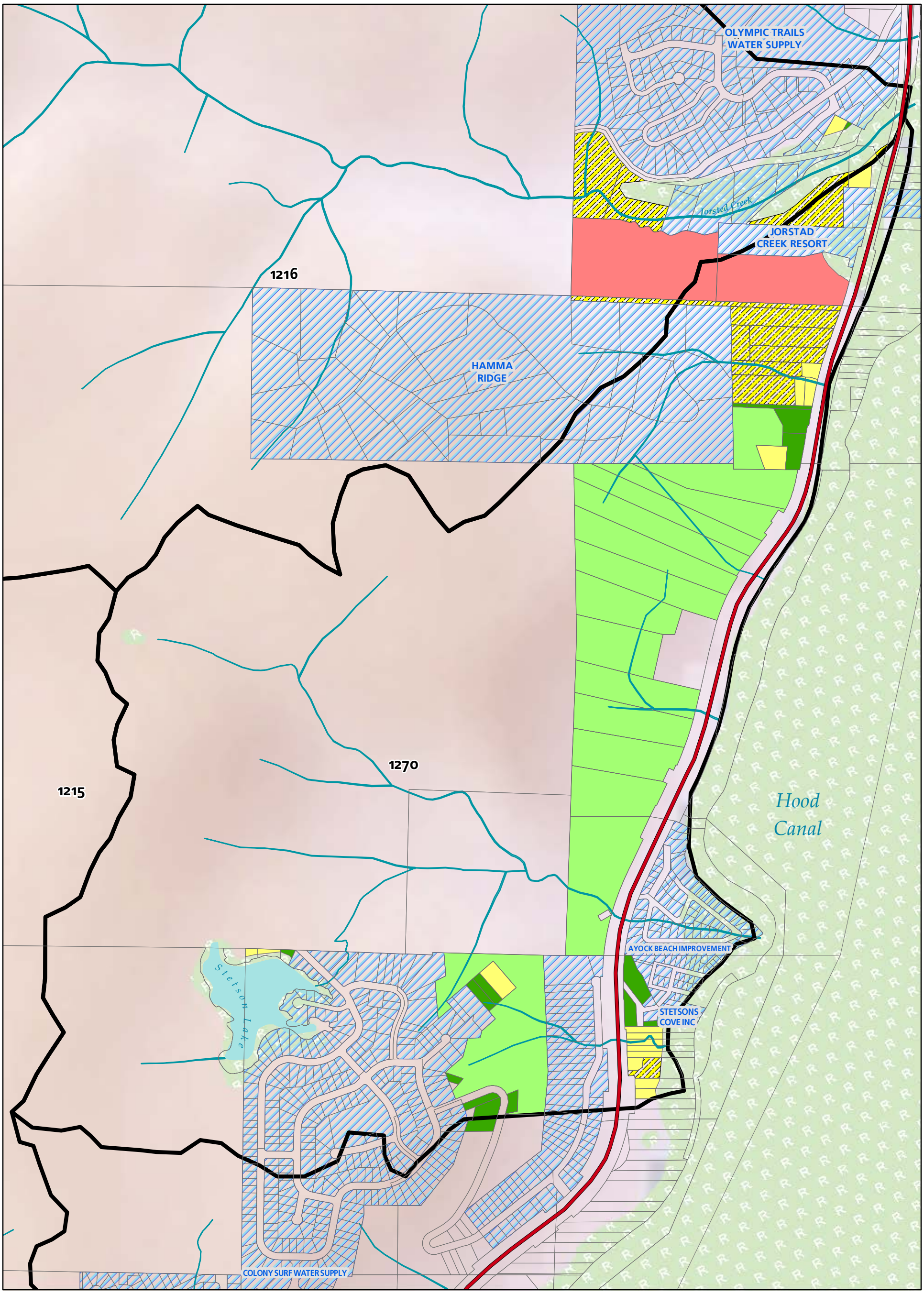
WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1270 -- #23 (Ayock Pt)

0 0.1 0.2 0.4 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_CA.mxd
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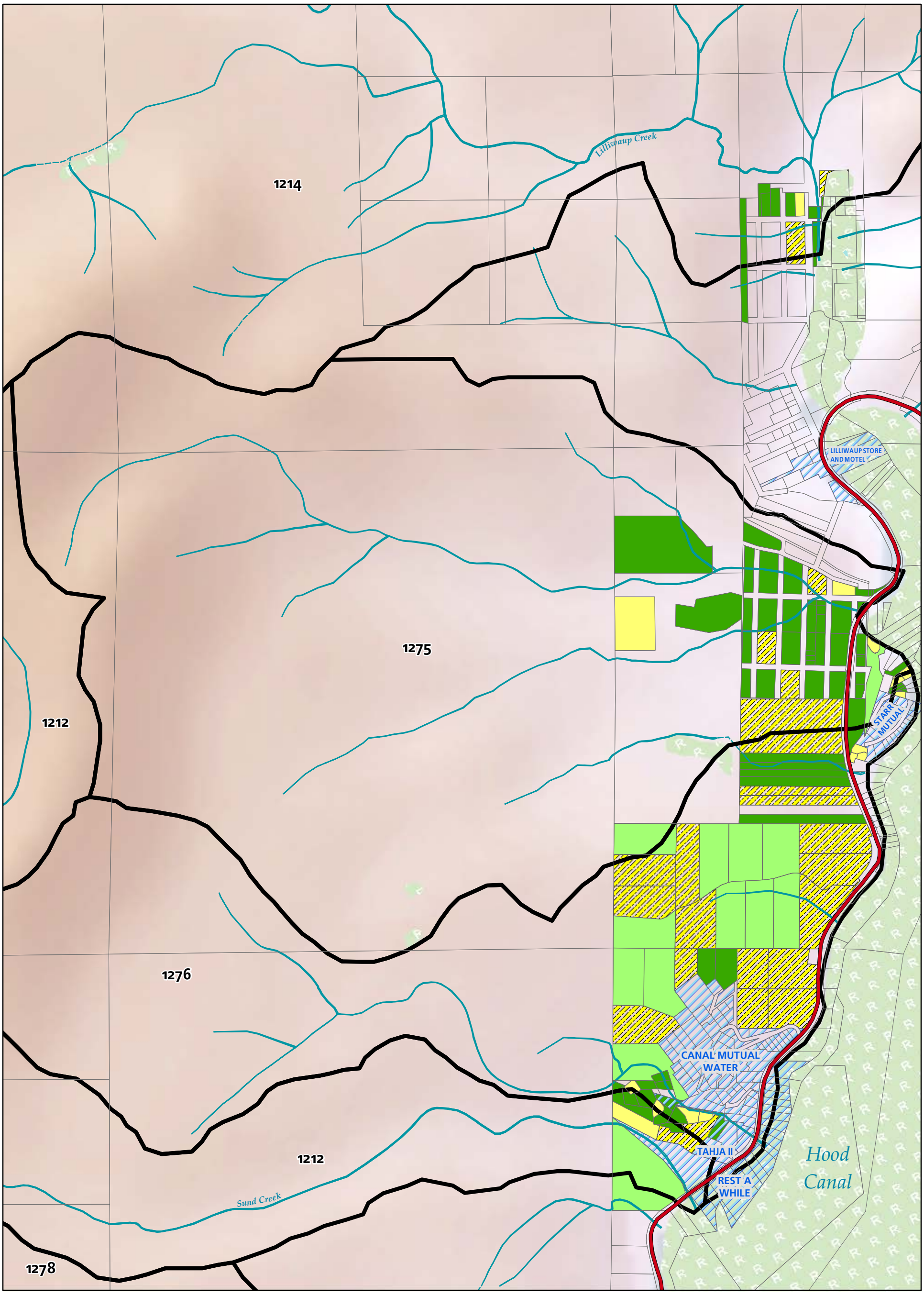
WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1275 -- #23a ((Little Lilliwaup)

0 0.15 0.3 0.6 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_CA.mxd
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WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1276 -- #23b (Unnamed)

0 0.15 0.3 0.6 Miles

Draft

1214
1214
1275
1276
1212
1278
1279
Sund Creek
Miller Creek
Hood Canal
LILLIWAUP STORE AND MOTEL
STARR MUTUAL
CANAL MUTUAL WATER
TAHJA II
REST A WHILE
HOLIDAY VIEW TWO WATER SYSTEM
HOLIDAYBEACH WATERSUPPLY
CANAL BEACH TRACTS MUTUAL WTR CO FS

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_CA.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1278 -- Miller Creek

0 0.225 0.45 0.9 Miles

Draft

1214
1214
1275
1212
Sund Creek
1276
1278
HOLIDAY VIEW TWO WATER SYSTEM
Miller Creek
CANAL BEACH TRACTS MUTUAL WTR CO FS
Finch Creek
Clark Creek
1279
1211
Hood Canal
HOODSPORTFUTURESERVICEAREA

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_CA.mxd
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Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1279 -- Clark Creek

0 0.175 0.35 0.7 Miles

Draft

1275
1276
1212
1278
1279
1211
Sund Creek
Miller Creek
Clark Creek
Finch Creek
HOLIDAY VIEW TWO WATER SYSTEM
CANAL BEACH TRACTS MUTUAL WTR CO FS
HOODSPORT FUTURE SERVICE AREA
HOODSPORT
SUNRISE MOTEL
Hood Canal

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1282 -- Hill Creek

0 0.175 0.35 0.7 Miles

Draft

CUSHMAN INC

MOUNTAIN VIEW FUTURE SERVICE AREA

HOODSPORT FUTURE SERVICE AREA

HOODSPORT FUTURE SERVICE AREA

Finch Creek

1211

HOODSPORT

HOODSPORT FUTURE SERVICE AREA

LAKE CUSHMAN SYSTEM 5

HILL VALLEY

Hill Creek

1282

No Name Creek

POTLATCH BEACH MUTUAL

Hood Canal

1284

CUSHMAN PLANT 2

TEN FOUR WATER SYSTEM

1285

Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

File: C:\GIS\Projects\Buildout2012\Buildout_Results\MapDocs\Buildout_Mason_CA.mxd
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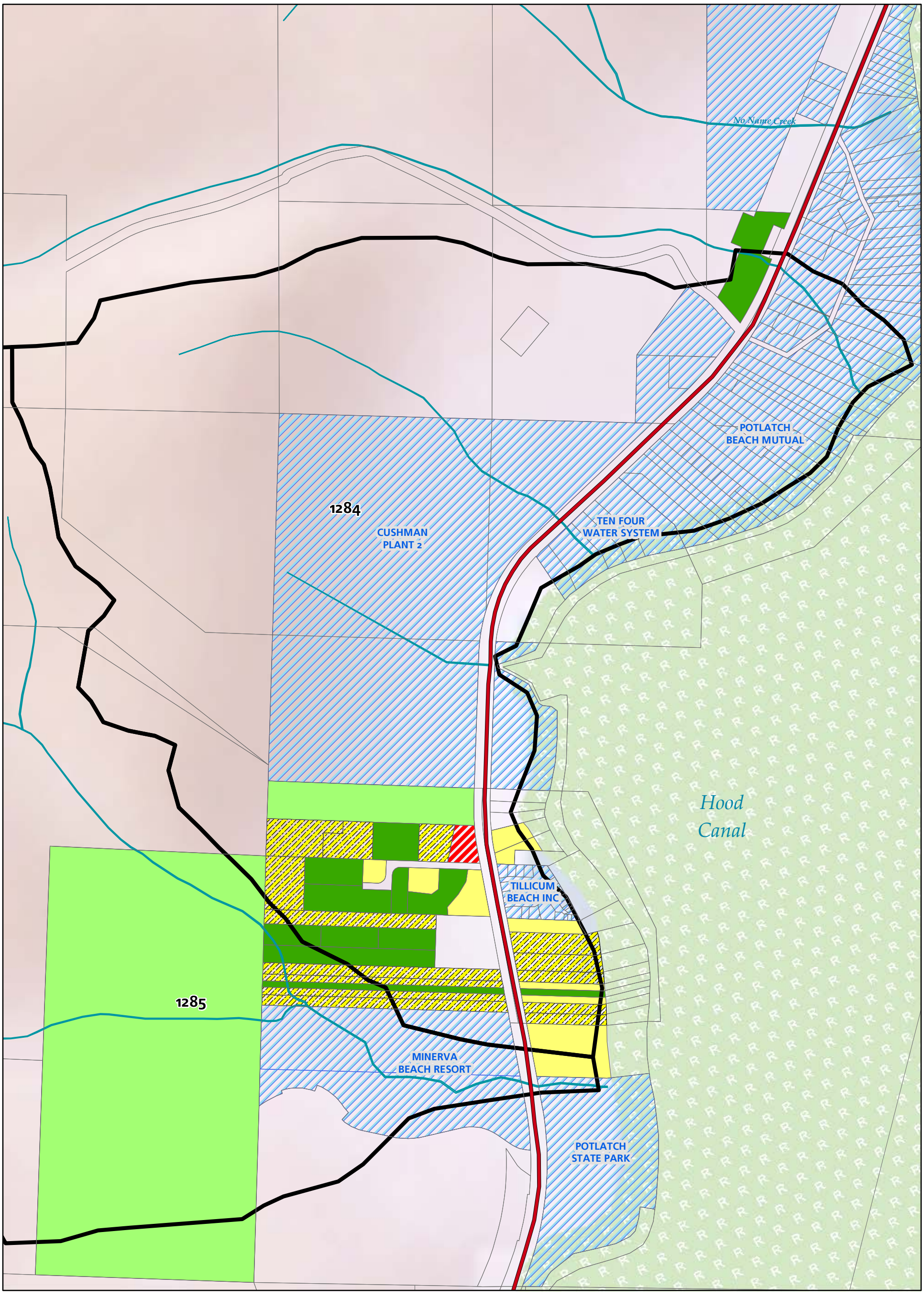
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1284 -- Unnamed

0 0.075 0.15 0.3 Miles

Draft



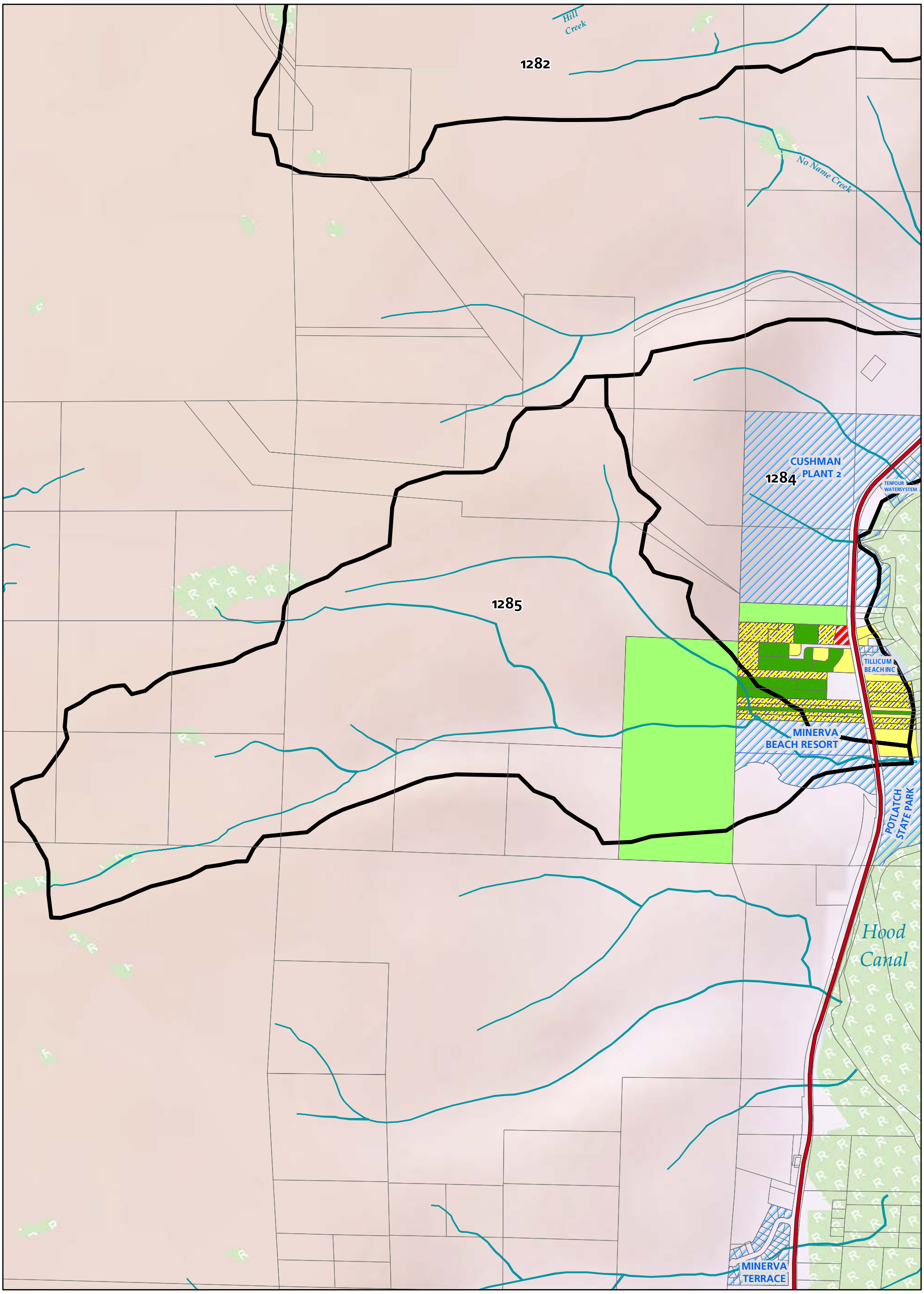
Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

WRIA 16 Buildout Parcels with Critical Areas Removed Mason County Portion

Aquatic Unit 1285 -- Potlatch Creek

0 0.175 0.35 0.7 Miles

Draft



Parcels
Aquatic Unit
Water Service Area
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
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Appendix L

Mason County Sanitary Code (June 2012)

Title 6 SANITARY CODE

Chapter 6.64 GROUP B WATER SYSTEM REGULATIONS

6.64.010 Authority.

Pursuant to the authority of Chapters 43.20, 43.70, 70.05, 70.116, 70.119A and 70.142 RCW, this chapter is established as minimum requirements of the Mason County board of health, governing Group B public water systems in Mason County. (Res. 68-96 (part), 1996: § 1 of Ord. dated 3/3/94).

6.64.020 Purpose.

The purpose of this chapter is to assure protection of public health by:
(1) Minimizing the potential for public exposure to unsafe drinking water;
(2) Establishing location, design, installation and management requirements for public water systems to accommodate safe and reliable drinking water sources. (Res. 68-96 (part), 1996: § 2 of Ord. dated 3/3/94).

6.64.030 Administration.

The Mason County health services director, through the authority delegated by the Mason County board of health and the Mason County health officer shall administer this chapter. Fees may be charged for this administration. (Res. 68-96 (part), 1996: § 3 of Ord. dated 3/3/94).

6.64.040 Definitions.

The definitions of terms in Chapter 246-290 WAC are adopted and incorporated by reference. In addition, the following definitions shall also apply in this chapter:
“Board” means the Mason County board of health.
“Department” means the Mason County department of health services.

“Director” means the Mason County director of health services or an authorized member of the health department staff.
“Group B water system” means water system consisting of two to nine connections and/or serving less than twenty-five people for sixty days or more/year.
“Purveyor” means an agency, subdivision of the state, municipal corporation, firm, company, mutual, or cooperative association, institution, partnership or person or other entity owning or operating a public water system. Purveyor also means the authorized agents of such entities.
“Water system owner” means the owner of the system or the designated manager of the system. (Res. 68-96 (part), 1996: § 4 of Ord. dated 3/3/94).

6.64.050 Applicability.
This chapter shall apply to all Group B water systems except the following:
(a) Existing nonexpanding Group B water systems. However, this chapter shall be applied to the maximum extent feasible for the water system and the appropriate permits shall be required.
(b) Where any of the requirements of this chapter conflict with one another or with any requirements of other state or local drinking water regulations, the more stringent requirement shall apply. (Res. 68-96 (part), 1996: § 5 of Ord. dated 3/3/94).

6.64.060 Minimum standards and adoption by reference.
(a) Chapter 246-290 WAC, Drinking Water Regulations as presently constituted and as hereafter amended, is adopted and incorporated by reference in this chapter as minimal standards governing the location, design, operation and monitoring of Group B public water systems in Mason County. Copies of said document shall be kept on file and made available for public inspection at the department office.
(b) Standards for design and construction shall be established and maintained by the department. Said standards shall be called “Mason County Department of Health Services Design and Construction Standards for Group B Water Systems,” and shall, upon completion, apply to all Group B water systems. Copies of said document shall be kept on file and made available for public inspection at the department office.
(c) Permits shall be required prior to any construction of any Group B water system well. Permits shall be valid for two years from their inspection date. Permit fees shall be charged according to the “Mason County Department of Health Services Fee Schedule.” Copies of said document shall be kept on file and made available for public inspection at the department office. (Res. 68-96 (part), 1996: § 6 of Ord. dated 3/3/94).

6.64.070 Certified water system designers.
(a) Any work associated with the design of a new Group B water system within Mason County shall be performed by a designer certified by the department except when one of the following conditions is met:
(1) The system is designed by a professional engineer licensed in the state of Washington under Chapter 18.43 RCW.
(2) The system is designed by a designer certified by Thurston County health department or Bremerton-Kitsap County health district.
(b) The departmental requirements for designer certification are as follows:
(1) Prior to issuance of certificate to person, the director shall require written examination of the applicant’s knowledge of sanitary principles and rules, regulations, laws and ordinances affecting public health and safety with respect to public water systems.
(2) The initial certificate fee shall be in accordance with the adopted fee schedule. At the end of each calendar year, all certificates shall expire. Certificates may be renewed for a fee established by the adopted fee schedule. A designer’s certificate shall not be transferable.
(c) A designer’s certificate may be suspended by the director for a period not to exceed thirty days for incompetency, negligence, misrepresentation, or for failure by the holder to comply with any other requirement of this chapter, unless the health officer feels a decision on revocation is needed.
(d) A designer’s certificate may be revoked by the director for a period not to exceed one year for serious or repeated violations of any of the requirements of this chapter, using the following procedure:
(1) To revoke a designer’s certificate, the director shall notify the designer in writing, stating the reason for which the designer’s certificate is subject to revocation and schedule a hearing with the health officer.

(2) The director may suspend the designer's certificate pending the hearing with the health officer.
(e) Any designer whose certificate has been revoked will be required to take the written examination again before issuance of a new designer's certificate. (Res. 68-96 (part), 1996: § 7 of Ord. dated 3/3/94).

6.64.080 Monitoring.
(a) The water system owner shall assure that water samples are submitted for testing as outlined in Chapter 246-290 WAC, according to the schedule established by the department.
(b) If the water system owner fails to perform the necessary testing in a timely and satisfactory manner, the department may collect for testing and bill in accordance with the current fee schedule. Failure to pay for the collection and testing of the water will result in the status of noncompliance for the water system and enforcement proceedings as set forth in Section 6.64.090 of this chapter. (Res. 68-96 (part), 1996: § 8 of Ord. dated 3/3/94).

6.64.090 Enforcement.
(a) It is unlawful for a purveyor to provide water from, use or maintain an unapproved Group B water system.
(b) No purveyor shall use, maintain, or expand a Group B water system except in a manner that is appropriate to the design of the system as approved by the department.
(c) Public Nuisance. All violations of this chapter are determined to be unlawful and declared to be detrimental to the public health, safety and welfare, and are public nuisances. All conditions which render any building, structure, premises, land use or portion thereof to be used or maintained in violation of this chapter shall be abated if provisions for their continuance made pursuant to this chapter are not satisfied.
(d) Civil Penalties. In addition to or as an alternative to any other judicial or administrative remedy provided herein, or by law, any water purveyor, person or establishment who violates this chapter or by each act of commission or omission procures, aids or abets such violation, may be assessed a civil penalty not to exceed fifty dollars for each day of continuous violation to be directly assessed by the health officer until such violation is corrected. The per diem penalty shall double for the second separate violation and triple for the third and subsequent separate violations of the same chapter within any five-year period.
(e) Criminal Penalties. In addition to or as an alternative to any other judicial or administrative remedy provided herein, or by law, any water purveyor or person who violates this chapter or by each act of commission or omission procures, aids or abets such violation, shall, upon conviction, be guilty of a misdemeanor. For purposes of this chapter, each section violated shall constitute a separate and distinct offense, and each day's violation shall constitute a separate and distinct offense. Penalty, upon conviction, shall be punishable by a fine of not more than five hundred dollars, or by imprisonment for not more than ninety days, or both such fine and imprisonment. (Res. 68-96 (part), 1996: § 9 of Ord. dated 3/3/94).

6.64.100 Appeals.
Decisions of the director may be appealed to the health officer. Appeals must be made in writing to the director within ten working days of the decision which is being disputed. A hearing date shall be scheduled with the health officer within thirty days. Any variation from this regulation resulting in requirements less stringent than those found in Chapter 246-290 WAC shall have concurrence from the Washington State Department of Health. (Res. 68-96 (part), 1996: § 10 of Ord. dated 3/3/94).

6.64.110 Waiver.
The board may waive this chapter or portions thereof, provided the waiver is consistent with the intent of this chapter, no public health hazard will result from said waiver, and the waiver will not violate the requirements of other state or local drinking water regulations. Any waiver from the requirements of Chapter 246-290 WAC must have prior written concurrence from the Washington State Department of Health. (Res. 68-96 (part), 1996: § 11 of Ord. dated 3/3/94).

Chapter 6.68 WATER ADEQUACY REGULATIONS

6.68.010 Purpose.
(a) The purpose of these rules is to define basic water adequacy in accordance with Section 63, Section 51, and Section 52 of the Growth Management Act new construction and to each lot in a proposed subdivision or a short subdivision prior to approval.
(b) It is the express purpose of this chapter to provide for and promote the health, safety and welfare of the general public, and not create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefitted by the terms of this chapter. (Res. 68-96 (part), 1996: § 1 of Res. dated 1/4/96).

6.68.020 Scope of coverage.
(a) The provisions of this chapter shall apply to all territories contained within the jurisdictional boundaries of the Mason County department of health services. The provisions of these rules and regulations shall apply to all new residences, places of business, or other buildings or places where persons congregate, reside or are employed which requires potable water and to land segregation regulated under Title 16 of this code.
(b) Any building necessitating potable water shall provide proof of potable water as delineated in this code and approved the health services director or designee(s) prior to issuance of the permit. Exemptions to this code are listed as follows:
(1) Buildings identified by the building official which do not require potable water facilities;
(2) Improvements, or additions to buildings which already contain potable water;
(3) Replacement structures that are similar or in-kind; and
(4) Replacement structures for mobile home parks or recreational parks. (Res. 68-96 (part), 1996: § 2 of Res. dated 1/4/96).

6.68.030 Definitions.
The definitions of terms in WAC 246-290, WAC 246-291, RCW 90.03, RCW 90.44, and Title 16 of this code are adopted and incorporated by reference. (Res. 68-96 (part), 1996: § 3 of Res. dated 1/4/96).

6.68.040 Determination of adequacy for building permits.
(a) Group B or Two-Party Public Water Systems.
(1) Prior to issuance of a building permit, the water system manager provides, in writing, verification that the water system is able and willing to provide water to the new connection and that doing so will not exceed limits imposed upon the system by any state and local regulation. Verification in writing will be accomplished by signing a statement on an application form; and
(2) Upon receipt of the application, the Group B public water system file is reviewed for the following:
(A) Quality.
(i) Public water sources must meet all the standards set forth by state regulation and be current on monitoring requirements.
(ii) In areas of water quality concern, water quality may be required to be further evaluated for any or all of the following:
A. Primary contaminates,
B. Secondary contaminates,
C. Volatile organic compounds (VOC), and/or
D. Synthetic organic compounds (SOC).
(B) Quantity. The minimum quantity of available water supply shall be eight hundred gallons per connection per day and a pumping rate of one gallon per minute per connection.
(C) Compliance.

(i) Water systems must be in compliance with state and local design and construction requirements and with on-going requirements set forth by state regulation.
(ii) Source wells must be constructed according to the requirements set forth by WAC 173-160. Proper permitting and notification to state and local departments shall be adhered to.
(iii) A water right permit or certificate of surface water right shall be obtained from the Washington State Department of Ecology where required by RCW 90.03 and 90.44.
(b) Group A Public Water Systems.
(1) Prior to issuance of a building permit, the water system manager provides, in writing, verification that the water system is able and willing to provide water to the new connection and that doing so will not exceed limits imposed upon the system by any state and local regulation. Verification in writing will be accomplished by signing a statement on an application form; and
(2) Upon receipt of the application form, the Washington State Department of Health is consulted and the Washington State Department of Health determines that the water system is adequate.
(c) Individual Sources.
(1) Prior to issuance of the building permit, a copy of the water well report, a satisfactory bacteriological report, and a capacity test is attached to the application; and
(2) Upon receipt of the application, documentation will be reviewed for the following:
(A) Quality.
(i) A satisfactory bacteriological analysis is required.
(ii) In areas of water quality concern, the same requirements apply as described in subsection (a)(2)(A)(ii) of this section.
(B) Quantity. The same requirements apply as described in subsection (a)(2)(B) with the exception that appropriate conservation in conjunction with adequate storage measures may be used to justify a daily volume of less than eight hundred gallons.
(C) Compliance. The same requirements apply as described in subsections (a)(2)(C)(i) and (ii) and assurance that the water source will not interfere with existing water rights;
(3) A surface water source will be determined to be adequate or issuance of a building permit upon receipt of a copy of the certificate of surface water right and evidence of an appropriate disinfection method is attached to the application. (Res. 68-96 (part), 1996: § 4 of Res. dated 1/4/96).

6.68.050 Determination of adequacy for division of land.
(a) Group B or Two-Party Public Water Systems.
(1) New Water System.
(A) The water system is completely installed and meets all state and local regulations; or
(B) Moneys, under the name of Mason County health services, totaling one hundred thirty-five percent of a bid obtained from an appropriate contractor for the entire cost of drilling the well, obtaining approvals, and installing the system, is placed either into an escrow account or a bond to secure completion of the work after the well site location is passed.
(2) Existing Water System. The same requirements apply as described in subsection 6.68.040(a).
(b) Group A Public Water System. The same requirements apply as described in subsection 6.68.040(b).
(c) Individual Water Sources.
(1) Individual water sources will be adequate for land division when the lots meet the sizing criteria in WAC 246-272-20501. The following disclaimer shall be placed on the face of the plat when potable water is not available for each parcel at the time of subdivision approval:
“The lots, parcels or tracts contained within this land segregation have been created without establishing a potable water supply. No building permit necessitating potable water will be issued without first satisfying potable water requirements as required by the Mason County Health Services Director.”

(2) In areas where a water quantity or quality problem may exist, the following may be required:
(A) Well logs of adjacent properties;
(B) One or more well drilled;
(C) Water study by a qualified hydrogeologist. (Res. 68-96 (part), 1996: § 5 of Res. dated 1/4/96).

6.68.060 Waiver of regulations.

Whenever a strict interpretation of this chapter would result in extreme hardship, the director of health services may waive such regulations or portion thereof; provided, that the waiver is consistent with the intent of this chapter and that no public health hazard will result. (Res. 68-96 (part), 1996: § 6 of Res. dated 1/4/96).

6.68.070 Appeals.

Decisions of the director of health services may be appealed to the Mason County board of health. Appeals must be made in writing within twenty working days of the decision which is being disputed. A hearing date shall be scheduled with the board for their next regular meeting. All appeals shall be sent to the board in writing via certified mail with return receipt requested. (Res. 68-96 (part), 1996: § 7 of Res. dated 1/4/96).

Appendix M

Please note: This document discusses regulatory requirements for construction of 2 party systems in Mason County. It has never been formerly adopted. Individual well construction is covered by WAC 173-160. Ecology regulated well construction and Mason County is under contract to inspect the sealing, tagging and decommissioning portion of the WAC.

Draft

MASON COUNTY DEPARTMENT OF HEALTH SERVICES
DESIGN AND CONSTRUCTION STANDARDS FOR
GROUP B WATER SYSTEMS
(9 connections or less)

§§§

§§§

REVISED 4/11/00

TABLE OF CONTENTS

SECTION ONE: PROCEDURAL REQUIREMENTS

1. APPLICABILITY

These design and construction standards apply to Group B Public Water Systems under the jurisdiction of Mason County through a Joint Plan of Operation between Mason county Health Services and Washington Department of Health.

2. REVIEW PROCEDURE

A. Source Site Inspection

The first step for installing a Group B public water system is to complete an application for Well Site Inspection, pay the fee, and stake the proposed well site out on the lot. The application plot plan will need to show the exact location of the well stake and provide measurable distances between proposed well location and property lines.

B. System design

The second step for installing a group B water system is to submit a complete Group B water system workbook. A Group B water system workbook is the vehicle by which all pertinent water system details are presented. A complete workbook contains a satellite management contract (expect residential 2-party water systems) water quality information, water quantity information, hydraulic analysis, water system design and layout, ownership information, and other information necessary for the efficient development, construction, and maintenance of the water system. The workbook must be completed by a certified designer or professional engineer. Fees must be paid at the time the workbook is submitted for review.

C. Notification and Final Inspection

After design approval is given by the health department the system may be installed. When the system is in place the third step for installing a group B water system is for the system installer to contact the health department and make arrangements for final inspections. The water system designer will also need to be contacted for final inspection. The well house will need to remain unlocked for a maximum of 48 hours, allowing the installation to be inspected by the designer and health department staff.

D. Final Approval

The system installation will be verified as complete and within current code when a Certification of Inspection and Installation of Public Water System Projects is completed and submitted to the health department. A revised "as-built" drawing must also be submitted if system was **not** installed according to the design. System changes may not be acceptable to health department; therefore, it is advisable to get approval prior to making changes.

SECTION TWO: DESIGN ELEMENTS

1. Water System Identification

The Water Facilities Inventory (WFI) identifies the water system name, managers/contact person, owner, mailing address, number of connections in service, location of well and other critical items about the water system. This information allows our department to contact the appropriate individual regarding monitoring, complaints, and other routine functions.

2. Source Site Inspection

Whenever possible the sanitary control area (100' radius) must be located inside the property lines of the proposed development. If the sanitary control area is not bound by the development boundaries, then all effected property owners must be contacted and sign the restrictive covenants.

In addition all potential contaminates should be located 100 feet from the proposed well. If this is not possible then the minimum horizontal separation shall be the distances found in table 1.

3. Water Rights

Washington State Department of Ecology requires that a Water Right Permit be issued prior to approving systems that require daily production of 5,000 gallons or more and/or irrigation of more than half an acre. This process takes approximately 24 months to complete and affects those systems with seven (7) or more connections.

An approved water right is required prior to approving a water system for seven (7) or more connection.

4. Satellite Management Contract

A contract with a Washington State Department of Health approved Satellite Management Agency is required for new and expanding water systems. The water system shall be designed to meet the Satellite Management Agency's conditions of service. The conditions of service may be more stringent than state and local design requirements. A signed contract will be required when the workbook is submitted to Mason County for review.

5. Vicinity Sketch

The vicinity sketch must indicate the general location of the water system. This should allow a person unfamiliar with the county to find the water system with ease.

TABLE ONE

Minimum Horizontal Separations for new Group B Public Water Systems

Potential Contaminate [1]	Drilled well (ft)	Spring (ft)
Barns, chicken coops, barns, manure piles, dog kennels, commercial gardens, compost piles	100	200
Roads[2]		
Private[3]	25	100
County	50	200
State or Federal	75	200
Houses or garage[4]	100	200
Septic tanks, drainfield, and other sewage components	100	200
Surface Water[5]		
Fresh water: Wetlands, Ponds, Streams and Lakes	25	100
Marine	100 ~~50~~	? ~~100~~
Chemical Storage	100	200
Landfills	>1000	>1000

[1] A variance request to any of these set backs requires proper justification. Proper justification would include but is not limited to; providing adequate drainage to outside the 100 foot protective radius, having a hydro-geologist review completed well log and comment on susceptibility of well to contamination, road slope away from source and proper adjacent roadside ditching.

[2] Mason County will consider this setback from the road right of way.
[3] Mason County will not consider this set back requirement to apply to driveways
[4] Mason County will allow portions of a house to be within 100 feet from well as long as that portion contains no plumbing fixtures (i.e.: bathroom (s), kitchen, etc.)
[5] Mason County will allow a new or replacement drilled well within the 100 year flood plain provided that the well is sealed into a restrictive layer and that the well casing is installed five feet above the flood plain elevation. The Mason County Planning Department also has regulations which govern the location of wells in relation to saltwater and freshwater shorelines, streams and wetlands. When two set backs are given the most restrictive applies.

6. **Layout Sketch**

The layout sketch must show the following:

- distribution system pipe diameter,
- length and schedule from the pump house to each connection,
- gate valves,
- water meters,
- blow-offs,
- other system components, and
- elevations at each connection and at the source.

Indicate how the piping is to be buried (i.e.: depth, cover etc.).

7. **Source Location Sketch**

The Source Location and sanitary control area must include all affected properties and property owner(s) names. This sketch can be combined with the layout sketch if there is room. The sketch will need to include distances to the following:

- property lines,
- building,
- roads and
- other sources of contamination.

8. **Source Site Inspection**

The Source Site Inspection must be approved and valid. Source site inspections are valid for a two-year period. All conditions must be addressed prior to approving the water system.

9. **Restrictive Covenant, Easement, Notices, and Agreements**

A. Restrictive Covenant

Restrictive covenants limit certain types of land uses within 100 feet of the well and within 200 feet of a spring. Document titles are the Declaration of Covenant and the Restrictive Covenant. These documents must be signed, notarized and recorded prior to approving the water system. All affected property owners must sign covenants.

B. Easements

Easements for the distribution system and access to well must be recorded prior to approving the water system. All affected property owners must sign easement.

C. Notice to Future Property Owners

The Notice to Future Property Owners is a document which provides specific information regarding the water system (i.e.: its name, number of connections it was approved for, jurisdictional agency…. etc.). The document provides information to new property owners and assists in the prevention of loss of this important information through time.

All property owners served by the water system must sign the Notice to Future Property Owners.

C. Agreements

Where a water system agreement is appropriate, the agreement will need to address the following:

- Name of the water system
- Cost of maintenance of the water system and financial responsibilities of each party
- Designation of the water system purveyor (who is responsible for arranging for submission of all water samples and handling emergencies)
- Provisions for continuation of water service in the event the well goes dry or becomes contaminated, and
- Restrictions on furnishing water to additional parties.

Easements of placement of water lines and crossing of property lines and access for maintenance and repair of the water line, pumphouse, and well may be incorporated into the water system agreement. The water system agreement may also incorporate the Notice to Future Property Owners as well as the protective covenants for the 100-foot well radius.

All affected property owners must sign the agreement.

10. **Well Log**

A Well Log must ~~show well depth , static water level, type and depth of surface seal, construction type , casing diameter, screen, pump type , name of driller and material drilled through in accordance with~~ be included and must be in accordance with WAC 173.160. 141.

11. **Source Capacity**

A source capacity test must be completed for in accordance with ~~WAC 173-160-345~~ WAC 173-160-321 except, when appropriation permit is not needed, t~~T~~he test pump shall run ~~for a minimum of a four hour period~~ at a constant pump rate not less than the proposed pumping rate for at least long enough to supply the required daily production of the system with no less than **a** ~~two~~ four hour stabilization. A draw down of more than 0.2 feet over the last ~~two~~ four hours is unacceptable. Recovery data must be logged until the well reaches 90% of the original static water level.

Where there are wells, in fields of wells, within 100 feet of each other a simultaneous draw down will be required.

Additional monitoring of wells with in 600 feet of the well field may be required during the time of the simultaneous pump test in area where water quantity is of concern to the department.

Recovery data for the well field and monitored wells will need to be recorded and attached to the pump tests.

12. **Bacteriological Analysis**

A satisfactory Bacteriological Analysis must be submitted.

13. **Chemical Analysis**

A complete Inorganic Chemical Analysis must be submitted. All primary and secondary contaminates must meet the Maximum Contaminate Levels (MCL's). The following exception will apply:

> Iron and Manganese (secondary contaminates), up to 1 mg/l combined, can be left up to the homeowner to treat. A covenant will need to be recorded with the property to notify the owner of the problems associated with Iron and Manganese (i.e.: color, taste and staining).
>
> Turbidity (primary contaminate) can also be treated at the individual connection provided that the turbidity is caused by either Iron or Manganese. Lab confirmation will be required.

Trihalomethanes, Pesticides, Radionuclides, Volatile Organic Chemicals (VOC's) and Synthetic Organic Chemicals (SOC's) only need to be tested in those areas which have been designated as highly suspect. These areas will be designated on the basis of density, commercial development & landfills. The areas will be subject to change as areas become developed and problems arise.

14. **Storage**

Storage will be required if estimated maximum instantaneous demand in gallons per minute cannot be maintained. The source capacity test will need to demonstrate peak flow if storage is not used.

Tanks will need to be certified under ANSI/NSF Standard 61 or must meet the following requirements established by WDOH in material specifications or solution tests. Tanks must be located above ground and have locking access lids.

Tanks must be equipped with the following:

- floats or another approved device for turning the pump on/off
- sized to allow 6 inches above and below outlet of tank

- a built-in drain

15. **Pressure Tanks**

Pressure tanks can be used for storage, pump protection or both. Pump protection is used to prevent excessive pump cycling with the requirement of no more than 6 cycles per hour. Justification must be provided on the number of tanks (i.e.: equation used to determine size or number of tanks).

Pressure tanks in excess of 120 gallons need to be ASME or equivalent. Tanks less than 120 gallons require an approved ASME pressure relief valve.

The Guidelines for Group B Public Water System Approval Appendices shall be used to determine the number of bladder tanks required for pump protection.

16. **Equipment Specifications**

Equipment specifications will need to be submitted for all pumps, pressure tanks, storage tanks, and any other items used in the water system.

17. **Pump House**

Pump house specifications will need to include, but are not limited to the following:

- dimensions of building,
- lockable door,
- insulation,
- type of sheeting over insulation,
- screened vent and
- a four inch concrete floor
- location of pressure tanks,
- storage tanks (if applicable)
- electrical panel,
- a heating unit,
- floor drain,
- flow meter,
- raw water sampling tap (6" above floor)
- Plumbing in the well house must be scheduled 80 PVC (or better), copper, or galvanized.

18. **Distribution System**

A hydraulic analysis is required for distribution sizing. A minimum of 30 pounds per square inch (psi) is required at each service connection. Pressure reducing valves shall be installed where pressure exceeds 80 (psi). Piping must be scheduled 40 or better.

19. **Water Treatment**

Water treatment other than simple hypo-chlorination must be designed by a professional engineer licensed in the State of Washington. The engineer will need to provide instruction for operation and maintenance of the device.

Mason County will consult with the State Department of Health Drinking Water Section on review treatment devices.

20. **New Technology**

Technologies may be available for use in the development of water systems that is not incorporated into the guidelines offered by the WDOH. New technologies may be used in water system designs provided that the technology or proprietary device has been reviewed and approved in writing by the Technical Services Section of the Drinking Water Division of the Washington State Department of Health.

SECTION THREE: 2-PARTY WATER SYSTEMS

WAC 246-291-030 (3) and (4) of the Drinking Water Regulations provides for waiver by the health officer of all or part of the rules for Group B water systems with two connections. For those public water systems where the waiver has been effected the health officer may approve project reports and construction documents in accordance with ~~engineering~~ criteria approved by the department.

The intent of this policy is to reduce the number of individual wells and improve existing situations for those lots that can support an individual well without any waivers. It is not the intent of this policy to create a proliferation of two party wells in order to circumvent lot size restrictions, or to reduce the number of Group B water systems to fulfill land segregation requirements.

1. Applicability

These policies and procedures shall apply to two party water systems except for the following:

two party water systems that are created during land segregation processes in order to comply with minimum land area requirements under an acre in size. These water systems will be subject to Group B requirements.

Mason County Drinking Water Standards
Revised 6/29/2012

2. Land Requirements

Mason County Department of Health Services may authorize such **private** two-party water system provided that the water system serves two lots in which each lot is at least an acre or larger in size and the water source is a drilled well. The two-party well must provide water for one existing parcel or for two existing parcels of land that are contiguous~~, or the two-party well must provide water for two residences on the same lot that are not occupied by members of the~~

~~same family~~. The location of all existing and planned encumbrances must meet individual well setbacks and on site sewage regulations. A Notice to Title for a two party water system must be recorded on each lot. The water supply must have a satisfactory bacteriology test and a partial inorganic chemical analysis (iron, manganese, nitrate, chloride and conductivity) from a state certified laboratory. Group B standards (section two, part 13) shall apply to the results. The water supply must provide a minimum of 1600 gallons per day. In addition ~~the following items are must be met~~

lots created after January 1, 1995 fulfill the requirements of WAC 246-272; or
each lot could support a well with one connection

~~3. Design Requirements~~

~~Two-party water system meeting the land requirements will be considered private water systems instead of public water systems. 2-party water systems will be exempt from securing a contract with a Satellite Management Agency, installing a generator disconnect switch and a totalizing source meter.~~

~~A. To qualify as a two-party well, proposed or existing, the source site must have been inspected and approved.~~

~~The two- party well may not be expanded to include an additional residence unless the water system is upgraded and approved as a Group B water system.~~

~~B. A zone of protection for the water source shall be established in accordance with WAC 246-272 and WAC 246-291 for these lots created after January 1, 1995.~~

~~C. The mimimum horizontal separation specified in Section 2 of Mason County Department of Health Services Design and Construction Standards for Group B Water Systems shall be adhered to except:~~

- ~~Wells can be placed adjacent to structures in accordance with WAC 173-160~~
- ~~Water systems approved prior to January 1, 1995~~

~~D. A satisfactory bacteriological analysis. The depatment may require additional testing based on known or suspected water quality problems I the area of the proposed water supply.~~

~~E. Positive pressure of at least 30 psi at each residence with a daily production of 1600 gallons not to exceed a total of 5,000 gallon per day wthout a water right.~~

~~F. A one hour stabilization pump test.~~

~~G. A water well report.~~

~~H. Plans for the design and construction of the source and distribution system shall include:~~

- ❑ A pump curve
- ❑ Approved potable water pipe. Class 200 or better pipe is required.
- ❑ Pressure tank capacity, for working storage and pump protection, based on 2.5 times the pump rate.
- ❑ When bladder tanks are used for storage use the bladder tank sizing equation in the Guideline for Group B Public Water System Approval Appendices.

I. Pump house minimum specifications are as follows:

- ❑ Lockable door,
- ❑ Insulation,
- ❑ A concrete floor,
- ❑ A heating unit,
- ❑ A raw sampling tap (6" above floor), and
- ❑ Comply with National Electric Code (NEC)

J. The water source/pumphouse must have a site address.

K. A water agreement must be drawn up and recorded on the deeds of the affected properties. The water agreement must address necessary easements and maintenance of the water system.

L. The plan review fee must be paid when the design is submitted.

M. Notice to Future Property Owners will be recorded on the deeds of properties serviced by the water system.)

SECTION FOUR: MONITORING REQUIREMENTS

1. **Bacteriological Sampling**

Approved Group B water systems must complete a bacteriological sample yearly. If the sample is unsatisfactory then two routine follow up samples must be completed. One from the original location and one from somewhere else in the distribution system (preferably upgradient from the original location).

2. **Nitrate Sampling**

Approved Group B water system must also complete a nitrate sample every three years.

SECTION FIVE: ASSOCIATED FEES

1. Fee schedule

Fees will be charged according to the established fee scheduled.

2. Fee Payment Due

Fees are due at the time permit applications are made and work books submitted for review.

MASON COUNTY Public Health
Always working for a safer & healthier Mason County

PO Box 1666, 415 N 6th Street, Bldg 8, Shelton WA 98584
Shelton: (360) 427-9670 ext 400 ❖ Belfair: (360) 275-4467 ext 400 ❖ Elma: (360) 482-5269 ext 400
FAX (360) 427-7787

Where Should I Site My Well?

Individual or Private Two-Party Well Siting

The setbacks and placement consideration for an individual well are:

- The well site should be located on the highest ground possible, up-slope from potential contamination sources.
- The well site should be protected from a one hundred year flood and from any surface or subsurface drainage that may impair the quality of groundwater.
- The following minimum distances shall be maintained:

5 ft	from building (from farthest overhang such as eave edge)
50 ft	from septic tanks, septic containment vessels, septic holding tanks, septic chamber and d box, building sewers, collection and non-perforated distribution pipe.
100 ft	from sewage system drainfields including proposed and reserve sites provided that the design has been approved for installation by Mason County Health Services, outhouses, manure lagoons, sewage lagoons, industrial lagoons, hazardous waste sites, sea-salt water intrusion areas, livestock barns and livestock feed lots, pipelines used to convey materials with contamination potential, chemical and petroleum storage areas.
1000 ft	from solid waste landfills.

- In addition, the Mason County Planning Department administers several regulations, which govern the location of development activities such as wells in relation to critical areas including saltwater, streams, wetlands and steep slopes. Prior to drilling Mason County Planning needs to be contacted if a Resource Land and Critical Areas Checklist (RLC) has not yet been done for your property. The RLC will identify these critical areas and their setback for you.
- A utility permit may be required by the Mason County Public Works Department or from the Department of Transportation for work done in or near right-of-ways. Road crossings for the installation of water/septic lines are included in this process. For a determination or for requirements involved in this permit process, please contact Mason County Public Works Department at (360) 427-9670 Ext. 450.

Appendix O

GIS Buildout Workflow – Jefferson County

This applies to build-outs with and without critical areas removed. Critical areas require and additional step noted below.

Pre-processed layers:

WRIA 16 and 14 HUC catchments combined– clip sub-catchment (aquatic units from DFW) to WRIA 16 & 14 extent.
Populated zoning density field where densities exist
Critical Areas = FEMA Flood, Erosion, Landslide and seismic layers merged together

Assumptions:

Parcel land use code takes priority over zoning designation for determining land use– what's on the ground vs. what can or should be there.

Process:

Reduce working set of parcels by selecting parcels with PIN > 260 (removes rights-of-ways and other non-taxable areas) and "Tax_Status" = Taxable.
Add field "Acres" and calculate gross acres of parcels – Assessor acreage may differ.

Select Parcels that *have their center in* the WRIA boundary – boundary is not coincident between the two layers
Unselect parcels that are within existing water service areas.

Select zoning not containing CF-80 (commercial forest) Overlay (*Spatial Join)* parcels with zoning (one to many) to combine zoning and density values with parcels (ParZone)
Overlay (*Spatial Join)* ParZone with WRIA to capture catchment names (ParZoneCatch)

CRITICAL AREA OPTION
ParZoneCatch areas underlying critical layers are *erased*

Dissolve ParZoneCatch to remove duplicate parcel IDs from overlays on the following fields (all must match):PIN;Land_Use;LU_Desc;Improved_Land_Value;Unimproved_Land_Value;Name_Type;LastName; Tax_Status;Acres;ZONING;DENSITY;Catchment_Name to create ParZoneCentroid

Add Landuse_Group field to ParZoneCentroid layer and populate field with the following selections from the layer:

Calc Commercial/Industrial from "Tax_Status" = 'Taxable ' AND "Name_Type" = 'COM'
Calc Vacant from "Land_Use" = 9100 OR "Land_Use" = 9800
Calc Residential from "Tax_Status" = 'Taxable ' AND "Name_Type" = 'RES'

Add Min_Lot_Acres field setting all values to 0, then calculate Acres/Density *density is from zoning layer where density values exist*

Add fields Factor and Category and populate Factor based on ESA assumptions from Mason County SMP buildout:

Residential = 1 / .2 * [Min_Lot_Acres]
Residential Fully Built Out = "Landuse_Group" = 'Residential' AND "Factor" > 1
Vacant = [Acres] / 2.5 * [Min_Lot_Acres]
Vacant Non-dividable = "Landuse_Group" = 'Residential' AND "Factor" < 1
Vacant Dividable = 'Residential' AND "Factor" > 1
Commercial/Industrial = [Unimproved_Land_Value] / [Improved_Land_Value] – if factor is null calc value = unimproved value
Commercial Underdeveloped = 'Commercial/Industrial' AND "Factor" > 1
Residential Underdeveloped = "Landuse_Group" = 'Residential' AND "Factor" <= 1
Commercial Fully Built Out = "Landuse_Group" = 'Commercial/Industrial' AND "Factor" < 1

Add field Acres and calculate current acreage of polygons
Select by Location WRIA catchments that intersect build-out polygons and dissolve on catchment name

Run a statistical *Frequency* on Build-out_JC_All to create a table of the number of catchment names by category and summarized by acreage

Add fields Current Gallons/Day and Future Gallons/Day
Calculate Cur_H2O = frequency * 350
Calculate Fut_H2O = Cur_H2O
Select "Category" LIKE '% Fully Built Out' OR "Category" = 'Vacant Non-Dividable'
Calculate Fut_H20 = 0

Appendix P Full Potential Build-out Frequency Table – Jefferson County

FREQUENCY	AU	Category	Acres
2	1224	Commercial Underdeveloped	115.14506621900
10	1224	Residential Fully Built Out	63.22258911090
5	1224	Residential Underdeveloped	1.48245367086
1	1224	Vacant Non-Dividable	195.26682262400
5	1225	Commercial Underdeveloped	818.84300301600
5	1225	Residential Fully Built Out	81.20304857620
6	1225	Residential Underdeveloped	5.08356491821
2	1225	Vacant Dividable	29.59421439210
1	1246	Commercial Underdeveloped	0.43537244509
26	1246	Residential Fully Built Out	59.49548813590
59	1246	Residential Underdeveloped	28.62057995440
2	1246	Vacant Non-Dividable	1.54174166639
11	1248	Residential Fully Built Out	111.87861056700
4	1248	Residential Underdeveloped	9.81558152964
2	1250	Commercial Underdeveloped	162.02856377500
77	1250	Residential Fully Built Out	334.96997386000
50	1250	Residential Underdeveloped	20.31489580910
2	1250	Vacant Dividable	13.21613857940
6	1251	Commercial Fully Built Out	91.68982816850
1	1251	Commercial Underdeveloped	39.44552202620
62	1251	Residential Fully Built Out	301.99773636100
52	1251	Residential Underdeveloped	21.90159623870
3	1251	Vacant Dividable	15.72475230580
5	1251	Vacant Non-Dividable	5.42439525851
4	1253	Commercial Underdeveloped	431.74223012200
35	1253	Residential Fully Built Out	265.80920602000
56	1253	Residential Underdeveloped	14.97272140460
1	1253	Vacant Non-Dividable	0.14349548785
6	1257	Residential Fully Built Out	35.21546785420
3	1257	Residential Underdeveloped	78.53525316980

Appendix Q Critical Areas Removed Frequency Table – Jefferson County

FREQUENCY	AU	Category	Acres
2	1224	Commercial Underdeveloped	52.20316808160
8	1224	Residential Fully Built Out	23.47623343730
4	1224	Residential Underdeveloped	0.35190601133
1	1224	Vacant Non-Dividable	4.29429249762
5	1225	Commercial Underdeveloped	323.86942024900
3	1225	Residential Fully Built Out	7.76628460492
6	1225	Residential Underdeveloped	2.17190594624
1	1225	Vacant Dividable	9.01679044233
9	1246	Residential Fully Built Out	3.26878113667
12	1246	Residential Underdeveloped	2.52035442244
9	1248	Residential Fully Built Out	44.76799889880
1	1248	Residential Underdeveloped	0.08764747898
1	1250	Commercial Underdeveloped	1.06919913384
45	1250	Residential Fully Built Out	50.32624305290
15	1250	Residential Underdeveloped	1.64628639535
1	1250	Vacant Dividable	0.00548700000
5	1251	Commercial Fully Built Out	61.28919173430
1	1251	Commercial Underdeveloped	7.23606748400
47	1251	Residential Fully Built Out	119.90670589300
27	1251	Residential Underdeveloped	8.88445304537
2	1251	Vacant Dividable	1.71842215702
3	1251	Vacant Non-Dividable	2.21834945498
3	1253	Commercial Underdeveloped	31.14514016710
22	1253	Residential Fully Built Out	62.47289366500
15	1253	Residential Underdeveloped	1.32534894207
1	1257	Residential Fully Built Out	3.90073601982
1	1257	Residential Underdeveloped	14.21405564650

Appendix R

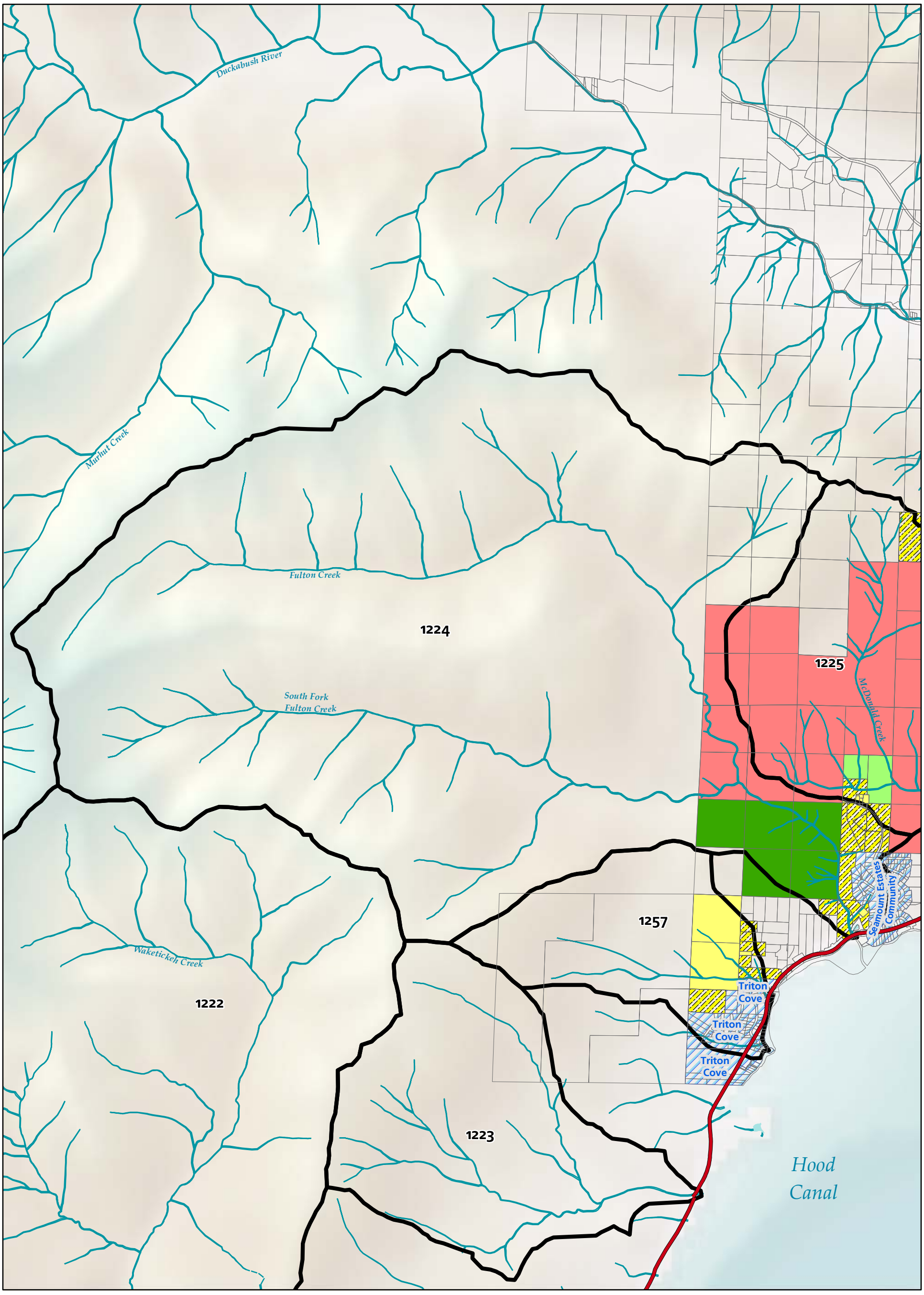
Maps of 8 Stream Sub-basins with Full Potential Build-out in Jefferson County

WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1224 -- Fulton Creek

0 0.4 0.8 1.6 Miles

Draft



Parcels
Aquatic Unit
Water Service Areas
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

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Prepared By: Doug Nottemier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1225 -- McDonald Creek

0 0.125 0.25 0.5 Miles

Draft

1225

1224

South Fork Fulton Creek

Fulton Creek

McDonald Creek

Hood Canal

Seamount Estates Community

Parcels
Aquatic Unit
Water Service Areas
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012_Multipart\Buildout_Results\MapDocs\Buildout_Jefferson_All.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
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WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1246 -- Turner Creek

0 0.15 0.3 0.6 Miles

Draft

Jackson Creek

Marple Creek

1246

Turner Creek

Dabob Bay

1248

Parcels
Aquatic Unit
Water Service Areas
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

File: C:\GIS\Projects\Buildout2012_Multipart\Buildout_Results\MapDocs\Buildout_Jefferson_All.mxd
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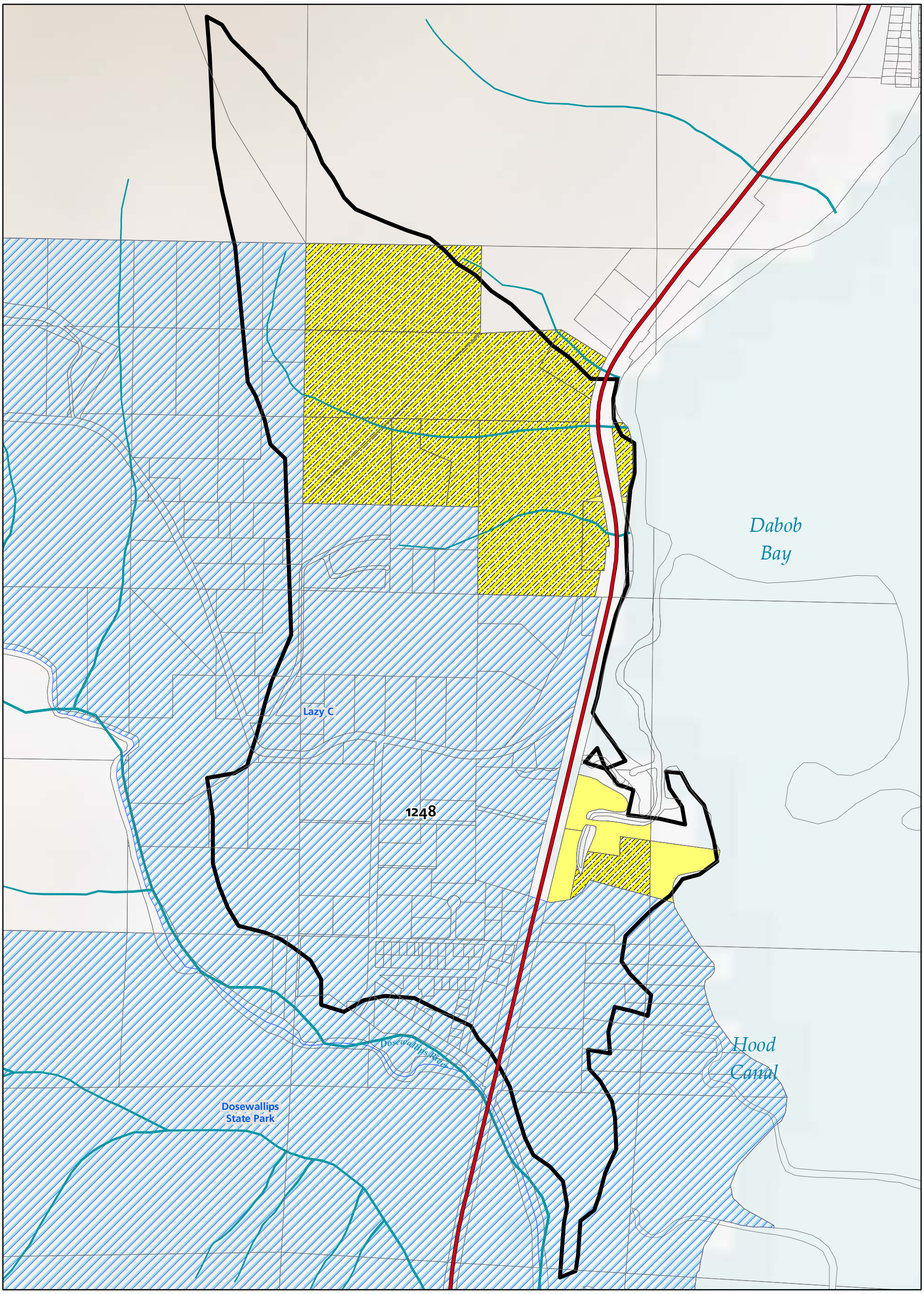
WRIA 16 Buildout Parcels w/o Critical Areas Removed Jefferson County Portion

Aquatic Unit 1248 -- Wolcott Creek

0 0.1 0.2 0.4 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Areas
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable

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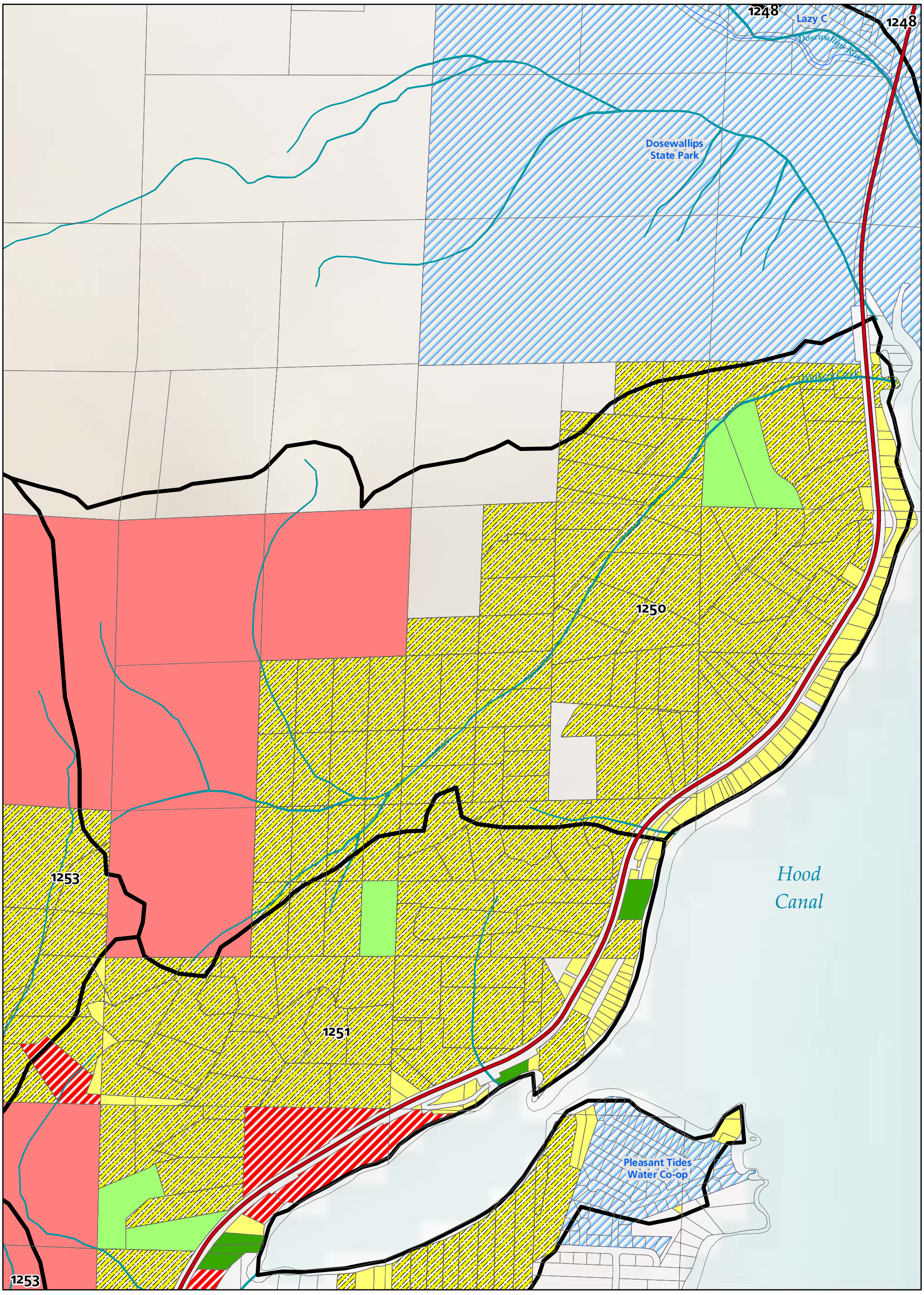
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1250 -- Walker Creek

0 0.125 0.25 0.5 Miles

Draft



Parcels
Aquatic Unit
Water Service Areas
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

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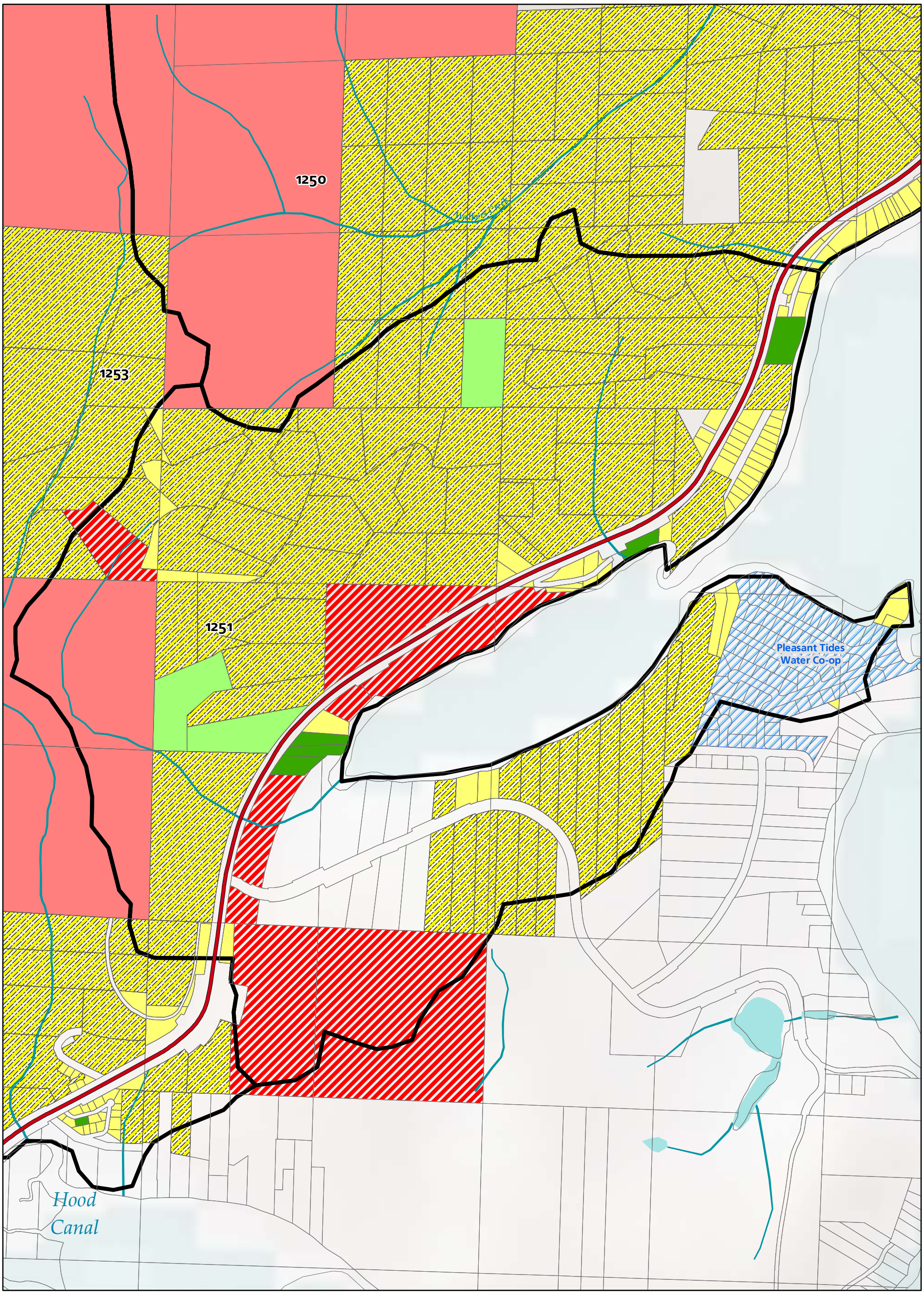
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1251 -- Unnamed

0 0.1 0.2 0.4 Miles

Draft



Parcels
Aquatic Unit
Water Service Areas
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

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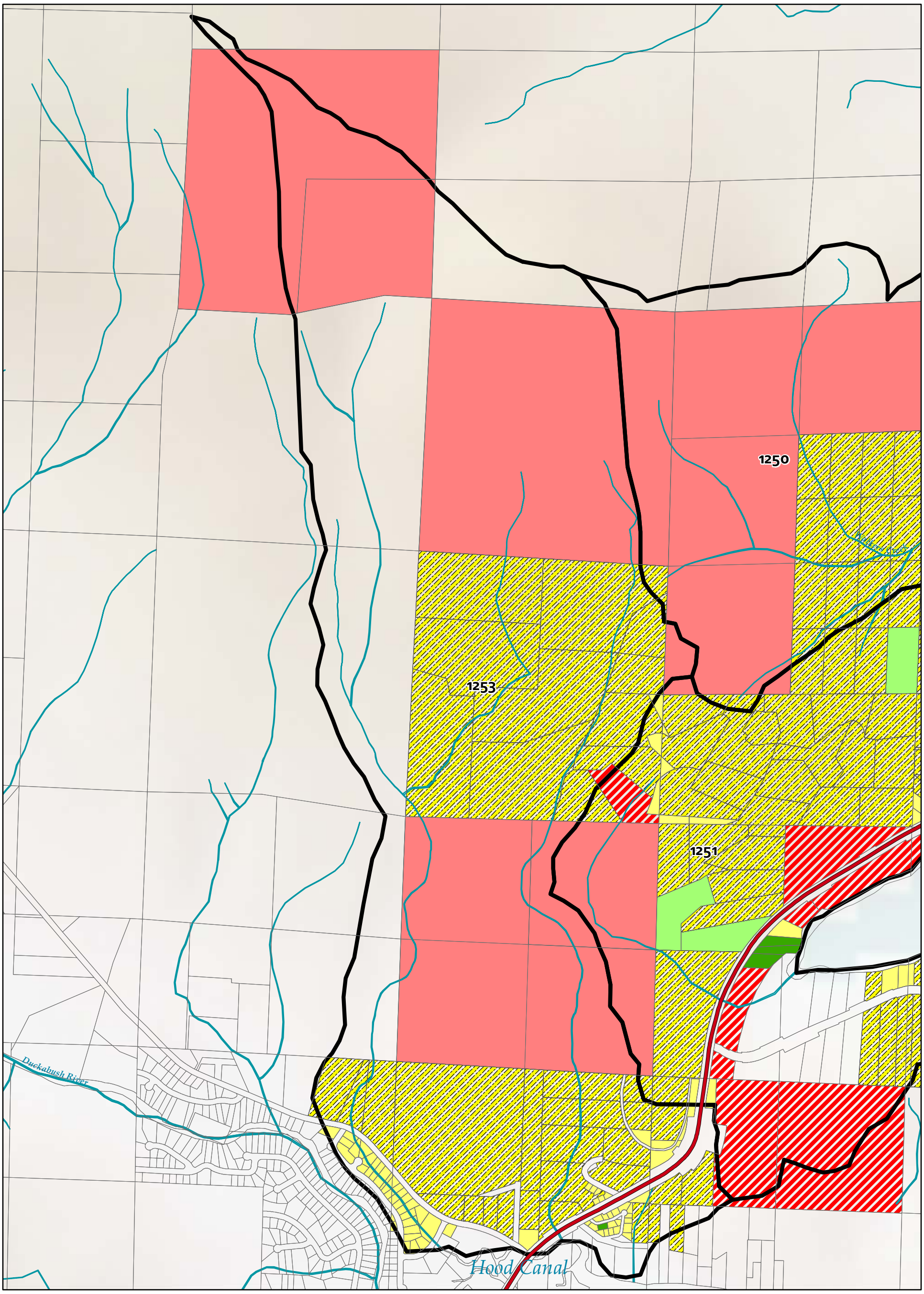
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1253 -- Pierce Creek

0 0.15 0.3 0.6 Miles

Draft



Parcels
Aquatic Unit
Water Service Areas
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable

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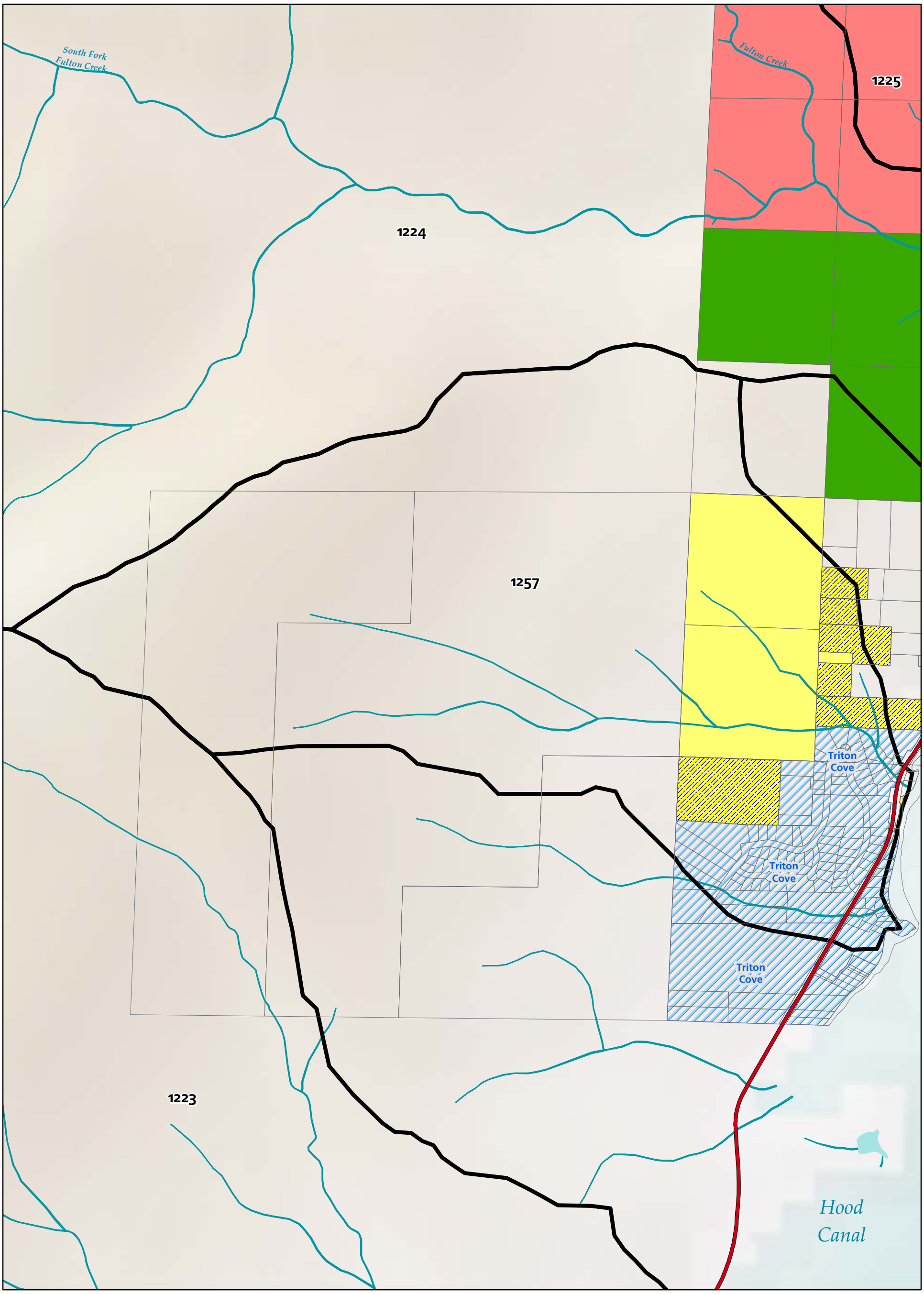
WRIA 16 Buildout Parcels
w/o Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1257 -- #12 (Triton Beach)

0 0.125 0.25 0.5 Miles

Draft



- Parcels
- Aquatic Unit
- Water Service Areas
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable

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Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

Appendix S

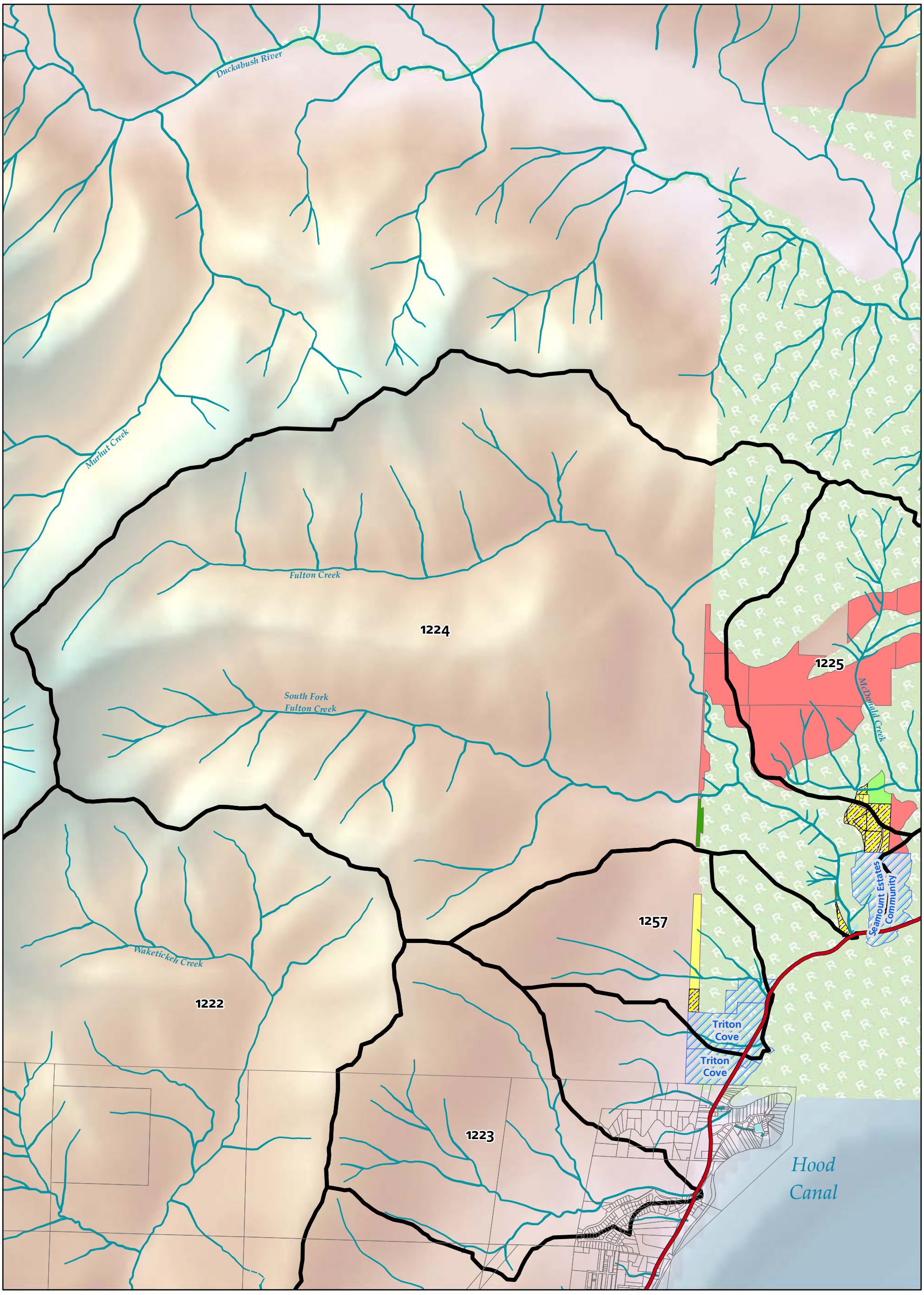
Maps of Stream Sub-basins with Critical Areas Removed in Jefferson County

WRIA 16 Buildout Parcels with Critical Areas Removed Jefferson County Portion

Aquatic Unit 1224 -- Fulton Creek

0 0.35 0.25 0.7 0.5 1 Miles 1.4 Miles

Draft



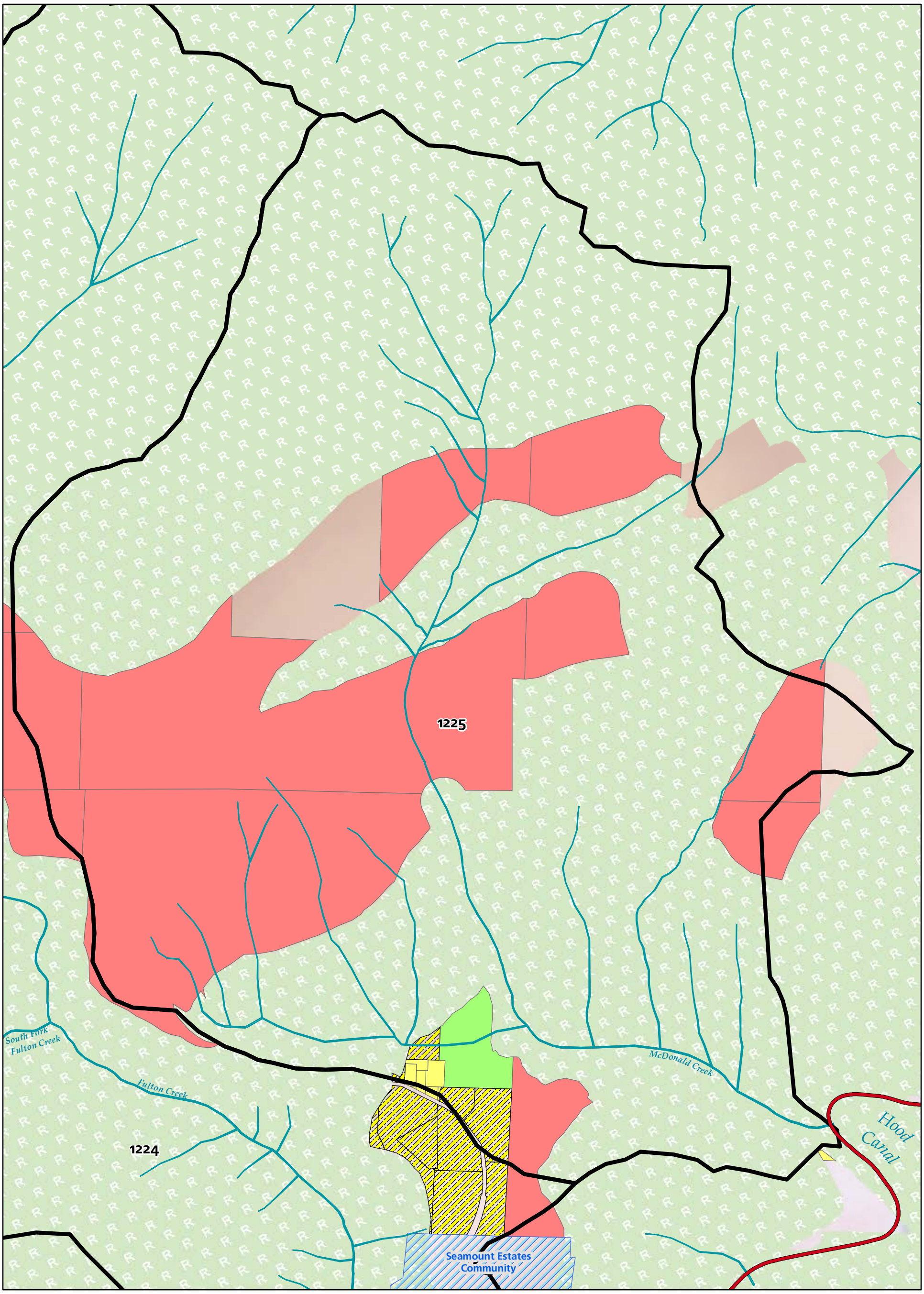
- Parcels
- Aquatic Unit
- WSA
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable
- Critical Areas

WRIA 16 Buildout Parcels with Critical Areas Removed
Jefferson County Portion

Aquatic Unit
1225 -- McDonald Creek

0 0.1 0.2 0.4 Miles

Draft



Parcels
Aquatic Unit
WSA
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Jefferson County Portion

Aquatic Unit 1246 -- Turner Creek

0 0.125 0.25 0.5 Miles

Draft

Jackson Creek

Marple Creek

1246

Turner Creek

Dabob Bay

1248

Parcels
Aquatic Unit
WSA
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

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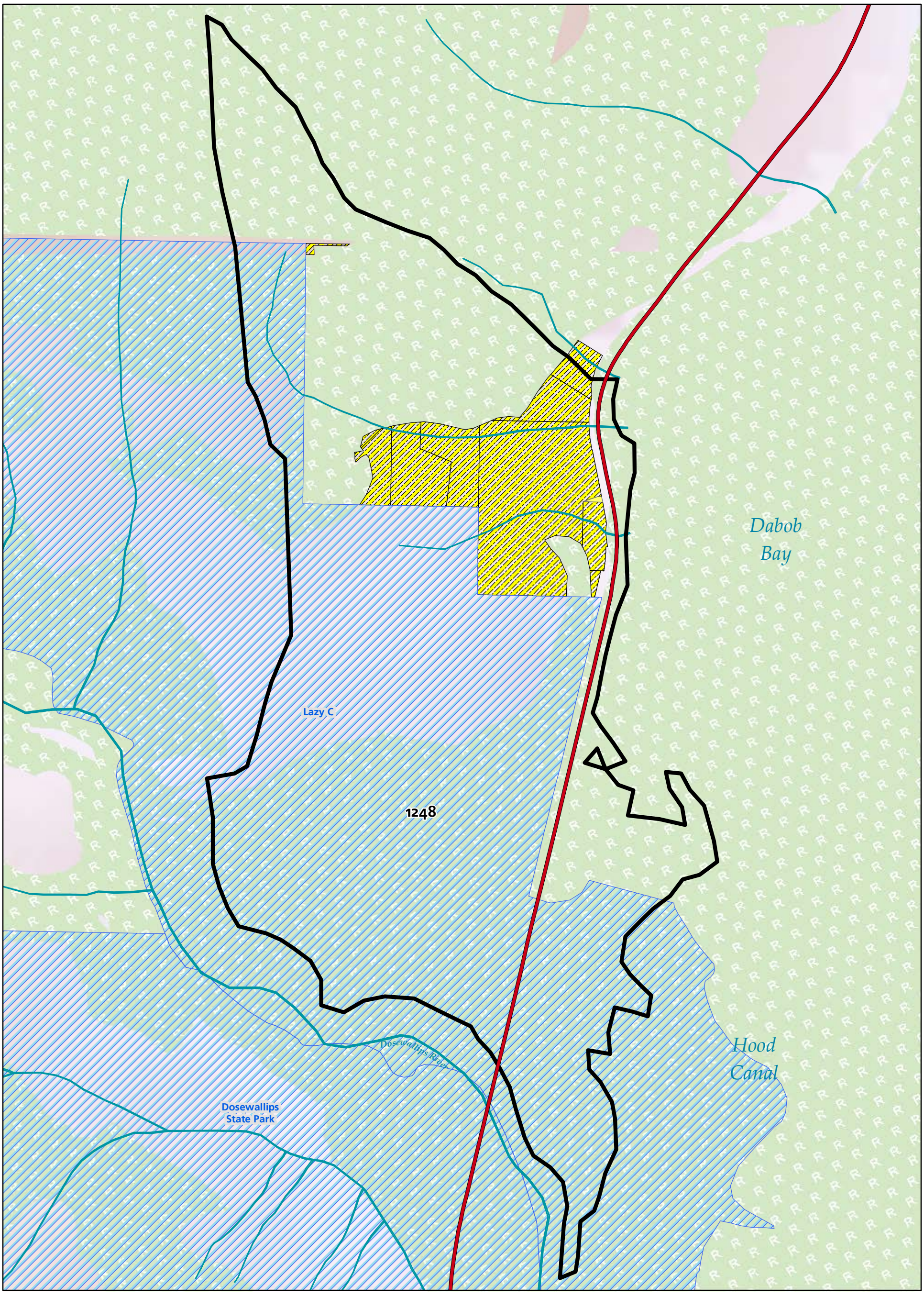
Prepared By: Doug Noltemeier, CISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Jefferson County Portion

Aquatic Unit 1248 -- Wolcott Creek

0 0.1 0.2 0.4 Miles

Draft



Parcels
Aquatic Unit
WSA
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

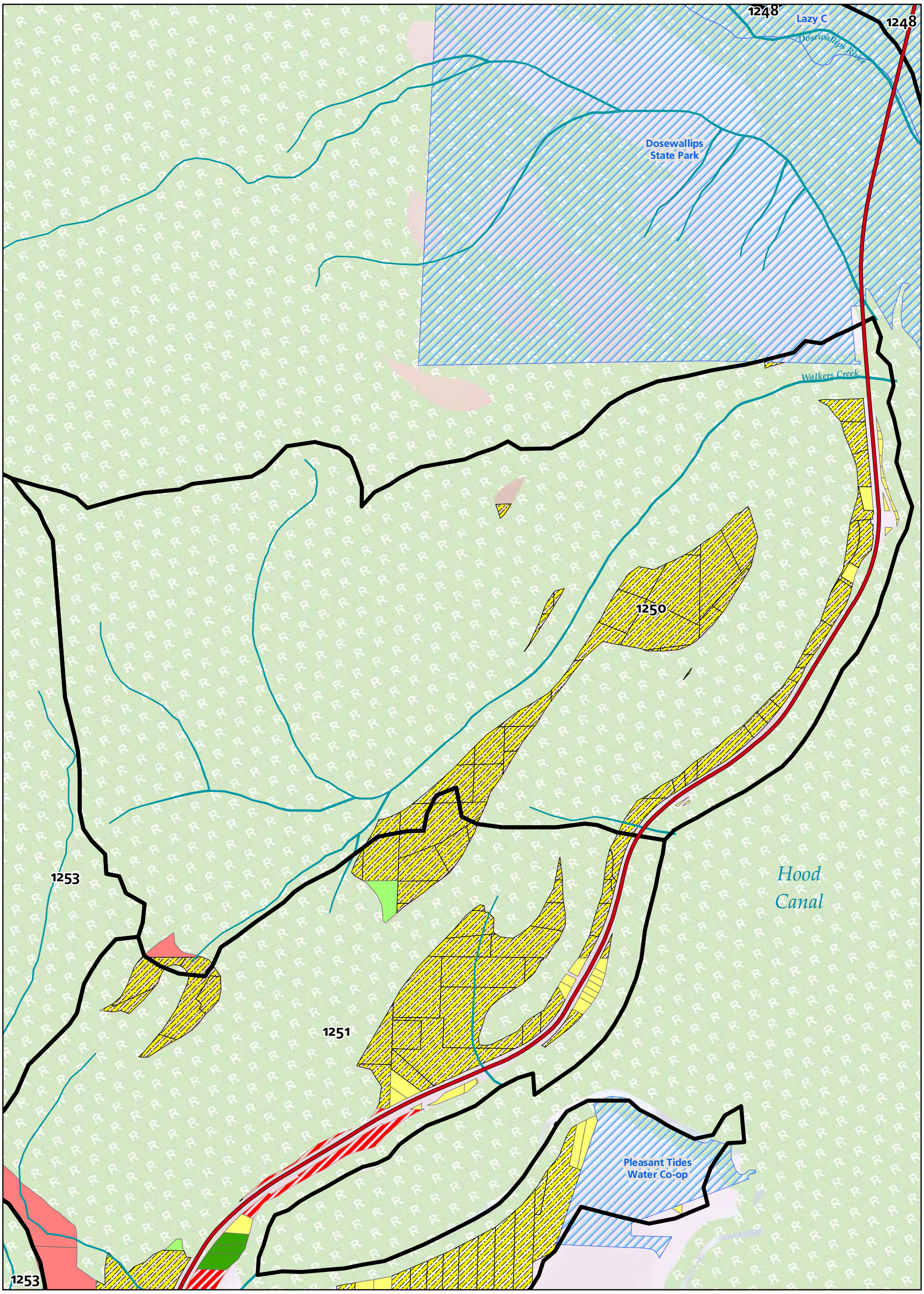
File: C:\GIS\Projects\Buildout2012_Multipart\Buildout_Results\MapDocs\Buildout_Jefferson_CA.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Jefferson County Portion

Aquatic Unit 1250 -- Walker Creek

0 0.125 0.25 0.5 Miles

Draft



Parcels
Aquatic Unit
WSA
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

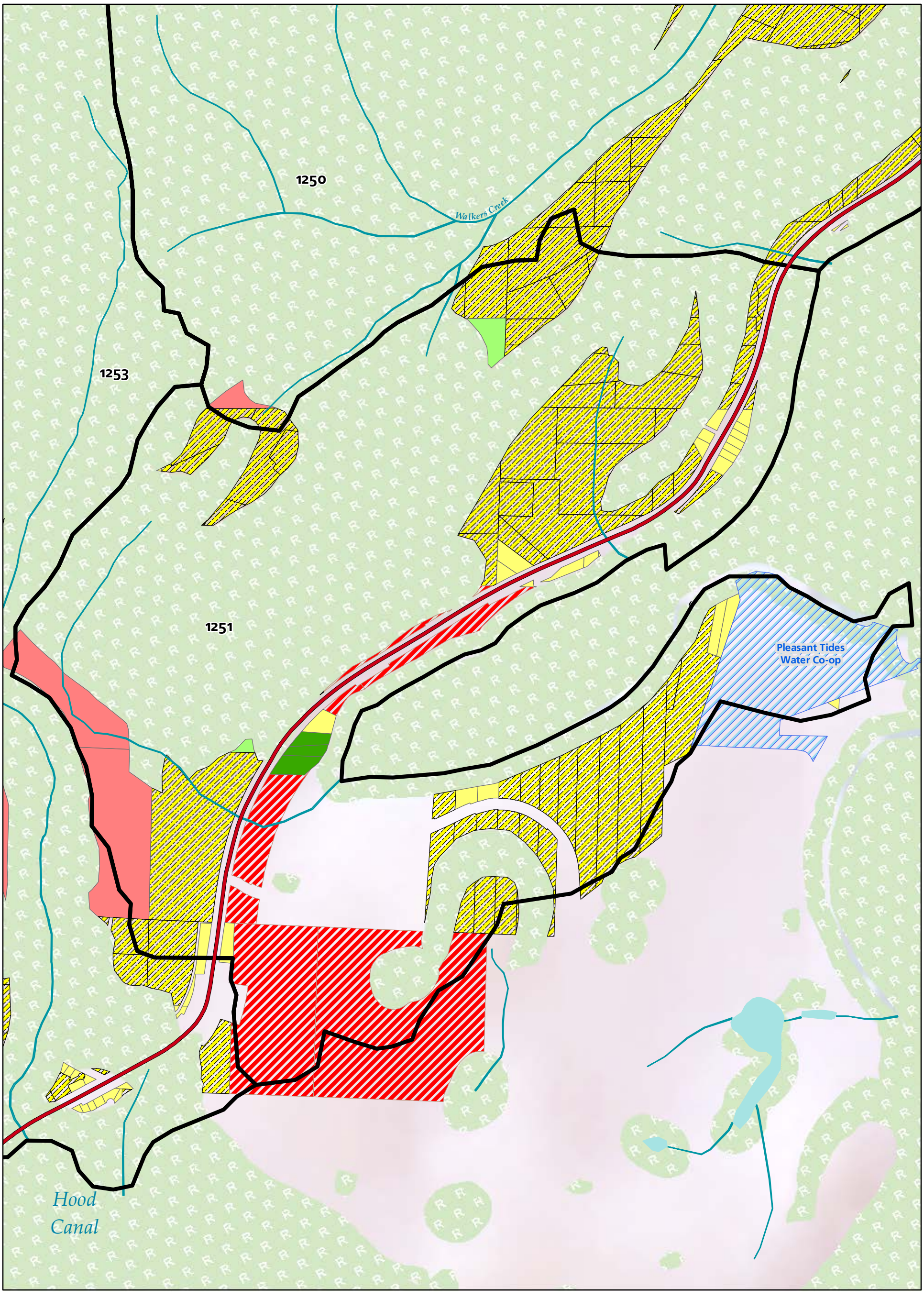
File: C:\GIS\Projects\Buildout2012_Multipart\Buildout_Results\MapDocs\Buildout_Jefferson_CA.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Jefferson County Portion

Aquatic Unit 1251 -- Unnamed

0 0.1 0.2 0.4 Miles

Draft



Parcels
Aquatic Unit
WSA
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

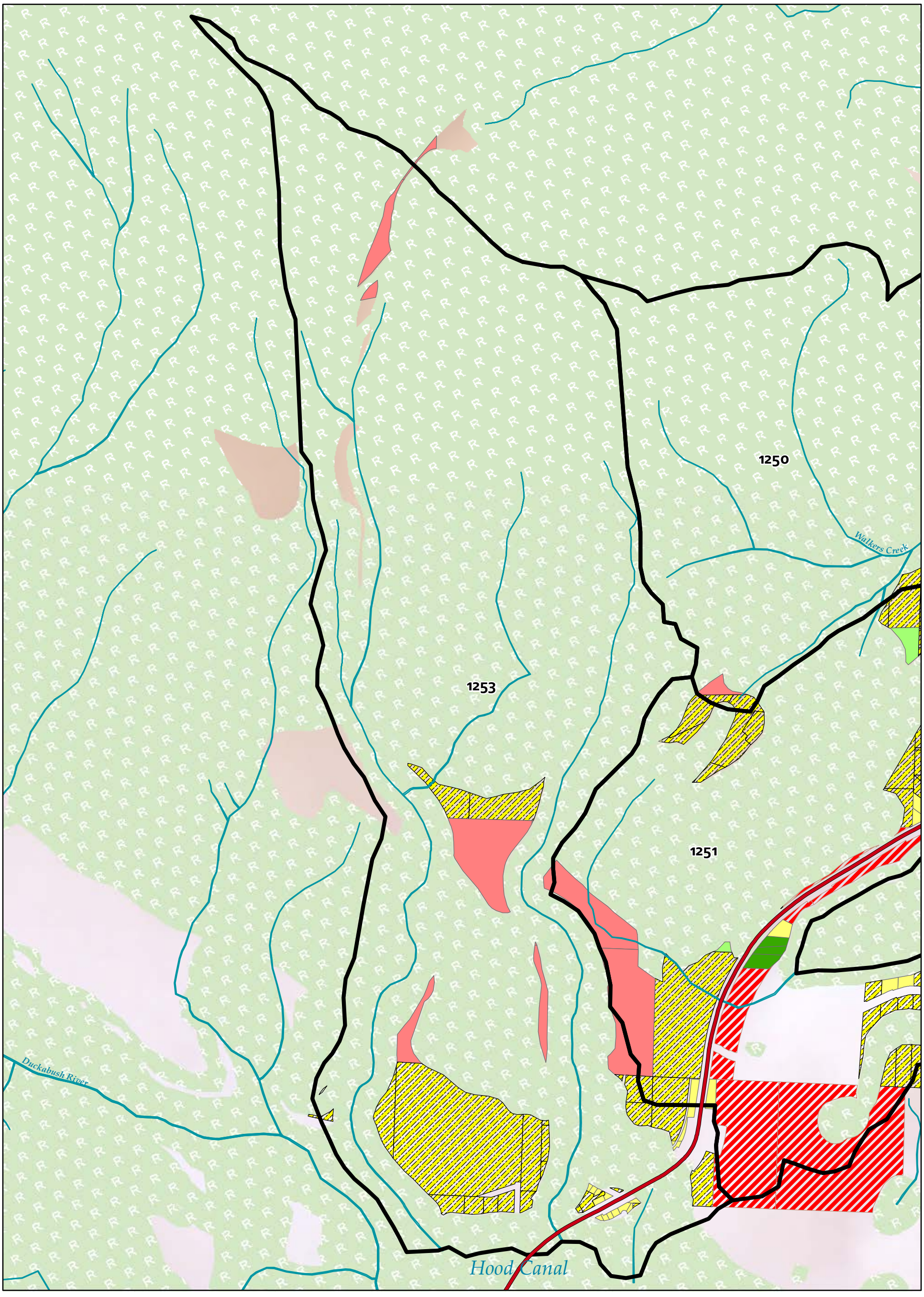
File: C:\GIS\Projects\Buildout2012_Multipart\Buildout_Results\MapDocs\Buildout_Jefferson_CA.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Jefferson County Portion

Aquatic Unit 1253 -- Pierce Creek

0 0.125 0.25 0.5 Miles

Draft



Parcels
Aquatic Unit
WSA
Commercial Fully Built Out
Commercial Underdeveloped
Residential Fully Built Out
Residential Underdeveloped
Vacant Non-Dividable
Vacant Dividable
Critical Areas

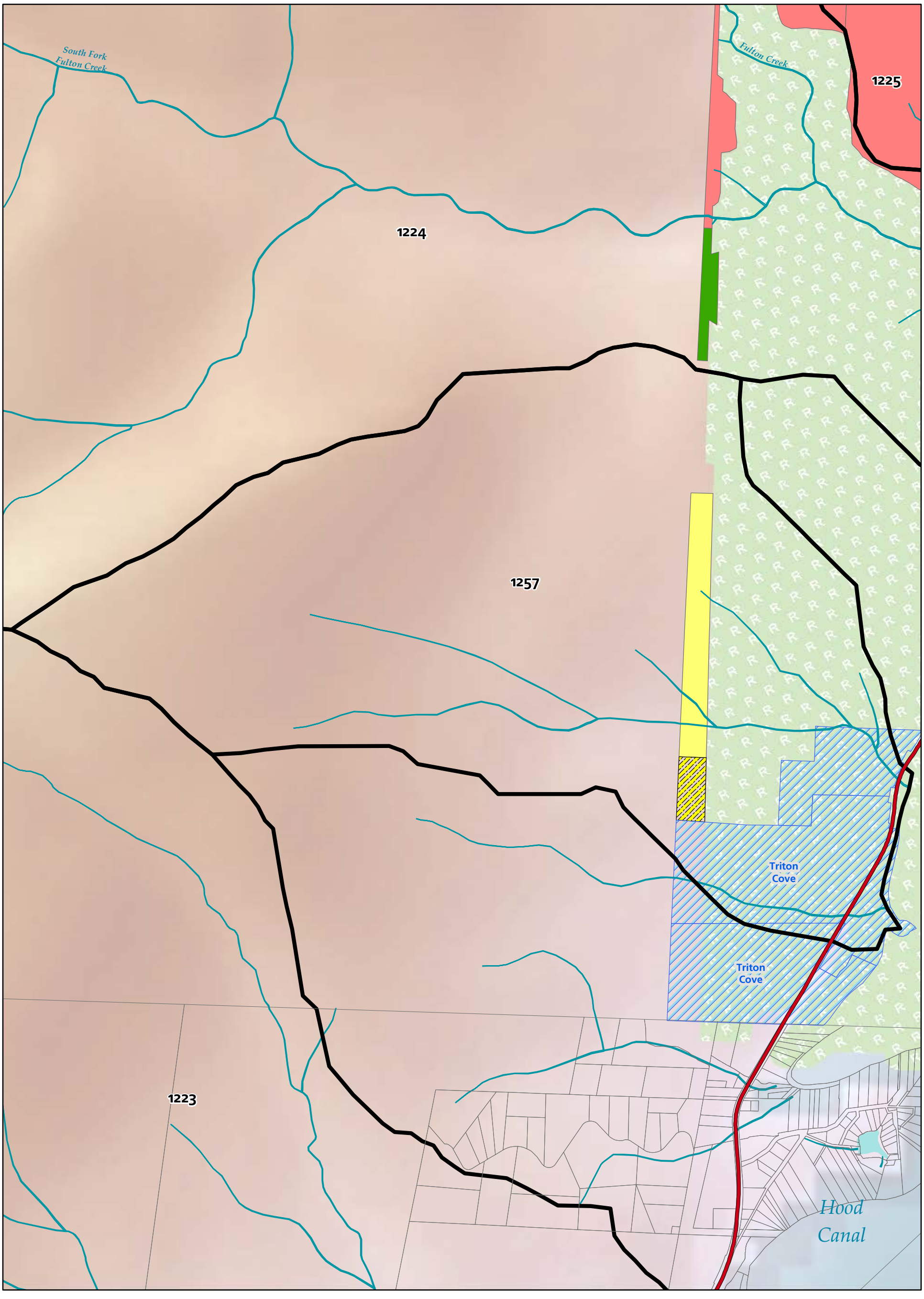
File: C:\GIS\Projects\Buildout2012_Multipart\Buildout_Results\MapDocs\Buildout_Jefferson_CA.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

WRIA 16 Buildout Parcels with Critical Areas Removed Jefferson County Portion

Aquatic Unit 1257 -- #12 (Triton Beach)

0 0.125 0.25 0.5 Miles

Draft



- Parcels
- Aquatic Unit
- WSA
- Commercial Fully Built Out
- Commercial Underdeveloped
- Residential Fully Built Out
- Residential Underdeveloped
- Vacant Non-Dividable
- Vacant Dividable
- Critical Areas

File: C:\GIS\Projects\Buildout2012_Multipart\Buildout_Results\MapDocs\Buildout_Jefferson_CA.mxd
Prepared By: Doug Noltemeier, GISP
Date: June 25, 2012
Coordinate System:
NAD 1983 StatePlane Washington North FIPS 4601 Feet

JEFFERSON COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

Policy Statement Number 93-02

Program: Drinking Water

Subject: Water Availability Requirements for Building Permits – Chapter 19-27.097

Effective this date, the following policy shall be adopted concerning proof of an adequate supply of potable water as a prerequisite for a building permit:

I. General Requirements.

A. Each applicant for a building permit for a project necessitating potable water shall provide evidence of an adequate supply of potable water for the intended use of the building, except that those applications for permits for replacement structures, improvements or additions to buildings that will not result in an increase in water usage, or building not requiring a potable water supply are not subject to the provision of this policy.

B. The Jefferson County Building department shall determine if proof provided meets the adequacy and quality (portability) requirements.

II. Public Water Systems

A. Applicants intending to connect to a public water supply shall provide written notification from an approved water system purveyor stating that the system has the capacity and commitment to provide water. The water system must be in compliance with state water supply regulations and the state surface and ground water codes (Chapters 90.03 and 90.44 RCW).

B. The health department shall review the notification supplied by the purveyor as well as the record from the Washington Department of Health to verify that the approved system has the capacity and is in compliance before finding that quantity and quality criteria has been met.

III. Individual Water Supplies.

A. Individual water supplies shall be capable of providing a minimum of 400 gallons per day.

B. Individual water systems shall be tested for coliform, bacteria and nitrate-N, and shall not exceed maximum contaminant limits established in the State Board of Health Drinking Water Regulations.

C. The Health Department may require testing for sodium and chlorides where there is known, or suspected, sea water intrusion.

D. Wells shall be constructed and sited in accordance with state standards for well construction (chapter 173-160 WAC). A copy of the well log showing the depth, production, casing and surface seal may serve as proof of proper construction.

E. Springs and surface water sources, including ground water under the influence of surface water, shall only be considered when authorized buy a valid water right permit. When surface waters or springs are considered, water quality and quantity standards apply. Because surface waters and springs are highly susceptible t o microbial and other contamination, these systems shall submit a conceptual plan for continuous treatment to meet potable water standards.

IV. Alternative water supplies shall only be approved when systems outlined in Sections II and III are not available.

A. When water quality test results indicate violation of a maximum contaminant limit, water supplies may be treated to improve quality. When on=going treatment is proposed, a conceptual plan for treatment system shall be submitted for review by the Health Department. When on-going treatment is required to obtain compliance with water quality standards, a notice to the property title shall be recorded. The notice will specify that the water supply does not meet water quality standards, specify what parameters are exceeded, and note that continuous treatment is required.

B. Water supplies that do not provide the minimum volumes specified shall only be considered adequate when accompanied by a water conservation plan. The water conservation plan shall provide water quantities in amounts adequate for daily and annual needs. When a water supply does not meet water quantity requirements, a notice to property title shall be recorded stating that the water supply does not meet minimum quantity requirements pursuant to 19.27.097 RCW.

C. The Jefferson County Health department may develop standard forms and notices for implementing provisions of sections III. E, IV.A and IV B.

The 1990 Growth Management Act includes provisions requiring proof of an adequate supply of potable water before a building permit can be issued. The law (19.27.097 RCW) authorizes the Department of Ecology to develop regulations to implement the act. The DOE has developed Guidelines for Determining Water Availability for New Buildings and is currently preparing final Guidelines. The guidelines are general in nature and allow for a certain amount of flexibility for local conditions although they do serve as minimum standards. The policy is intended to adopt those guidelines as the county standard for implementing RCW 19.27.097, clarify county procedures, and provide consistent interpretation of the Guidelines.

The policy shall remain in effect until amended or repealed by the Jefferson county Board of Health.

__/S/ J. Peter Geerlofs M.D. Date: 5/27/93
Health Officer

_/S/ Bob Hinton_____ Date 5/27/93
Chairman, Board of Health

JEFFERSON SOUNTY HEALTH AND HUMAN SERVICES
ENVIRONMENTAL HEALTH DIVISION

POLICY STATEMENT NUMBER 97-01

PROGRAM: DRINKING WATER

SUBJECT: RAINWATER COLLECTIONS

I. Effective this date the following policy shall be adopted concerning the use of a rainwater collections systems for proof of water adequacy for a building permits.

A. Rainwater collections systems (catchments) will be accepted as proof of meeting water adequacy requirements for a building permit as stated in Chapter 19.27.097 RCW, provided that the conditions outlined in this policy are met. All designs under renew shall be submitted for individual catchments systems only. It shall be the applicant's responsibility to demonstrate that the catchment systems provides adequate supplies of potable water; Jefferson County assumes no responsibility in the events of failure of the water systems to provide potable or adequate supply.

B. Requests for review of catchment system designs shall be submitted as a catchment system design report. The catchment system design report shall be reciewed by Environmental Health Staff. The Report shall, at a Minimum, address the following:

1) Estimated daily average and annual water demand based on an occupancy of two people per bedroom for residential structures. In the event that water usage is projected at less than 45 gallons per person per day, the report shall document how the use estimates have been derived.

2) Annual average precipitation the location of the proposed structure.

3) Catchment area required based on 1) and 2) above with allowances for losses in the system and dry years.

4) Required storage volume based on a water balance analysis.

5) Storage tank conceptual design which provides for protection of the water from contamination while in storage.

6) A detailed description of a treatment system that provides for disinfection and filtration sufficient for the removal of suspended solids and cysts such as those of giardia and cryptosporidium.

C. In order to receive approval, the catchment system design report must demonstrate that an adequate supply of potable water will be provided. A copy of the report shall be retained with the building permit record. In addition, a notice shall be recorded with the property title. The notice shall identify the water source as a rainwater catchment system and specify the daily capacity of the

system. The notice will not make any assurance of continued supply of potable water. A continued supply of potable water is assured only with appropriate operation and maintenance of the water treatment system by the owner, and with sufficient rainfall.

D. A combination system uses both a well and catchment system to meet water demands. If used a proof of water adequacy for a building permit, a combination system may mix treated catchment water with well water provided that the catchment water is potable and meets all the requirements of Section B, above.

E. Combined systems may be constructed, and are encouraged for uses other than a proof of an adequate water supply. If used, there shall be no cross-connection between untreated catchment water and potable water supplies, as per universal plumbing code standards.

II. As a part of the Growth Management Act, RCW Chapter 19.27.097 requires applicants for building permits for structures requiring a potable water supply to submit proof of an adequate supply of potable water for the intended purpose(S) of the building before a building permit may be issued. State Guidelines developed by the Washington Department of Ecology (DOE) and the Washington Department of Health (DOH) established the following criteria for adequacy of individual supplies:

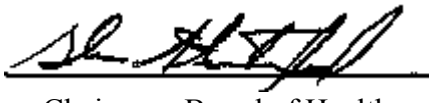
* An adequate supply of water is 400 gallons per day for a single family residence.
* Potable water conforms with state drinking water standards (at a minimum, bacteriological quality and nitrates).
* Whole house treatment is allowed, and is recommended if water quality does not meet drinking water standards.
* Alternative sources of supply (including catchments) may be adequate if all other criteria are met.

Jefferson County resolution 99-90 adopted the guidelines for the purposes of administering RCW 19.27.097. The Jefferson County Board of Health adopted Policy 93-02, "Water Availability Requirements for Building Permits," which is consistent with County Resolution 99-90. However, neither of these policies directly addressed the use of rainwater catchment systems to establish proof of an adequate supply of potable water. The catchment policy more specifically defines how Jefferson County will interpret the conditions required for alternative sources of supply in the state regulations.

Health Officer

5/21/97

Date



Chairman, Board of Health

5/16/97

Date

WRIA 16 PLANNING UNIT MEETING

Thursday, October 6, 2011
1:30 – 4:00 p.m.
Hoodsport Library
Hoodsport, WA

MEETING SUMMARY

Attending: Amy Georgeson & Loretta Swanson, Mason County; Tami Pokorny, Jefferson County; Ron Gold & Jocelyne Gray, Mason PUD #1; Bill Graham, Jefferson PUD #1; Randy Lumper, Skokomish Tribe; Tim Gates, Jim Pacheco, & Brian Walsh, Ecology; Michael Blanton & Terra Hegy, WDFW; Constance Ibsen, LHCWC; Donna Simmons, HC Environmental Council; Dick Bergeron and Barbara Moore-Lewis, Citizens; and Susan Gulick, Sound Resolutions *(facilitator)*.

1. **Instream Flow data**
   - Jim Pacheco of Ecology provided an overview of streamflow data he has been gathering in WRIA 16 to assist Ecology when it develops a draft water management rule for the basin.
   - Ecology has no immediate plans to begin working on a water management rule (instream flow rule) for WRIA 16 but work could begin in the next few years.
   - The Planning Unit made a decision (many years ago) that they would like to be involved in discussions of a water management rule after Ecology had completed its required consultation with the Tribes. The Planning Unit has the option to revise this decision in the future.
   - Jim noted that Ecology has good data (PHABSIM) for many of the large streams in the basin but lacked reliable streamflow data for many of the smaller streams
   - Jim reviewed the data he's collected for each stream. Most of the streams monitored show results that are significantly different than was projected in an earlier report using the Watershed Area method (this is a paper exercise that does not involve actual measurements). This indicates the unique nature of streams in the watershed.
   - The Planning Unit discussed the issues of aggradation impacts on stream flows.
   - The Planning Unit agreed with Ecology's decision to suspend monitoring at the end of this water year; the value of additional data won't be useful if we have another La Nina weather pattern. Ecology's data (1 drought year and 2 years [2010 and 2011] of median to high precipitation) should be sufficient.
   - Other data that would be useful prior to the development of a water management rule are updated fish presence data and water demand information.
   - Michael Blanton will look into what fish survey data is available. This may also be available through the HCCC.
   - The Planning Unit will spend part of its current grant from Ecology to prepare a build-out analysis to assess future water demand in each basin where Jim has collected streamflow data.
   - Terra Hegy volunteered to combine the parcel layers and Jim Pacheco's streamflow layers as a starting point for the build-out analysis.
   - The Planning Unit or a Technical Committee will meet to refine the details of the water needs assessment after the grant is signed.

2. **2011-12 Grant**
   - The Planning Unit agreed to the following grant tasks:
     - ✓ Administration
     - ✓ Facilitation/Project Management/Transition Planning

- ✓ Public education/outreach (either newsletters or web-based information dissemination)
- ✓ Groundwater monitoring
- ✓ Future Water Needs Assessment

- ❑ Amy, Susan and Tim will work to complete the grant and submit it to Ecology soon.

3. Transition Planning

- ❑ The Planning Unit discussed options for on-going funding.
- ❑ There is interest in advocating for additional legislative funding for Planning Units after Phase IV. The Planning Unit will continue to discuss these options.
- ❑ Susan will talk to Mason and Jefferson County and Skokomish Tribal representatives to the HCCC in November to explore funding options.

4. Action Area Update

- ❑ The Planning Unit would like to prepare comments for the update to the Action Agenda.
- ❑ Susan will distribute the comments that were prepared for the original Action Agenda.
- ❑ This will be discussed at the Oct. 20 Planning Unit meeting.

5. Other Issues

- ❑ The NW Indian Fisheries Commission has offered their website to host the groundwater monitoring data. Randy will coordinate a meeting with Tim, Bill, Jocelyne and Commission staff.
- ❑ Mason and Jefferson PUDs are beginning groundwater monitoring and hope to complete it by the end of October.

Upcoming Meetings

- ✓ *Planning Unit Meeting, Thursday, October 20th; 1:30-4:00 at the Hoodsport Library*
- ✓ *Planning Unit Meeting, Thursday, November 17th; 1:30-4:00 at the Hoodsport Library*