City of Richland
625 Swift Blvd
Richland WA 99352
(509) 942-7794

Plan Snapshot Report

Plan Type:	Type 3	**Plan #:**	PLN-T3-2025-00001	**App Date:**	03/19/2025
Work Class:	T3 - Preliminary Plat	**District:**	City of Richland	**Exp Date:**	07/17/2025
Status:	In Review			**Completed:**	NOT COMPLETED
Description:	QUAIL RIDGE III			**Approval Expire Date:**	

Parcel:	**Address:**	**Zone:**
120083000009023	3112 Village Pkwy Richland, WA 99354	
120083020010000	3255 Sr 240 Main Richland, WA 99354	
120082020003000 Main	3100 Village Pkwy Richland, WA 99354	

Surveyor	Engineer	Applicant	Property Owner
AKS Engineering & Forestry 9600 NE 126th AVE Ste 2520 Vancouver, WA 98682 Business: (360) 882-0419	Lawrence Pankey 501 N Quay Street Suite C-102 Suite C-102 Kennewick, WA 99336 Business: (509) 905-0219 Mobile: (541) 571-8190	Natashia Mobley 12965 SW Herman Road, ste 100 Tualatin, OR 97062 Business: (503) 563-6151	Pahlisch Homes at Horn Rapids Limited Partnership Home: (509) 905-0219 Business: (509) 905-0219 Mobile: (509) 905-0219

Plan Custom Fields

PreAppQuestionBox	Yes	PreAppMeetingDate	Jan 14 2025 12:00AM	Proposed Subdivision Name	Quail Ridge
Parcel Number	120082020003000	Zoning	R-3	Gross Plat Acreage	19.1
Number of Lots	75	Smallest Lot Size	5876	Largest Lot Size	12391
Net Lot Area Acreage	17.1	Average Lot Size	7821	Domestic Water Supply	City Supplied Water
Sewage Disposal	Sewer	Irrigation Source	City		

AKS ENGINEERING & FORESTRY
2245 Robertson Drive, Richland, WA 99354
P: (509) 905-0219

AKS Job #9141

Quail Ridge III Plat Boundary Description

A parcel of land lying in a portion of Northwest quarter, the Southwest quarter, and the Southeast quarter of Section 20, Township 10 North, Range 28 East of the Willamette Meridian, City of Richland, Benton County, Washington, being more particularly described as follows;

The Adjusted Pahlisch Parcel and a portion of the Adjusted City Parcel per that Record of Survey for a Boundary Line Adjustment recorded in Volume 1 or Surveys, Page 5545, together with a portion of Tract C, Quail Ridge II Phase 1 Final Plat, recorded in Volume 15 of Plats, Page 0752, records of Benton County, Washington, described as follows:

Commencing at a Stone engraved with an "X" marking the Northwest corner of said Section 20, from which a 5/8-inch rebar with yellow plastic cap marking the Southwest corner of the Northwest quarter of said Section 20 bears South 00°57'09" West, 2640.23 feet;

Thence along the West line of the Northwest quarter of said Section 20, South 00°57'09" West, 813.41 feet to the Southerly right-of-way line of State Route 240, said point being 75.00 feet Southerly of the centerline thereof when measured at right angles;

Thence along the Southerly right-of-way line of said State Route 240, South 52°35'11" East, 4013.86 feet to the Northeast corner of said Adjusted City Parcel and the TRUE POINT OF BEGINNING of the parcel of land to be described;

Thence leaving the Southerly right-of-way line of said State Route 240, along the Easterly line of said Adjusted City Parcel, South 35°55'34" West, 117.51 feet to the Northerly line of said Adjusted Pahlisch Parcel;

Thence Southeasterly along the Easterly boundary of said Adjusted Pahlisch Parcel and the arc of a 102.00-foot radius, non-tangent curve to the right, the chord of which bears South 19°13'48" East, 113.47 feet, through and interior angle of 67°35'30", for an arc length of 120.33;

Thence South 14°33'57" West, 45.09 feet;

Thence Southeasterly along the arc of a 25.00-foot radius tangent curve to the left, the chord of which bears South 30°26'03" East, 35.36 feet, through an interior angle of 90°00'00", for an arc length of 39.27 feet to the Northerly right-of-way line of Village Parkway, said point being 42.00 feet Northerly of the centerline thereof when measured at right angles;

Thence along the Northerly right-of-way line of said Village Parkway the following eight (8) courses;

Thence North 75°26'03" West, 62.88 feet;

Thence Northwesterly along the arc of a 458.00-foot radius tangent curve to the right, the chord of which bears North 69°53'41" West, 88.42 feet, through an interior angle of 11°04'44", for an arc length of 88.56 feet;

Thence North 64°21'20" West, 378.80 feet;

Thence Northwesterly along the arc of a 562.00-foot radius tangent curve to the left, the chord of which bears North 69°25'25" West, 99.30 feet, through and interior angle of 10°08'11", for an arc length of 99.43 feet;

Thence North 74°29'30" West, 483.39 feet;

Thence Northwesterly along the arc of a 562.00-foot radius tangent curve to the right, the chord of which bears North 71°53'44" West, 50.91 feet, through an interior angle of 05°11'33", for an arc length of 50.93 feet;

Thence North 69°17'57" West, 587.15 feet;

Thence Northwesterly along the arc of a 292.00-foot tangent curve to the left, the chord of which bears South 88°06'57" West, 224.29 feet, through and interior angle of 45°10'12", for an arc length of 230.20 feet to the Southeast corner of Lot 1 of said Quail Ridge II Phase 1 Final Plat;

Thence leaving the Northerly right-of-way line of said Village Parkway, along the Easterly line of said Lot 1, North 24°28'10" West, 113.00 feet to the Northeast corner of said Lot 1 and the Southerly right-of-way line of Emory Avenue, said point being 27.00 feet Southerly of the centerline thereof when measured at right angles;

Thence Northeasterly along the Southerly right-of-way of said Emory Avenue and the arc of a 405.00-foot radius non-tangent curve to the right, the chord of which bears North 79°19'37" East, 193.16 feet, through an interior angle of 27°35'32" for an arc length of 195.04 feet;

Thence leaving the Southerly right-of-way line of said Emory Avenue, North 03°07'23" East, 54.00 feet to the North right-of-way line of said Emory Avenue, said point being 27.00 feet Northerly of the centerline thereof when measured at right angles;

Thence Northwesterly along the arc of a 25.00-foot radius non-tangent curve to the right, the chord of which bears North 44°57’39” West, 33.40 feet through and interior angle of 83°49’56” for an arc length of 36.58 feet;

Thence North 03°02’41” West, 90.16 feet;

Thence South 85°36’36” East, 94.32 feet;

Thence South 76°10’39” East, 98.18 feet;

Thence South 62°07’09” East, 54.00 feet;

Thence Southwesterly along the arc of a 553.00-foot radius non-tangent curve to the left, the chord of which bears South 26°08’40” West, 33.51 feet, through an interior angle of 03°28’22”, for an arc length of 33.52 feet;

Thence South 69°17’57” East, 111.84 feet;

Thence North 29°46’26” East, 62.46 feet;

Thence North 37°24’49” East, 266.09 feet;

Thence North 52°35’11” West, 14.47 feet;

Thence North 37°24’49” East, 158.00 feet to the Southerly right-of-way line of said State Route 240, said point being 75.00 feet Southwesterly of the centerline thereof when measured at right angles;

Thence along the Southerly right-of-way line of said State Route 240, South 52°35’11” East, 1472.08 feet to the TRUE POINT OF BEGINNING and end of this parcel description.

Containing 19.10 acres, more or less

Quail Ridge III
Preliminary Subdivision

Date:	March 2025
Submitted to:	City of Richland Development Services 625 Swift Boulevard, MS-02 Richland, WA 99352
Applicant:	Pahlisch Homes, Inc. 1020 N Center Parkway Suite A Kennewick, WA 99336
AKS Job Number:	9141

AKS ENGINEERING & FORESTRY
2245 Robertson Drive
Richland, WA 99354
(509) 905-0219

Submittal Items

(One Original)

1. Land Use Narrative
2. Title Reports
3. Preliminary Plat
4. Vehicle Trip Accounting Letter
5. Cultural Resources Report
6. Inadvertent Discovery Report
7. Geotechnical Engineering Letter
8. Horn Rapids EIS
9. Critical Areas Report

1. Land Use Narrative

Quail Ridge III
Preliminary Subdivision

Date: March 2025

Submitted to: City of Richland Development Services
625 Swift Boulevard, MS-02
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AKS ENGINEERING & FORESTRY

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Quail Ridge III
Preliminary Subdivision

Submitted to:
City of Richland Development Services
625 Swift Boulevard, MS-02
Richland, WA 99352

Applicant:
Pahlisch Homes, Inc.
1020 N Center Parkway Suite A
Kennewick, WA 99336

Property Owners:
Pahlisch Homes at Horn Rapids Limited Partnership
1020 N Center Parkway Suite A
Kennewick, WA 99336

Applicant's Consultant:
AKS Engineering & Forestry, LLC
2245 Robertson Drive
Richland, WA 99354

Contact(s): Joey Sheerer, AICP
Email: shearerj@aks-eng.com
Phone: (509) 905-0219

Site Location:
3012 Village Parkway
Richland, WA 99352

Benton County Parcels:
120083020010000, 120083000009023, & 120082020003000

Site Size:
±19.1 acres (±831,996 square feet)

Land Use Districts:
High Density Residential Residential (R-3)

I. Executive Summary

AKS Engineering & Forestry, LLC (AKS) is pleased to submit this Preliminary Subdivision application to the City of Richland (City) on behalf of Pahlisch Homes, Inc. (Applicant) to divide ±19.1 acres within the approved Horn Rapids Master Plan into ±75 lots for future detached single-family homes as Quail Ridge III.

Quail Ridge III will connect to, and build upon, the existing Quail Ridge I and II subdivisions. Approval of this preliminary plat and future subdivision will provide needed housing for the City of Richland, consistent with the goals and policies set forth in the City's Comprehensive Plan and the approved Horn Rapids Master Plan. This subdivision will provide safe and attractive internal streets and sidewalks which will connect outward to existing open spaces and amenities within Horn Rapids.

The essential components of the project include the following:

- 75 lots meeting R-3 zoning standards for future detached, single-family homes.
- Dedication and full-street improvements to applicable City standards for the internal public street network serving the community and providing circulation to adjacent properties.
- Extension of City water and sewer and all other necessary utilities to serve the community.
- Open space tracts planned to be owned and maintained by the Homeowners Association (HOA).
- Construction of a stormwater system providing on-site management and detention and meeting applicable City and Department of Ecology standards.
- Continuation of the uses, housing types, and general development pattern of adjacent phases of Quail Ridge and Horn Rapids.
- Consistency with the original Horn Rapids master planned community, which was the subject of an Environmental Impact Statement (EIS) and Traffic Impact Study previously approved by the City.

This written narrative includes findings of fact demonstrating that the application complies with all applicable approval criteria. These findings are supported by substantial evidence, including title reports, Preliminary Plans, a Vehicle Trip Accounting Letter, a Cultural Resources Report, an Inadvertent Discovery Report, the Horn Rapids EIS, a Critical Areas Report, a Geotechnical Engineering Report, and other written documentation. This information, which is included in this application package, provides the basis for the City to approve this application.

II. Site Description/Setting

The project site consists of three parcels and is ±19.1 acres in size. The site is addressed as 3012 Village Parkway, Richland, WA 99352. The included properties are identified as Parcel Numbers 120083020010000, 120083000009023, and 120082020003000 of Section 20, Township 10 North, Range 28 East, Willamette Meridian. The site is in the High-Density Residential (R-3) zone. The surrounding properties are in the (R-3) and Medium Density residential Small Lot (R-2S) zone.

The site is mostly flat with some gentle rolling slopes and no major landscape features. The site is not developed and contains sagebrush, wild grasses, and other vegetation commonly found in this region.

Previous environmental studies have found that there are no wetlands, critical areas, or protected species on the site.

The site has frontage to Village Parkway to the south. Village Parkway is a public road and is designated as a minor collector. State Route 240 (SR 240) bounds the site to the north. SR 240 is a state highway and provides no direct access to the site. All traffic must enter the site through Village Parkway. The City of Richland owns the parcel directly east of the site. Land to the west is also owned by the Applicant, within the Horn Rapids Master Plan, and planned for future phases of this residential community.

III. Applicable Review Criteria

CITY OF RICHLAND COMPREHENSIVE PLAN

ED Goal 7: **Recognize parks, natural areas, and a built environment with quality design for the value they offer as major attractions.**

Policy 1: Preserve open space areas and associated functions and values.

Response: Quail Ridge III is part of the larger Quail Ridge phased community. The Preliminary Plat in Submittal Item 3 shows at least one open space tract planned to be owned and maintained by the HOA. Quail Ridge III expands upon the existing open spaces and paths within the greater Quail Ridge phased community by providing sidewalks which lead to public paths and open spaces. This also provides connection to the Horn Rapids Public Golf Course, which is designated as Developed Open Space within the City of Richland Urban Growth Boundary. By creating new open space tracts and providing access to existing open space areas, the project helps preserve open space and its associated functions and values. Therefore, the policy is met.

Policy 2: Work with public and private groups to support these areas.

Response: The project provides at least one open space tract, which will be owned and maintained by the HOA. The tract along with sidewalks which connect to existing open space areas and paths show the Applicants commitment to working with private groups to support open space areas. Therefore, the policy is met.

Policy 3: Provide opportunities for active and passive recreation in parks and open spaces.

Response: The project provides a connection between Village Parkway and the extension of Emory Avenue and other new local roads. From the existing paths on Village Parkway, users can easily access the surrounding open spaces. In addition to the local road sidewalk system which connects to developed open spaces, a planned open space tract will be built and dedicated to the HOA. See the Preliminary Plat included in this application package for more information. By providing sidewalks that connect developed open spaces, the project provides active and passive recreation opportunities to all. Therefore, the policy is met.

LU Goal 1: **Plan for growth within the urban growth area and promote compatible land use.**

(…)

Policy 2: Facilitate planned growth and infill developments within the City.

Response: The project includes a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district.

The planned subdivision meets all applicable requirements of the R-3 zoning district, as well as all other applicable requirements of Richland Municipal Code (RMC). By meeting the requirements of the RMC, the project is developed following the pattern of growth intended by the City and facilitating the planned growth and infill developments within the city. Therefore, the policy is met.

LU Goal 2: Establish land uses that are sustainable and create a livable and vibrant community

Response: Sustainable land use utilizes existing infrastructure, protects critical areas to the greatest extent practicable and mitigates for any impacts. In the case of residential development, sustainable land use provides housing that is appropriate for the infrastructure and helps meet the housing needs of the City. The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district. R-2S zoning allows single-family homes to be built on smaller lots and provides necessary housing types for the City. Residents of the subdivision will have access to an existing clubhouse with a pool that was built with the Quail Ridge II community. Access to this feature, along with open space access helps create a livable and vibrant community. Therefore, the policy is met.

Policy 1: Maintain a variety of land use designations to accommodate appropriate residential, commercial, industrial, healthcare, educational, recreational, and open space uses that will take advantage of the existing infrastructure network.

Response: The project includes a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district. By providing residential housing with R-3 zoning standards, the project efficiently utilizes existing infrastructure to provide needed housing for the City. The planned subdivision will extend existing public utilities through the project site which will serve both the project and future development to the west.

As depicted on the Preliminary Plat (Submittal Item 3), one open space tract within the site is planned. The project will connect to existing paths within the larger Qual Ridge community. By extending existing utility stubs and developing at the City's intended zoning standards, the project is using the existing infrastructure to its fullest advantage. Therefore, the policy is met.

Policy 2: Ensure that adequate public services are provided in a reasonable time frame for new developments.

Response: The planned subdivision will provide public sanitary sewer, water, irrigation, and electricity, as well as other dry utilities for each lot within the site. There is an existing sanitary sewer main in Village Parkway that will loop through the site and connect to the existing sanitary sewer main stub at the western site boundary near lots 2 and 75. Sanitary sewer service will be provided to each lot from the planned sanitary sewer main. There is an existing water main in Village Parkway that will loop through the site and connect to the existing water main stub at the western site boundary near lots 2 and 75. Water service will be provided to each lot from the planned water main. There is an existing irrigation main in Village Parkway that will loop through the site and connect to the existing irrigation main stub at the western site boundary near lots 2 and 75. Irrigation service will be provided to each lot from the planned irrigation main. Electricity will be extended to the site from Village Parkway and run within the public utility easement (PUE) at the front of each lot to provide service to all lots within the site. Other available dry utilities will be extended to the site and run within the PUE. All public services will be extended through the project site. By connecting to existing service mains and looping those services through the project site as needed, the project is ensuring that public services shall be provided to the lots within a reasonable time frame. This also benefits the public by ensuring that public services will be available for future developments in a reasonable time frame via connection and extension. Therefore, the policy is met.

Policy 3: Ensure that the intent of the land use and districts are maintained.

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Detached single-family homes are permitted in the R-3 zone and Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district. The planned subdivision will follow the City's Type III application process, allowing for review of the project by the City, the public, and the Hearings Examiner. This ensures the intent of the land use designation, zoning, and district is maintained. Therefore, the policy is met.

LU Goal 3: Maintain a broad range of residential land use designations to accommodate a variety of lifestyles and housing opportunities.

Policy 1: Distribute residential uses and densities throughout the urban growth area consistent with the City's vision.

(…)

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district. By providing housing, the project helps meet the City's goal of distributing residential densities throughout the Urban Growth Area (UGA). Therefore, the policy is met.

LU Goal 5: **Ensure connectivity that enhances community access and promotes physical, social, and overall well being so residents can live healthier and more active lives.**

(…)

Policy 2: Promote pedestrian and bicycle circulation throughout the community by connecting with the infrastructure and the City's network of parks and trail system.

(…)

Response: The planned roads within the site and the existing roads within the surrounding neighborhoods, are designed as local streets and minor collectors. These local streets and minor collectors are designed to allow bicyclists to share the roadway with vehicles. 5-foot sidewalks will be constructed on both sides of all planned roads within the project. The sidewalks will connect to the existing paths along Village Parkway and to existing open space tracts. By connecting open spaces, trails, and paths, and providing sidewalks, the project is promoting pedestrian and bicycle circulation throughout the community. This circulation helps connect the City's network of parks and trail systems. Therefore, the policy is met.

UD Goal 1: **Create a physically attractive and culturally vibrant, pedestrian and bicycle friendly environment in the City.**

(…)

Policy 3: Improve streetscape and connectivity for safe and pedestrian-friendly environments.

(…)

Response: The planned subdivision will provide manicured streetscapes complete with curbs and sidewalks which will provide safe pedestrian connections. All work within the public right-of-way will meet City of Richland's development standards, which, by design, create a physically attractive streetscape that is also pedestrian and bicycle friendly. Therefore, the policy is met.

HE Goal 1: **Provide a range of housing densities, sizes, and types for all income and age groups of the Richland community.**

Policy 1: Ensure that the comprehensive plan and development regulations allow for a variety of housing types, sizes, densities, and lot configurations such as small lot single family housing, mixed development, cluster development, live/work housing, co-housing, accessory dwelling units, single room occupancy units, zero lot line and similar subdivisions, and planned unit developments.

(…)

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district. The planned subdivision meets the City of Richland Housing Element goal of providing housing of differing densities and

sizes. This project will help meet the goal of allowing for a variety of housing types, sizes, and densities by providing small-lot single family housing. Therefore, the policy is met.

Policy 6: Plan for an adequate supply of land in appropriate land use designations and zoning categories to accommodate projected household growth, while accommodating other commercial, industrial, and open space needs of the City.

(…)

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district. The planned project will help meet the goal of providing adequate housing in appropriate zoning categories to accommodate household growth. Therefore, the policy is met.

HE Goal 5: Ensure compatibility of new residential developments with established neighborhoods and the community.

Response: As described in the Richland Comprehensive Plan, compatibility is based on the intensity of land uses, with industrial being the most intense use due to the impacts of its operations and natural areas being the least intense use as there is no development. The proposed residential community is located with other similarly zoned residential communities to the southeast. The planned subdivision will also build at least one open space tract that will be dedicated to the HOA. Open space tracts provide public use areas which are ubiquitous with the surrounding neighborhoods, thus ensuring compatibility with the surrounding community. Therefore, the policy is met.

Policy 1: Maintain quality design and landscaping in the new developments.

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district. The R-3 and R-2S density is the same density as the surrounding neighborhoods.

The planned subdivision will provide sidewalks and planter strips on both sides of all local roads within the site, meeting RMC standards. Additionally, at least one open space tract is depicted within preliminary plat. All open space tracts will be manicured common areas, intended for public use. Therefore, the policy is met.

RICHLAND MUNICIPAL CODE

Title 12 Streets and Sidewalks

(…)

Chapter 12.03 Transportation Impact Fees

Response: PBS Engineering and Environmental LLC (PBS) provided a Trip Accounting Letter which estimates the number of trips generated by the proposed Quail Ridge III development.

The proposed development is part of the Horn Rapids Master Planned Community and trip accounting is based on the March 1993 traffic impact study. Existing and approved land uses within Horn Rapids were addressed in prior trip accounting efforts on Quail Ridge II. Please refer to the attached Trip Accounting Letter, for more information.

(…)

Chapter 12.06 Complete Streets Policy

12.06.010 Purpose.

The city of Richland shall, to the maximum extent practical, scope, plan, design, construct, operate and maintain appropriate facilities for the safe accommodation of pedestrians, bicyclists, transit users, motorists, emergency responders, freight and users of all ages and abilities in all new construction, retrofit or reconstruction projects. Cost-effective opportunities to include complete streets practices shall be identified and implemented by the city as part of the standard operations and maintenance of city streets.

12.06.020 Exceptions.

Facilities for pedestrians, bicyclists, transit users, and people of all abilities are not required to be provided when, in the judgment of the public works director, any of the following apply:

A. A documented absence of current or future need exists;

B. Nonmotorized uses are prohibited by law;

C. Routine maintenance of the transportation network is performed that does not change the roadway geometry or operations, such as mowing, sweeping and spot repair;

D. The cost would be disproportionate to the current need or probable future uses.

12.06.030 Complete streets infrastructure.

The city shall incorporate complete streets infrastructure into existing public streets, as feasible and recommended by professional engineer design professionals, to create a comprehensive, integrated, connected transportation network that balances access, mobility, health and safety needs of pedestrians, bicyclists, transit users, motorists, emergency responders, freight and users of all ages and abilities.

"Complete streets infrastructure" means design features that contribute to a safe, convenient, or comfortable travel experience for users, including but not limited to features such as: sidewalks; shared-use paths; bicycle lanes; automobile lanes of appropriate width; paved shoulders; street trees and landscaping; planting strips; curbs; accessible curb ramps; bulb-outs; crosswalks; refuge islands; pedestrian and traffic signals; signage; street furniture; bicycle parking facilities; public transportation stops and facilities in coordination with Ben Franklin Transit; traffic calming devices; and raised medians.

Response: The Preliminary Plat within Submittal Item 3 shows 54-foot-wide local street right-of-way dedications that can be designed and improved in accordance with City standards. The dedications and full-street improvements for the extension of Emory Avenue, as well as the new internal streets, will provide additional connections to Quail Ridge II and an additional connection to Village Parkway. The planned transportation improvements, internal circulation system, and street cross sections will support the residential uses within the R-3 zone.

The City of Richland does not require dedicated bicycle facilities on local streets as they have low enough traffic volumes and speeds to allow bicycles to safely share the roadway with vehicles. Streets are planned to include the required paved width, landscape strips, and sidewalks on both sides. The streets, sidewalks, landscaping and other design features provided by the project will comply with the City's Complete Street Policy. Applicable standards are, or can be, met.

(…)

Chapter 12.10 Installation of Street Improvements

12.10.010 Street improvements for new construction.

(…)

Response: The project will include construction of roadway improvements including 34 feet of pavement and curbs prior to platting the subdivision. The planned sidewalks and landscaping will be constructed with the associated lot at the time of home construction. The project will construct and provide all street improvements needed to conform with the City standards including grading, paving, curb and sidewalk installation, storm drainage and street light improvements. By providing these improvements, the project meets the necessary requirements in RMC 12.10.010. Therefore, this criterion is met.

12.10.035 Sidewalks for new or improved streets.

Whenever any street is constructed or improved in any area of the city zoned residential or commercial, whether such construction be by local improvement or otherwise, as a part of such construction or improvement there shall be included therein, on both sides of any such street that may abut on previously developed property, sidewalks, curbs, and gutters constructed in conformity with requirements of this chapter.

Response: Within the planned subdivision, 5-foot-wide detached sidewalks on both sides of all roads will be constructed within the site. See the Preliminary Plans included in this application package for more information.

12.10.040 Permits

Before constructing street improvements, a permit shall be obtained in the same manner as is provided in Chapter 12.08 RMC.

Response: All appropriate permits will be obtained as required prior to any construction. This criterion is met.

Chapter 12.11 Intersection Sight Distance

(…)

12.11.020 Sight distance required.

(…)

Response: The planned subdivision will extend Emory Avenue and establish new local roads throughout the site. All local roads will have a speed limit of 25 miles per hour. Vision Clearance triangles meeting the requirements of RMC Table 12.11.020 are shown in the Preliminary Plans. These vision clearance triangles demonstrate that the planned subdivision meets sight distance requirements. See the Preliminary Plans included in this application package for more information. This criterion is met.

12.11.030 Requirements for the establishment of a vision clearance triangle

(…)

Response: Vision Clearance triangles meeting the requirements of RMC Table 12.11.020 are shown on the Preliminary Plans. Vision clearance areas will remain clear as required by this section. Therefore, this criterion is met.

Title 14 Electricity

(…)

Response: City of Richland Energy Services will provide electricity service for the project. Electricity will be extended into the site from Village Parkway and run within the PUE at the front of each lot to provide service to all lots in the project. All applicable connection fees will be paid for each lot. Therefore, this criterion is met.

Title 16 Stormwater

(…)

Response: The planned subdivision will generate stormwater runoff from the roads, sidewalks, driveways, and homes. This stormwater runoff will be collected on site with catch basins and conveyed to a stormwater detention pond within a tract owned and maintained by the City in the northeast portion of the site. Stormwater will be detained and treated in a stormwater pond prior to infiltrating on site. Please note that additional stormwater tracts may be necessary to serve the project. Any additional tracts will be shown on the final plat. Please see the Preliminary Plans included in this application package for more information.

Title 17 Sewers

(…)

Response: An existing sanitary sewer main runs through the Village Parkway. The planned subdivision will extend the sanitary sewer main into the site from Village Parkway in the planned roads to serve the project. Sanitary sewer service will be extended to each lot from the planned sewer mainline. See the Preliminary Plans included in this application package for more information.

Title 18 Water

(…)

Response: An existing water main exists in Village Parkway. The planned subdivision will extend the water main into the site from Village Parkway in the planned roads to serve the project. Water service will be extended to each lot from the planned water mainline. See the Preliminary Plans included in this application package for more information. This criterion is met.

Title 19 Development Regulation Administration

Chapter 19.20 Types of Project Permit Applications

19.20.010 Procedures for processing development permits

For the purpose of project permit processing, all development permit applications shall be classified as one of the following: Type I, Type II, Type III, or Type IIIA. Legislative decisions are Type IV actions, and are addressed in RMC 19.20.050. Exclusions from the requirements of project permit application processing are contained in RMC 19.20.070.

(…)

C. Type III permits include the following types of permit applications:

1. Preliminary plats or major revisions thereof;

2. Plat alterations or vacations.

(…)

Response: This application is for a preliminary plat. Therefore, the application is subject to a Type III review. The application package contains the materials necessary for the City to review and approve this submittal, including this narrative, current title reports, Preliminary Plans, a Vehicle Trip Accounting Letter, a Cultural Resources Report, an Inadvertent Discovery Report, the Horn Rapids EIS, Critical Areas Report, and a Geotechnical Engineering Report. Therefore, this criterion is met.

Chapter 19.30 Type I – III Project Permit Applications

19.30.010 Pre-application conferences

(…)

Response: A pre-application was submitted to the City on June 27, 2022. The pre-application conference was held on January 14, 2025. Therefore, this criterion is met.

19.30.020 Development permit application

Applications for project permits shall be submitted upon forms provided by the director. An application shall consist of all materials required by the applicable development regulations, and shall include the following general information:

(…)

Response: All necessary application forms and materials are included with this application package. Therefore, this criterion is met.

Chapter 19.60 Open Record Public Hearings

19.60.095 Required findings

No development application for a Type II or Type III permit shall be approved by the city of Richland unless the decision to approve the permit application is supported by the following findings and conclusions:

A. The development application is consistent with the adopted comprehensive plan and meets the requirements and intent of the Richland Municipal Code.

Response: The project is for a new 75-lot single-family residential community. As depicted on the Preliminary Plat (submittal document 3), at least one open space tract, at least one pedestrian access tract, and at least one stormwater detention tract will be constructed.

Additional utility and stormwater tracts may be required to serve the project. Any additional tracts will be shown on the final subdivision plat. The lots planned within the project meet all standards of the R-3 zoning district. More detailed discussions of how the planned community is consistent with the applicable comprehensive goals and policies and how the planned subdivision meets applicable sections of the RMC are provided throughout this narrative. Therefore, the criterion is met.

B. Impacts of the development have been appropriately identified and mitigated under Chapter 22.09 RMC.

Response: A Critical Areas Report was performed for the Quail Ridge II subdivision. The site boundary of Quail Ridge III is within the Quail Ridge II Critical Areas Report. Findings from City of Richland Staff Report number S2021-105 and the subsequent Hearings Examiner Decision from Quail Ridge II, Phases 1-3, identify that a critical areas report was forwarded to the Washington State Department of Fish and Wildlife (WDFW) for their review and comment. The Critical Areas Report did not receive any written comment from WDFW, indicating that that the critical areas report stands unrebutted by WDFW or any other agency with expertise on habitat and wildlife issues. With that information, the City of Richland Hearings Examiner found that the Applicant provided credible and unrebutted environmental documentation from qualified professionals on a number of relevant issues, and that the project would not adversely impact any protected critical area or protected wildlife and that the project is not likely to impact protected cultural resources. In 1993, an EIS was performed for the Horn Rapids Master Planned Community. Impact and mitigation measures were identified in that EIS. Quail Ridge III is within the boundary of that EIS and subject to the same approval criteria that were identified in that EIS. All project impacts will comply with the mitigation measures identified in the EIS. Therefore, this criterion is met.

C. The development application is beneficial to the public health, safety and welfare and is in the public interest.

Response: The planned subdivision helps the City meet its housing needs, which are identified in the comprehensive plan. The project also provides open space tracts and sidewalks that connect to paths and additional open spaces, including the Horn Rapids Golf Course. By meeting the City's housing needs and providing recreation opportunities through open space tracts and public trails/sidewalks, this project is beneficial to public health and is of public interest. Therefore, this criterion is met.

D. The development does not lower the level of service of transportation facilities below the level of service D, as identified in the comprehensive plan; provided, that if a development application is projected to decrease the level of service lower than level of service D, the development may still be approved if improvements or strategies to raise the level of service above the minimum level of service are made concurrent with development. For the purposes of this section, "concurrent with development" means that required improvements or strategies are in place at the time of occupancy of the project, or a financial commitment is in place to complete the required improvements within six years of approval of the development.

Response: Please refer to the attached Trip Accounting Letter prepared by PBS for more information regarding trip generation and impacts on transportation facilities. This criterion is met.

> **E. Any conditions attached to a project approval are as a direct result of the impacts of the development proposal and are reasonably needed to mitigate the impacts of the development proposal.**

Response: The application package contains the materials necessary for the City to review and approve this submittal, including this this narrative, current title reports, Preliminary Plans, a Vehicle Trip Accounting Letter, a Cultural Resources Report, an Inadvertent Discovery Report, the Horn Rapids EIS, Critical Areas Report, and a Geotechnical Engineering Report. Therefore, this criterion is met.

Chapter 19.80 Application and Appeals Fees

(…)

Response: All fees set forth in the RMC or City Fee Schedule have been paid in full. This criterion is met.

Title 22 Environment

(…)

Chapter 22.09 State Environmental Policy Act

(…)

Response: A Critical Areas Report was performed for the Quail Ridge II subdivision. The site boundary of Quail Ridge III is within the Quail Ridge II Critical Areas Report. As determined in City of Richland File Number: S2021-105, the City's Hearings Examiner noted that Quail Ridge II, the preceding subdivision phase to this development, was not subject to a State Environmental Policy Checklist (SEPA) as the City of Richland had already adopted an Environmental Impact Statement (EIS) for the Horn Rapids Master Planned Area. Given that the city had already adopted an EIS for Horn Rapids, no separate SEPA threshold determination was needed; because Quail Ridge II was consistent with the development addressed in the Horned Rapids planned action ordinance. The planned subdivision is also within the Horn Rapids Master Planned Area and is an expansion of Quail Ridge community. The planned Quail Ridge III community is consistent with the development in the Horned Rapids planned action ordinance; therefore, no SEPA is required for this application. Therefore, this criterion is met.

Chapter 22.10 Critical Areas

(…)

Response: A Critical Areas Report was performed for the Quail Ridge II subdivision. The site boundary of Quail Ridge III is within the Quail Ridge II Critical Areas Report. Under City of Richland File Number S2021-105, the Applicant provided a critical areas report which covered the current project area. The report was sent to numerous local and state agencies. WDFW Priority Habitat & Species (PHS) mapping resource indicated that a portion of the plat site may potentially contain suitable habitats able to support Ferruginous Hawks and Burrowing Owls. However, the critical areas report indicated no evidence of suitable

Ferruginous Hawk Habitat on-site and indicates no evidence of the site being used by Burrowing Owls.

The Critical Areas Report for Quail Ridge II is at least four years old. To provide a current Critical Areas Report, biologists with AKS Engineering and Forestry conducted a site visit and Critical Areas Assessment for Quail Ridge III on March 4th, 2025. They determined that that no potentially jurisdictional Dish and Wildlife Habitat Conservation Areas (FWHCAs), including priority habitat and species, are present within the project area. The Critical Areas Report that they prepared is included in this application. Please refer to that Critical Areas Report for more information. This criterion is met.

Title 23 Zoning Regulations

Chapter 23.18 Residential Zoning Districts

23.18.025 Single-family residential design standards

Any one-family attached dwelling, one-family detached dwelling or designated manufactured home shall meet the following minimum requirements:

A. All dwellings shall be placed on permanent foundations.

B. At the time of construction, all new single-family dwellings shall be new, not having been previously titled to a retail purchaser and not meeting the definition of a "used mobile home" as defined in RCW 82.45.032(2).

Response: Foundations for future homes will be evaluated with future building permits. Because planned lots meet applicable zoning standards, future homes can feasibly be designed to meet applicable development standards. Compliance with development standards for future single-family homes will be reviewed with future building permits. Therefore, the applicable standards can be met.

23.18.030 Residential use districts permitted land uses

In the following chart, land use classifications are listed on the vertical axis. Zoning districts are listed on the horizontal axis.

(…)

Land Use	R-1-12	R-1-10	R-2	R-2S	R-3
Residential Uses					
Dwelling, One-Family Detached	P[4]	P[4]	P[4]	P[4]	P[4]

4. RMC 23.18.025

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. The Preliminary Plat within Submittal Item 3 depicts one open space tract, one pedestrian access tract, one monument sign tract, and one stormwater detention tract. Additional open space, stormwater, and utility tracts may be required to serve the site. The monument sign is displayed at the entrance to the subdivision as permitted by RMC (27.08.030 (2)) As shown in the above table from RMC 23.18.040, all planned uses are permitted in the R-3 zoning district. Therefore, this criterion is met.

23.18.040 Site requirements for residential use districts

In the following chart, development standards are listed on the vertical axis. Zoning districts are listed on the horizontal axis. If a number appears in the box at the

intersection of the column and row, that number represents the dimensional standard that applies to that zoning district.

Standard	R-2S	R-3
Minimum Lot Area Requirement – One-Family Detached Dwelling	4,000 feet	4,000 feet
Minimum Lot Area Requirement – Two-Family Detached Dwelling	7,000 feet	7,000 feet
Minimum Lot Area Requirement – One-Family Attached Dwellings	3,000 feet	3,000 feet
Maximum Density – Multifamily Dwellings (Units/Square Foot)	N/A	1:3,000
Minimum Lot Width – One-Family Detached Dwelling	42 feet	42 feet
Minimum Lot Width – Two-Family Detached Dwelling	64 feet	64 feet
Minimum Lot Width – One-Family Attached Dwellings	30 feet	30 feet
Average Lot Size Requirement[2]	None	None
Minimum Front Yard Setback[3]	15 feet/18 feet[4]	20 feet[6, 10]
Minimum Side Yard Setback	6 feet[5]	[6, 10]
Minimum Alley/Private Access Easement Setback	6 feet	6 feet
Minimum Rear Yard Setback	20 feet/3 feet[7]	25 feet[6, 10]
Maximum Lot Coverage[8]	50%	33%/45%[9, 10]
Maximum Building Height – Main Building	30 feet	40 feet[10]
Maximum Building Height – Detached Accessory Buildings[11]	16 feet	16 feet

2. Minimum average lot area per subdivision, exclusive of the area of streets and lots designated for nonresidential uses. In calculating average lot size, at least 35 percent of all lots shall be larger than the average lot size requirement.
3. Front yard setbacks are required from all street rights-of-way adjoining a lot as shown in the table above, except as follows:
   a. In single-family residence districts and in R-2 and R-3 districts where more than 50 percent of the normal or average-size lots in a block fronting on one side of the street are developed with existing buildings, other than accessory buildings, with front yard setbacks less than that required for the district, a new single-family or duplex dwelling shall adopt a minimum front yard setback dimension which is the average of the setbacks of the buildings on the two adjoining lots, existing prior to July 22, 1960, but in no case shall this dimension be less than 15 feet nor need it exceed 30 feet.
   b. Residential Districts. In any R district, or any combination therewith, on any corner lot where there is provided a side yard along the interior side lot line at least equal in width to the minimum depth of the rear yard required for the district, the main building may encroach upon the required rear yard up to a line where the remaining rear yard is no less in depth than the minimum width of the side yard required for the district. No accessory buildings may be located in said side yard, except a patio shelter enclosed on no more than two sides by walls or other enclosures and in conformity with the other provisions of this title.
   c. The flanking frontage or nonaddress front yard of a corner lot may reduce the front yard setback of said frontage to 15 feet; see diagram below.
4. Front yards shall not be less than 15 feet in front of living areas, up to a maximum of 55 percent of the front lot line, and not less than 18 feet in front of all other areas.
5. Detached one-family or detached two-family dwellings shall have two side yards with each side yard having a width of not less than six feet. A nonattached side of an attached one-family dwelling shall have a side yard having a width of not less than six feet.
6. For multiple-family dwellings and other allowable uses other than one-family attached and one-family and two-family detached dwellings, front yards shall be 20 feet, side yards shall be equal to one foot of side yard for each three feet or portion thereof of building height, and rear yards shall be 25 feet, except as required by RMC 23.18.020(B) when multifamily development is located adjacent to a single-family residential zoning district or development.
7. Rear yards shall be not less than 20 feet in back of living areas and three feet in back of garages or carports up to a maximum of 60 percent of the rear lot line for the garage or carport portion of the rear yard.
8. Lot coverage includes all buildings, including accessory buildings or structures on any lot in a residential district, exclusive of patios without roof coverings or patios with only open lattice or similar type roof construction.
9. Buildings in an R-3 district shall cover not more than 33 percent of the area of the lot except one-family attached dwellings, which may cover up to 45 percent of the area of the lot.
10. Setbacks, building heights, and lot coverage requirements for one-family attached, one-family detached and two-family detached dwellings in the R-3 zoning district shall be the same as those set forth for development in the R-2S zoning district.
11. Detached accessory structures built pursuant to the setback provisions of RMC 23.38.020 are limited to one story.

(…)

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes in the R-3 zoning district. Footnote 10 of RMC 23.18.040 allows future homes in the R-3 zone to apply the setbacks, building heights, and lot coverage requirements in the R-2S zone. The Preliminary Plat in Submittal Item 3 shows planned lots meeting the applicable dimensional standard of the R-3 zoning district.

Because planned lots meet applicable zoning standards, future homes can feasibly be designed to meet applicable development standards. Compliance with development standards for future single-family homes will be reviewed with future building permits. Therefore, the applicable standards are, or can be, met.

Chapter 23.54 Off-Street Parking and Landscaping

(…)

23.54.020 Standards and requirements

The minimum required parking spaces for the respective uses shall be as follows:

A.	Residential Uses	Number of Parking Stalls Required
1.	Single-family attached and detached dwellings, manufactured homes, condominiums and duplexes	2 spaces per dwelling unit.

Response: The project is for a 75-lot subdivision for the future construction of detached single-family homes. Because planned lots meet applicable zoning standards, future homes can feasibly be designed to meet applicable parking standards. Compliance with parking standards for future single-family homes will be reviewed with future building permits. Therefore, the applicable standards can be met.

23.54.090 Location of parking spaces

Required off-street parking spaces shall be located as follows:

A. For any type of dwelling: on the same lot with the building to be served.

(…)

Response: Because planned lots meet applicable zoning standards, future homes can feasibly be designed to meet applicable parking standards. Compliance with parking standards for future single-family homes will be reviewed with future building permits. Therefore, the applicable standards can be met.

Title 24 Plats and Subdivisions

Chapter 24.50 Subdivisions

24.50.005 Preapplication conference required.

A preapplication conference pursuant to RMC 19.30.010 is required prior to filing an application for a preliminary subdivision unless the administrator waives this requirement. The administrator's determination to waive this preapplication requirement is based on the scope and complexity of the proposed project, and will be made in the administrator's sole discretion.

Response: A pre-application conference was held on January 14th, 2025. This criterion is met.

24.50.010 Contents of application.

Every preliminary subdivision shall consist of the appropriate application form, applicable fees, and the following:

A. Maps and Exhibits.

1. The preliminary subdivision plat shall be submitted to the city in a digital PDF format;
2. SEPA environmental checklist;
3. A plat certificate dated within 30 days of the application filing date confirming that the title of the lands as described and shown on the short subdivision is in the name of the owner(s) signing;
4. Any other information deemed necessary by the administrator to demonstrate compliance with requirements of the Richland Municipal Code.

B. Preliminary Subdivision Data (To Be Included on the Preliminary Subdivision).

1. Title of the proposed subdivision;
2. Location of the subject property by quarter-quarter(s) of the section, township and range;
3. Legal description of the subject property with the source of the legal description clearly indicated;
4. A vicinity map at a scale of not more than 400 feet to the inch, except that the administrator may approve an alternative scale if requested. The vicinity map shall show all adjacent parcels. It shall show how the streets and alleys in the proposed subdivision connect with existing and proposed streets and alleys in neighboring subdivisions or unplatted property;
5. North arrow, scale and boundary of the proposed subdivision, and the date the map is prepared;
6. Boundaries of all blocks, lot numbers, and lot lines along with their dimensions and areas in square feet and acreage to two decimal places;
7. Location and identification of existing utilities;
8. Location, names and widths of all existing and proposed streets, roads and access easements within the proposed subdivision and within 100 feet thereof, or the nearest city street if there is no city street within 100 feet of the subject property;
9. All easements, including border easements, or tracts proposed to be dedicated for any public purpose or for the common use of the property owner(s) of the subdivision;
10. All existing easements that affect the subject property as shown in a current plat certificate;
11. Location of any natural features such as wooded areas, streams, drainage ways, special flood hazard areas identified on the flood insurance rate map, or critical areas as defined in Chapter 22.10 RMC;
12. Location of existing buildings, septic tanks, drain fields, wells or other improvements such as existing irrigation facilities, easements, rights-of-way, canals, wasteways, drainageways, piping and artificially created wetlands, and a note indicating if they will remain or be removed;
13. Whether adjacent property is platted or unplatted. If platted, give the name of the subdivision. If the proposed subdivision is the division

of a portion of an existing plat, the approximate lines of the existing plat are to be shown, and a copy of the existing plat shall be submitted, along with the recording numbers of any recorded covenants and easements;

14. Topographic information as provided by a licensed land surveyor, at five-foot maximum contour intervals, or at two-foot intervals where overall site topography is too flat to be depicted by five-foot intervals. Delineate areas with any slopes that are 15 percent or greater; and

15. Site data table showing number of proposed lots, existing zoning, water supplier, and method of sewerage.

Response: This narrative and the Preliminary Plans in Submittal Item 3 contain the required data and information. The standard is met.

24.50.050 Findings.

Prior to approving any preliminary subdivision, the hearing examiner shall determine and make written findings of fact that the public interest will be served by the subdivision, the proposed subdivision is in conformity with all applicable development code provisions and that appropriate provisions are made for the following:

A. The public health, safety, and general welfare;

B. Open spaces;

C. Drainage ways/stormwater;

D. Streets or roads, alleys, sidewalks, multi-use pathways, and other public ways;

E. Transit stops;

F. Public potable water supplies and irrigation water right-of-way and distribution facilities;

G. Sanitary sewer;

H. Parks and recreation;

I. Playgrounds, schools and school grounds;

J. Sidewalks and other planning features that assure safe walking conditions for students who only walk to and from school.

Response: The project includes ±75 lots meeting the dimensional standards for detached single-family homes in the R-3 zone. This new community will help the City meet housing need identified in the comprehensive plan, consistent with the approved Horn Rapids Master Plan. The Preliminary Plat (within Submittal Item 3) shows tracts for open space and pedestrian access, providing opportunities for active and passive recreation withing Quail Ridge III, but also connections outward to existing open spaces and recreation areas within Horn Rapids, including the clubhouse and pool constructed in Quail Ridge II and the Horn Rapids Public Golf Course.

The Preliminary Composite Utility Plan and Preliminary Grading Plan (within Submittal Item 3) show a stormwater system providing on-site management and detention and meeting applicable City and Department of Ecology standards.

Horn Rapids is not presently served by transit, though the Richland School District does provide school bus service for students. The nearest school to Quail Rapids III is Sacajawea Elementary, ±3.5 miles from the project. While the nearest school is located more than

walking distance from the project, the new and existing sidewalks will provide students safe, curb and grade separated pedestrian access to school bus stops.

The dedications and full-street improvements for the extension of Emory Avenue, as well as the new internal streets, will provide additional connections to Quail Ridge II and an additional connection to Village Parkway. The planned transportation improvements, internal circulation system, and street cross sections will support the residential uses within the R-3 zone, and the extension of all necessary utilities—including sanitary sewer, storm sewer, water service, irrigation service, and dry utilities—to and through the subject property can serve new homes in Quail Ridge III as well as future homes on appropriately zoned land.

Consequently, the Hearings Examiner can find that the project is in the public interest and provides for public health, safety and welfare. Furthermore, the applicable sections of the City's Comprehensive Plan and development regulations are addressed throughout this narrative with reference to the attached Submittal Items. The applicable standards are met.

Chapter 24.100 Land Division Design Standards

24.100.010 Application.

> **Except for divisions of land which meet the conditions of RMC 24.20.020, the regulations contained in this chapter shall apply to all divisions of land within the city. Every map, plat, replat or plan hereafter made of any such division of land within the city limits shall comply with the provisions of this chapter and the public works standards.**

Response: This project includes a 75-lot subdivision. Therefore, the applicable provisions of Chapter 24.100 are addressed below.

24.100.020 Street requirements.

> **All streets and rights-of-way within a short subdivision, subdivision or binding site plan shall be designed and improved in accordance with city standards as established by Chapter 12.08 RMC and the public works standards.**

Response: The Preliminary Plat within Submittal Item 3 shows 54-foot-wide right-of-way dedications that can be designed and improved in accordance with City standards. Applicable standards are, or can be, met.

24.100.030 Streets – Conformity with comprehensive plan.

> **The alignment of streets shall conform as nearly as possible with those shown on the comprehensive plan or related plans of the city.**

Response: The dedications and full-street improvements for the extension of Emory Avenue, as well as new local streets, will provide additional connections to Quail Ridge II and an additional connection to Village Parkway. The Comprehensive Plan and Citywide Transportation Plan do not prescribe a local street alignment within this part of Horn Rapids. However, the planned transportation improvements, internal circulation system, and street cross sections will support the residential uses within the R-3 zone. The standard is met.

24.100.040 Streets – Relation to adjoining street systems.

> **The layout of streets shall provide for the continuation of major streets existing on adjoining properties or of their proper projection when adjoining property is not divided. The layout shall also provide for future projection of streets into areas which presently are not subdivided.**

Response: Village Parkway and SR 240 are the only higher order streets abutting the project. Both are fully improved where they abut Quail Ridge III. No direct access or connections are planned to SR 240. The dedications and full-street improvements for the extension of Emory Avenue, as well as new local streets, will provide additional connections to Quail Ridge II and an additional connection to Village Parkway. Street stubs provided with Quail Ridge II and planned with Quail Ridge III will provide future street connections for adjacent lands that which are presently not subdivided. The standard is met. This criterion is met.

24.100.060 Streets – Local residential streets.

> **Local streets which serve primarily to provide access to abutting property shall be designed to discourage cut-through traffic and planned to channel traffic onto minor collectors and other major streets. Local residential streets shall be designed to discourage average traffic speeds in excess of the posted or basic rule (25 mph) speed.**

Response: The dedications and full-street improvements for the extension of Emory Avenue, as well as new local streets, will provide additional connections to Quail Ridge II and an additional connection to Village Parkway. The planned local streets discourage speeds in excess of 25 miles per hour by providing on-street parking to visually narrow the travel way, incorporating curvilinear design, and creating T-intersections. Cut through traffic is discouraged by the lack of direct connection between major roadways. New local streets intersect with the extension of Emory Avenue, which connects to Village Parkway. The standard is met.

24.100.080 Streets – Alignment.

> **For major streets, connecting street centerlines deflecting from each other at any one point more than 10 degrees shall be connected by a horizontal curve that meets the minimum curve radius per AASHTO guidelines unless otherwise approved by the public works director. Connecting tangents between curves shall be a minimum of 100 feet long. For minor streets, curves shall have a typical minimum deflection angle of 30 degrees with curve radii between 100 feet minimum and 150 feet maximum unless approved by the public works director or designee. These parameters are to minimize the potential for speeding within neighborhoods.**

Response: The Preliminary Plans in Submittal Item 3 shows the applicable standards are, or can be, met.

24.100.090 Streets – Intersections.

Street intersections shall be as nearly at right angles as is practicable. When the most feasible plan entails an intersection angle that deviates more than 15 degrees from a right angle, curves or suitable radius and lengths shall be provided. Where street intersections have curvature within 275 feet of the centerline of a stop or yield controlled intersection (looking right or left), the plat shall establish sight distance easements if necessary, based on evaluation of the AASHTO sight triangles per RMC 12.11.020.

Response: The Preliminary Plat in Submittal Item 3 shows new street intersections at, or as close as practicable, right angles. The standard is met.

24.100.110 Streets – Grades.

Streets shall confirm closely to the natural contour of the land, except where a different grade has been established by the city authorities or the agency furnishing municipal services to the community. Grades shall be not less than 0.50 percent on any street and shall meet AASHTO maximum guidelines for major streets and a maximum of 12 percent for minor streets, unless otherwise approved by the public works director and the fire marshal based on the fire department's specific apparatus needs. Changes passing through intersections shall not exceed five percent with one percent grade breaks allowed upon entry and exit.

Response: The Preliminary Grading Plan within Submittal Item 3 shows street grades within the subdivision can be designed in accordance the applicable City standards and AASHTO maximum guidelines. The standard can be met.

24.100.120 Streets – Intersection spacing.

Intersection spacing or jogs of minor streets in neighborhoods shall not be less than 125 feet from centerline to centerline of street. Intersection spacing along major streets with minor streets shall use the following table to the extent feasible based on the posted speed of the major street. Greater spacing may be required in some instances where a proposed intersection might be within the ninety-fifth percentile queues from intersections of two major streets.

Posted Speed (MPH)	Minimum Spacing (Feet)
25	155
30	200
35	250
40	305
45	360

Response: The Preliminary Plat in Submittal Item 3 shows minimum spacing requirements are met for local streets. The applicable standard is met.

24.100.130 Streets – Width.

Street widths and right-of-way widths shall be as shown in the public works standards.

Response: The Preliminary Plat in Submittal Item 3 shows planned local streets with a 54-foot-wide right-of-way. The planned right-of-way width meets the Public Works Standards for a local street. The standard is met.

24.100.140 Roadway widths and standards.

All streets, not including alleys, shall be improved in accordance with the public works standards.

Response: The Preliminary Plat in Submittal Item 3 shows planned local streets with a 54-foot-wide right-of-way. The planned right-of-way width meets the Public Works Standards for a local street. Therefore, the local street can be improved in accordance with the Public Works Standards. The applicable standards can be met.

24.100.160 Street name signs.

Street signs corresponding in design to those adopted as standard for the city shall be installed at each intersection for convenient identification of streets. Street naming and addressing shall be consistent with Chapter 12.01 RMC.

Response: Street signs designs and locations will be provided with the final engineering design, consistent with the Public Works Standards. The applicable standards can be met.

24.100.180 Sewer system requirements.

All proposed land division shall be provided with a complete sanitary sewer system serving each lot designed for human habitation. Design of the sewage disposal system shall be in accordance with RMC Title 17 and the public works standards.

Response: The Preliminary Composite Utility Plan within Submittal Item 3 shows the planned sanitary sewer system. Each residential lot will have a service connection to the planned sanitary sewer system, and the detailed design will be provided with final engineering consistent with RMC Title 17 and the Public Works Standards. The applicable standards are, or can be, met.

24.100.190 Water system requirements.

All new development shall be connected to the public water main to provide a potable water distribution system serving each lot designed for human habitation. Design of the water distribution system shall be in accordance with International Fire Code Standards, RMC Title 18 and the public works standards.

Response: The Preliminary Composite Utility Plan within Submittal Item 3 shows the planned public water system. Each residential lot will have a service connection to the potable water distribution system, and the detailed design will be provided with final engineering consistent with International Fire Code Standards, RMC Title 18 and the Public Works Standards. The applicable standards are, or can be, met.

24.100.200 Provision for Irrigation.

Nonpotable irrigation facilities must be provided for every lot within any proposed residential land division in which the use of potable water is restricted pursuant to RMC 18.16.080. The irrigation distribution system (as distinguished from the separate domestic water distribution system) must be designed and installed in accordance with the public works standards and irrigation districts or irrigation purveyor's requirements, except as otherwise approved by the public works director and applicable irrigation district or irrigation purveyor.

Response: The Preliminary Composite Utility Plan within Submittal Item 3 shows the planned irrigation water system. The project is in a Potable Water Use Restricted Zone and subject to Richland Municipal Code 18.16.080. Each residential lot will have a connection to the

irrigation distribution system. The irrigation distribution system for all lots is designed in accordance with public works standards and irrigation district requirements. Refer to the Preliminary Plans included in this application for more details. The applicable standards are, or can be, met.

24.100.210 Stormwater system requirements.

Stormwater runoff from streets, impervious areas, and other areas shall be disposed of through stormwater drainage facilities complying with RMC Title 16 and the public works standards.

Response: The Preliminary Composite Utility Plan within Submittal Item 3 shows the planned stormwater system. Stormwater runoff will be collected in catch basins and conveyed to one or more stormwater detention ponds for treatment, prior to infiltrating on-site. and The detailed design will be provided with final engineering, consistent with RMC Title 16 and the Public Works Standards. The applicable standards are, or can be, met.

24.100.220 Utility rights-of-way and easements – Required.

All municipal utility rights-of-way and utility easements shall be dedicated to the public and shown on the plat. Ten-foot public utility easements shall be placed adjacent to existing and proposed public street ROWs. Separate utility easements shall be located as required by the provider.

Response: The Preliminary Composite Utility Plan within Submittal Item 3 shows the municipal utilities are located within the right-of-way and a public utility easement abutting existing and proposed rights-of-way, except for SR 240. The applicable standards are met.

24.100.240 Capacity for future developments.

The capacities and dimensions of water, sewerage, drainage, electrical, and street facilities shall be adequate to provide for the future needs of other undeveloped properties in the general vicinity. The city may share in the cost of these improvements to the extent of the difference in cost between the capacities needed to serve the development and the capacities required to serve the vicinity.

Response: The planned subdivision has adequate capacity to provide water, sewer, drainage, electrical, and street facilities for future needs of undeveloped properties. There is adequate irrigation capacity for expansion to the east side of Twin Bridges Road. Irrigation capacity was documented and assessed by IRZ Engineering & Consulting in 2022. This criterion is met.

24.100.250 Blocks – Depth.

Except for reverse frontage lots, the width of blocks shall be sufficient to allow for two tiers of lots of depths consistent with the type of land use proposed.

Response: The Preliminary Plat within Submittal Item 3 shows blocks that allow for two tiers of lots, except for the reverse frontage lots necessary where direct access to Village Parkway or SR 240 is not permitted. The applicable standards are met.

24.100.270 Lots – Access.

> **Each lot shall be provided with satisfactory access by means of a public street or by some other legally sufficient right of access (easement) which is permanent and inseparable from the lot served subject to the provisions of RMC Title 12.**

Response: The Preliminary Plat within Submittal Item 3 shows all lots will have direct access to public streets. The standard is met.

24.100.280 Lots – Size.

> **Lot widths and lot areas shall conform with the zoning restrictions applicable to the area within which the property may be located, except that corner lots for which side yards are required shall have extra width to permit appropriate setback from and orientation to both streets. Lot depths shall be suitable for the land use proposed.**

Response: The Preliminary Plat within Submittal Item 3 shows all lots meet applicable R-3 zone standards. Compliance with development standards for future single-family homes will be reviewed with future building permits. Therefore, the applicable standards can be met.

24.100.290 Lots – Shape.

> **Lots shall be as nearly rectangular as possible with side lot lines approximately at right angles or radial to street lines. Ordinarily, the ratio of width to depth shall be one to not more than two and one-fourth. Flag lots shall be discouraged unless no other practical alternative exists as determined by the review authority.**

Response: The Preliminary Plat within Submittal Item 3 shows all lots in the planned subdivision are generally rectangular in shape. Certain lots backing to SR 240, where the local street in front angles away from SR 240, are longer than ordinary. Lots backing SR 240 are also intentionally deeper to provide an opportunity for buffering and/or screening from the highway. No flag lots are planned. The applicable standards are met.

24.100.300 Double frontage.

> **Residential lots which have street frontage along two opposite boundaries shall be avoided except for reverse frontage lots which are essential to provide separation of residential development from traffic arterials, or to overcome specific disadvantages of topography and orientation. For such lots, there shall be an easement in favor of the city limiting access to only one street and a note stating such shall be placed on the face of the final plat map.**

Response: The Preliminary Plat within Submittal Item 3 shows reverse frontage lots are necessary where direct access to Village Parkway or SR 240 is not permitted, and access must be provided by a new local street. Where necessary, an easement benefiting the City can be provided to limit access to the higher order street. The applicable standards are, or can be, met.

24.100.310 Standard specifications.

Physical developments and improvements required by this title shall be designed and installed in accordance with public works standards and/or other specifications as determined by the public works director. Construction shall be performed subject to the inspection of the public works director or designee. The improvement intended to become part of the city system, including streets, water, electrical and sewer utilities, shall not become part of the city system until formally accepted by the city.

Response: All improvements within the public right of way and improvements within easements dedicated to the public are intended to become a part of the city system. All improvements within the site meet city public works standards. All construction will be inspected by the public works director or their designee. Refer to the Preliminary Plans included in this application for more details. This criterion is met.

24.100.320 Streetlights required.

Streetlights shall be installed by the developer in accordance with the public works standards.

Response: Streetlights are planned to meet the applicable public works standards and will be reviewed with final engineering. The standard can be met.

24.100.330 Other utilities required.

New electrical, telephone, and cable television lines must be placed underground, except:

A. Electric utility substations, pad-mounted transformers and switching facilities, and electrical service pedestals.

B. CATV pedestals, active and passive devices, including amplifiers and cable warning signs.

C. Telephone pedestals, cross connect terminals, repeaters and cable warning signs.

D. Temporary services for construction.

E. Existing overhead electric and communications lines which are not in substantial conflict with the final, approved design such that they would render lots or streets unusable.

F. Existing main feeder lines which are relocated.

Response: The Preliminary Plan in Submittal Item 3 shows a PUE along all lot fronts to allow for all other utilities to be installed underground, except as allowed in this section. Refer to the Preliminary Plans included in this application for more details. This criterion is met.

IV. Conclusion

The submittal requirements have been met and the required findings made for all applicable approval criteria. These findings serve as the basis for the City of Richland to approve the application and are supported by substantial evidence in the application materials. Therefore, the Applicant respectfully requests approval of Quail Ridge III.

2. Title Reports

DISTRIBUTION LIST

Our Order No.: **CBF19503**
Reference No:
Re: **PAHLISCH HOMES AT HORN RAPIDS**
Property Address: **VACANT LAND**
RICHLAND, WA 99352

This Preliminary Commitment has been prepared and distributed to the following parties:

	Lender
Selling Agent	**Listing Agent**
Additional Selling Agent	**Additional Listing Agent**
Buyer's Attorney	**Seller's Attorney**
Mortgage Broker	**Additional Lender**
	BrockA@pahlisch.com

SHORT PLAT CERTIFICATE

SCHEDULE A

Office File Number	Date of Policy	Premium
CBF19503	**March 11, 2025**	**$350.00**
Ref. No.:	at 8:00 a.m.	

THE ASSURED REFERRED TO ON THE FACE PAGE ARE:

THAT ACCORDING TO THE COMPANY'S PROPERTY RECORDS RELATIVE TO THE FOLLOWING DESCRIBED REAL PROPERTY (BUT WITHOUT EXAMINATION OF THOSE COMPANY RECORDS MAINTAINED AND INDEXED BY NAME):

SEE ATTACHED EXHIBIT "A"

A. THE LAST RECORDED INSTRUMENT PURPORTING TO TRANSFER TITLE TO SAID REAL PROPERTY INDICATES THAT TITLE WAS CONVEYED TO:

PAHLISCH HOMES AT HORN RAPIDS, AN OREGON LIMITED PARTNERSHIP

B. THERE ARE NO MORTGAGES OR DEEDS OF TRUST WHICH PURPORT TO AFFECT SAID PROPERTY, OTHER THAN THOSE SHOWN BELOW UNDER EXCEPTIONS.

NO GUARANTEE IS MADE REGARDING (A) MATTERS AFFECTING THE BENEFICIAL INTEREST OF ANY MORTGAGE OR DEED OF TRUST WHICH MAY BE SHOWN HEREIN AS AN EXCEPTION, OR (B) OTHER MATTERS WHICH MAY AFFECT ANY SUCH MORTGAGE OR DEED OF TRUST.

NO GUARANTEE IS MADE REGARDING ANY LIENS, CLAIMS OF LIEN, DEFECTS OR ENCUMBRANCES OTHER THAN THOSE SPECIFICALLY PROVIDED FOR ABOVE, AND, IF INFORMATION WAS REQUESTED BY REFERENCE TO A STREET ADDRESS, NO GUARANTEE IS MADE THAT SAID REAL PROPERTY IS THE SAME AS SAID ADDRESS.

EXCEPTIONS:

1. **DELINQUENT GENERAL TAXES FOR THE YEAR 2024, PLUS INTEREST AND PENALTIES;**
   AMOUNT: $193.71
   TAX ACCOUNT NO.: 1-2008-302-0010-000 PARCEL A

2. **GENERAL TAXES FOR THE YEAR 2025. THE FIRST HALF THEREOF MUST BE PAID ON OR BEFORE APRIL 30, 2025, TO AVOID INTEREST AND PENALTIES;**
   AMOUNT BILLED: $1,283.57
   AMOUNT DUE: $641.82
   TAX ACCOUNT NO.: 1-2008-302-0010-000 PARCEL A

3. **GENERAL TAXES FOR THE YEAR 2025. THE FIRST HALF THEREOF MUST BE PAID ON OR BEFORE APRIL 30, 2025, TO AVOID INTEREST AND PENALTIES;**
   AMOUNT BILLED: $6,348.74
   AMOUNT DUE: $3,174.42
   TAX ACCOUNT NO.: 1-2008-300-0009-023 PARCEL B

CONTINUED

4. **GENERAL TAXES FOR THE YEAR 2025. THE FIRST HALF THEREOF MUST BE PAID ON OR BEFORE APRIL 30, 2025, TO AVOID INTEREST AND PENALTIES;**
   AMOUNT BILLED: **$1,662.72**
   AMOUNT DUE: **$831.39**
   TAX ACCOUNT NO.: **1-2008-202-0003-000 PARCEL C**

5. **UNPAID CHARGES AND ASSESSMENTS, IF ANY, LEVIED BY HORN RAPIDS HOMEOWNERS ASSOCIATION.**

6. **UNPAID CHARGES AND ASSESSMENTS, IF ANY, LEVIED BY QUAIL RIDGE OWNERS ASSOCIATION.**

7. **TERMS, COVENANTS, CONDITIONS AND PROVISIONS AS SET FORTH IN DEED TO THE CITY OF RICHLAND**

   RECORDING NO.: **87-4170 AND CORRECTED UNDER RECORDING NO. 2016-017764**
   AFFECTS: **INCLUDES OTHER PROPERTY**

8. **COVENANTS, CONDITIONS AND RESTRICTIONS BUT OMITTING ANY COVENANTS OR RESTRICTIONS, IF ANY, INCLUDING BUT NOT LIMITED TO THOSE BASED UPON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, FAMILIAL STATUS, MARITAL STATUS, DISABILITY, HANDICAP, NATIONAL ORIGIN, ANCESTRY, SOURCE OF INCOME, GENDER, GENDER IDENTITY, GENDER EXPRESSION, MEDICAL CONDITION OR GENETIC INFORMATION, AS SET FORTH IN APPLICABLE STATE OR FEDERAL LAWS, EXCEPT TO THE EXTENT THAT SAID COVENANT OR RESTRICTION IS PERMITTED BY APPLICABLE LAW, AS SET FORTH IN THE DOCUMENT**

   RECORDING NO.: **94-18376**

   MODIFICATION(S) OF SAID COVENANTS, CONDITIONS AND RESTRICTIONS

   RECORDING NO.: **2001-021610, 2003-061197, 2005-026398, 2005-030827, 2007-022828, 2015-030743, 2016-006290 A RE-RECORD OF 2016-006215, 2018-002298, 2021-008986 AND 2021-016191**
   AFFECTS: **INCLUDES OTHER PROPERTY**

9. **RELINQUISHMENT OF ALL EXISTING, FUTURE OR POTENTIAL EASEMENTS FOR ACCESS, LIGHT, VIEW AND AIR, AND ALL RIGHTS OF INGRESS, EGRESS AND REGRESS TO, FROM AND BETWEEN SAID PREMISES AND THE HIGHWAY OR HIGHWAYS TO BE CONSTRUCTED ON LANDS CONVEYED BY DEED;**
   RECORDED: **MARCH 2, 1967**
   RECORDING NO.: **573713**
   TO: **THE STATE OF WASHINGTON**
   FOR: **ALL RIGHTS OF INGRESS AND EGRESS**
   AFFECTS: **INCLUDES OTHER PROPERTY**

CONTINUED

10. RESERVATIONS AND RECITALS CONTAINED IN THE DEED AS SET FORTH BELOW:
    DATED: MARCH 21, 1969
    RECORDING DATE: MARCH 21, 1969
    RECORDING NO.: 599668

    SAID DOCUMENT PROVIDES FOR, AMONG OTHER THINGS, THE FOLLOWING:
    ALL OIL, GAS, COAL, MINERAL AND MINING INTERESTS AND SUBSURFACE RIGHTS OF THE NORTHERN PACIFIC RAILWAY COMPANY, A WISCONSIN CORPORATION HAVE BEEN CONVEYED TO THE UNITED STATES OF AMERICA.
    AFFECTS: INCLUDES OTHER PROPERTY

    NO INSURANCE IS MADE AS TO THE PRESENT OWNERSHIP OF THE ESTATE OR INTEREST REFERRED TO BY THIS EXCEPTION, AND NO INVESTIGATION HAS BEEN MADE THERETO.

11. ROAD AND UTILITIES EASEMENT AND AGREEMENT AND THE TERMS, CONDITIONS AND PROVISIONS THEREOF;
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028629
    BETWEEN: CITY OF RICHLAND; ET AL
    AFFECTS: INCLUDES OTHER PROPERTY

12. ROAD AND UTILITIES EASEMENT AND AGREEMENT AND THE TERMS, CONDITIONS AND PROVISIONS THEREOF;
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028630
    BETWEEN: CITY OF RICHLAND; ET AL
    AFFECTS: INCLUDES OTHER PROPERTY

13. DRAINAGE EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028631
    AFFECTS: INCLUDES OTHER PROPERTY

14. EMERGENCY ACCESS AND UTILITIES EASEMENT AND AGREEMENT AND THE TERMS, CONDITIONS AND PROVISION THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028632
    AFFECTS: INCLUDES OTHER PROPERTY

15. SEWER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028633
    AFFECTS: INCLUDES OTHER PROPERTY

CONTINUED

16. SEWER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028634
    AFFECTS: INCLUDES OTHER PROPERTY

17. SEWER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028635
    AFFECTS; INCLUDES OTHER PROPERTY

18. SEWER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028636
    AFFECTS; INCLUDES OTHER PROPERTY

    NOTE: RELINQUISHMENT RECORDED UNDER AUDITOR'S FILE NO. 2017-002344

19. SEWER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028637
    AFFECTS; INCLUDES OTHER PROPERTY

20. SEWER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028638
    AFFECTS; INCLUDES OTHER PROPERTY

    NOTE: RELINQUISHMENT RECORDED UNDER AUDITOR'S FILE NO. 2017-002345

21. WATER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028639
    AFFECTS: INCLUDES OTHER PROPERTY

22. WATER EASEMENT AGREEMENT AND THE TERMS AND CONDITIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028640
    AFFECTS: INCLUDES OTHER PROPERTY

CONTINUED

23. ELECTRICAL AND WATER EASEMENT AND AGREEMENT AND THE TERMS, CONDITIONS AND PROVISIONS THEREOF;
    BETWEEN: CITY OF RICHLAND, ET AL
    RECORDED: JULY 25, 2002
    RECORDING NO.: 2002-028641
    AFFECTS: INCLUDES OTHER PROPERTY

24. TERMS AND CONDITIONS AND PROVISIONS AS SET FORTH IN ORDINANCE NO. 71-15, RECORDED UNDER AUDITOR'S FILE NO. 2016-000862.
    AFFECTS: INCLUDES OTHER PROPERTY

25. TERMS AND CONDITIONS CONTAINED IN DEED:
    GRANTOR: CITY OF RICHLAND, A WASHINGTON MUNICIPAL CORPORATION
    GRANTEE: STATE OF WASHINGTON, ACTING BY AND THROUGH IT DEPARTMENT OF TRANSPORTATION
    FOR: RELINQUISHMENT OF ACCESS RIGHTS
    RECORDED: SEPTEMBER 29, 2017
    RECORDING NO.: 2017-028179, BEING A RE-RECORD OF 2017-020178.
    AFFECTS: INCLUDES OTHER PROPERTY

26. TERMS AND CONDITIONS OF CITY OF RICHLAND ORDINANCE NO. 18-18, RECORDED JUNE 5, 2018 UNDER AUDITOR'S FILE NO. 2018-016037.

    NOTE: SAID INSTRUMENT CORRECTS ORDINANCE NO. 07-17, RECORDED UNDER AUDITOR'S FILE NO. 2018-010457.

    AFFECTS: INCLUDES OTHER PROPERTY

27. TERMS AND CONDITIONS CONTAINED IN DEED:
    GRANTOR: CITY OF RICHLAND, A WASHINGTON MUNICIPAL CORPORATION
    GRANTEE: STATE OF WASHINGTON, ACTING BY AND THROUGH IT DEPARTMENT OF TRANSPORTATION
    FOR: RELINQUISHMENT OF ACCESS RIGHTS
    RECORDED: APRIL 3, 2018
    RECORDING NO.: 2018-009302
    AFFECTS: INCLUDES OTHER PROPERTY

28. TERMS AND CONDITIONS CONTAINED IN DEED:
    GRANTOR: CITY OF RICHLAND, A WASHINGTON MUNICIPAL CORPORATION
    GRANTEE: STATE OF WASHINGTON, ACTING BY AND THROUGH IT DEPARTMENT OF TRANSPORTATION
    FOR: RELINQUISHMENT OF ACCESS RIGHTS
    RECORDED: SEPTEMBER 29, 2017
    RECORDING NO.: 2017-020179
    AFFECTS: INCLUDES OTHER PROPERTY

29. EASEMENT DELINEATED ON THE FACE OF THE PLAT OF SAID SUBDIVISION OF QUAIL RIDGE PHASE 1 AND 2 AND QUAIL RIDGE II, PHASE 1; FOR UTILITIES (AFFECTS PORTION OF SAID PREMISES)

CONTINUED

30. **NOTES AS CONTAINED ON THE FACE OF SAID PLAT OF QUAIL RIDGE PHASE 1 AND 2, AND QUAIL RIDGE II PHASE 1 AS FOLLOWS:**

A) VILLAGE PARKWAY IS CLASSIFIED AS AN ARTERIAL COLLECTOR STREET, SUBSEQUENTLY, NO DRIVEWAYS ACCESSING SINGLE FAMILY LOTS WILL BE ALLOWED ON IT.

B) TRACT A IS TO BE USED FOR A STORM POND AND IS HEREBY CONVEYED TO THE CITY OF RICHLAND.
HOMEOWNERS MAY MAINTAIN THE LANDSCAPING WITHIN TRACT A STORM POND FOR AESTHETIC PURPOSES IF SO DESIRED. TRACT B IS FOR OPEN SPACE WITH A MONUMENT AND LANDSCAPING AND IS RESERVED FOR FUTURE DEDICATION TO THE HOMEOWNER'S ASSOCIATION BY A SEPARATE INSTRUMENT. TRACTS C THROUGH H ARE FOR FUTURE DEVELOPMENT AND ARE TO BE RETAINED BY OWNER OF RECORD.

C) ADDRESS NUMBERS [NOTED IN BRACKETS] ARE SUBJECT TO CHANGE BY THE CITY OF RICHLAND AT TIME OF BUILDING PERMIT ISSUANCE.

D) LOTS WITHIN THIS PLAT ARE RESERVED FOR DETACHED SINGLE FAMILY RESIDENCES ONLY. NO DUPLEXES OR ATTACHED SINGLE FAMILY RESIDENCES SHALL BE PERMITTED.

E) ALL LIVING UNITS ON THIS PROPERTY SHALL BE DESIGNED AND INTENDED FOR USE AND OCCUPANCY AS A RESIDENCE BY A SINGLE-FAMILY.

F) RESIDENTIAL DEVELOPMENT SHALL CONFORM TO THE STANDARDS CONTAINED IN THE R2-S SINGLE-FAMILY RESIDENTIAL SMALL LOT ZONING DISTRICT AS THEY EXIST AT THE TIME OF PRELIMINARY PLAT APPROVAL; EXCEPT THAT ONLY DETACHED SINGLE-FAMILY DWELLINGS MAY BE PERMITTED WITHIN QUAIL RIDGE. DUPLEXES, TRI-PLEXES, FOUR-PLEXES, TOWNHOMES NOR ANY OTHER STYLE OF MULTI-FAMILY LIVING UNITS ARE NOT PERMITTED WITHIN QUAIL RIDGE. ZERO LOT-LINE CONSTRUCTION IS PROHIBITED.

G) SETBACKS, BUILDING HEIGHTS AND LOT COVERAGE LIMITS FOR SINGLE-FAMILY DETACHED DWELLINGS SHALL BE AS SET FORTH IN IN THE SITE REQUIREMENTS FOR RESIDENTIAL USE DISTRICTS TABLE (RMC 23.18.040) INCLUDING FOOTNOTE # 10:
(FOOTNOTE # 10) SETBACKS, BUILDING HEIGHTS, AND LOT COVERAGE REQUIREMENTS FOR ONE-FAMILY ATTACHED, ONE-FAMILY DETACHED AND TWO-FAMILY DETACHED DWELLINGS IN THE R-3 ZONING DISTRICT SHALL BE THE SAME AS THOSE SET FORTH FOR DEVELOPMENT IN THE R-2S ZONING DISTRICT.

H) THE CITY OF RICHLAND'S STANDARD FOR STORM POND MAINTENANCE CONSISTS OF SEMI-ANNUAL VEGETATION ABATEMENT AND SPECIFICALLY DOES NOT INCLUDE IRRIGATION, LANDSCAPING OR OTHER AESTHETIC IMPROVEMENTS.

I) ALL LANDSCAPED AREAS WITHIN THE PLAT THAT ARE IN THE PUBLIC RIGHT OF WAY SHALL BE THE RESPONSIBILITY OF THE HOMEOWNERS TO MAINTAIN.

NOTES CONTINUED ON FOLLOWING PAGE

J) IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT FOR THE QUAIL RIDGE SUBDIVISION BY SHANNON & WILSON, INC. (REPORT NO. 22-1-03168-001, DATED 2/2/2017), 15-INCH-WIDE CONTINUOUS FOOTINGS OR 24-INCH-WIDE SPREAD FOOTINGS ARE REQUIRED.

K) DEVELOPMENT OF LOTS WITHIN THIS PLAT SHALL BE PERFORMED IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT FOR QUAIL RIDGE PREPARED BY PBS ENGINEERING (PROJECT NO. 66118.002, DATED SEPTEMBER 15, 2020).

L) THE PLAT OF QUAIL RIDGE II PHASE I LIES WITHIN THE BOUNDARY OF THE "RICHLAND TRAFFIC IMPACT FEE" PROGRAM (RMC 12.03), AS SUCH, EACH DWELLING PERMIT WITHIN THE PLAT SHALL THEREFORE BE SUBJECT TO THE FEES ADMINISTERED BY THE FINANCE PLAN FOR ANY PHASE SUBMITTED FOR APPROVAL.

31. **COVENANTS, CONDITIONS AND RESTRICTIONS CONTAINED IN INSTRUMENT;**
    RECORDED: September 17, 2020
    AUDITOR'S FILE NO.: 2020-035672

32. **BYLAWS OF QUAIL RIDGE OWNERS ASSOCIATION AND THE TERMS AND CONDITIONS THEREOF:**
    RECORDED: September 17, 2020
    AUDITOR'S FILE NO.: 2020-035673

33. **RECORD OF SURVEY 5765 AND THE TERMS AND CONDITIONS THEREOF:**
    RECORDED: January 06, 2023
    AUDITOR'S FILE NO.: 2023-000265

END OF SCHEDULE A EXCEPTIONS.

NOTES:

a. THE ADDRESS OF THE SUBJECT PROPERTY IS:
VACANT LAND
RICHLAND, WA 99352

b. ACCORDING TO THE RECORDS OF BENTON COUNTY ASSESSOR, THE CURRENT VALUE OF SAID PREMISES IS AS FOLLOWS:

TAX ACCOUNT NO.:	1-2008-302-0010-000
LAND:	$137,200.00
IMPROVEMENTS:	$0.00
TOTAL:	$137,200.00

TAX ACCOUNT NO.:	1-2008-300-0009-023
LAND:	$686,680.00
IMPROVEMENTS:	$0.00
TOTAL:	$686,680.00

TAX ACCOUNT NO.:	1-2008-202-0003-000
LAND:	$178,300.00
IMPROVEMENTS:	$0.00
TOTAL:	$178,300.00

c. THE FOLLOWING ABBREVIATED LEGAL DESCRIPTION IS PROVIDED AS A COURTESY TO ENABLE THE DOCUMENT PREPARER TO CONFORM WITH THE REQUIREMENTS OF RCW 65.04.045, PERTAINING TO STANDARDIZATION OF RECORDED DOCUMENTS.

ABBREVIATED LEGAL DESCRIPTION: TRACT E, PTN OF TRACT D, QUAIL RIDGE PHASE 1 & 2, PTN. W 1/2 NW 20-10-28, TRACT C, QUAIL RIDGE II, PHASE 1

d. CONVEYANCES AFFECTING SAID PREMISES WITHIN THE LAST 24 MONTHS WERE RECORDED UNDER AUDITOR'S FILE NO(S). 2021-032149 AND 2024-006302, A COPY OF WHICH ARE ATTACHED.

EXHIBIT "A"

PARCEL A:

TRACT E, A PORTION OF TRACT D, BOTH OF QUAIL RIDGE PHASE I & 2, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 15 OF PLATS, PAGE 680, UNDER BENTON COUNTY AUDITOR'S FILE NUMBER 2020-025039 AND A PORTION OF THOSE LANDS DESCRIBED IN DEED RECORDED UNDER BENTON COUNTY AUDITOR'S FILE NUMBER 2005-026833, LOCATED WITHIN THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER, THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 20, TOWNSHIP 10 NORTH, RANGE 28 EAST OF THE WILLAMETTE MERIDIAN, CITY OF RICHLAND, BENTON COUNTY, WASHINGTON, DESCRIBED MORE PARTICULARLY AS FOLLOWS:

COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 20, MARKED BY A 3 INCH BRASS CAP INSCRIBED "S20-S21-S28-S29 T10N R28E LS 6455 1994" ON THE GOLF COURSE FAIRWAY, LOCATED NORTH

86°44'36" EAST A DISTANCE OF 5,300.70 FEET FROM THE SOUTHWEST CORNER OF SAID SECTION 20, MARKED BY A STONE WITH "X" IN IRRIGATION VALVE CASE NEAR THE INTERSECTION OF WEIDLE ROAD & E 811 PR NE AT FENCE CORNER;

THENCE NORTH 00°16'10" EAST ALONG THE EAST LINE OF SAID SECTION 20 A DISTANCE OF 175.39 FEET TO THE INTERSECTION WITH THE SOUTHWESTERLY EASEMENT MARGIN OF STATE ROUTE 240, ALSO KNOWN AS SECONDARY STATE HIGHWAY NO. I I -C, GRANTED PER DEED RECORDED UNDER BENTON COUNTY AUDITOR'S FILE NUMBER 573713, SAID SOUTHWESTERLY EASEMENT MARGIN BEING A 75.00 FOOT OFFSET FROM THE CENTERLINE THEREOF;

THENCE NORTH 52°35'11 " WEST ALONG SAID SOUTHWESTERLY EASEMENT MARGIN A DISTANCE OF 2,555.47 FEET TO A POINT HEREAFTER MARKED BY A 5/8 INCH REBAR WITH YELLOW PLASTIC CAP INSCRIBED "MATARAZZO 46318";

THENCE SOUTH 35°55'34" WEST A DISTANCE OF 117.51 FEET TO THE TRUE POINT OF BEGINNING;

BEING A POINT ON THE ARC OF A NON-TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 102.00 FEET; THE RADIUS POINT OF WHICH BEARS SOUTH 36°58'07" WEST;

CONTINUED

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 120.34 FEET, WITH A DELTA ANGLE OF 67°35'50", A CHORD BEARING OF SOUTH 19°13'58" EAST, AND A CHORD LENGTH OF 113.48 FEET;

THENCE SOUTH 14°33'57" WEST A DISTANCE OF 45.09 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE LEFT, HAVING A RADIUS OF 25.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 39.27 FEET, WITH A DELTA ANGLE OF 90°00'00", A CHORD BEARING OF SOUTH 30°26'03" EAST, AND A CHORD LENGTH OF 35.36 FEET TO THE INTERSECTION WITH THE NORTHEASTERLY RIGHT OF WAY MARGIN OF VILLAGE PARKWAY DEDICATED PER SAID PLAT OF QUAIL RIDGE PHASE I & 2;

THENCE ALONG SAID NORTHEASTERLY RIGHT OF WAY MARGIN THE FOLLOWING COURSES:

THENCE NORTH 75°26'03" WEST A DISTANCE OF 62.89 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 458.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 88.56 FEET, WITH A DELTA ANGLE OF 11°04'44", A CHORD BEARING OF NORTH 69°53'41 " WEST, AND A CHORD LENGTH OF 88.42 FEET;

THENCE NORTH 64°21'20" WEST A DISTANCE OF 378.80 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE LEFT, HAVING A RADIUS OF 562.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 99.43 FEET, WITH A DELTA ANGLE OF 10°08'11", A CHORD BEARING OF NORTH 69°25'25" WEST, AND A CHORD LENGTH OF 99.30 FEET;

THENCE NORTH 74°29'30" WEST A DISTANCE OF 483.39 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 562.00 FEET; THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 50.93 FEET, WITH A DELTA ANGLE OF 05°11'33", A CHORD BEARING OF NORTH 71°53'44" WEST, AND A CHORD LENGTH OF 50.91 FEET;

THENCE NORTH 69°17'57" WEST A DISTANCE OF 247.61 FEET TO THE SOUTHWEST CORNER OF SAID TRACT E;

THENCE LEAVING SAID NORTHEASTERLY RIGHT OF WAY MARGIN AND FOLLOWING ALONG THE BOUNDARY OF SAID TRACT E THE FOLLOWING COURSES:

THENCE NORTH 20°42'03" EAST A DISTANCE OF 33.51 FEET;

CONTINUED

THENCE SOUTH 69°17'53" EAST A DISTANCE OF 473.24 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE LEFT, HAVING A RADIUS OF 424.47 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 38.47 FEET, WITH A DELTA ANGLE OF 05°11'33", A CHORD BEARING OF SOUTH 71°53'40" EAST, AND A CHORD LENGTH OF 38.46 FEET;

THENCE SOUTH 74°29'26" EAST A DISTANCE OF 268.02 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 575.53 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 49.43 FEET, WITH A DELTA ANGLE OF 04°55'16", A CHORD BEARING OF SOUTH 72°01'49" EAST, AND A CHORD LENGTH OF 49.42 FEET;

THENCE LEAVING SAID TRACT E BOUNDARY NORTH 20°25'17" EAST A DISTANCE OF 153.50 FEET TO A POINT ON THE ARC OF A NON-TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 729.00 FEET; THE RADIUS POINT OF WHICH BEARS SOUTH 20°25'17" WEST;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 66.46 FEET, WITH A DELTA ANGLE OF 05°13'23", A CHORD BEARING OF SOUTH 66°58'01 " EAST, AND A CHORD LENGTH OF 66.43 FEET;

THENCE SOUTH 64°21'20" EAST A DISTANCE OF 390.42 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 102.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 20.16 FEET, WITH A DELTA ANGLE OF 11°19'26", A CHORD BEARING OF SOUTH 58°41'36" EAST, AND A CHORD LENGTH OF 20.13 FEET TO THE TRUE POINT OF BEGINNING.

HAVING AN AREA OF 108,647 SQUARE FEET, 2.49 ACRES, MORE OR LESS.

PARCEL B:

A PORTION OF THOSE LANDS DESCRIBED IN DEED RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 2005-026833, LOCATED WITHIN THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 10 NORTH, RANGE 28 EAST OF THE WILLAMETTE MERIDIAN, CITY OF RICHLAND, BENTON COUNTY, WASHINGTON, DESCRIBED MORE PARTICULARLY AS FOLLOWS:

CONTINUED

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 20, MARKED BY A 5/8 INCH REBAR WITH YELLOW PLASTIC CAP INSCRIBED "LS 16216" IN CASE AT THE

CENTERLINE OF TWIN BRIDGES ROAD, LOCATED NORTH 00°58'12" EAST A DISTANCE OF 2,641.78 FEET FROM THE SOUTHWEST CORNER OF SAID SECTION 20, MARKED BY A STONE WITH "X" IN IRRIGATION VALVE CASE NEAR THE INTERSECTION OF WEIDLE ROAD & E 811 PR NE AT FENCE CORNER; THENCE NORTH 00°57'17" EAST ALONG THE WEST LINE OF SAID SECTION 20 A DISTANCE OF 1458.49 FEET TO THE INTERSECTION WITH THE EAST MARGIN OF TWIN BRIDGES ROAD RIGHT OF WAY, DEDICATED PER CITY OF RICHLAND ORDINANCE NO. 18-10, PAGES 34 THROUGH 36 OF 38, RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 2010-020839 AND THE TRUE POINT OF BEGINNING;

THENCE NORTH 00°57'17" EAST CONTINUING ALONG SAID WEST LINE OF SECTION 20 A DISTANCE OF 368.54 FEET TO THE INTERSECTION WITH THE SOUTHWESTERLY EASEMENT MARGIN OF STATE ROUTE 240, ALSO KNOWN AS SECONDARY STATE HIGHWAY NO. 11-C, GRANTED PER DEED RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 573713, SAID SOUTHWESTERLY EASEMENT MARGIN BEING A 75.00 FEET OFFSET FROM THE CENTERLINE THEREOF;

THENCE SOUTH 52°35'11" EAST ALONG SAID SOUTHWESTERLY EASEMENT MARGIN A DISTANCE OF 771.54 FEET;

THENCE SOUTH 37°24'49" WEST A DISTANCE OF 158.26 FEET,

THENCE NORTH 52°35'11" WEST A DISTANCE OF 35.74 FEET;

THENCE SOUTH 37°24'49" WEST A DISTANCE OF 329.00 FEET;

THENCE SOUTH 61°57'09" WEST A DISTANCE OF 27.75 FEET;

THENCE NORTH 89°02'49" WEST A DISTANCE OF 71.00 FEET;

THENCE SOUTH 00°57'11" WEST A DISTANCE OF 20.00 FEET;

THENCE NORTH 89°02'49" WEST A DISTANCE OF 166.97 FEET TO THE EAST MARGIN OF SAID TWIN BRIDGES ROAD RIGHT OF WAY, BEING A 40.00 FEET OFFSET FROM THE CENTERLINE THEREOF;

THENCE NORTH 00°57'17" EAST ALONG SAID EAST RIGHT OF WAY MARGIN A DISTANCE OF 208.45 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURING TO THE LEFT, HAVING A RADIUS OF 1,040.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 289.38 FEET WITH A DELTA ANGLE OF 15°56'33", A CHORD BEARING OF NORTH 07°00'69" WEST, AND A CHORD LENGTH OF 288.44 FEET TO THE POINT OF BEGINNING.

TOGETHER WITH A PORTION OF THOSE LANDS DESCRIBED IN DEED RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 2005-026833, LOCATED WITHIN THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 20, TOWNSHIP 10 NORTH, RANGE 28 EAST OF THE WILLAMETTE MERIDIAN, CITY OF RICHLAND, BENTON COUNTY, WASHINGTON DESCRIBED MORE PARTICULARLY AS FOLLOWS:

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 20, MARKED BY A 5/8 INCH REBAR WITH YELLOW PLASTIC CAP INSCRIBED "LS 16216" IN CASE AT THE CENTERLINE OF TWIN BRIDGES ROAD. LOCATED NORTH 00°58'12" EAST A DISTANCE OF 2,641.78 FEET FROM THE SOUTHWEST CORNER OF SAID SECTION 20, MARKED BY A STONE WITH "X" IN IRRIGATION VALVE CASE NEAR THE INTERSECTION OF WEIDLE ROAD AND & E 811 PR NE AT FENCE CORNER;

THENCE SOUTH 00°58'12" WEST ALONG THE WEST LINE OF SAD SECTION 20 A DISTANCE OF 762.73 FEET TO THE TRUE POINT OF BEGINNING.

CONTINUED

THENCE SOUTH 00°58'12" WEST CONTINUING ALONG SAID WEST LINE OF SECTION 20 A DISTANCE OF 617.40 FEET TO THE INTERSECTION WITH THE NORTHEASTERLY RIGHT OF WAY MARGIN OF THE FORMER RICHLAND IRRIGATION DISTRICT CANAL DESCRIBED IN DEED RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 87-4170 AND DEPICTED ON RICHLAND IRRIGATION DISTRICT CANAL SURVEY NO. 5052, BY CITY OF RICHLAND, RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 2018-023978, SAID NORTHEASTERLY RIGHT OF WAY MARGIN BEING A 50.00 FEET OFFSET FROM THE CENTERLINE THEREOF, THENCE ALONG SAID NORTHEASTERLY RIGHT OF WAY MARGIN THE FOLLOWING COURSES:

THENCE SOUTH 32°07'49" EAST A DISTANCE OF 35.71 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE LEFT, HAVING A RADIUS OF 400.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 94.87 FEET, WITH A DELTA ANGLE OF 13°35'19", A CHORD BEARING OF SOUTH 38°55'28" EAST, AND A CHORD LENGTH OF 94.64 FEET;

THENCE SOUTH 45°43'08" EAST A DISTANCE OF 104.50 FEET TO A POINT OF CURVATURE WITH A TANGENT TURNING TO THE LEFT, HAVING A RADIUS OF 300.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 201.61 FEET, WITH A DELTA ANGLE OF 38°30'15", A CHORD BEARING OF SOUTH 64°58'15" EAST, AND A CHORD LENGTH OF 197.83 FEET;

THENCE SOUTH 84°13'23" EAST A DISTANCE OF 238.59 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 1225.00 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 1,379.87 FEET, WITH A DELTA ANGLE OF 64°32'21", A CHORD BEARING OF SOUTH 51°57'12" EAST, AND A CHORD LENGTH OF 1,308.06 FEET TO THE NORTHWEST CORNER OF THE PLAT OF GRAYHAWK PHASE 2 RECORDED IN VOLUME 15 OF PLATS AT PAGE 563 UNDER BENTON COUNTY AUDITORS FILE NUMBER 2017-023243;

THENCE LEAVING SAID NORTHEASTERLY RIGHT-OF-WAY MARGIN NORTH 72°11'54" EAST ALONG THE NORTHERLY BOUNDARY OF SAID PLAT OF GRAYHAWK PHASE 2 A DISTANCE OF 137.07 FEET TO THE INTERSECTION WITH THE WEST BOUNDARY OF THE GOLF COURSE PARCEL DESCRIBED IN DEED RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 2019-006258 AND DEPICTED ON AMENDED SURVEY NO. 3935 RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 2008-029833;

THENCE NORTH 17°49'17" WEST ALONG SAID WEST BOUNDARY A DISTANCE OF 341.44 FEET TO THE INTERSECTION WTH THE SOUTH AND WEST COMPOSITE BOUNDARY OF THOSE LANDS DESCRIBED IN DEEDS RECORDED UNDER BENTON COUNTY AUDITOR'S FILE NUMBERS 2019-008939 AND 2020-00064, PORTIONS OF SAID SOUTH AND WEST COMPOSITE BOUNDARY ARE A 20.00 FEET NORTHEASTERLY OFFSET FROM SAID NORTHEASTERLY RIGHT OF WAY MARGIN OF THE FORMER RICHLAND IRRIGATION DISTRICT CANAL;

THENCE ALONG SAID SOUTH AND WEST COMPOSITE BOUNDARY THE FOLLOWING COURSES;

CONTINUED

THENCE SOUTH 72°12'36" WEST A DISTANCE OF 176.25 FEET TO THE BEGINNING OF THE 20.00 FEET OFFSET PORTION AND BEING A POINT ON THE ARC OF A NON-TANGENT CURVE TURNING TO THE LEFT, HAVING A RADIUS OF 1,245.00 FEET; THE RADIUS POINT OF WHICH BEARS SOUTH 54°20'40" WEST;
THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 1,055.34 FEET, WITH A DELTA ANGLE OF 48°34'03", A CHORD BEARING OF NORTH 59°53'22" WEST, AND A CHORD LENGTH OF 1,024.03 FEET;
THENCE NORTH 84°13'23" WEST A DISTANCE OF 238.59 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 280.00 FEET; THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 68.79 FEET, WTH A DELTA ANGLE OF 14°04'38", A CHORD BEARING OF NORTH 77°11'04" WEST, AND A CHORD LENGTH OF 68.62 FEET TO THE END OF SAID 20.00 FEET OFFSET PORTION;
THENCE NORTH 06°27'35" EAST A DISTANCE OF 557.99 FEET TO THE END OF SAID SOUTH AND WEST COMPOSITE BOUNDARY, BEING A POINT ON THE ARC OF A NON-TANGENT CURVE TURNING TO THE LEFT, HAVING A RADIUS 1,058.00 FEET; THE RADIUS POINT OF WHICH BEARS SOUTH 53°24'40" WEST;
THENCE 21°39'07", A CHORD BEARING OF NORTH 47°24'53" WEST, AND A CHORD LENGTH OF 397.44 FEET TO A POINT OF REVERSE CURVATURE TURNING TO THE RIGHT, HAVING A RADIUS OF 273.00 FEET;
THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 330 FEET, WITH A DELTA ANGLE OF 07°01'46", A CHORD BEARING OF NORTH 54°43'33" WEST, AND A CHORD LENGTH OF 33.47 FEET TO THE TRUE POINT OF BEGINNING.

TOGETHER WITH A PORTION OF THOSE LANDS DESCRIBED IN DEED RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 2005-026833, LOCATED WITHIN THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER, NORTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 20, TOWNSHIP 10 NORTH, RANGE 28 EAST OF THE WILLAMETTE MERIDIAN, CITY OF RICHLAND, BENTON COUNTY, WASHINGTON, DESCRIBED MORE PARTICULARLY AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 20, MARKED BY A 3 INCH BRASS CAP INSCRIBED "S20-S21-S28-S29 T10N R28E LS 6455 1994" ON THE GOLD COURSE FAIRWAY, LOCATED NORTH 86°44'36" EAST A DISTANCE OF 5,300.75 FEET FROM THE SOUTHWEST CORNER OF SAID SECTION 20, MARKED BY A STONE WITH "X" IN IRRIGATION VALVE CASE NEAR THE INTERSECTION OF WEIDLE ROAD & E 811 OR NE AT FENCE CORNER;

CONTINUED

THENCE NORTH 00°16'10" EAST ALONG THE EAST LINE OF SAID SECTION 20 A DISTANCE OF 175.64 FEET TO THE INTERSECTION WITH THE SOUTHWESTERLY EASEMENT MARGIN OF STATE ROUTE 240, ALSO KNOWN AS SECONDARY STATE HIGHWAY NO. 11-C, GRANTED PER DEED RECORDED UNDER BENTON COUNTY AUDITORS FILE NUMBER 573713, SAID SOUTHWESTERLY EASEMENT MARGIN BEING A 75.00 FEET OFFSET FROM THE CENTERLINE THEREOF; THENCE NORTH 52°35'11" WEST ALONG SAID SOUTHWESTERLY EASEMENT MARGIN A DISTANCE OF 2,555.47 FEET TO A POINT HEREAFTER MARKED BY A 5/8 INCH REBAR WITH A YELLOW PLASTIC CAP INSCRIBED "MATARAZZO 46318" AND THE TRUE POINT OF BEGINNING.

THENCE NORTH 52°35'11" WEST CONTINUING ALONG SAID SOUTHWESTERLY EASEMENT MARGIN A DISTANCE OF 1,692.61 FEET TO THE INTERSECTION WITH THE SOUTHEASTERLY COMPOSITE BOUNDARY OF THOSE LANDS DESCRIBED IN DEED RECORDED UNDER BENTON COUNTY AUDITOR'S FILE NUMBER 2011-023857 AND SAID BENTON COUNTY AUDITORS FILE NUMBER 2019-008939;

THENCE SOUTH 37°24'49" WEST ALONG SAID SOUTHEASTERLY COMPOSITE BOUNDARY A DISTANCE OF 774.63 FEET TO THE INTERSECTION WITH THE NORTHEASTERLY COMPOSITE BOUNDARY OF TRACT E & F OF THE PLAT OF QUAIL RIDGE PHASE 1 & 2 RECORDED IN VOLUME 15 OF PLATS AT PAGE 680 UNDER BENTON COUNTY AUDITORS FILE NUMBER 2020-025039;

THENCE ALONG SAID NORTHEASTERLY COMPOSITE BOUNDARY THE FOLLOWING COURSES;

THENCE SOUTH 69°17'53' EAST A DISTANCE OF 983.93 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE LEFT, HAVING A RADIUS OF 424.47 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 38.47 FEET, WITH A DELTA ANGLE OF 05°11'33", A CHORD BEARING OF SOUTH 71°53'40" EAST, AND A CHORD LENGTH OF 38.46 FEET;

THENCE SOUTH 74°29'26" EAST A DISTANCE OF 268.02 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 575.53 FEET;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 49.43 FEET, WITH A DELTA ANGLE OF 04°55'16", A CHORD BEARING OF SOUTH 72°01'49" EAST, AND A CHORD LENGTH OF 49.42 FEET;

THENCE LEAVING SAID NORTHEASTERLY COMPOSITE BOUNDARY NORTH 20°25'17" EAST A DISTANCE OF 153.50 FEET TO A POINT ON THE ARC OF A NON-TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 729.00 FEET; THE RADIUS POINT OF WHICH BEARS SOUTH 20°25'17" WEST;

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 66.46 FEET, WITH A DELTA ANGLE OF 05°13'23", A CHORD BEARING OF SOUTH 66°58'01" EAST, AND A CHORD LENGTH OF 66.43 FEET;

THENCE SOUTH 64°21'20" EAST A DISTANCE OF 390.42 FEET TO A POINT OF CURVATURE WITH A TANGENT CURVE TURNING TO THE RIGHT, HAVING A RADIUS OF 102.00 FEET;

CONTINUED

THENCE ALONG SAID CURVE, HAVING AN ARC LENGTH OF 20.16 FEET, WITH A DELTA ANGLE OF 11°19'26", A CHORD BEARING OF SOUTH 58°41'06" EAST, AND A CHORD LENGTH OF 20.13 FEET;
THENCE NORTH 35°55'34" EAST A DISTANCE OF 117.51 FEET TO THE TRUE POINT OF BEGINNING.

ALSO TOGETHER WITH:

THAT PORTION OF SECTION 19, TOWNSHIP 10 NORTH, RANGE 28 EAST OF THE WILLAMETTE MERIDIAN, CITY OF RICHLAND, BENTON COUNTY, WASHINGTON, LYING SOUTHERLY AND EASTERLY OF STATE ROUTE 240 STATE OF WASHINGTON STATE HIGHWAY PER CONVEYANCE RELINQUISHMENT OF ACCESS AUDITORS FILE NUMBER 573713, RECORDS OF BENTON COUNTY, WASHINGTON AND LYING NORTHERLY AND EASTERLY OF THE RICHLAND IRRIGATION CANAL RIGHT-OF-WAY AS RETAINED PER DEED RECORDED UNDER AUDITORS FILE NUMBER 874170, RECORDS OF BENTON COUNTY, WASHINGTON AND LYING EAST OF TWIN BRIDGES RIGHT-OF-WAY AS DEDICATED PER THE CITY OF RICHLAND ORDINANCE 18-10, RECORDED UNDER AUDITORS FILE NUMBER 2010-020839, RECORDS OF BENTON COUNTY, WASHINGTON.

EXCEPT THAT PORTION OF THE SOUTHEAST QUARTER OF SECTION 19, TOWNSHIP 10 NORTH, RANGE 28 EAST OF THE WILLAMETTE MERIDIAN, CITY OF RICHLAND, BENTON COUNTY, WASHINGTON, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE EAST QUARTER CORNER OF SAID SECTION 19;
THENCE SOUTH 0°58'16" EAST 348.26 FEET ALONG THE EAST LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 19 TO THE INTERSECTION WITH THE SOUTHEASTERLY RIGHT-OF-WAY MARGIN OF TWIN BRIDGES ROAD AND TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE NORTHWEST HAVING A RADIUS OF 840.00 FEET (THE LONG CHORD OF WHICH BEARS SOUTH 33°39'31" WEST 432.97 FEET);
THENCE ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY MARGIN AND ALONG THE ARC OF SAID CURVE 437.91 FEET THROUGH A CENTRAL ANGLE OF 29°52'10";
THENCE ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY MARGIN SOUTH 48°34'27" WEST 361.70 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTHEAST HAVING A RADIUS OF 760.00 FEET;
THENCE ALONG SAID SOUTHEASTERLY MARGIN AND ALONG THE ARC OF SAID CURVE 42.05 FEET THROUGH A CENTRAL ANGLE OF 3°10'11" TO THE POINT OF BEGINNING;
THENCE CONTINUING ALONG SAID SOUTHEASTERLY MARGIN AND ALONG THE ARC OF SAID CURVE 13.88 FEET THROUGH A CENTRAL ANGLE OF 1°02'47" TO THE INTERSECTION WITH THE NORTHEASTERLY RIGHT-OF-WAY MARGIN OF THE OLD RICHLAND IRRIGATION CANAL DESCRIBED IN DEED RECORDED UNDER AUDITOR'S FILE NUMBER 1987-004170;

THENCE ALONG SAID NORTHEASTERLY RIGHT-OF-WAY MARGIN SOUTH 60°57'22" EAST 56.07 FEET;

CONTINUED

THENCE LEAVING SAID NORTHEASTERLY MARGIN NORTH 31°51'04" EAST 12.93 FEET; THENCE NORTH 60°28'50" WEST 52.94 FEET TO THE POINT OF BEGINNING.

PARCEL C:
TRACT C, QUAIL RIDGE II PHASE 1, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 15 OF PLATS, PAGE 752, RECORDS OF BENTON COUNTY, WASHINGTON.

Cascade Title Company of Benton-Franklin Counties

Privacy Policy Notice

PURPOSE OF THIS NOTICE

Title V of the Gramm-Leach-Bliley Act (GLBA) generally prohibits any financial institution, directly or through its affiliates, from sharing nonpublic personal information about you with a nonaffiliated third party unless the institution provides you with a notice of its privacy policies and practices, such as the type of information that it collects about you and the categories of persons or entities to whom it may be disclosed. In compliance with the GLBA, we are providing you with this document, which notifies you of the privacy policies and practices of **Cascade Title Company of Benton-Franklin Counties**

We may collect nonpublic personal information about you from the following sources:

Information we receive from you such as on applications or other forms.
Information about your transactions we secure from our files, or from [our affiliates or] others.
Information we receive from a consumer reporting agency.
Information that we receive from others involved in your transaction, such as the real estate agent or lender.

Unless it is specifically stated otherwise in an amended Privacy Policy Notice, no additional nonpublic personal information will be collected about you.

We may disclose any of the above information that we collect about our customers or former customers to our affiliates as permitted by law.

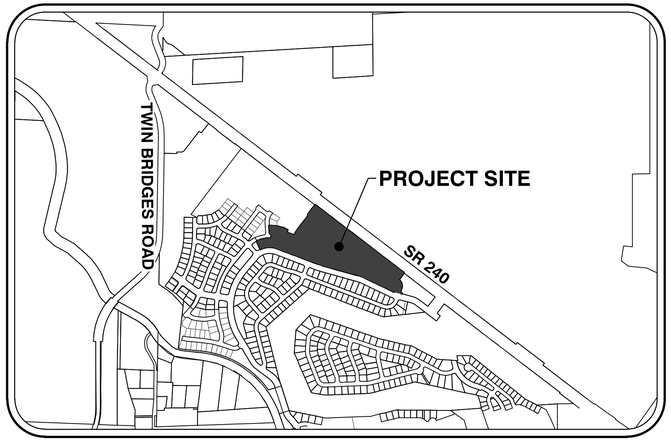
WE DO NOT DISCLOSE ANY NONPUBLIC PERSONAL INFORMATION ABOUT YOU WITH ANYONE FOR ANY PURPOSE THAT IS NOT SPECIFICALLY PERMITTED BY LAW.

We restrict access to nonpublic personal information about you to those employees who need to know that information in order to provide products or services to you. We maintain physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

3. Preliminary Plat

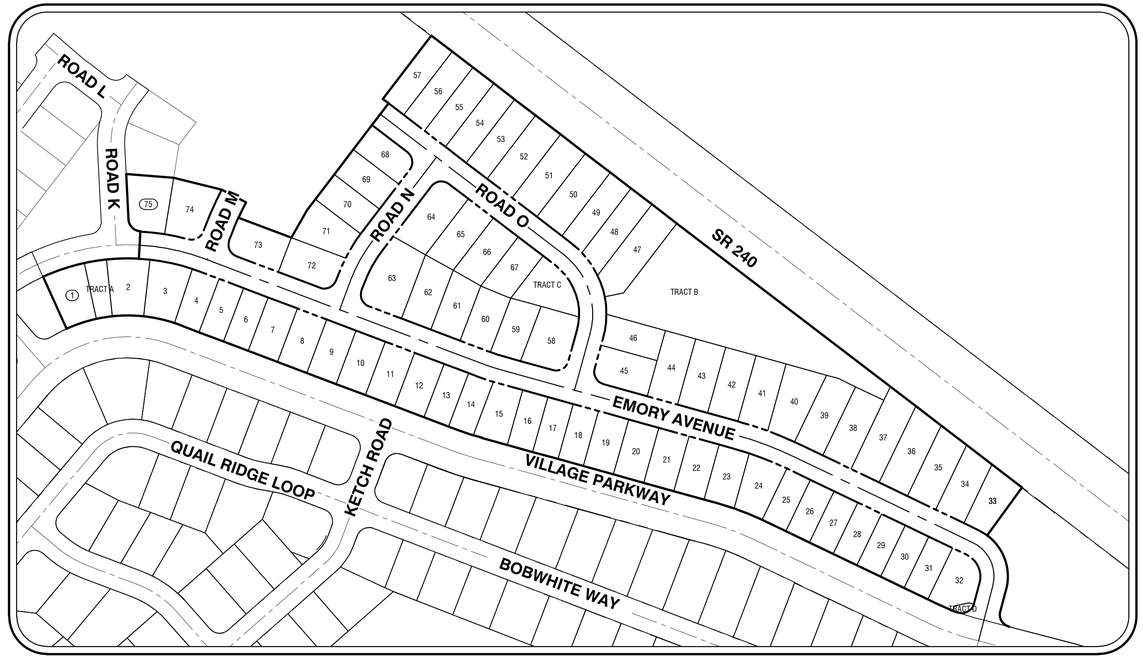
QUAIL RIDGE III

PRELIMINARY PLAT



N

VICINITY MAP
1" = 1000'



N

SITE MAP
1" = 150'

LEGEND

	EXISTING	PROPOSED		EXISTING	PROPOSED
DECIDUOUS TREE			STORM DRAIN CLEAN OUT		
CONIFEROUS TREE			STORM DRAIN CATCH BASIN		
FIRE HYDRANT			STORM DRAIN AREA DRAIN		
WATER BLOWOFF			STORM DRAIN MANHOLE		
WATER METER			GAS METER		
WATER VALVE			GAS VALVE		
DOUBLE CHECK VALVE			GUY WIRE ANCHOR		
AIR RELEASE VALVE			UTILITY POLE		
SANITARY SEWER CLEAN OUT			POWER VAULT		
SANITARY SEWER MANHOLE			POWER JUNCTION BOX		
SIGN			POWER PEDESTAL		
STREET LIGHT			COMMUNICATIONS VAULT		
MAILBOX			COMMUNICATIONS JUNCTION BOX		
			COMMUNICATIONS RISER		

	EXISTING	PROPOSED
RIGHT-OF-WAY LINE		
BOUNDARY LINE		
PROPERTY LINE		
CENTERLINE		
DITCH		
CURB		
EDGE OF PAVEMENT		
EASEMENT		
FENCE LINE		
GRAVEL EDGE		
POWER LINE	PWR	PWR
OVERHEAD WIRE	OHW	OHW
COMMUNICATIONS LINE	COM	COM
FIBER OPTIC LINE	CFO	CFO
GAS LINE	GAS	GAS
STORM DRAIN LINE	STM	STM
SANITARY SEWER LINE	SAN	SAN
WATER LINE	WAT	WAT

APPLICANT:
PAHLISCH HOMES, LLC
210 SW SILCON AVE, #100
BEND, OR 97702

PLANNING / ENGINEERING / SURVEYING FIRM:
AKS ENGINEERING & FORESTRY, LLC
CONTACT: JOEY SHEARER
2777 NW LOLO DR, STE 150
BEND, OR 97703
PH: 541-317-8429

PROJECT LOCATION:
VILLAGE PARKWAY
NORTH OF THE INTERSECTION OF BOBWHITE WAY & VILLAGE PARKWAY IN RICHLAND, WASHINGTON.

PROPERTY DESCRIPTION:
LOCATED IN SECTION 20 TOWNSHIP 10 NORTH, RANGE 28 EAST, W.M., CITY OF RICHLAND, BENTON COUNTY, WASHINGTON

EXISTING LAND USE:
VACANT LAND

PROJECT PURPOSE:
±75-LOT SUBDIVISION FOR FUTURE SINGLE-FAMILY HOMES WITHIN THE APPROVED HORN RAPIDS MASTER PLAN

SITE INFORMATION:
GROSS AREA: ±19.1 ACRES

HORIZONTAL DATUM:
A LOCAL GROUND PROJECTION OF NAD 1983 (2011), EPOCH: 2010.000, WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, UTILIZING THE WASHINGTON STATE REFERENCE NETWORK (WSRN). DATA HAS BEEN PROJECTED TO GROUND NEAR THE CENTER OF THE SITE, AT STATE PLANE COORDINATE N: 367937.18, E: 1932724.86 USING A GROUND SCALE FACTOR OF 1.0000931814. BEARINGS SHOWN ARE GRID, DISTANCES ARE GROUND EXPRESSED IN SURVEY FEET.

VERTICAL DATUM:
NAVD 88, UTILIZING THE WSRN NETWORK. SITE BENCHMARK BEING AKS CONTROL POINT NUMBER 1, ELEVATION 438.58

SHEET INDEX

AKS ENGINEERING & FORESTRY, LLC
2245 ROBERTSON DRIVE,
RICHLAND, WA 99354
509.905.0219
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

COVER SHEET
QUAIL RIDGE III PRELIMINARY PLAT
PAHLISCH HOMES, LLC
RICHLAND, WASHINGTON

LAWRENCE T PAHLISCH
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

FOR REVIEW ONLY

JOB NUMBER:	9141
DATE:	03/14/2025
DESIGNED BY:	LTP
DRAWN BY:	AC
CHECKED BY:	LTP

P01

AKS DRAWING FILE: 9141 COVER.DWG | LAYOUT: 1

ROAD O ALIGNMENT TABLE						
CURVE/ TANGENT	STATION	RADIUS	LENGTH	DELTA	CHORD	TANGENT/CHORD BEARING
T1	9+73.00		141.67'			N15°30'29"E
C1	11+14.67	150.00'	178.27'	68°05'33"	167.96	N18°32'17"W
T2	12+92.94		2349.50'			N52°35'04"W

ROAD M ALIGNMENT TABLE						
CURVE/ TANGENT	STATION	RADIUS	LENGTH	DELTA	CHORD	TANGENT/CHORD BEARING
T1	9+72.97		90.99'			N20°42'03"E
C1	10+63.96	580.00'	169.18'	16°42'46"	168.58	N29°03'26"E

EMORY AVENUE ALIGNMENT TABLE						
CURVE/ TANGENT	STATION	RADIUS	LENGTH	DELTA	CHORD	TANGENT/CHORD BEARING
T1	9+72.23		139.86'			N14°33'48"E
C1	11+12.09	75.00'	103.31'	78°55'08"	95.33	N24°53'46"W
T2	12+15.40		390.42'			N64°21'20"W
C2	16+05.82	702.00'	124.19'	10°08'10"	124.03	N69°25'25"W
T3	17+30.01		483.38'			N74°29'30"W
C3	22+13.39	422.00'	38.24'	5°11'33"	38.23	N71°53'44"W
T4	22+51.64		587.15'			N69°17'57"W
C4	28+38.78	432.00'	340.57'	45°10'12"	331.82	S88°06'57"W

ROAD N ALIGNMENT TABLE						
CURVE/ TANGENT	STATION	RADIUS	LENGTH	DELTA	CHORD	TANGENT/CHORD BEARING
T1	9+72.84		91.24'			N20°42'03"E
C1	10+64.08	300.00'	87.51'	16°42'46"	87.20	N29°03'26"E
T2	11+51.59		235.71'			N37°24'49"E

CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	CHORD
C1	25.00'	93°16'31"	40.70'	S63°22'37"W 36.35'
C2	48.00'	78°55'16"	66.12'	S24°53'40"E 61.01'
C3	675.00'	0°22'24"	4.40'	S64°32'32"E 4.40'
C4	675.00'	6°47'34"	80.03'	S68°07'32"E 79.98'
C5	675.00'	2°58'12"	34.99'	S73°00'25"E 34.98'
C6	449.00'	0°58'31"	7.64'	S74°00'15"E 7.64'
C7	449.00'	4°13'02"	33.05'	S71°24'28"E 33.04'
C8	405.00'	2°19'21"	16.42'	S70°27'38"E 16.41'
C9	405.00'	12°11'19"	86.16'	S77°42'57"E 85.99'
C10	405.00'	3°04'01"	21.68'	S85°20'37"E 21.68'
C11	405.00'	9°07'18"	64.48'	N88°33'44"E 64.41'
C12	405.00'	6°16'56"	44.41'	N80°51'37"E 44.38'
C13	405.00'	12°11'19"	86.16'	N71°37'30"E 85.99'
C14	292.00'	12°11'19"	62.12'	S71°37'30"W 62.00'
C15	292.00'	6°16'56"	32.02'	S80°51'37"W 32.00'
C16	292.00'	12°11'19"	62.12'	N89°54'16"W 62.00'
C17	292.00'	12°11'19"	62.12'	N77°42'57"W 62.00'
C18	292.00'	2°19'21"	11.84'	N70°27'38"W 11.83'
C19	562.00'	3°22'05"	33.04'	N70°59'00"W 33.03'
C20	562.00'	1°49'28"	17.89'	N73°34'47"W 17.89'

CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	CHORD
C21	562.00'	3°34'03"	34.99'	N72°42'29"W 34.99'
C22	562.00'	6°07'12"	60.03'	N67°51'52"W 60.00'
C23	562.00'	0°26'56"	4.40'	N64°34'48"W 4.40'
C24	458.00'	4°19'19"	34.55'	N66°30'59"W 34.54'
C25	25.00'	89°59'51"	39.27'	S30°25'59"E 35.35'
C26	102.00'	67°35'30"	120.33'	S19°13'48"E 113.47'
C27	102.00'	11°19'46"	20.17'	N58°41'26"W 20.14'
C28	729.00'	1°03'40"	13.50'	N64°53'10"W 13.50'
C29	729.00'	4°30'17"	57.32'	N67°40'09"W 57.30'
C30	729.00'	4°34'13"	58.15'	N72°12'24"W 58.13'
C31	25.00'	90°00'00"	39.27'	N29°29'30"W 35.36'
C32	177.00'	15°30'34"	47.91'	N7°45'13"E 47.77'
C33	177.00'	11°11'32"	34.58'	N5°35'50"W 34.52'
C34	177.00'	14°26'46"	44.63'	N18°24'59"W 44.51'
C35	177.00'	17°46'34"	54.91'	N34°31'39"W 54.69'
C36	177.00'	9°10'15"	28.33'	N48°00'03"W 28.30'
C37	25.00'	90°00'00"	39.27'	S7°35'11"E 35.36'
C38	327.00'	0°34'37"	3.29'	S37°07'31"W 3.29'
C39	327.00'	9°51'30"	56.26'	S31°54'27"W 56.19'
C40	327.00'	6°16'40"	35.83'	S23°50'23"W 35.81'

CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	CHORD
C41	25.00'	90°00'00"	39.27'	S65°42'03"W 35.36'
C42	25.00'	90°00'00"	39.27'	N24°17'57"W 35.36'
C43	553.00'	3°42'26"	35.78'	N22°33'16"E 35.78'
C44	607.00'	7°10'48"	76.07'	S24°17'27"W 76.02'
C45	25.00'	84°24'44"	36.83'	S62°54'25"W 33.59'
C46	459.00'	5°59'38"	48.02'	N77°53'02"W 48.00'
C47	459.00'	5°59'46"	48.04'	N83°52'44"W 48.01'
C48	25.00'	83°49'56"	36.58'	N44°57'39"W 33.40'
C49	25.00'	90°00'00"	39.27'	S60°30'30"W 35.36'
C50	395.00'	4°12'33"	29.02'	N72°23'14"W 29.01'
C51	395.00'	0°59'00"	6.78'	N69°47'27"W 6.78'
C52	25.00'	90°00'00"	39.27'	N24°17'57"W 35.36'
C53	273.00'	16°42'46"	79.63'	N29°03'26"E 79.35'
C54	25.00'	90°00'00"	39.27'	N82°24'49"E 35.36'
C55	123.00'	55°09'15"	118.40'	S25°00'34"E 113.88'
C56	123.00'	12°56'26"	27.78'	S9°02'17"W 27.72'

LAND USE TABLE	
PRE-PLATTED SITE AREA:	19.1 ACRES
R-3 RESIDENTIAL ZONED AREA:	19.1 ACRES
RIGHT OF WAY DEDICATION:	3.83 ACRES
*TRACTS A, B, C, D TOTAL AREA	1.81 ACRES
SINGLE FAMILY RESIDENTIAL LOT COUNT:	75 LOTS
MINIMUM LOT AREA:	5,876 SF
MAXIMUM LOT AREA:	12,391 SF
AVERAGE LOT AREA:	7,821 SF

*THE NUMBER, SIZE, AND LOCATION OF UNDEVELOPABLE TRACTS ARE PRELIMINARY AND SUBJECT TO CHANGE. ADDITIONAL TRACTS MAY BE NECESSARY FOR ACCESS, INFRASTRUCTURE, OR OTHER REQUIRED ELEMENTS.

NOTES:
THE PURPOSE OF THIS PRELIMINARY PLAT IS TO SHOW THE PROPOSED LOT DIMENSIONS AND AREAS FOR PLANNING PURPOSES. THIS IS NOT AN OFFICIAL PLAT AND IS NOT TO BE USED FOR SURVEY PURPOSES.

SCALE: 1" = 80 FEET
80 0 16 40 80
ORIGINAL PAGE SIZE: 22" x 34"

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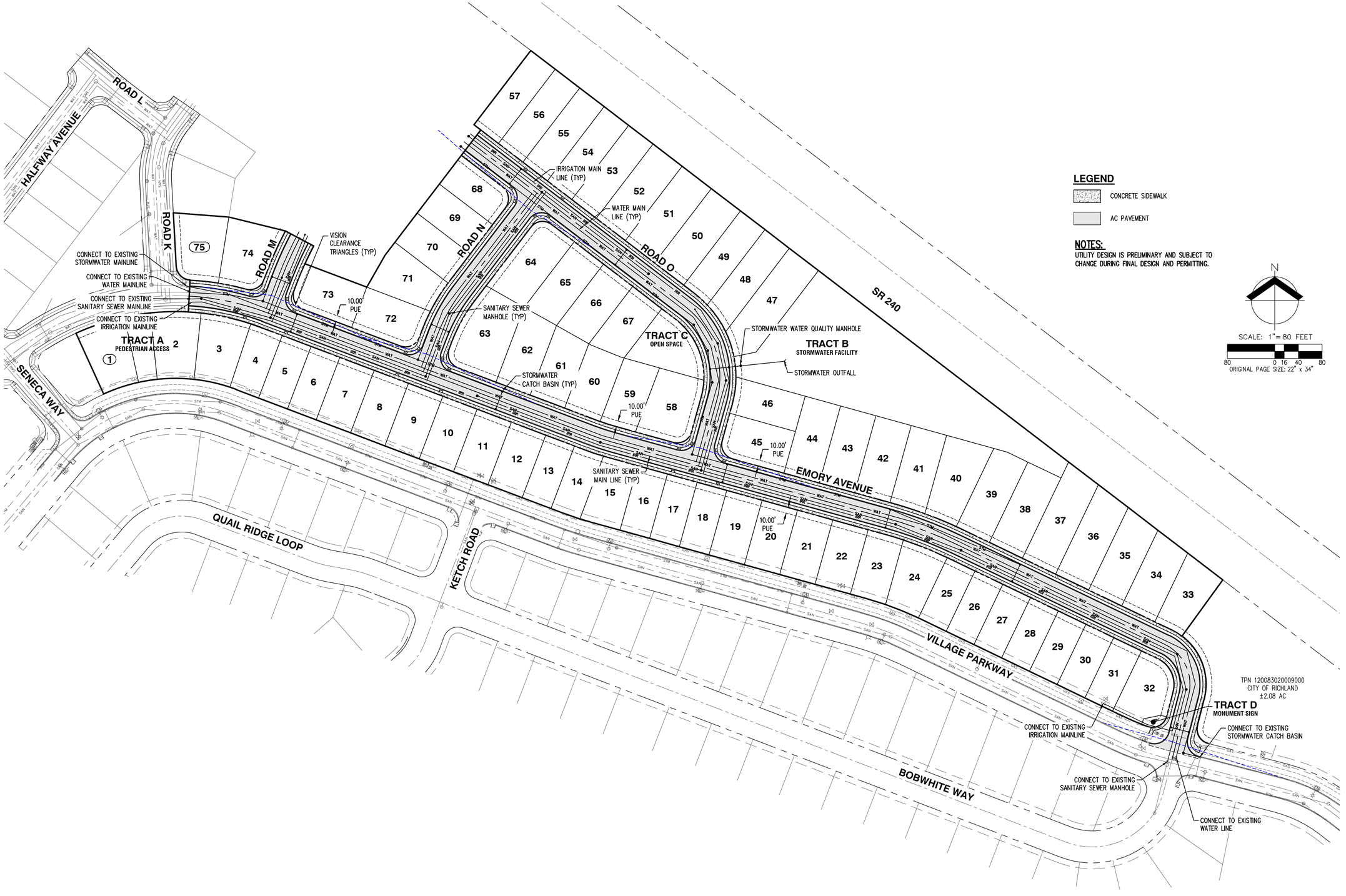
PRELIMINARY PLAT
QUAIL RIDGE III PRELIMINARY PLAT
PAHLISCH HOMES, LLC
RICHLAND, WASHINGTON

LAWRENCE T. PANTIER — STATE OF WASHINGTON — 21600 — REGISTERED PROFESSIONAL ENGINEER
DRAFT — FOR REVIEW ONLY

JOB NUMBER:	9141
DATE:	03/14/2025
DESIGNED BY:	LTP
DRAWN BY:	AC
CHECKED BY:	LTP

P02

AKS DRAWING FILE: 9141 DIM SUMDWG | LAYOUT: 2



LEGEND

- CONCRETE SIDEWALK
- AC PAVEMENT

NOTES:

UTILITY DESIGN IS PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL DESIGN AND PERMITTING.

N

SCALE: 1"= 80 FEET

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PRELIMINARY COMPOSITE UTILITY PLAN
QUAIL RIDGE III PRELIMINARY PLAT
PAHLISCH HOMES, LLC
RICHLAND, WASHINGTON

LAWRENCE T PAHLISCH
STATE OF WASHINGTON
21111
REGISTERED PROFESSIONAL ENGINEER

DRAFT
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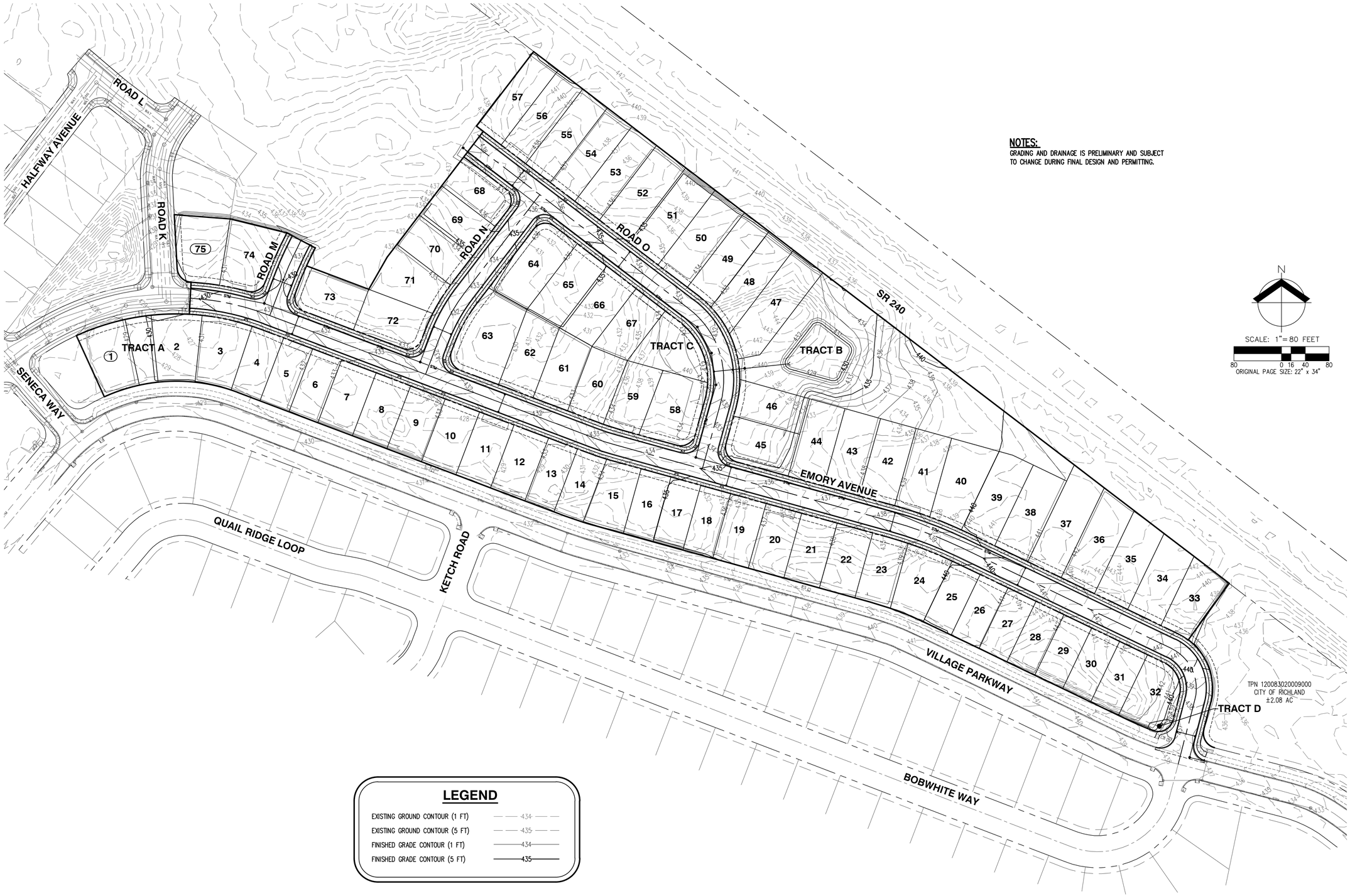
P03

AKS DRAWING FILE: 9141 COMP UTILDWG | LAYOUT: 3



NOTES:
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N

SCALE: 1"= 80 FEET
80 0 16 40 80
ORIGINAL PAGE SIZE: 22" x 34"

LEGEND

- EXISTING GROUND CONTOUR (1 FT) — 434 —
- EXISTING GROUND CONTOUR (5 FT) — 435 —
- FINISHED GRADE CONTOUR (1 FT) — 434 —
- FINISHED GRADE CONTOUR (5 FT) — 435 —

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PRELIMINARY GRADING PLAN
QUAIL RIDGE III PRELMINARY PLAT
PAHLISCH HOMES, LLC
RICHLAND, WASHINGTON

LAWRENCE T PAHLISCH
STATE OF WASHINGTON
PROFESSIONAL ENGINEER

FOR REVIEW ONLY

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DRAWN BY:	AC
CHECKED BY:	LTP

P04

AKS DRAWING FILE: 9141 GRADING | LAYOUT: 4

4. Vehicle Trip Accounting Letter

March 13, 2025

Brock Argyropoulos, Special Projects Manager
Pahlisch Homes, Inc.
12585 SW 68th Avenue
Tigard, Oregon 97223

Via email: BrockA@pahlisch.com

Regarding: Trip Accounting Letter
Quail Ridge III
3012 Village Parkway
Richland, Washington
PBS Project 25005044, Task 003

Dear Brock:

PBS Engineering and Environmental LLC (PBS) has prepared this trip accounting letter estimating the number of trips generated by the proposed Quail Ridge III development within the Horn Rapids community. This letter supports the Quail Ridge III preliminary land use application to the City of Richland and documents the status of the vested trips for the overall Horn Rapids development.

PROJECT DESCRIPTION

The proposed Quail Ridge III site is located along the west side of State Route 240 (SR 240) between SR 240 and Village Parkway in Richland, Washington; see Figure 1 for the vicinity map. The development proposes 75 dwelling units of single-family residential housing; see Figure 2 for the site plan.

The proposed development is part of the Horn Rapids Master Planned Community (Horn Rapids); see Figure 3 for the original conceptual site plan. The master plan trip accounting presented in this letter is based on the March 1993, J-U-B Engineers, Inc., "Horn Rapids Development" traffic impact study; the 1993 trip estimate table is attached for reference. The existing and approved land uses within Horn Rapids were addressed in the prior trip accounting effort (also prepared by PBS) on Quail Ridge II. See Figure 4 for the overall Horn Rapids site map that shows the areas that are existing, under construction, and proposed.

PROPOSED TRIP GENERATION

Trip generation estimates for the Quail Ridge III development rely on data provided in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 11th Edition (2021). Specifically, the estimates are based on the ITE regression equations for 75 single-family dwelling units of Single-Family Detached Housing (ITE land use code 210). Table 1 presents the trip generation estimates, and the detailed trip generation calculations are attached for reference.

Table 1. Trip Generation for Proposed Quail Ridge III Site

Proposed Land Use (ITE Code)	**Single-Family Detached Housing (210)**	
Independent Variable	Dwelling Units	
Size	75	
Average Daily Trips	774	
Peak Hour Trips	**AM**	**PM**
Entering	14	48
Exiting	43	28
Total Trips	57	76

The Quail Ridge III development is anticipated to generate 774 new vehicle trips on a typical weekday, including 57 new trips during the AM peak hour and 76 new trips during the PM peak hour, which will be subtracted from the original trip allocation in the trip accounting section in this letter.

EXISTING LAND USES AND TRIP GENERATION

The trip generation characteristics of the existing land uses and prior approved phases of the Horn Rapids development were documented in the PBS trip accounting letter for Quail Ridge II, which is attached for reference. In total, the existing, approved, and under-construction uses at the overall Horn Rapids site include:

- 1,358 single-family dwelling units
- An 18-hole golf course
- Recreational vehicle (RV) storage
- Recreation center with swimming pool and tennis courts

These are the only land uses developed on the Horn Rapids site to date. Other uses anticipated with the original Horn Rapids traffic impact study—including apartments, townhouses, winery, hotel, elementary school, day care, parks, office, church, retail, restaurant, and bank—have not yet been developed on the site.

As noted in the attached 2021 PBS letter, about 10% of the homeowners in Horn Rapids are members of the golf course, and the RV storage and recreation center are assumed to be amenities open only to the Horn Rapids residents, so it is likely that some internal trips occur. For this trip accounting letter, however, no internal capture reductions were applied as a conservative approach. In the future, PBS recommends that the internal trips between the residential uses and the community facilities (golf course, storage, and recreation center) be estimated with an informal reduction at full buildout of the overall Horn Rapids site. This will supply the maximum number of trips available at full buildout.

As documented in the 2021 PBS letter, the existing and approved land uses at the Horn Rapids site are anticipated to generate 12,307 average weekday vehicle trips, including 1,006 trips during the AM peak hour and 1,311 trips during the PM peak hour. These are the sums of the Quail Ridge II trips and the trips existing prior to the Quail Ridge II development. These existing and approved trips are included within the trip accounting section below.

HORN RAPIDS TRIP ACCOUNTING

The overall Horn Rapids development approved 33,158 daily vehicle trips, including 2,512 trips during the AM peak hour, and 3,661 trips during the weekday PM peak hour. The existing land uses have claimed trips from these vested trips, and this Quail Ridge III project proposes to do the same. Table 2 provides an accounting of the available trips remaining for the Horn Rapids development.

Table 2. Horn Rapids Development Trip Accounting

Trip Accounting Element (Applicable Document Date)	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
Original Horn Rapids Vested Trips (March 1993)	33,158	928	1,584	2,512	2,124	1,537	3,661
Existing and Approved Land Uses' Trips (April 20, 2021)	(12,307)	(269)	(737)	(1,006)	(821)	(490)	(1,311)
Quail Ridge III (March 13, 2025)	(774)	(14)	(43)	(57)	(48)	(28)	(76)
Remaining Available Trips After the Proposed Quail Ridge III	**20,077**	**645**	**804**	**1,449**	**1,255**	**1,019**	**2,274**

Negative values are shown in parentheses.

Following the development of Quail Ridge III, the Horn Rapids development will have 20,077 daily trips, including 1,449 AM peak hour trips and 2,274 PM peak hour trips, remaining available for future development phases.

CLOSING

Please feel free to contact me at 360-567-2123 or David.Holt@pbsusa.com with any questions or comments.

Sincerely,

David Holt

David Holt, PE
Traffic Engineer

Digitally signed by David Holt
Date: 2025.03.13 16:02:50-07'00'

DAVID ANTHONY HOLT
STATE OF WASHINGTON
46043
REGISTERED
PROFESSIONAL ENGINEER

cc: Ana Bozich, Jason Spence, Rachel Vickers (Pahlisch Homes)
John Manix, Jason Mattox, Moe Taha (PBS)

Attachments: Traffic Figures
Trip Generation Calculations for Proposed Land Uses
Trip Generation Table from 1993 J-U-B Engineers Traffic Impact Study for the Original Horn Rapids Development
Trip Accounting Letter – Quail Ridge II

MT:DH

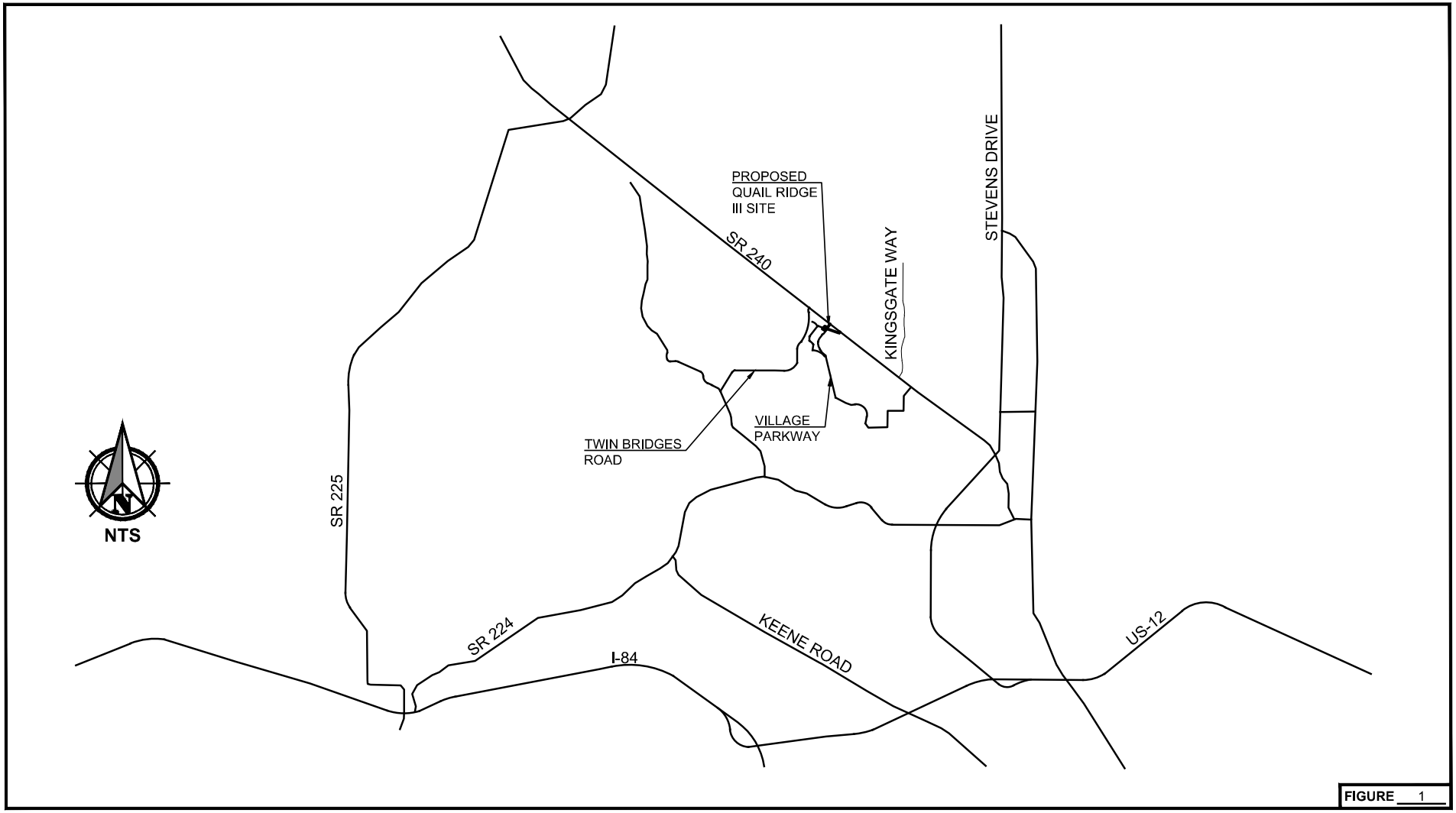


FIGURE 1

Vicinity Map

Horn Rapids - Quail Ridge III

NTS

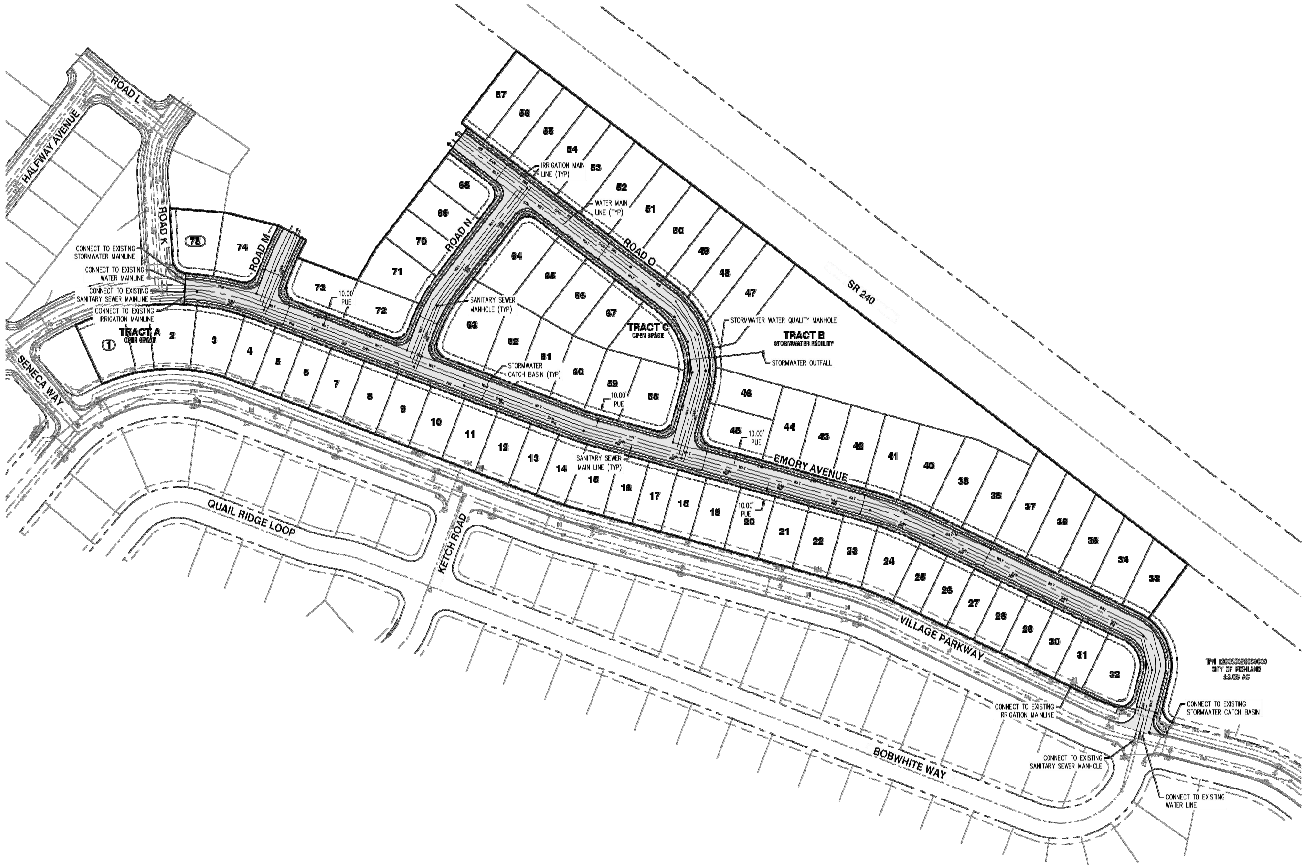


FIGURE 2

Site Plan

Horn Rapids - Quail Ridge III

FIGURE 3

Original Horn Rapids Conceptual Site Plan

Horn Rapids - Quail Ridge III

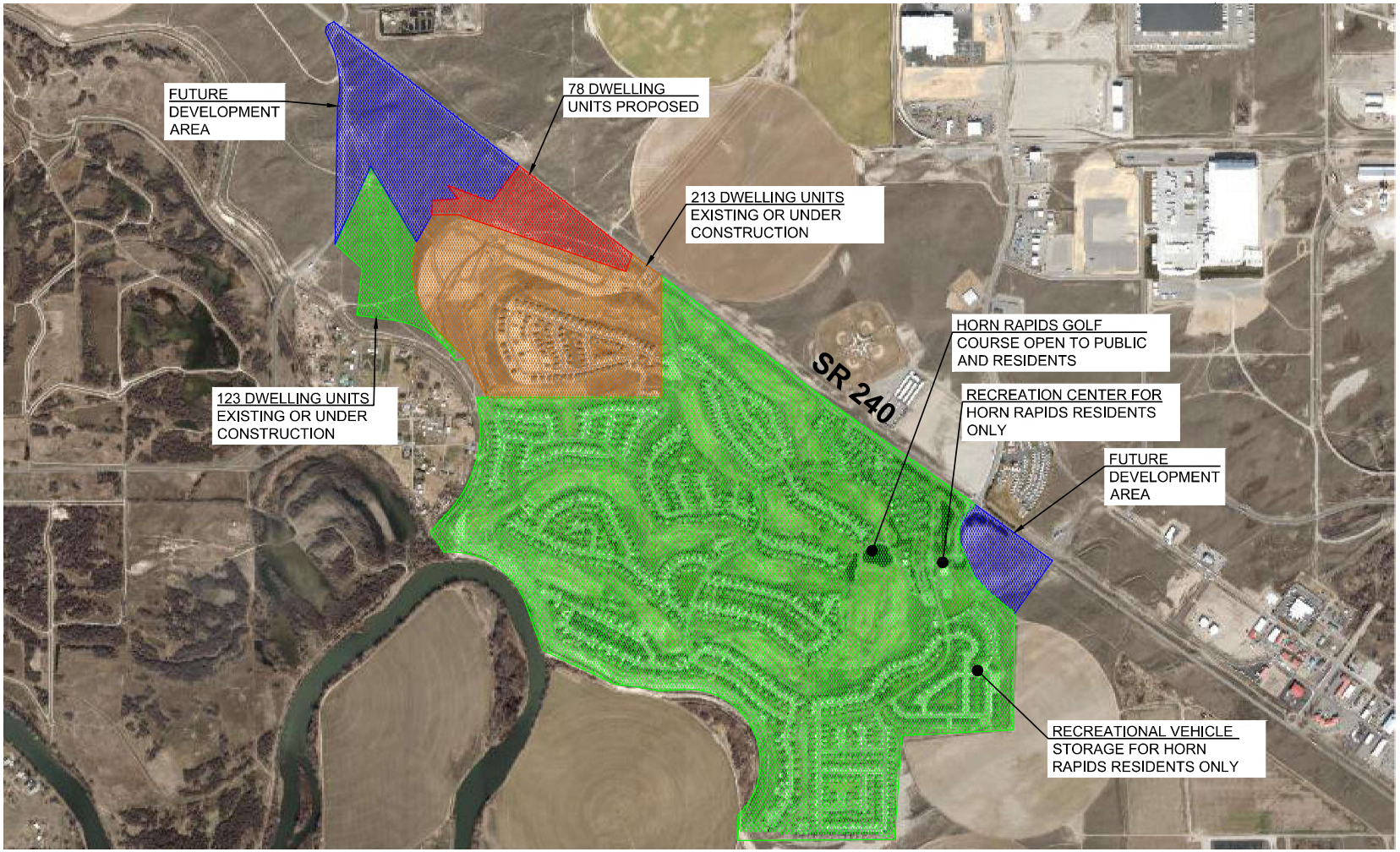


FIGURE 4

Overall Horn Rapids Site Land Uses

Horn Rapids - Quail Ridge III

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE :
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

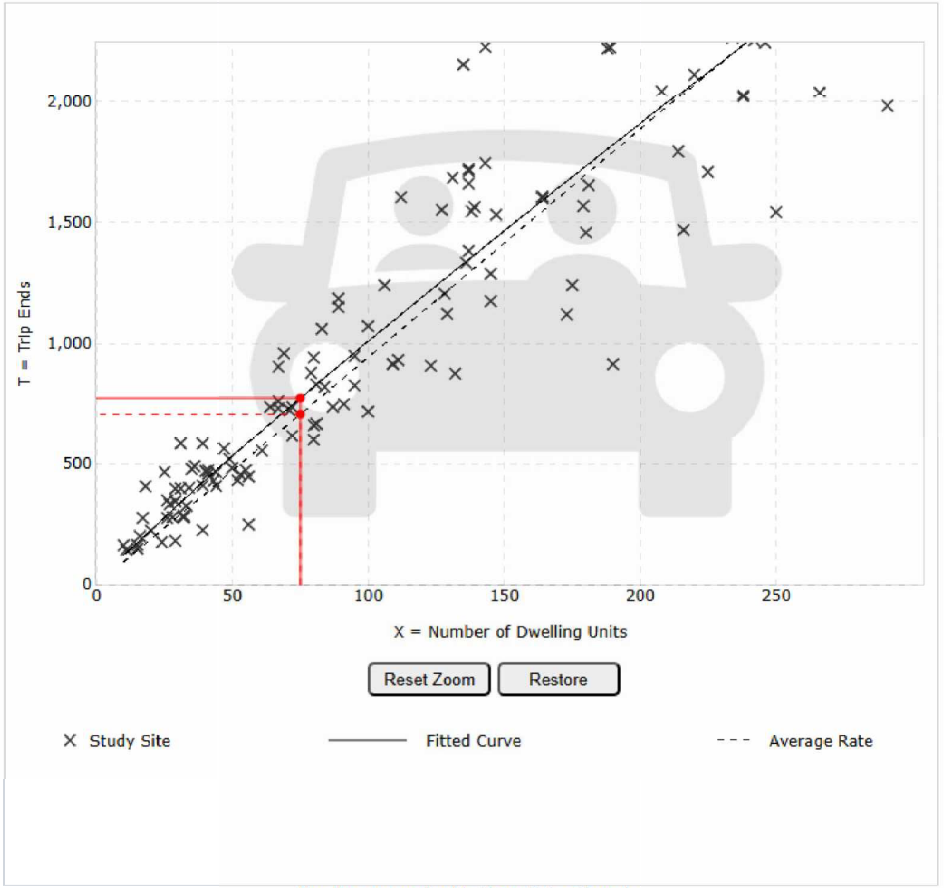
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
75
Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
174

Avg. Num. of Dwelling Units:
246

Average Rate:
9.43

Range of Rates:
4.45 - 22.61

Standard Deviation:
2.13

Fitted Curve Equation:
Ln(T) = 0.92 Ln(X) + 2.68

R^2:
0.95

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 707 (Total), 354 (Entry), 353 (Exit)
Fitted Curve: 774 (Total), 387 (Entry), 387 (Exit)

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE :
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

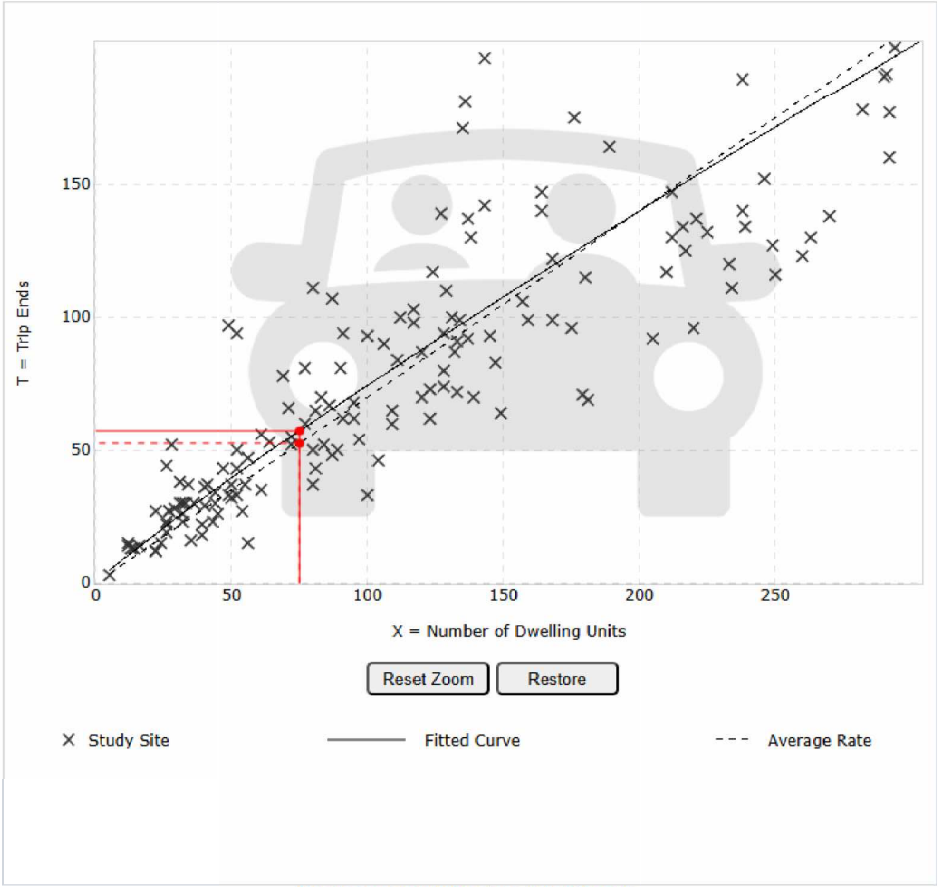
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
75
Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
192

Avg. Num. of Dwelling Units:
226

Average Rate:
0.70

Range of Rates:
0.27 - 2.27

Standard Deviation:
0.24

Fitted Curve Equation:
Ln(T) = 0.91 Ln(X) + 0.12

R^2:
0.90

Directional Distribution:
25% entering, 75% exiting

Calculated Trip Ends:
Average Rate: 53 (Total), 13 (Entry), 40 (Exit)
Fitted Curve: 57 (Total), 14 (Entry), 43 (Exit)

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE :
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

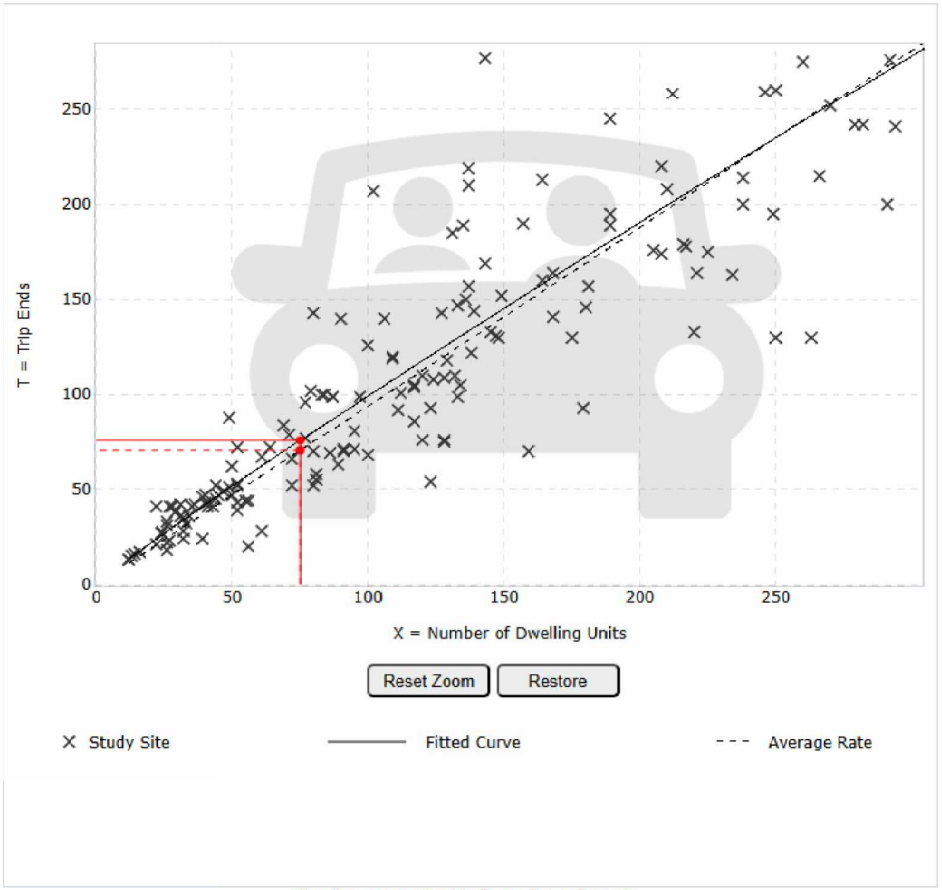
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
75 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
208

Avg. Num. of Dwelling Units:
248

Average Rate:
0.94

Range of Rates:
0.35 - 2.98

Standard Deviation:
0.31

Fitted Curve Equation:
Ln(T) = 0.94 Ln(X) + 0.27

R^2:
0.92

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 71 (Total), 44 (Entry), 27 (Exit)
Fitted Curve: 76 (Total), 48 (Entry), 28 (Exit)

TABLE 1
TRIP GENERATION VOLUMES

GENERATOR	UNITS	AREA (GFA)	AVERAGE DAILY TRIPS	A.M. PEAK HOUR DEPARTURES	P.M. PEAK HOURS ARRIVALS	P.M. PEAK HOURS DEPARTURES
DESIGN YEAR 1994 - SINGLE FAMILY	200	---	1,954	109 (74%)	131 (65%)	71 (35%)
GOLF COURSE	18 HOLES	---	645	84 (83%)	31 (52%)	29 (48%)
DESIGN YEAR 1999 - SINGLE FAMILY	800	---	7,006	362 (74%)	457 (65%)	246 (35%)
APARTMENTS	200	---	1,256	508 (74%)	83 (68%)	39 (32%)
DESIGN YEAR 2008 - SINGLE FAMILY	1,182	---	10,037	99 (83%)	651 (65%)	351 (35%)
APARTMENTS	237	---	1,494	128 (83%)	97 (68%)	45 (32%)
TOWNHOUSE	403	---	2,130	0 (7%)	129 (66%)	66 (34%)
WINERY	---	19,000	61	13 (40%)	7 (53%)	28 (46%)
HOTEL	80 SUITES	---	645	8 (17%)	33 (54%)	28 (46%)
ELEMENTARY SCHOOL	---	38,000	449	50 (40%)	58 (56%)	47 (44%)
DAY CARE	---	12,000	951	43 (46%)	62 (46%)	73 (54%)
PARKS	31 ACRES	---	174	N/A	N/A	N/A
OFFICE	---	105,000	1,456	22 (11%)	33 (17%)	160 (83%)
CHURCH	---	7,000	65	5 (50%)	3 (54%)	2 (46%)
RETAIL	---	34,000	1,325	82 (50%)	82 (50%)	81 (50%)
RESTAURANT	---	9,000	1,848	71 (50%)	79 (54%)	67 (46%)
BANK	---	9,000	1,662	N/A	188 (48%)	204 (52%)
TOTAL			33,158	1584	2,124	1,537

April 20, 2021

John Deskins, Traffic Engineer
City of Richland
625 Swift Boulevard
Richland, Washington 99352

Via email: jdeskins@CI.RICHLAND.WA.US

Regarding: Trip Accounting Letter
Horn Rapids – Quail Ridge II
Southeast of Twin Bridges Road and SR 240 Intersection
Richland, Washington 99354
PBS Project 66118.003

Dear Mr. Deskins:

PBS Engineering and Environmental Inc. (PBS) has prepared this trip accounting letter estimating the number of trips generated by the proposed Quail Ridge II subdivision of the Horn Rapids development. This letter supports the Quail Ridge II preliminary land use application to the City of Richland and documents the status of the vested trips for the overall Horn Rapids development.

The proposed Quail Ridge II site is located along the southwest side of State Route 240 (SR 240) between Twin Bridges Road and Village Parkway in Richland, Washington; see Figure 1 for the vicinity map. The development proposes 123 dwelling units of single-family residential housing; see Figure 2 for the site plan.

The master plan trip accounting is based on the March 1993, J-U-B Engineers, Inc., "Horn Rapids Development" traffic impact study. See Figure 3 for the original conceptual site plan and trip estimate table from the 1993 traffic impact study. This trip accounting subtracts the Quail Ridge II subdivision and existing land uses' trips from the total project trips of the original Horn Rapids development. The existing land uses were estimated using the ArcGIS[1] online image services from 2020 and verified with a site survey performed by PBS staff. See Figure 4 for the overall Horn Rapids site survey map that shows the areas that are existing, under construction, and proposed.

TRIP GENERATION

The following sections rely on data provided in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 10th Edition (*Manual)*, and the ITE *Trip Generation Handbook* (*Handbook*), 3rd Edition, both published in 2017. Detailed trip generation calculations are provided in the attachments.

Proposed Land Use

Trip generation estimates for the Quail Ridge II subdivision are based on the ITE *Manual* regression equations for 123 single-family dwelling units and using ITE land use code 210 – Single-Family Detached Housing. Table 1 presents the trip generation estimates.

[1] https://tiles.arcgis.com/tiles/5g4JcCVJwbhPOszb/arcgis/rest/services/COR_Imagery_2020_tpkX/MapServer

Table 1. Trip Generation for Proposed Quail Ridge II Site

Proposed Land Use (ITE Code)	**Single-Family Detached Housing (210)**	
Independent Variable	Dwelling Units	
Size	123	
Average Daily Trips	1,258	
Peak Hour Trips	**AM**	**PM**
Entering	23	78
Exiting	69	46
Total Trips	92	124

The Quail Ridge II subdivision is anticipated to generate 1,258 new vehicle trips on a typical weekday, including 92 new trips during the AM peak hour and 124 new trips during the PM peak hour, which will be subtracted from the original trip allocation in the trip accounting section in this letter.

Existing Land Uses

Since no prior trip accounting documents were provided to PBS for the prior phases of the Horn Rapids development, trip generation estimates for the existing and under-construction uses at the overall Horn Rapids site are based on the ITE regression equations for 1,235 single-family dwelling units and ITE weighted average trip rates for an 18-hole golf course based on the ITE *Manual* data for land use codes 210 and 430, respectively. These are the only land uses developed on the Horn Rapids site to date. Other uses anticipated with the original Horn Rapids traffic impact study, including apartments, townhouses, winery, hotel, elementary school, day care, parks, office, church, retail, restaurant, and bank, have not yet been developed on the site.

Following the ITE *Handbook*, no internal trips were calculated between the 18-hole recreational golf course and existing residential uses on the site. The Horn Rapids Golf Course manager mentioned in a phone conversation that about 10% of the existing homeowners in the Horn Rapids community are members of the golf course. For the purpose of this trip accounting letter, no internal capture reductions were applied as a conservative approach. In addition, a significant number of remaining trips are available after subtracting the Quail Ridge II and existing land uses' trips from the total project trips. This finding is shown in the trip accounting section in this letter.

PBS recommends that an informal reduction to account for the internal trips between the residential uses and the golf course be applied at full buildout of the overall Horn Rapids site. This will supply the maximum number of trips available at full buildout.

The recreational vehicle storage and recreation center that includes a swimming pool and tennis courts are assumed to be open for the Horn Rapids residents only. Trips generated are internal, therefore no independent trip generation calculations were performed for these uses.

Following the ITE *Handbook* data, no pass-by trip rate was applied to the peak hour trips. No adjustments were made for transit, pedestrian, or diverted linked trips. Table 2 presents the trip generation estimates.

Table 2. Trip Generation for Existing Uses at the Horn Rapids Site

Existing Land Use (ITE Code)	Single-Family Detached Housing (210)		Golf Course (430)		Total	
Independent Variable	Dwelling Units		Holes			
Size	1,235[a]		18			
Average Daily Trips	10,502		547		11,049	
Peak Hour Trips	AM	PM	AM	PM	AM	PM
Entering	221	715	25	28	246	743
Exiting	661	420	7	24	668	444
Total Trips	882	1,135	32	52	914	1,187

[a] 213 of the single-family dwelling units are currently under construction.

The existing land uses at the overall Horn Rapids site are anticipated to generate 11,049 average weekday trips, including 914 vehicle trips during the AM peak hour and 1,187 trips during the PM peak hour, which will be subtracted from the original trip allocation in the trip accounting below.

HORN RAPIDS TRIP ACCOUNTING

The overall Horn Rapids development approved 33,158 daily trips, 2,512 AM peak hour trips, and 3,661 trips during the weekday PM peak hour. The existing land uses have claimed trips from these vested trips, and this Quail Ridge II project proposes to do the same. Table 3 provides an accounting of the available trips remaining for the Horn Rapids development. The detailed trip generation estimate for the original Horn Rapids development is provided in the attachments as well as the trip accounting calculation.

Table 3. Horn Rapids Development Trip Accounting

Trip Accounting Element (Applicable Document Date)	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
Original Horn Rapids Vested Trips (March 1993)	33,158	928	1,584	2,512	2,124	1,537	3,661
Existing Land Uses' Trips (April 20, 2021)	(11,049)	(221)	(661)	(882)	(715)	(420)	(1,135)
Remaining Available Trips Prior to the Proposed Quail Ridge II Subdivision	**22,109**	**682**	**916**	**1,598**	**1,381**	**1,093**	**2,474**
Quail Ridge II Subdivision (April 20, 2021)	(1,258)	(23)	(69)	(92)	(78)	(46)	(124)
Remaining Available Trips After the Proposed Quail Ridge II Subdivision	**20,851**	**659**	**847**	**1,506**	**1,303**	**1,047**	**2,350**

Negative values are shown in parentheses.

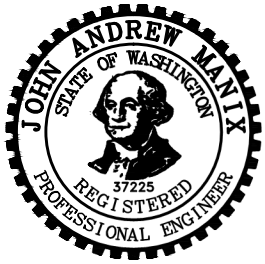
Following the development of Quail Ridge II, the Horn Rapids development will have 20,851 daily trips, including 1,506 AM peak hour trips and 2,350 PM peak hour trips, remaining available for future development on other areas of the overall site.

CLOSING

Please feel free to contact me at 360.567.2117 or John.Manix@pbsusa.com with any questions or comments.

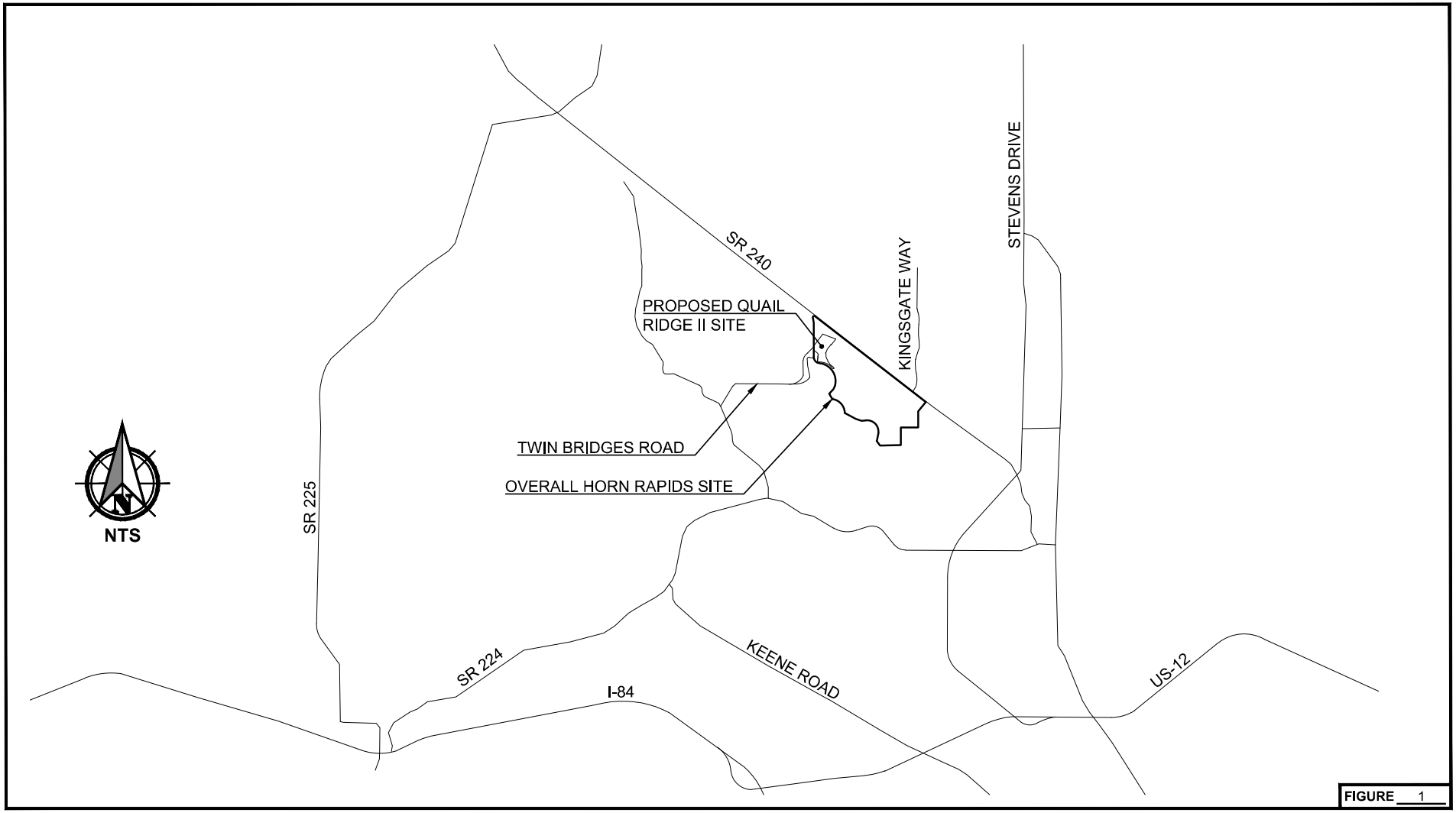
Sincerely,

John Manix, PE
Senior Traffic Engineer



Attachments:
Figure 1. Vicinity Map
Figure 2. Site Plan
Figure 3. Original Horn Rapids Conceptual Site Plan
Figure 4. Overall Horn Rapids Site Survey Map
Trip Generation Calculations for Proposed and Existing Land Uses
Trip Generation Table from 1993 J-U-B Engineers Traffic Impact Study for the Original Horn Rapids Development
Trip Accounting Calculations

BJ:JAM:DAH:rg



Vicinity Map

Horn Rapids - Quail Ridge II

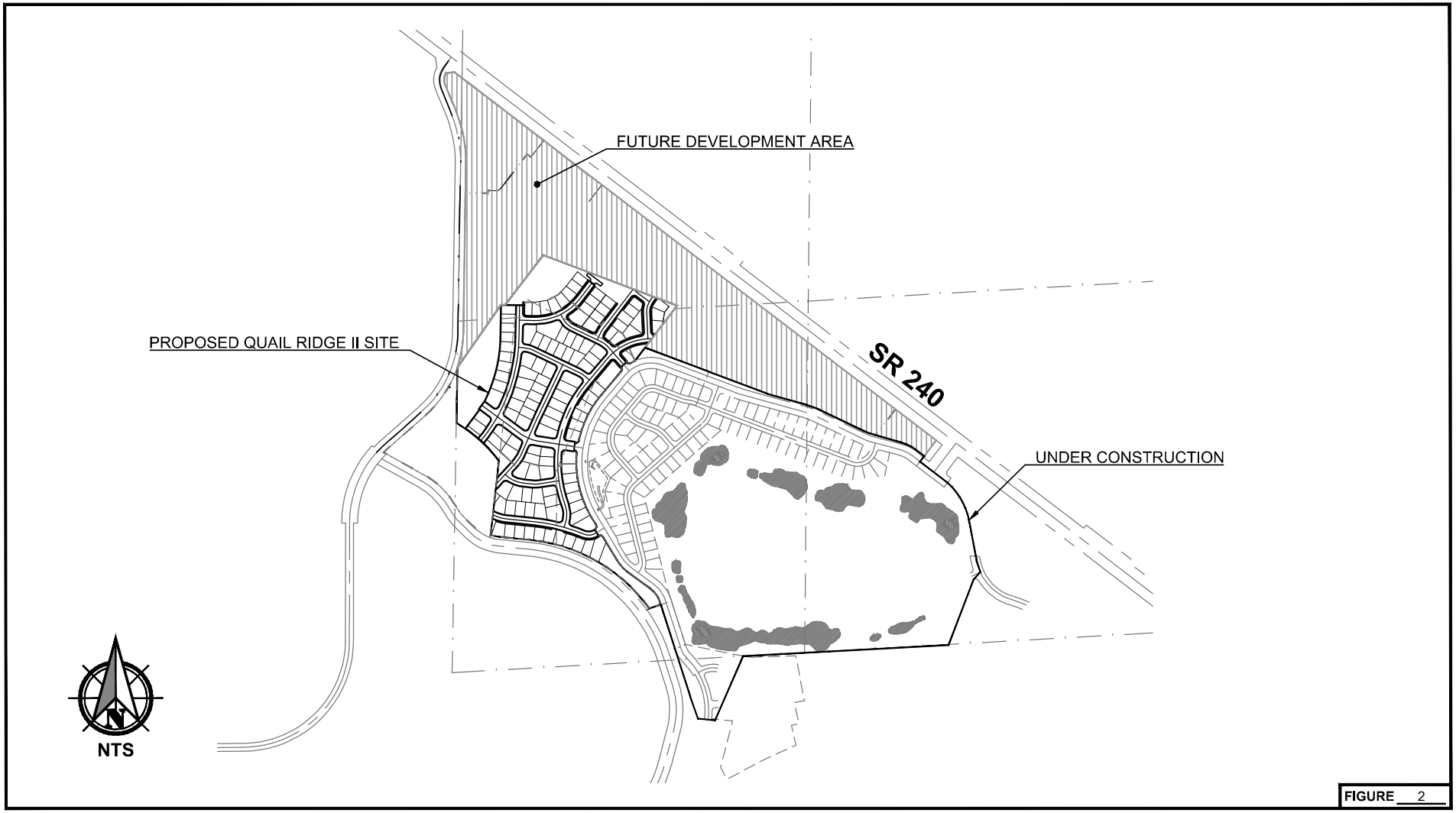


FIGURE 2

Site Plan

Horn Rapids - Quail Ridge II

FIGURE 3

Original Horn Rapids Conceptual Site Plan

Horn Rapids - Quail Ridge II

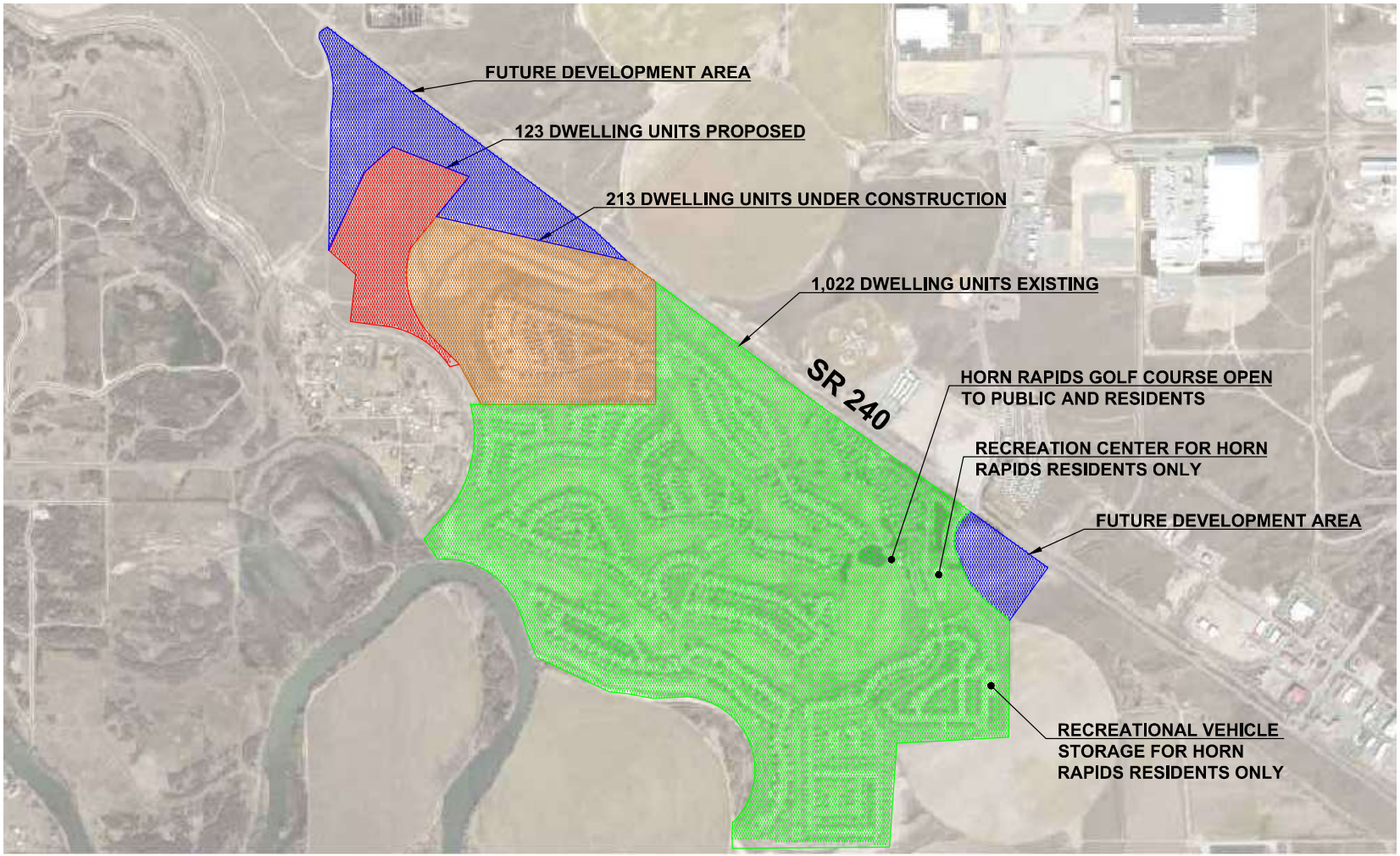


FIGURE 4

Overall Horn Rapids Site Survey Map

Horn Rapids - Quail Ridge II

TABLE 1
TRIP GENERATION VOLUMES

GENERATOR	UNITS	AREA (GFA)	AVERAGE DAILY TRIPS	A.M. PEAK HOUR DEPARTURES	P.M. PEAK HOURS ARRIVALS	P.M. PEAK HOURS DEPARTURES
DESIGN YEAR 1994 - SINGLE FAMILY	200	---	1,954	109 (74%)	131 (65%)	71 (35%)
GOLF COURSE	18 HOLES	---	645	84 (83%)	31 (52%)	29 (48%)
DESIGN YEAR 1999 - SINGLE FAMILY	800	---	7,006	362 (74%)	457 (65%)	246 (35%)
APARTMENTS	200	---	1,256	508 (74%)	83 (68%)	39 (32%)
DESIGN YEAR 2008 - SINGLE FAMILY	1,182	---	10,037	99 (83%)	651 (65%)	351 (35%)
APARTMENTS	237	---	1,494	128 (83%)	97 (68%)	45 (32%)
TOWNHOUSE	403	---	2,130	0 (7%)	129 (66%)	66 (34%)
WINERY	---	19,000	61	13 (40%)	7 (53%)	28 (46%)
HOTEL	80 SUITES	---	645	8 (17%)	33 (54%)	28 (46%)
ELEMENTARY SCHOOL	---	38,000	449	50 (40%)	58 (56%)	47 (44%)
DAY CARE	---	12,000	951	43 (46%)	62 (46%)	73 (54%)
PARKS	31 ACRES	---	174	N/A	N/A	N/A
OFFICE	---	105,000	1,456	22 (11%)	33 (17%)	160 (83%)
CHURCH	---	7,000	65	5 (50%)	3 (54%)	2 (46%)
RETAIL	---	34,000	1,325	82 (50%)	82 (50%)	81 (50%)
RESTAURANT	---	9,000	1,848	71 (50%)	79 (54%)	67 (46%)
BANK	---	9,000	1,662	N/A	188 (48%)	204 (52%)
TOTAL			33,158	1584	2,124	1,537

Detailed Land Use Data

For 1235 Dwelling Units of SFHOUSE

(210) Single-Family Detached Housing

Open Date: 4/14/2021

Project: Horn Rapids - Quail Ridge II

Analysis Date: 4/14/2021

Day / Period	Total Trips	Pass-By Trips	Avg Rate	Min Rate	Max Rate	Std Dev	Avg Size	% Enter	% Exit	Use Eq.	Equation	R2
Weekday Average Daily Trips	10502	0	9.44	4.81	19.39	2.1	264	50	50	True	Ln(T) = 0.92 Ln(X) + 2.71	0.95
Source : Trip Generation Manual 10th Edition												
Weekday AM Peak Hour of Adjacent Street Traffic	882	0	0.74	0.33	2.27	0.27	219	25	75	True	T = 0.71(X) + 4.8	0.89
Source : Trip Generation Manual 10th Edition												
Weekday PM Peak Hour of Adjacent Street Traffic	1135	0	0.99	0.44	2.98	0.31	242	63	37	True	Ln(T) = 0.96 Ln(X) + 0.2	0.92
Source : Trip Generation Manual 10th Edition												

Detailed Land Use Data

For 18 Holes of GOLF 1

(430) Golf Course

Open Date: 4/14/2021

Project: Horn Rapids - Quail Ridge II

Analysis Date: 4/14/2021

Day / Period	Total Trips	Pass-By Trips	Avg Rate	Min Rate	Max Rate	Std Dev	Avg Size	% Enter	% Exit	Use Eq.	Equation	R2
Weekday Average Daily Trips	547	0	30.38	14.5	40.5	9.88	23	50	50	False	T = 34.93(X) - 102.33	0.72
Source : Trip Generation Manual 10th Edition												
Weekday AM Peak Hour of Adjacent Street Traffic	32	0	1.76	0.61	3.06	0.64	18	79	21	False	Ln(T) = 0.91 Ln(X) + 0.77	0.5
Source : Trip Generation Manual 10th Edition												
Weekday PM Peak Hour of Adjacent Street Traffic	52	0	2.91	1.67	5	0.93	19	53	47	False		
Source : Trip Generation Manual 10th Edition												

Detailed Land Use Data

For 123 Dwelling Units of SFHOUSE 1

(210) Single-Family Detached Housing

Open Date: 4/14/2021

Project: Horn Rapids - Quail Ridge II

Analysis Date: 4/14/2021

Day / Period	Total Trips	Pass-By Trips	Avg Rate	Min Rate	Max Rate	Std Dev	Avg Size	% Enter	% Exit	Use Eq.	Equation	R2
Weekday Average Daily Trips	1258	0	9.44	4.81	19.39	2.1	264	50	50	True	Ln(T) = 0.92 Ln(X) + 2.71	0.95
Source : Trip Generation Manual 10th Edition												
Weekday AM Peak Hour of Adjacent Street Traffic	92	0	0.74	0.33	2.27	0.27	219	25	75	True	T = 0.71(X) + 4.8	0.89
Source : Trip Generation Manual 10th Edition												
Weekday PM Peak Hour of Adjacent Street Traffic	124	0	0.99	0.44	2.98	0.31	242	63	37	True	Ln(T) = 0.96 Ln(X) + 0.2	0.92
Source : Trip Generation Manual 10th Edition												

Trip Generation Summary

Alternative: Proposed Land Use
Phase:
Project: Horn Rapids - Quail Ridge II

Open Date: 4/14/2021
Analysis Date: 4/14/2021

ITE	Land Use		Weekday Average Daily Trips			Weekday AM Peak Hour of Adjacent Street Traffic			Weekday PM Peak Hour of Adjacent Street Traffic		
		*	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
210	SFHOUSE 1		629	629	1258	23	69	92	78	46	124
	123 Dwelling Units										
Unadjusted Volume			629	629	1258	23	69	92	78	46	124
Internal Capture Trips			0	0	0	0	0	0	0	0	0
Pass-By Trips			0	0	0	0	0	0	0	0	0
Volume Added to Adjacent Streets			629	629	1258	23	69	92	78	46	124

Total Weekday Average Daily Trips Internal Capture = 0 Percent
Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent
Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 10th Edition

Trip Generation Summary

Alternative: Existing Land Use
Phase:
Project: Horn Rapids - Quail Ridge II

Open Date: 4/14/2021
Analysis Date: 4/14/2021

ITE	Land Use		Weekday Average Daily Trips *	Enter	Exit	Total	Weekday AM Peak Hour of Adjacent Street Traffic *	Enter	Exit	Total	Weekday PM Peak Hour of Adjacent Street Traffic *	Enter	Exit	Total
210	SFHOUSE			5251	5251	10502		221	661	882		715	420	1135
	1235	Dwelling Units												
430	GOLF 1			274	273	547		25	7	32		28	24	52
	18	Holes												
Unadjusted Volume				5525	5524	11049		246	668	914		743	444	1187
Internal Capture Trips				0	0	0		0	0	0		0	0	0
Pass-By Trips				0	0	0		0	0	0		0	0	0
Volume Added to Adjacent Streets				5525	5524	11049		246	668	914		743	444	1187

Total Weekday Average Daily Trips Internal Capture = 0 Percent
Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent
Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 10th Edition

TRIP GENERATION

Horn Rapids - Quail Ridge II - Total Trips				ADT	AM			PM		
ITE Code	Land Use	Total	Unit		Enter	Exit	Total	Enter	Exit	Total
	Original Land Uses									
	Various			33,158	928	1,584	2,512	2,124	1,537	3,661
	Existing Land Uses									
210	Single-Family Detached Housing	1235	DU	10,502	221	661	882	715	420	1,135
430	Golf Course	18	Holes	547	25	7	32	28	24	52
			Total Existing Trips	11,049	246	668	914	743	444	1,187
	Remaining Trips Available Prior to Quail Ridge II Subdivision			22,109	682	916	1,598	1,381	1,093	2,474
	Proposed Land Use									
210	Single-Family Detached Housing	1235	DU	1,258	23	69	92	78	46	124
			Total Proposed Trips	1,258	23	69	92	78	46	124
	Remaining Available Trips After Quail Ridge II Subdivision			20,851	659	847	1,506	1,303	1,047	2,350

5. Cultural Resources Report

CULTURAL RESOURCES REPORT COVER SHEET

Author(s): Stacie J. Sexton and Molly E. Swords, GRAM Northwest, LLC

Title of Report: *Cultural Resource Survey Report for the Quail Ridge Development – Richland, Washington (DAHP Project Number: 2021-06-04006)*

Date of Report: June 2021

County(ies): Benton **Section:** 19, 20, & 29 **Township:** 10N **Range:** 28E

Quad: Richland, WA 7.5 **Acres:** 147.0

PDF of report submitted (REQUIRED): ☒ Yes

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

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

TCP(s) found? ☐ Yes ☒ No

Replace a draft? ☐ Yes ☒ No

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

Were Human Remains Found?
☐ Yes (DAHP Case #_____) ☒ No

DAHP Archaeological Site #: None

Cultural Resource Survey Report for the Quail Ridge Development Project – Richland, Washington (DAHP Project Number: 2021-06-04006)

Preface

This cultural resource review report (survey report) has been prepared by GRAM Northwest, LLC, for the construction of a housing development on a tract of land located in Richland, Washington. The project will not involve state or federal funding; however, the project is subject to compliance with the Washington State Environmental Policy Act (RCW 43.21, "State Environmental Policy").

This report includes a literature review, a geomorphologic review, data from geographic information systems, and archaeological fieldwork. A pedestrian survey and installation of shovel test units throughout the project area were conducted May 11–20, 2021. No cultural resources were identified during fieldwork.

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Contents

Appendices

Figures

Tables

1 Introduction

This cultural resource review (survey report) has been prepared by GRAM Northwest, LLC, for the construction of the Quail Ridge housing development on a tract of land located in Richland, Washington. The project will not involve state or federal funding; however, the project is subject to compliance with the Washington State Environmental Policy Act (SEPA) (RCW 43.21, "State Environmental Policy").

1.1 Project Activities

The project includes the construction of a housing development on approximately 59.5 hectares (147 acres) of land located south of Washington State Route 240 between Twin Bridges Road and Village Parkway in Richland, Washington. Project activities including excavation and grading, as well as other general construction activities, that will take place throughout the project area. The anticipated maximum depth of excavation for this project is approximately 3 meters (10 feet).

The project area is approximately 59.5 hectares (147 acres) and is located in Benton County, Section 19, 20, and 29 of Township 10N, Range 28E (Figures 1 and 2). The property overlaps all or part of the following Benton County tax lots:

- #119081000001004
- #120083000009006
- #120083000009008
- #120083000009009
- #120083000009013
- #120084000001002
- #129082020003000
- #129082020000011
- #129082020000012
- #129082020000013
- #129082020000038
- #129082020002000
- #120083000009012
- #120083000009014
- #120083000009015

1.2 Regulatory Background

This survey report is intended to meet SEPA requirements (RCW 43.21).

1.3 Survey Personnel

The principal investigator for this project was Stacie Sexton of GRAM Northwest, LLC. Ms. Sexton meets the Secretary of the Interior's professional qualification standards and oversaw the completion of all elements of this cultural resource survey.

1.4 Availability of Survey and Inventory Forms

Digital copies of the report and any additional documents (e.g., site and/or isolate forms) associated with this project are available via the Washington Information System for Architectural & Archaeological Records Data (WISAARD) (https://fortress.wa.gov/dahp/wisaardp3/), which is maintained by the Department of Archaeology and Historic Preservation (DAHP).

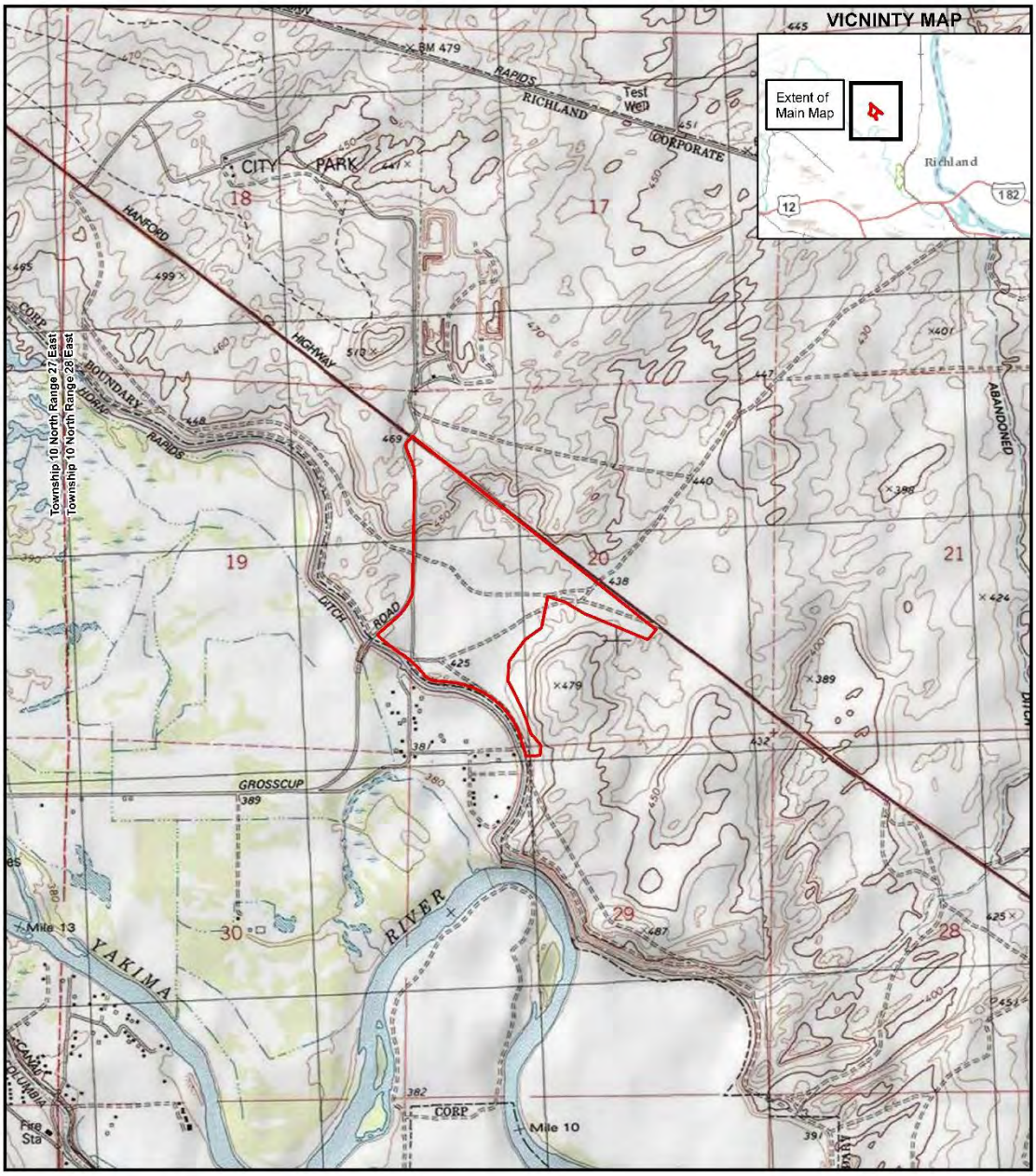


Figure 1. Project Area on USGS Quad Topography Map

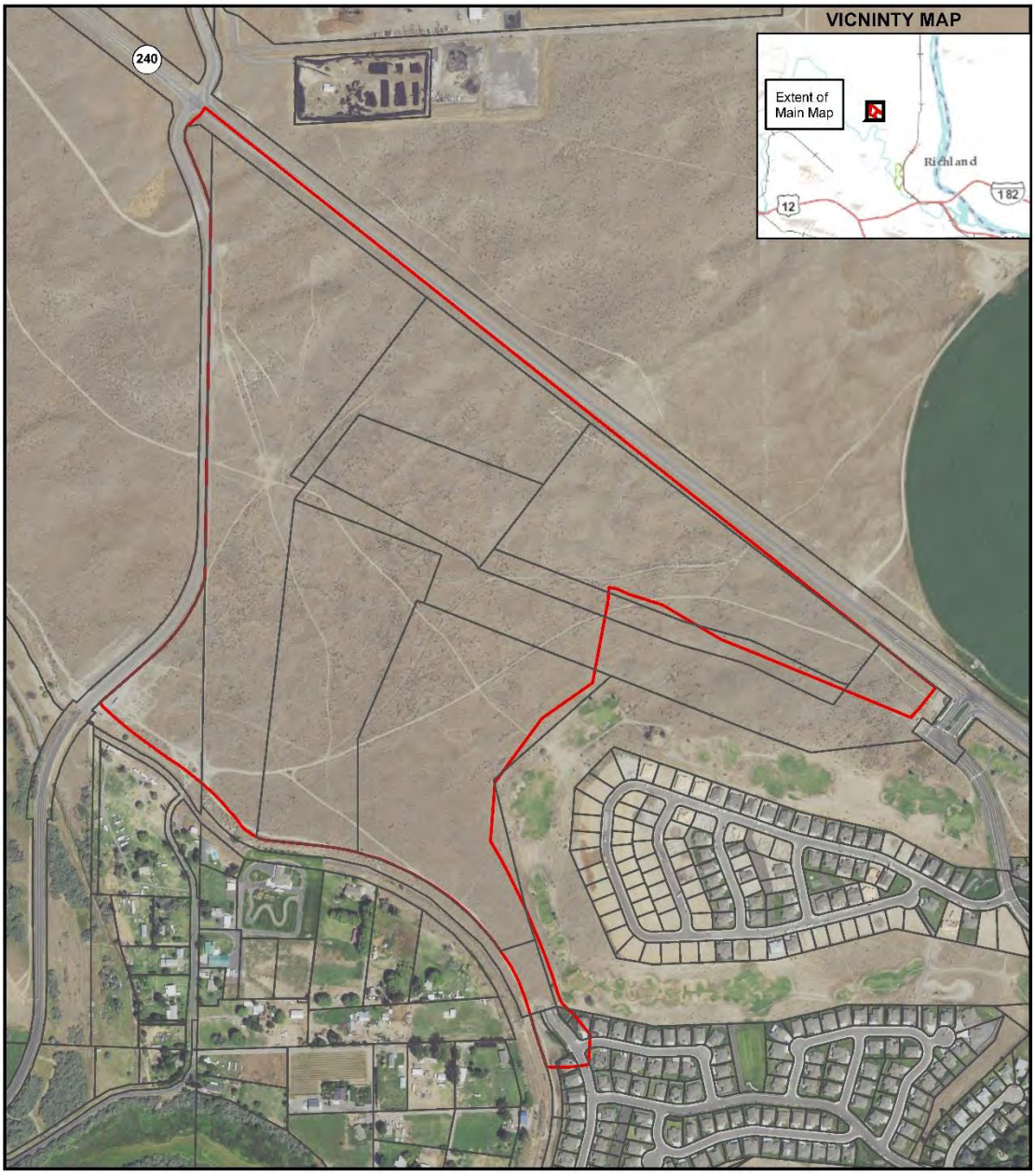


Figure 2. Project Area – Aerial Imagery

2 Environmental Setting

2.1 Climate and Vegetation

The project area is located within the Columbia Plateau, a region characterized by a shrub-steppe ecosystem. This semiarid environment typically consists of perennial grasses and shrubs, including the following: Great Basin wild rye (*Leymus cinereus*), needle and thread grass (*Stipa comata*), antelope bitterbrush (*Purshia tridentate*), sagebrush (*Artemisia* sp.), and rabbitbrush (*Chrysothammus* sp.). Native wildflowers include balsamroot (*Balsamorhiza* sp.), buckwheat (*Eriogonum* sp.), phloxes, desert parsleys, and lupines (Franklin and Dyrness, 1973). This area receives approximately 20 centimeters (8 inches) of rainfall annually, primarily during the winter months (Morgan et al., 2001).

2.2 Geomorphology

The geomorphology within and around the project area is composed largely of Pleistocene gravel and sandy gravel deposits with interbedded silt lenses, deposited as benches along the main stem of the Snake River resulting from rapid draining of glacial Lake Bonneville. The area also includes widespread silt, sand, gravel, and boulder deposits that were deposited during multiple catastrophic drainings of glacial Lake Missoula, including glaciolacustrine deposits. The northwestern and eastern corners of the project area are composed of Holocene fine to medium sand and silt deposits in active and stabilized dunes. The southwestern corner of the project area is composed of Pleistocene alluvial unconsolidated or semiconsolidated clay, silt, sand, gravel, and/or cobble deposits. These geological units are described as observed in the Washington Department of Natural Resources geologic information portal (https://geologyportal.dnr.wa.gov/).

3 Cultural Setting

3.1 Pre-Contact Cultural Sequence

Archaeological investigations conducted on the Columbia Plateau have enabled the creation of a cultural chronology dating to the end of the Pleistocene epoch. Table 1 summarizes the cultural sequence for the area (from Sharpe and Demaris, 2012 [used with permission]).

Table 1. Pre-Contact Cultural Sequence for Southeast Washington

Cultural Period	Years Before Present	Site Types	Architecture	Subsistence
General Columbia Plateau				
Windust Phase	11,000 – 8,000	Rock shelters, caves, game processing sites, lithic reduction sites; isolated lithic tools Examples include Marmes Rockshelter, Bernard Creek, Lind Coulee, Kirkwood Bar, Deep Gully, Granite Point, Fivemile Rapids, and Bobs Point	Rock shelters and caves; open habitation sites No evidence of constructed dwellings or storage features	Large mammals supplemented with small mammals and fish Toolset: Windust, Clovis, Folsom, and Scottsbluff points; contracting stemmed points and/or lanceolate points; cobble tools
Mid-Columbia Region — Vantage Area				
Cascade/ Vantage Phase	8,000 – 4,500	Lithic scatters, quarry sites, resource processing sites, and temporary camps	Rock shelters and caves; open habitation sites	Mobile, opportunistic foragers subsisting on fish, mussels, seeds, and mammals Basalt leaf-shaped Cascade and stemmed projectile points, ovate knives, edge-ground cobble tools, microblades, hammerstones, core tools, and scrapers
Frenchman Springs Period	4,500 – 2,500	Habitation sites along major rivers, confluences, tributaries, canyons, and rapids Lithic scatters, quarry sites, resource processing sites, seasonal round of upland to lowland travel for resource procurement, and seasonal camps	House dwellings, including semi-subterranean	As earlier, but with increased use of upland resources, seeds, and roots Groundstone and cobble tools, mortars, pestles, contracting stemmed, corner notched, and stemmed projectile points, hopper mortar bases and pestles, knives, scrapers, and gravers Wider tool material variety

Table 1. Pre-Contact Cultural Sequence for Southeast Washington

Cultural Period	Years Before Present		Site Types	Architecture	Subsistence
Cayuse Phase	I	2,500 – 1,200	Habitation sites at major rivers, confluences, tributaries, canyons, and rapids Lithic scatters, quarry sites, resource processing sites, and seasonal round camps Ideological and spiritual sites	Pithouses with wall benches	Reliance on riverine resources, fish, and botanicals; basal-notched and corner-notched projectile points (most corner-notched) Variety of tools including groundstone, scrapers, lanceolate and pentagonal knives, net weights, cobble tools, drills, etc.
	II	1,200 – 900	Same as Cayuse Phase I	Pithouses without wall benches	Same as Cayuse Phase I
	III	900 – 250	Increased mobility and hunting ability due to horse introduction Large village habitation sites along rivers, seasonal round camps Same site types as Cayuse Phases I & II	Pit longhouse village sites	Decrease in corner notched points, increase in stemmed and side-notched projectile points, fine pressure flaked tools Increase in trade goods

Sources: Morgan et al. (2001); Walker (1998); Sharpe and Marceau (2001); Swanson (1962); Nelson (1969); Galm et al. (1981); Benson et al. (1989); Thoms et al. (1983); Green (1975); and Rice (1980).

3.2 Ethnographic Period

Native American groups in the region include the Wanapum, Yakama, Umatilla, Nez Perce, Walla Walla, Cayuse, Palouse, and other neighboring groups (Fagan, 2000; Schuster, 1998; Stern, 1998). The Southern Plateau groups did not have formal political unity under a permanent central influence; instead, they formed smaller, politically self-governing groups (villages). The groups were joined by bordering territory, language (Sahaptin), common culture, and frequent social interaction. Although the different groups within the Southern Plateau presided and had power over a specific territory, hunting and fishing grounds were shared amongst all, as cooperation between these groups was common.

During this period, local residents moved seasonally. Seasonal rounds included semi-permanent winter villages along major waterways, including the Columbia and Snake Rivers. In the spring, small groups would travel into canyons and river valleys in temporary camps to gather roots and other spring provisions. Summer food gathering centered on collecting berries and other mountain-based foods in the late summer and early fall (Chatters, 1980).

The *Handbook of North American Indians* (Walker, 1998) summarizes the ethnohistoric cultural pattern of the Columbia Plateau as follows:

- Riverine settlement patterns
- Reliance on a diverse subsistence base of anadromous fish and extensive game and root resources
- Mutual cross-utilization of subsistence resources among the various groups comprising the populations of the area
- Extension of kinship ties through extensive intermarriage
- Limited political integration, primarily at the village and band levels, until adoption of the horse
- Relatively uniform mythology, art styles, and religious beliefs and practices focused on the vision quest, shamanism, lifecycle observances, and seasonal celebrations of the annual subsistence cycle

Review of the project area described in *Čáw Pawá Láakni, They Are Not Forgotten: Sahaptian Place Names Atlas of the Cayuse, Umatilla, and Walla Walla* (Hunn et al., 2015) indicated the importance of Badger Mountain. Badger Mountain is part of a chain of hills known as Piyuušmaami Puštáy (the "hills of the snake") which is a mythical snake that transformed into a portion of the hills in southwest Richland (Hunn et al., 2015). The project area is adjacent to but does not overlap Piyuušmaami Puštáy.

3.3 Euro-American Period

The Lewis and Clark Expedition of 1805 prompted large-scale Euro-American exploration and settlement of the region. Early explorers sought trade with Native Americans, and trade routes were established. Other settlers including miners, livestock producers, and homesteaders soon followed. By the 1860s, the discovery of gold north and east of the mid-Columbia region resulted in an influx of miners traveling through the area. The mining industry created a demand for beef, and the Columbia Basin was ideal for livestock production (Grundy et al., 1998).

Eastern Washington saw an increase in Euro-American settlement in the late 1800s, beginning with livestock producers. Ranchers relied on the abundant bunchgrass and open rangeland to graze thousands of cattle, and later sheep and horses. The open range lasted from the 1880s until about 1910, when homesteaders settled the area and plowed the rangeland to plant crops. However, livestock remained an important economic commodity to the area's agricultural producers (Fridlund, 1985). The *Homestead Act of 1862* enabled legal land ownership to those 21 years of age or older who were willing to live on and develop the land. Around 1900, homesteaders moved west, and agricultural producers gradually replaced the open-range livestock operations that had dominated the area in the latter part of the 1800s and early 1900s. The Northern Pacific Railroad entered the area in the 1880s, creating transportation routes for agricultural commodities and an increase in settler traffic (Lewty, 1987).

In 1943, the Columbia Basin Project was authorized by the U.S. federal government as a project to control floods, regulate stream flow, improve navigation, and provide storage and delivery for irrigation water to approximately 202,343 hectares (500,000 acres) of land (Callum et al., 2005). The project began with the construction of Grand Coulee Dam, which provided irrigation water to convert large areas of desert into productive farmland (Meinig, 1995). The Columbia Basin Project initially authorized water

management for 443,131 hectares (1,095,000 acres); however, by the mid-1980s, only around half of this area was receiving irrigation water (Alwin, 1994).

3.4 City of Richland

A summary of the history of the city of Richland, Washington, is described by the City of Richland (2015) and Kershner (2008). The developmental history of Richland, as described in those texts, is summarized below:

- **1805:** Captain William Clark canoed up the Columbia River to the mouth of the Yakima River and observed the area that would eventually become Richland (Kershner, 2008).
- **1864:** The John B. Nelson family, the first settlers of what is now Richland, settled on the south side of the Yakima River (City of Richland, 2015).
- **1888:** Ben Rosencrance moved north across the Yakima River to what is now Richland and filed a homestead claim of 688 hectares (1,700 acres), with other farmers soon following. Irrigation canals were dug to provide water to the dry land (Kershner, 2008).
- **1894:** W.R. Amon and son Howard Amon created the Benton Water Company, along with other investors. The Benton Water Company provided water and electricity to the area, and the Amon's proposed building a town (Kershner, 2008).
- **1905:** The first post office opened, with the town name listed as Benton. Per the Postal Service's request, Benton was renamed "Richland" to avoid confusing it with another community in the state (City of Richland, 2015).
- **1910:** Richland was incorporated as a fourth-class town on April 28 (City of Richland, 2015).
- **1943:** The United States government began condemning farms, homes, and businesses in Richland for the eventual development of Richland as a government city to house workers at the Hanford Site. Richland was built into a bedroom community for some 16,000 Hanford workers. The Hanford Site eventually produced the plutonium used in the atomic bomb dropped on Nagasaki, Japan, that quickly brought an end to the second World War (Kershner, 2008).
- **1955:** Richland was directed by federal law to make the transition from a federal city to a self-governing city within 5 years. Local residents were unhappy with high housing appraisals that would make purchasing their homes and businesses back from the government more difficult. Appraisals were lowered to a more acceptable level (Kershner, 2008).
- **1958:** Richland was incorporated as a first-class city via popular vote by its inhabitants (Kershner, 2008). Nuclear weapons production during the Cold War and later environmental cleanup continued to draw Hanford Site workers and their families to Richland (City of Richland, 2015).

4 Literature Review

A literature review was conducted for all land within a 1.6-kilometer (1-mile) radius of the project area using the WISAARD and available historical maps.

4.1 Previously Recorded Archaeological Sites/Isolates

A review of WISAARD identified one previously reported site within the project area. Three sites/isolates were identified within 1.6 kilometers (1 mile) of the project area (Table 2).

Table 2. Previously Recorded Archaeological Sites/Isolates

Site Number	Type	Relative Age	Eligibility*	Description	In Project Area?*
45BN1403	Site	Historic	Unevaluated	Original Horn Rapids Road, debris	No
45BN1475	Isolate	Pre-contact	Unevaluated	Groundstone (netherstone)	No
45BN2124	Site	Historic	Unevaluated	Historic scatter, glassware, ceramic, steel can	Yes
*As identified in WISAARD.					

Site 45BN2124 is a historic debris scatter located within the northeastern quarter of the project area. The surficial debris scatter is approximately 50 square meters (538 square feet) and contains ceramic and glassware fragments, as well as one crushed steel can. One shovel test probe was excavated within the scatter, and no artifacts were found below ground surface. This site has been recommended as not eligible for the National Register of Historic Places.

4.2 Previously Conducted Archaeological Surveys

A review of WISAARD identified one previously conducted archaeological survey within the project area. Nine additional surveys were identified within 1.6 kilometers (1 mile) of the project area (Table 3).

Table 3. Previously Conducted Archaeological Survey

Report Number	Title	Reference	In Project Area?
1342318	*Letter to Gene Post Regarding Preliminary Report on the Cultural Resources File Search and Survey of the Precision Cast Parts Property*	Chatters (1997)	No
1350517	*Cultural Resources Survey for the Washington State Department of Transportation's SR 240, Beloit Road to Kingsgate Way Project*	Sharley (2007)	Yes
1351107	*Archaeological Survey for the Proposed Babe Ruth Baseball Complex, Richland*	Miller (2008)	No
1351223	*Cultural Resources Assessment and Monitoring for the Port of Benton Transload Facility Project*	Chobot and Harrison (2008)	No
1352450	*Cultural Resource Survey for the Horn Rapids .75 Mgal Reservoir, Richland*	Arthur and Hartmann (2009b)	No
1353206	*Cultural Resources Survey for the Robertson Drive Extension, Richland*	Arthur and Hartmann (2009c)	No

Table 3. Previously Conducted Archaeological Survey

Report Number	Title	Reference	In Project Area?
1353208	*Cultural Resources Survey for the First Street Construction, Kingsgate Way to Logston Boulevard, Richland*	Arthur and Hartmann (2009a)	No
1683164	*Letter Report to the City of Richland Regarding Monitoring of the Installation of Water and Electrical Lines in Horn Rapids ORV Park*	Miller (2012)	No
1689642	*Archaeological Assessment of the 40-Acre Parcel Being Considered for the Proposed Army National Guard Readiness Center, Richland*	Knobbs and Stapp (2017)	No
1694156	*Cultural Resources Reconnaissance for the Clubhouse Lane Roundabout and Road Extension, and Grading of Adjacent Lots Project, Richland, WA*	Stapp and Paul (2020)	No
N/A	*A Cultural Resources Review and Inventory of the Proposed Horn Rapids Future Fire Station Project, Richland, Benton County, Washington*	Landreau and Triplett (2021 [*in draft*])	Yes

Sharley (2007) conducted a pedestrian survey approximately 20 meters (66 feet) from the centerline of State Route 240 that passed along the northern edge of the project area. No sites or isolates were found within the project area during this pedestrian survey.

During fieldwork to support this project, a draft report and fieldwork completed by Reiss-Landreau Research (Landreau and Triplett, 2021) supporting construction of a fire station was identified as part of a final WISAARD search prior to subsurface testing. This report was in draft and, as such, was not identified during background research completed as part of Section 4 of this report. A copy of the report was obtained, which indicated that approximately 14 hectares (35 acres) of the current project area had been surveyed (pedestrian survey and subsurface testing) in February 2021 (Figure 5). One archaeological site (a historic debris scatter_ had been identified, recorded, and evaluated as part of this project. This site was recommended as not eligible for the National Register of Historic Places.

4.3 Historic Property Inventories

A total of three historic property inventories have been completed for standing structures within 1.6 kilometers (1 mile) of the project area. The inventories were completed for the following:

- Residence – 2898 Riverbend Drive, Richland, Washington
- Residence – 2898 Riverbend Drive, Richland, Washington
- Historic road – Horn Rapids Road, Richland, Washington

None of these structures have been evaluated for placement on state or national historic registers, and none overlap the project area.

4.4 Historic Maps

4.4.1 1883 General Land Office Map

Review of the 1880 General Land Office map (Figure 3) shows that the area had been surveyed, but no features fall within the project area. The Yakima River is to the south of the project area.

4.4.2 1917 U.S. Geological Survey Topographic Map

Review of the 1917 U.S. Geological Survey (USGS) topographic map (Figure 4) indicates very little development within the project area other than branching unimproved roads. An irrigation ditch is seen roughly forming the southern border of the project area.

1.1.1 Additional Maps

Additional USGS topographic maps were reviewed digitally as part of this project. Reviewed maps include the following:

- Pasco, Washington (1917)
- Richland, Washington (1951)
- Walla Walla, Washington (1953)
- Walla Walla, Washington (1958)
- Richland, Washington (1978)
- Richland, Washington (1992)
- Richland, Washington (2011)
- Richland, Washington (2014)
- Richland, Washington (2017)
- Richland, Washington (2020)

Review of historical USGS topographic maps indicates little development within the project area. Three unimproved roads were present in the 1917 map, branching out from near the southeast corner of the site. Beginning in the 1978 map, State Route 240 is present, forming the northern boundary of the project area, as well as the modern-day Twin Bridges Road forming the western boundary of the project area. Also beginning in the 1978 map, a road runs exactly north-south from what is now Twin Bridges Road; however, the road is no longer present on the 2011 map.

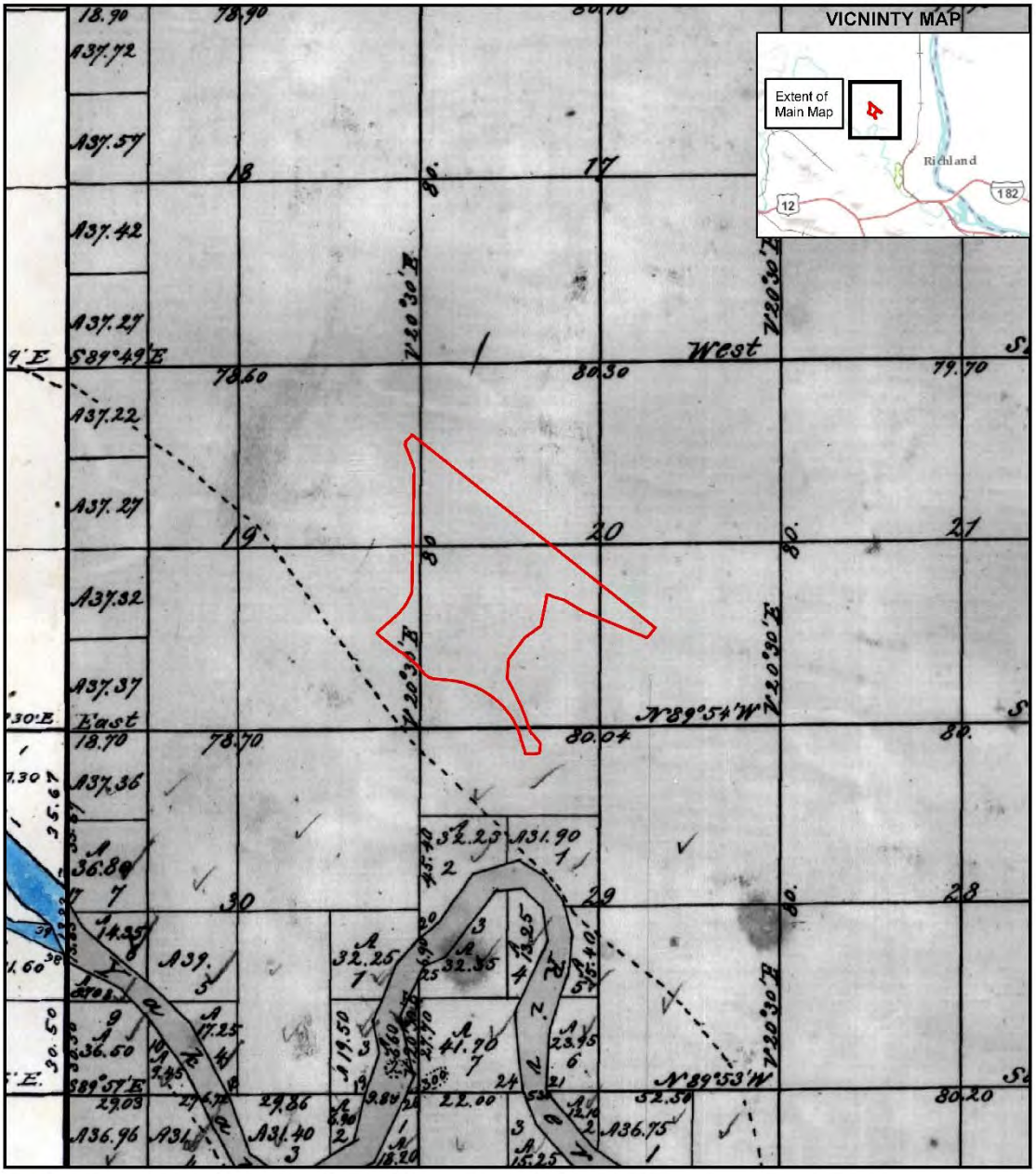
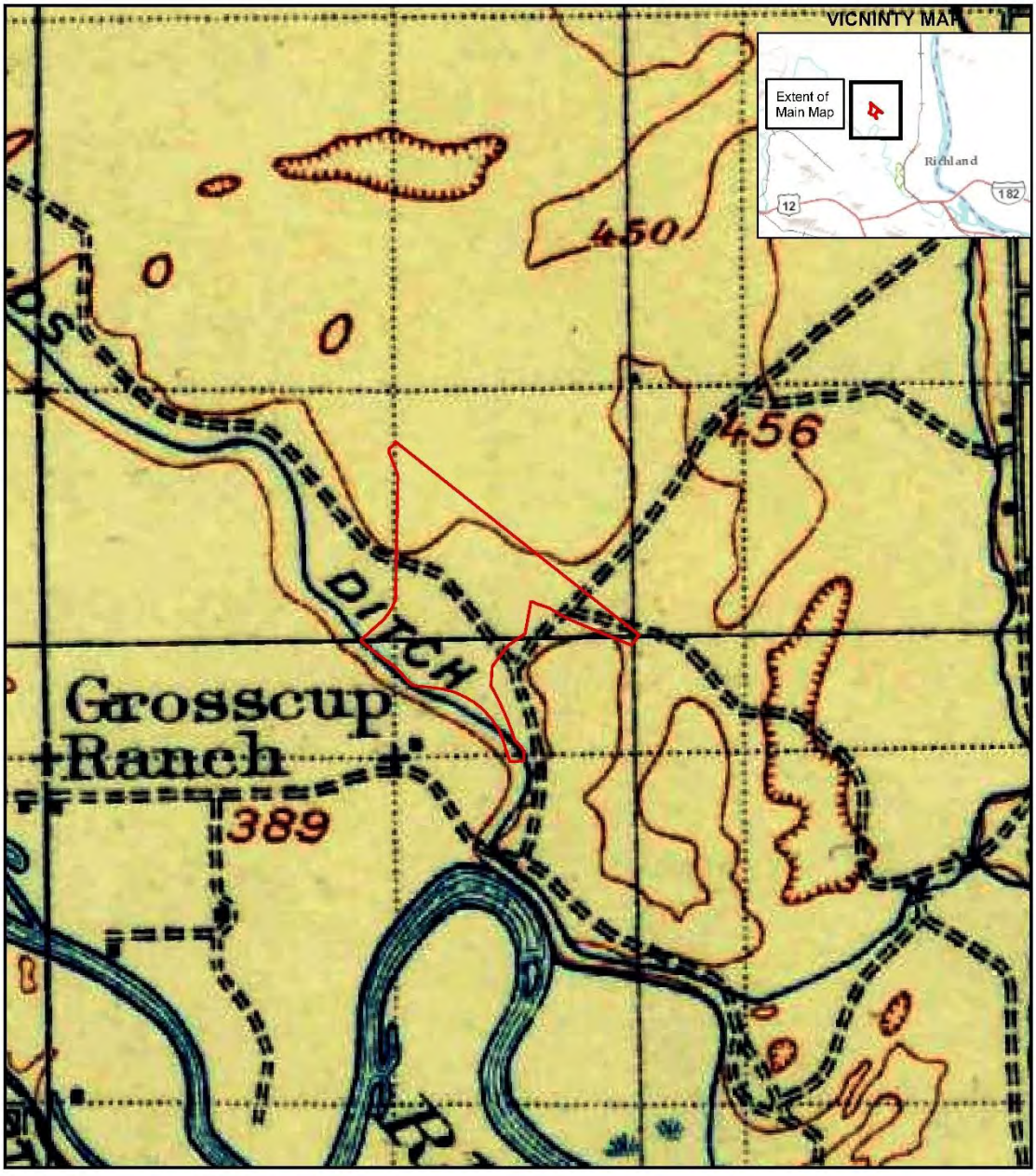


Figure 3. Map of Project Location and 1883 GLO Map



Project Location & 1917 USGS Topographic Map
Benton County, Washington

Legend

0 4,000 Feet

0 1,000 Meters

NOTES: Historic topographic map obtained at http://ngmdb.usgs.gov/maps/Topoview/

DIGS: C:\Users\Raena Ballantyne\Documents\GRAM\MapFiles\Task29_QuailRidge.mxd

Figure 4. Map of Project Location and 1917 USGS Topographic Map

5 Research Design

5.1 Objectives and Expectations

The scope of this survey is limited to providing the client with relevant information to meet the requirements of SEPA (RCW 43.21) (checklist question 13). The components of question 13 are as follows:

- Are there any buildings, structures, or sites located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.
- Are there any landmarks, features, or other evidence of Native American or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.
- Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with the Tribes and DAHP, archaeological surveys, historic maps, geographic information system data, etc.
- Discuss proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

The goal of this research design was to determine if there are any constraints on development of the project area by identifying cultural resources, determining their extent, and evaluating their eligibility for listing in state or national historic registers.

Based on the information obtained from the literature review, there is a potential for both pre-contact and historic cultural materials. Pre-contact, the potential exists for isolated finds and small sites. Previous cultural resource investigations and a literature search in the general area have identified isolated finds and small sites (primarily near water sources). Historically, the project area has the potential to contain early settlement and agricultural related items such as can scatters, roads, or isolated finds.

5.2 Proposed Field and Laboratory Methods

Current project activities will occur throughout the project area. No previous archaeological fieldwork has been conducted at this location; therefore, pedestrian survey and subsurface testing are recommended to evaluate the potential for cultural resources to exist within the project area. A pedestrian survey and subsurface testing will occur throughout the project area.

5.2.1 Pedestrian Survey

A pedestrian survey will be conducted throughout the project area using transects spaced no more than 10 meters (32.8 feet) apart. Any potential cultural resources encountered will be recorded in the field and evaluated to determine eligibility as a recorded archaeological site. Recorded data will include a description of the items encountered (including dimensions), photographs, global positioning system (GPS) coordinates, environmental context, and any other relevant observations. All observations and data will be recorded in the field. Artifacts will not be collected as part of fieldwork.

5.2.2 Subsurface Testing

Given the absence of previously conducted fieldwork and the unknown extent of excavations within the project area, subsurface testing will use shovel test pits (STPs) to provide a systematic sample of the project area. A total of 74 STPs are planned within the project area. Appendix A presents a summary of data recovered from each STP.

Each STP will be hand-dug to approximately 30 centimeters (12 inches) in diameter and will be excavated to approximately 1 meter (39.3 inches) deep, if possible. All excavated soil will be screened through 1/4-inch hardware cloth. An STP may be moved or abandoned if environmental conditions (e.g., geologic conditions, construction activities, or other environmental hazards) prevent excavation. If an STP cannot be moved within an approximately 10-meter (30-foot) radius of the original location, that unit will be removed from the excavation plan.

If any artifacts are identified during the survey or shovel testing, they will be documented according to DAHP excavation reporting standards. The documentation will include careful descriptions of soil types and natural/cultural stratigraphic layers. For each STP, photographs and GPS coordinates will be collected. Artifacts will not be collected. Information obtained from this activity will be included in the survey report.

If positive shovel tests occur, additional STPs will be completed to determine if an archaeological site is present and to identify the spatial boundaries of the site, if possible. Shovel testing will only be conducted within the project area. Any artifacts identified during shovel testing will be documented for size, form, and function (if possible); will be photographed; and will then be returned to the STP. All observations and data will be recorded in the field. Artifacts will not be collected as part of fieldwork.

Subsurface testing at a depth greater than 1 meter (39.3 inches) (hand auger) was considered but was ultimately not included as part of the research design for this project because local geomorphology primarily consists of Pleistocene outburst flood deposits that will likely not extend beyond 1 meter (39.3 inches) in depth. Additionally, subsurface deposits are likely to relate to agricultural use of the property, which typically do not extend beyond 1 meter (39.3 inches) below ground surface. However, should artifacts be encountered near the termination depth of an STP, use of a hand auger will be reconsidered as a means of confirming the extent of cultural deposits at that location.

An inadvertent discovery plan was compiled for the field work component of this project and is provided in Appendix B of this report.

6 Survey Results

6.1 Survey

A pedestrian survey and subsurface testing within the project area were conducted May 11–20, 2021 (Figure 5). Fieldwork was led by Stacie Sexton (principal investigator for GRAM Northwest, LLC). Field conditions were generally sunny and breezy, with high temperatures reaching approximately 26°C to 32°C (80°F to 90°F).

During fieldwork to support this project, a draft report and fieldwork completed by Reiss-Landreau Research (Landreau and Triplett, 2021) supporting construction of a fire station was identified overlapping the current project area. This review was observed as part of a final WISAARD search prior

to subsurface testing. This report was in draft and, as such, was not identified during background research completed as part of Section 4 of this report. A copy of the report was obtained, which indicated that approximately 14 hectares (35 acres) of the current project area had been surveyed (pedestrian survey and subsurface testing) in February 2021 (Figure 5). One archaeological site (a historic debris scatter) had been identified, recorded, and evaluated as part of this project. This site was recommended "not eligible" for the National Register of Historic Places. Intensive fieldwork, including pedestrian survey and subsurface testing, had been conducted less than 6 months prior to fieldwork to support the current project. Therefore, subsurface testing was not conducted in areas overlapping the Reiss-Landreau Research survey.

Additionally, the survey area is adjacent to an active construction site (Figure 5). Pedestrian survey and subsurface testing within the construction site were avoided.

6.1.1 Pedestrian Survey

Survey transects were spaced 10 meters (32.8 feet) apart throughout the surveyed project area (Figure 5). The survey was generally conducted in parallel to State Route 240 (Figure 5). The survey area consisted of shrub stepped desert, bisected by active off-road driving/cycling and modern dumping. Most of the project area was comprised of a mixture of bare ground with low vegetation (weeds and grasses) and invasive shrubs (including Russian thistle). Various photos from the project area are presented in Figures 6 through 10.

Several concentrations of modern debris (including pallets, window screens, concrete, and PVC piping) were noted throughout the project area. Additionally, modern trash (including plastic food and beverage containers, mylar celebration balloons, golf balls, and plastic grocery bags) was also observed throughout the project area.

Two concentrations of debris potentially meeting the criterion for recordation as an archaeological site (50 years of age) were encountered during the pedestrian survey (Figure 5). These concentrations were temporarily recorded as "QR Debris 01" and "QR Debris 02" (Tables 3 and 4, respectively) for research and evaluation after fieldwork.

No other potential cultural resources were identified during the field survey for this project.

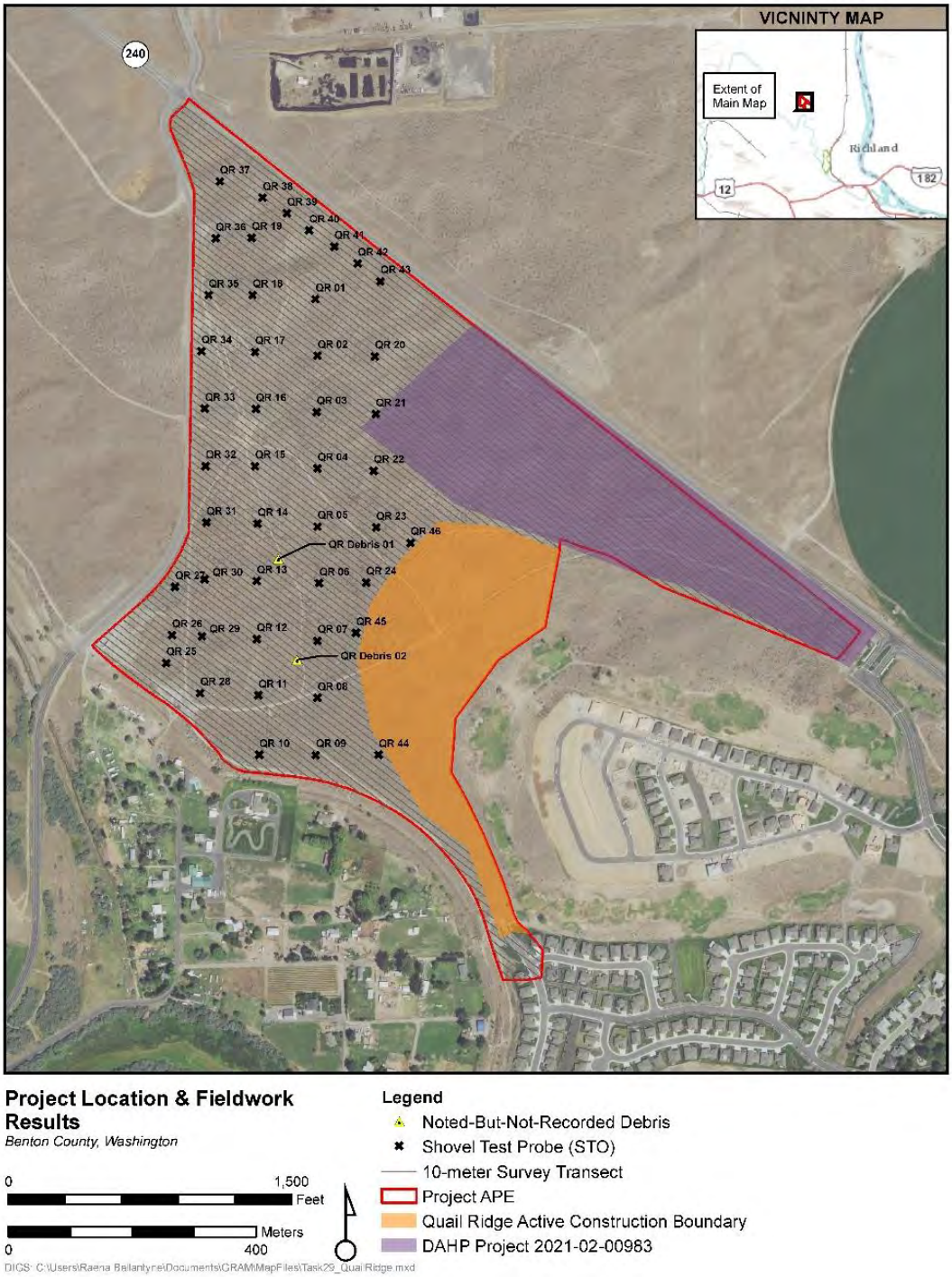


Figure 5. Surveyed Project Area

Table 3. QR Debris 01

Artifact	Description
Broken glass	Amber and clear glass (miscellaneous), nondiagnostic fragments
Sanitary cans	~20 count 4 ¾ inches by 2 ¾ inches Church-key opened Rolled/crimped seams Modern vertical seal May be oil cans
Sanitary cans	~6 count 2 inches by 2 ¾ inches (larger diameter than height)
Sardine tin	5 ¾ inches by 3 inches by 1 ¼ inches
Sanitary cans	~10 crushed cans of varying sizes
Bottle caps	Crown cap: 1 1/8 inches in diameter, ¼ inch in height Metal cap: White with red logo; 1 ¼ inches in diameter, ½ inch in height Plastic "Lux" liquid detergent cap: Plastic, red, embossed logo; 1 inch in diameter, ¾ inch in height Nalley cap: "If It's Nalley's, It's good" logo; 2 inches in diameter, ¼ inches in height
Bottle bases	Brown Clorox base Clear Duraglass base with Owens, Illinois mark Clear grape embossed glass side and bottle base: "Des Pat Applied for… IDI: 54-47"
Leather glove	Crumpled and deteriorated leather glove: unknown side and size
Light bulb	Incandescent bulb screw base and filament
Rubber automotive hose	Embossed rubber (longitudinal ribbing): ~1/2 inches in inner diameter; marks from spring clamp on one end (clamp missing)
Broken plastic	Three pieces of broken yellow plastic; male/female molded connectors on each piece
Toilet paper roll holder	Fragment of white ceramic bathroom fixture: "STAE-FAST Vitreous China," Willette's, New York, NY
Broken ceramic	Miscellaneous pieces

Table 4. QR Debris 02

Artifact	Description
Sanitary cans	~30 cans of varying sizes Majority of cans approximately 4 ¾ inches by 2 ¾ inches
Oval tin	6 inches by 4 ½ inches by 1 ¼ inches
Bottle bases	Two clear glass bases with embossing Two clear square bases
Ceramic kettle and cup	Small fragments with floral pattern
Blue glass fragment	Nondiagnostic fragment
Automotive part	Transmission mount from a 1966–1972 Volkswagen Beetle (Part #311-301-265)
Red/orange ceramic fragment	Nondiagnostic fragment

Figure 6. Overview from Northwest Corner of Project Area (Aspect: East)

Figure 7. Overview from South Central of Project Area (Aspect: Northeast)

Figure 8. Overview of the Southeast Corner of Project Area (Aspect: East)

Figure 9. Overview of Potential Cultural Resource QR Debris 01 (Aspect: Southeast)

Figure 10. Overview Potential Cultural Resource QR Debris 01 (Aspect: South)

6.1.2 Subsurface Testing

A total of 46 STPs were excavated within the project area. Three STPs (QR44, QR45, and QR46) were not excavated because they fell within the boundary of an active construction site. Field conditions at the site consisted of fine-grained sands and silts overlaying coarse-grained medium sands and gravels. Gravels were typically mixed river rock and gray basalts, including some vesicular basalt (10 centimeters [0.33 inches] maximum). Several units were truncated due to gravel concentrations.

Appendix A provides a summary of data recovered from each STP.

7 Analysis

Background research (including a review of archaeological site and survey data available in the WISAARD), analysis of historical maps and geographic information system data, and an assessment of local geology were conducted to identify any previously recorded cultural resources within the project area.

Sediments observed throughout the project area consisted of fine-grained sands and silts overlaying coarse-grained medium sands and gravels. Gravels were typically mixed river rock and gray basalts, including some vesicular basalt (10 centimeters [0.33 inches] maximum). These sediments are consistent with those observed in the Washington Department of Natural Resources geologic information portal (https://geologyportal.dnr.wa.gov/2d-view).

A review of literature via WISAARD identified one previously conducted survey (in draft) and one archaeological site (site form in process) within the project area. During fieldwork to support this project, a draft report and fieldwork completed by Reiss-Landreau Research (Landreau and Triplett, 2021) supporting construction of a fire station was identified overlapping the current project area. Since this report was in draft, it was not identified during background research completed as part of Section 4 of this report. One archaeological site (a historic debris scatter) had been identified, recorded, and evaluated as part of this project. This site was recommended as not eligible for the National Register of Historic Places. Additionally, a review of historical USGS topographic maps indicates little development within the project area.

A pedestrian survey and subsurface testing within the project area were conducted May 11–20, 2021. Survey transects were spaced 10 meters (32.8 feet) apart, and a total of 46 STPs were excavated within the project area. Three STPs (QR44, QR45, and QR46) were not excavated because they were within the boundary of an active construction site. Several units were truncated due to gravel concentrations. The project area consisted of shrub stepped desert, bisected by active off-road driving/cycling and modern dumping. Most of the project area was comprised of a mixture of bare ground with low vegetation (weeds and grasses) and invasive shrubs (including Russian thistle).

Two concentrations of debris potentially meeting the criterion for recordation as an archaeological site (50 years of age) were encountered during pedestrian survey (Figure 5). These concentrations were temporarily recorded as “QR Debris 01” and “QR Debris 02” for research and evaluation after fieldwork.

7.1 QR Debris 01

Potential cultural resources identified at QR Debris 01 included yellow plastic fragments with molded interlocking connectors, possibly from a children's toy (Figure 11). The vivid color and complex molding design suggest that this plastic is modern. The plastic fragments were intermixed with glass and other debris, indicating that they were deposited at the same time. Additionally, a metal cap observed within the debris scatter contained the logo and slogan "If it's Nalley's, It's Good" (Figure 12). The trademark filing date indicates that the cap was manufactured in 1978 or later (Justia Trademarks, 2001).
The inclusion of modern (<50 years of age) debris at this potential site indicates that it was deposited during or after the late-1970s. Therefore, this debris scatter was not recorded as an archaeological site.

7.2 QR Debris 02

Potential cultural resources identified at QR Debris 02 included an automotive part (311-301-265) with the Volkswagen logo (Figure 13). The part number identified this debris as the transmission mount from a 1966–1972 Volkswagen Beetle (California Import Parts, Ltd. 2021). The part was likely deposited at the site after an initial use period, typically lasting several years after original manufacture. Additionally, the condition of the piece (pliable rubber fittings with easily identifiable markings) suggests that it may be a reproduction part, manufactured after the original production dates for the vehicle. The inclusion of modern (<50 years of age) debris at this potential site indicates that it was deposited during or after the mid-1970s. Therefore, this debris scatter was not recorded as an archaeological site.

Figure 11. Overview of Potential Cultural Resource (Yellow Plastic Fragment) QR Debris 01

Figure 12. Overview of Potential Cultural Resource ("If It's Nalley's, It's Good" Jar Lid) QR Debris 01

Figure 13. Overview of Potential Cultural Resource (1966–1972 Volkswagen Beetle Transmission Mount) QR Debris 02

No other potential cultural resources were identified during the fieldwork to support this project.

8 Conclusions and Recommendations

The findings of the literature review and archaeological investigation indicate that the project area has a low potential to contain archaeological materials. Based on the results of the archaeological survey and shovel testing, cultural resources monitoring is not recommended for this project.

This survey report was developed to answer all of the components of question 13 of the SEPA checklist (RCW 43.21). The components of question 13 are as follows:

- Are there any buildings, structures, or sites located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.
  - No. Background research and fieldwork to support this project did not identify any historic buildings, structures, or sites.
- Are there any landmarks, features, or other evidence of Native American or historical use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.
  - A professional archaeological survey, including pedestrian survey and subsurface testing, was conducted to identify any cultural resources located within the project area. A review of archaeological site and survey data available in the WISAARD, analysis of historical maps and geographic information system data, and archaeological fieldwork conducted to support this project did not identify any cultural resources overlapping the project area.
- Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with the Tribes and the DAHP, archaeological surveys, historic maps, geographic information system data, etc.
  - A professional archaeological review (including archaeological site and survey data available in the WISAARD), analysis of historical maps and geographic information system data, and archaeological fieldwork were conducted as part of this survey report.
- Discuss proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.
  - The findings of the literature review and archaeological investigation did not identify any cultural resources within the project area. As such, no additional measures were recommended for this project.

9 References

Alwin, J., 1984, *Between the Mountains, a Portrait of Eastern Washington*, Northwest Panorama Publishing, Inc., Bozeman, Montana.

Arthur, E. and G.D. Hartmann, 2009a, *Cultural Resources Survey for the First Street Construction, Kingsgate Way to Logston Boulevard, Richland* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Arthur, E. and G.D. Hartmann, 2009b, *Cultural Resource Survey for the Horn Rapids .75 Mgal Reservoir, Richland* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Arthur, E. and G.D. Hartmann, 2009c, *Cultural Resources Survey for the Robertson Drive Extension, Richland* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Benson, J.R., J.V. Jermann, and D.E. Lewarch, 1989, *Cultural Resources Inventory of the Proposed Yakima Firing Center Expansion Area East-Central Washington*, Contract CACA67 86-D 0051, Sacramento, California.

Callum, K.E., N. Lopez, and C. Smith, 2005, *NRCS Richland Tennis EQIP 2005 Site Identification Survey in Franklin County, Washington*, Natural Resources Conservation Service, Washington, D.C.

Chatters, J.C., 1980, *Cultural Resources of the Columbia Basin Project: An Inventory of Selected Parcels*, Reconnaissance Report No. 32, University of Washington, Seattle, Washington.

Chatters, J.C., 1997, *Letter to Gene Post Regarding Preliminary Report on the Cultural Resources File Search and Survey of the Precision Cast Parts Property* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Chobot, K.F. and J.B. Harrison III (2008) *Cultural Resources Assessment and Monitoring for the Port of Benton Transload Facility Project* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

California Import Parts, Ltd., 2021, *VWC-311-301-265-B - FRONT TRANSMISSION MOUNT BEETLE 66-72 / GHIA 66-72 / T3 66-67*, website. Available at: https://www2.cip1.com/ProductDetails.asp?ProductCode=VWC%2D311%2D301%2D265%2DB. Accessed 5/17/2021.

City of Richland, 2015, *Richland's History*, City of Richland, Richland, Washington. Available at: https://www.ci.richland.wa.us/home/showdocument?id=98. Accessed 10/21/2020.

Fagan, B.M., 2000, *Ancient North America: The Archaeology of a Continent*, Thames & Hudson, New York.

Franklin, J.F. and C.T. Dyrness, 1973, *Natural Vegetation of Oregon and Washington*, Oregon State University Press, Corvallis, Oregon.

Fridlund, P., 1985, *Prosser 1910-20 Going Back*, Ye Galleon Press, Fairfield, Washington.

Galm, J.R., G.D. Hartmann, R.A. Masten, and G.O. Stephenson, 1981, *A Cultural Resources Overview of the Bonneville Power Administration's Mid-Columbia Project, Central Washington*, Eastern Washington University, Cheney, Washington.

Green, G.S., 1975, *Prehistoric Utilization in the Channeled Scablands of Eastern Washington*, Washington State University, Pullman, Washington.

Grundy, F.J., S. Axton, S. Emerson, S. Gough, and C.T. Luttrell, 1998, *A Cultural Resources Overview of the United States Bureau of Reclamation's Scattered Tracts/Potholes Study Area Adams, Franklin, Grant, and Walla Walla Counties, Washington*, Eastern Washington University, Cheney, Washington.

Homestead Act of 1862, Public Law 37-64, 37th Congress.

Hunn, E.S., E.T. Morning Owl, P.E. Cash Cash, and J.K. Engum, 2015, *Čáw Pawá Láakni, They Are Not Forgotten: Sahaptian Place Names Atlas of the Cayuse, Umatilla, and Walla Walla*, Tamástslikt Cultural Institute, Pendleton, Oregon.

Justia Trademarks, 2021, *IF IT'S NALLEY'S, IT'S GOOD - Trademark Details*, website. Available at: https://trademarks.justia.com/731/98/if-it-s-nalley-s-it-s-good-73198337.html. Accessed 5/17/2021.

Kershner, J., 2008, *Richland – Thumbnail History*, Historylink.org Essay 8450. Available at: http://historylink.org/File/8450. Accessed 11/14/ 2020.

Knobbs, J. and D.C. Stapp, 2017, *Archaeological Assessment of the 40-Acre Parcel Being Considered for the Proposed Army National Guard Readiness Center, Richland* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Landreau, C. and M. Triplett, 2021, *A Cultural Resources Review and Inventory of the Proposed Horn Rapids Future Fire Station Project, Richland, Benton County, Washington*, DAHP Project: 2021-02-00983, *IN DRAFT* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Lewty, P.J., 1987, *To the Columbia Gateway, the Oregon Railway and the Northern Pacific, 1879-1884*, Washington State University Press, Pullman, Washington.

Meinig, D.W., 1995, *The Great Columbia Plain, A Historical Geography, 1805-1910*, University of Washington Press, Seattle, Washington.

Miller, C.L., 2008, *Archaeological Survey for the Proposed Babe Ruth Baseball Complex, Richland* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Miller, C.L., 2012, *Letter Report to the City of Richland Regarding Monitoring of the Installation of Water and Electrical Lines in Horn Rapids ORV Park* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Morgan, V., R. Bruce, J. Creighton, and S. Emerson, 2001, *A Cultural Resources Overview for the Priest Rapids Hydroelectric Generation Project (FERC Project No. 2114), Grant, Chelan, Douglas, Kittitas, and Yakima Counties, Washington*, Grant County Public Utility District, Ephrata, Washington.

Nelson, C.M., 1969, *The Sunset Creek Site (45-KT-28) and its Place in Plateau Prehistory*, Report of Investigations No. 47, Laboratory of Anthropology, Washington State University, Pullman, Washington.

RCW 43.21, "State Environmental Policy," *Revised Code of Washington*, Olympia, Washington.

Rice, D.G., 1980, *Overview of Cultural Resources on the Hanford Reservation in South Central Washington State*, submitted to U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Schuster, H., 1998, "Yakima and Neighboring Groups," *Handbook of North American Indians*, Volume 12, Plateau, Smithsonian Institution, Washington, D.C.

Sharley, A., 2007, *Cultural Resources Survey for the Washington State Department of Transportation's SR 240, Beloit Road to Kingsgate Way Project* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Sharpe, J. and R. DeMaris, 2012, *Cultural Resources Survey Report for 95 acres of Land for the Port of Pasco Project, Franklin County, Washington* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Sharpe, J.J. and T.E. Marceau, 2001, *Archaeological Excavation Report for Extraction Well C3662 in Support of the 100-KR-4 Pump and Treat Project*, BHI-01645, Bechtel Hanford, Inc., Richland, Washington.

Stapp, D.C. and C. Paul, 2020, *Cultural Resources Reconnaissance for the Clubhouse Lane Roundabout and Road Extension, and Grading of Adjacent Lots Project, Richland, WA* (on file), Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Stern, T., 1998, "Cayuse, Umatilla, and Walla Walla," *Handbook of North American Indians*, Volume 12, Plateau, Smithsonian Institution, Washington, D.C.

Swanson, E.H., 1962, *The Emergence of Plateau Culture*, Occasional Papers of the Idaho State College Museum No. 8, Idaho State University Museum, Pocatello, Idaho.

Thoms, A.V., S.J. Bobalick, K. Bohm, T.R. Metzger, D. Olson, and S.R. Samuels, 1983, *Archaeological Investigations in Upper McNary Reservoir: 1981-1982*, Washington State University, Pullman, Washington.

Walker, D.E., Jr. (ed.), 1998, *Handbook of North American Indians*, Volume 12, Plateau, Smithsonian Institution, Washington, D.C.

Appendix A – Shovel Test Unit Data

Table A-1. Data for STU 1

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30-85 cm	Coarse and medium sand, <10% gravel, gray.	None.
	85 cm	Rock/caliche layer.	None.
	Reason terminated:	Refusal due to rock/caliche layer.	

Table A-2. Data for STU 2

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-3. Data for STU 3

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 90 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Sand cave-in.	

Table A-4. Data for STU 4

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 85 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Sand cave-in.	

Table A-5. Data for STU 5

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 80 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Sand cave-in.	

Table A-6. Data for STU 6

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-7. Data for STU 7

Photo	Depth	Soil Description	Artifacts/Features
	0 to 95 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	Reason terminated:	Refusal due to large rock.	

Table A-8. Data for STU 8

Photo	Depth	Soil Description	Artifacts/Features
	0 to 95 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	Reason terminated:	Refusal due to large rock.	

Table A-9. Data for STU 9

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-10. Data for STU 10

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray.. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-11. Data for STU 11

Photo	Depth	Soil Description	Artifacts/Features
	0 to 40 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	40 cm	Rock layer.	None.
	Reason terminated:	Refusal due to rock layer.	

Table A-12. Data for STU 12

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-13. Data for STU 13

Photo	Depth	Soil Description	Artifacts/Features
	0 to 40 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	40 cm	Rock/caliche layer.	None.
	Reason terminated:	Refusal due to rock/caliche layer.	

Table A-14. Data for STU 14

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 80 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Sand cave-in.	

Table A-15. Data for STU 15

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 95 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Sand cave-in.	

Table A-16. Data for STU 16

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-17. Data for STU 17

Photo	Depth	Soil Description	Artifacts/Features
	0 to 95 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Sand cave-in.	

Table A-18. Data for STU 18

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-19. Data for STU 19

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-20. Data for STU 20

Photo	Depth	Soil Description	Artifacts/Features
	0 to 65 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	65 cm	Rock/caliche layer.	None.
	Reason terminated:	Refusal due to rock/caliche layer.	

Table A-21. Data for STU 21

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 85 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Sand cave-in.	

Table A-22. Data for STU 22

Photo	Depth	Soil Description	Artifacts/Features
	0 to 50 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	50 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-23. Data for STU 23

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	50 to 75 cm	Coarse and medium sand with 40% gravel, gray.	None.
	75 cm	Rock/caliche layer.	None.
	Reason terminated:	Refusal due to rock/caliche layer.	

Table A-24. Data for STU 24

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-25. Data for STU 25

Photo	Depth	Soil Description	Artifacts/Features
	0 to 20 cm	Fine sand and silt, non-compacted, brown. Roots within top ~5 cm.	None.
	20 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-26. Data for STU 26

Photo	Depth	Soil Description	Artifacts/Features
	0 to 20 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	20 to 85 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Refusal due to large rock.	

Table A-27. Data for STU 27

Photo	Depth	Soil Description	Artifacts/Features
	0 to 40 cm	Fill: 60% river rock, up to 15 cm, with fine, medium and coarse sand. Gray overall. Roots within top ~5 cm.	None.
	Reason terminated:	Refusal due to rocks.	

Table A-28. Data for STU 28

Photo	Depth	Soil Description	Artifacts/Features
	0 to 20 cm	Fine sand and silt, non-compacted, brown. Roots within top ~5 cm.	None.
	20 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-29. Data for STU 29

Photo	Depth	Soil Description	Artifacts/Features
	0 to 60 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	60 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-30. Data for STU 30

Photo	Depth	Soil Description	Artifacts/Features
	0 to 25 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	Reason terminated:	Refusal due to multiple large rocks.	

Table A-31. Data for STU 31

Photo	Depth	Soil Description	Artifacts/Features
	0 to 45 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	45 to 80 cm	Coarse and medium sand, 30% gravel – mixed river rock (10 cm maximum), gray.	None.
	Reason terminated:	Refusal due to rocks.	

Table A-32. Data for STU 32

Photo	Depth	Soil Description	Artifacts/Features
	0 to 40 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	40 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-33. Data for STU 33

Photo	Depth	Soil Description	Artifacts/Features
	0 to 55 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	55 to 60 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Refusal due to large rock.	

Table A-34. Data for STU 34

Photo	Depth	Soil Description	Artifacts/Features
	0 to 95 cm	Mix of silt, fine, medium and coarse sand with <10% gravel, noncompacted, overall tan color. Roots within top ~5 cm.	None.
	Reason terminated:	Refusal due to rocks.	

Table A-35. Data for STU 35

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-36. Data for STU 36

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Mix of silt, fine, medium and coarse sand with <10% gravel, noncompacted, overall tan color. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-37. Data for STU 37

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-38. Data for STU 38

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-39. Data for STU 39

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-40. Data for STU 40

Photo	Depth	Soil Description	Artifacts/Features
	0 to 90 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Sand cave-in.	

Table A-41. Data for STU 41

Photo	Depth	Soil Description	Artifacts/Features
	0 to 100 cm	Coarse and medium sand, <10% gravel, gray. Roots within top ~5 cm.	None.
	Reason terminated:	Reached depth.	

Table A-42. Data for STU 42

Photo	Depth	Soil Description	Artifacts/Features
	0 to 70 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	70 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-43. Data for STU 43

Photo	Depth	Soil Description	Artifacts/Features
	0 to 30 cm	Fine sand and silt, compacted, brown. Roots within top ~5 cm.	None.
	30 to 100 cm	Coarse and medium sand, <10% gravel, gray.	None.
	Reason terminated:	Reached depth.	

Table A-44. Data for STU 44

Photo	Depth	Soil Description	Artifacts/Features
	0 cm	Not excavated due to recent grading and hydroseeding.	None.
	Reason terminated:	Unable to excavate.	

Table A-45. Data for STU 45

Photo	Depth	Soil Description	Artifacts/Features
	0 cm	Not excavated due to recent grading and hydroseeding.	None.
	Reason terminated:	Unable to excavate.	

Table A-46. Data for STU 46

Photo	Depth	Soil Description	Artifacts/Features
	0 cm	Not excavated due to recent grading and hydroseeding.	None.
	Reason terminated:	Unable to excavate.	

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Appendix B – Inadvertent Discovery Plan

Quail Ridge Housing Devlopment Inadvertent Discovery Plan

June 24, 2021

Project Location

USGS Quadrangle: Richland, Washington 7.5'
Township: 10 N, Range: 28 E
Section: 19, 20, & 29

Project Description

The project includes the construction of a housing development on approximately 59.5 hectares (147 acres) of land located south of Washington State Route 240 between Twin Bridges Road and Village Parkway in Richland, Washington. Project activities including excavation and grading, as well as other general construction activities, that will take place throughout the project area. The anticipated maximum depth of excavation for this project is approximately 3 meters (10 feet).

The project area is approximately 59.5 hectares (147 acres) and is located in Benton County, Section 19, 20, and 29 of Township 10N, Range 28E (Figures 1 and 2). The property overlaps all or part of the following Benton County tax lots:

- #119081000001004
- #120083000009006
- #120083000009008
- #120083000009009
- #120083000009013
- #120084000001002
- #129082020003000
- #129082020000011
- #129082020000012
- #129082020000013
- #129082020000038
- #129082020002000
- #120083000009012
- #120083000009014
- #120083000009015

Project Area

The Project area contains approximately 59.5 hectares (147 acres) located in Benton County, in Township 10 North, Range 28 East in Section 19, 20, and 29 of the Richland, WA 7.5' USGS Quadrangle.

Inadvertent Discovery Plan

This inadvertent discovery plan (IDP) was prepared to support project activities described above. This plan was prepared to provide field personnel a process for the inadvertent discovery of cultural resources and/or human remains identified during fieldwork for the project.

Recognizing Cultural Resources

A cultural resource discovery could be prehistoric or historic. Examples include the following:

- An accumulation of shell, burned rocks, or other food-related materials
- Bones or small pieces of bone
- An area of charcoal or very dark-stained soil with artifacts
- Stone tools or waste flakes (i.e. an arrowhead. or stone chips)
- Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years
- Buried railroad tracks, decking, or other industrial materials

When in doubt, assume the material is a cultural resource.

Onsite Responsibilities

STEP 1: Stop Work

If any employee, contractor, or subcontractor believes that he or she has uncovered a cultural resource at any point in the project, all work must stop immediately in the vicinity of the find. Notify the appropriate party(ies) as outlined in steps 2 through 4. The area surrounding the find must be secured using pin flags, stanchions and rope, or other appropriate delineation to provide for the security and protection of the discovery.

STEP 2: Notify the Archaeological Monitor

If there is an archaeological monitor for the project, notify that person. If there is a monitoring plan in place, the monitor will follow the procedure as described.

STEP 3: Notify the Project Manager

Notify the identified project manager of this project or other applicable contacts:

Project Manager
Jason Mattox, Principal Civil Engineer, PBS
400 Bradley Blvd, Suite 160, Richland, WA 99352
Phone: (509) 430-4252
Email: jason.mattox@pbsusa.com

Alternate Project Contact
TBD

Project manager responsibilities include the following:

- ***Protect the Find***: The project manager is responsible for ensuring that the project takes appropriate steps to protect the discovery site while all necessary assessments and notifications are completed. As stated in steps 1 and 2, all work will stop immediately in the surrounding area, and the area will be secured to protect the integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to enter the area of the discovery. See the section of this plan titled "Resuming Work" for further instruction on how and when work may resume.

- ***Direct Project Activities Elsewhere Onsite:*** The project manager may direct project activities to continue in areas away from cultural resources for working in other areas prior to contacting the concerned parties.
- ***Contact the Project Archaeologist*:** If the assigned project archaeologist has not yet been contacted, the project manager must do so.

STEP 5: Notify the Professional Archaeologist

Notify the identified professional archaeologist serving as the archaeologist for this project (if a monitor is not present)

Professional Archaeologist(s)

Stacie Sexton, Professional Archaeologist, GRAM Northwest, LLC
1201 Jadwin Ave., Richland, WA 99352
Phone: (509) 713-6806
Email: stacie.sexton@gramnorthwest.com

Molly Swords, Professional Archaeologist, GRAM Northwest, LLC
1201 Jadwin Ave., Richland, WA 99352
Phone: (703) 283-5175
Email: molly.swords@gramnorthwest.com

The professional archaeologist's responsibilities include the following:

- ***Identify Find*:** The professional archaeologist will examine the area to determine if there is an archaeological find.
  - If it is determined not to be a cultural resource/archaeological find or human remains, work may proceed with no further delay.
  - If it is determined to be a cultural resource/archaeological find or human remains, the professional archaeologist will continue with all notifications.

  If the find may be human remains or funerary objects, the Project Archaeologist will ensure that a qualified physical anthropologist examines the find. **If the find is determined to be human remains, the procedure described in the section of this plan titled "DISCOVERY OF HUMAN REMAINS" will be followed.**
- ***Notify Appropriate Parties:*** If the find is determined to be a cultural resource, the professional archaeologist will notify the appropriate parties. Notifications may include the following:
  - ***Agency Contact:*** The professional archaeologist will contact the designated point of contact for the City of Richland.
  - ***Washington Department of Archaeology (DAHP)*:** The professional archaeologist will contact DAHP.
  - ***Tribes*:** If the discovery may be of interest to Native American Tribes, the professional archaeologist, the Agency point of contact, and the DAHP will coordinate with the interested and/or affected Tribes.

- ***Record the Find:*** The project archaeologist will work with DAHP and the consulting parties as appropriate to determine how to record the find. Methods for recording will likely require completion of a Washington State Archaeological Site or Isolate Form.

Resuming Work

Work outside of the discovery location may continue while documentation and assessment of the cultural resources proceed. The professional archaeologist must determine the final boundaries of the discovery location.

Work may continue at the discovery location only after the process outlined in this plan is followed and the project manager, DAHP, and any affected Tribes (if applicable) determine that appropriate documentation has been completed.

Discovery of Human Remains

The inadvertent discovery of human skeletal remains on non-federal and non-Tribal land in the state of Washington is implemented under RCW 68.50.645, 27.44.055, and 68.60.055. The information below in italics for the inadvertent discovery of human remains was obtained from the Washington State Department of Archaeology and Historic Preservation web page **(http://www.dahp.wa.gov/programs/human-remains-program/idp-language)**.

In the event that human remains are encountered during field-related project activities, the following steps will be implemented.

Step 1: Stop Work Immediately

If ground disturbing activities encounter human skeletal remains during the course of data collection or construction, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance.
(http://www.dahp.wa.gov/programs/human-remains-program/idp-language)

In order to secure the discovery, a temporary fencing system such as posts and rope or similar protection measures will be placed around the discovery. Work in the immediate area of the discovery will be discontinued, however; work outside the discovery area may continue.

When an inadvertent discovery is encountered, staff will take measures to avoid further disturbance of the area. Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Cultural materials shall not be moved from the location of the discovery. Photographs shall not be taken of bones unless photographs are needed to assist in the determination of the remains to be human or animal.

Step 2: Notification Process

The finding of human skeletal remains will be reported to the county medical examiner/coroner and local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or nonforensic.
(http://www.dahp.wa.gov/programs/human-remains-program/idp-language)

In the event of the discovery of human remains, the following individuals will be contacted:

Benton County Coroner
William Leach, Coroner
7110 West Okanogan Pl. Building A, Kennewick WA 99336
Phone: (509) 736-2720
Email: william.leach@co.benton.wa.us

Benton County Sheriff
Address: 7122 West Okanogan Pl. Building B, Kennewick, WA 99336
Phone: (509) 735-6555

City of Richland Point of Contact
Mike Stevens, City Planner
625 Swift Boulevard, MS-35 Richland, WA 99352
Phone: (509) 942-7794
Email: mstevens@CI.RICHLAND.WA.US

Step 3: Jurisdictional Authority

If the county medical examiner/coroner determines the remains are non-forensic, then they will report that finding to the Department of Archaeology and Historic Preservation (DAHP) who will then take jurisdiction over the remains. The DAHP will notify any appropriate cemeteries and all affected tribes of the find. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.
(http://www.dahp.wa.gov/programs/human-remains-program/idplanguage)

DAHP Contact
Guy Tasa, State Physical Anthropologist
Phone: (360) 586-3534
Email: Guy.Tasa@dahp.wa.gov

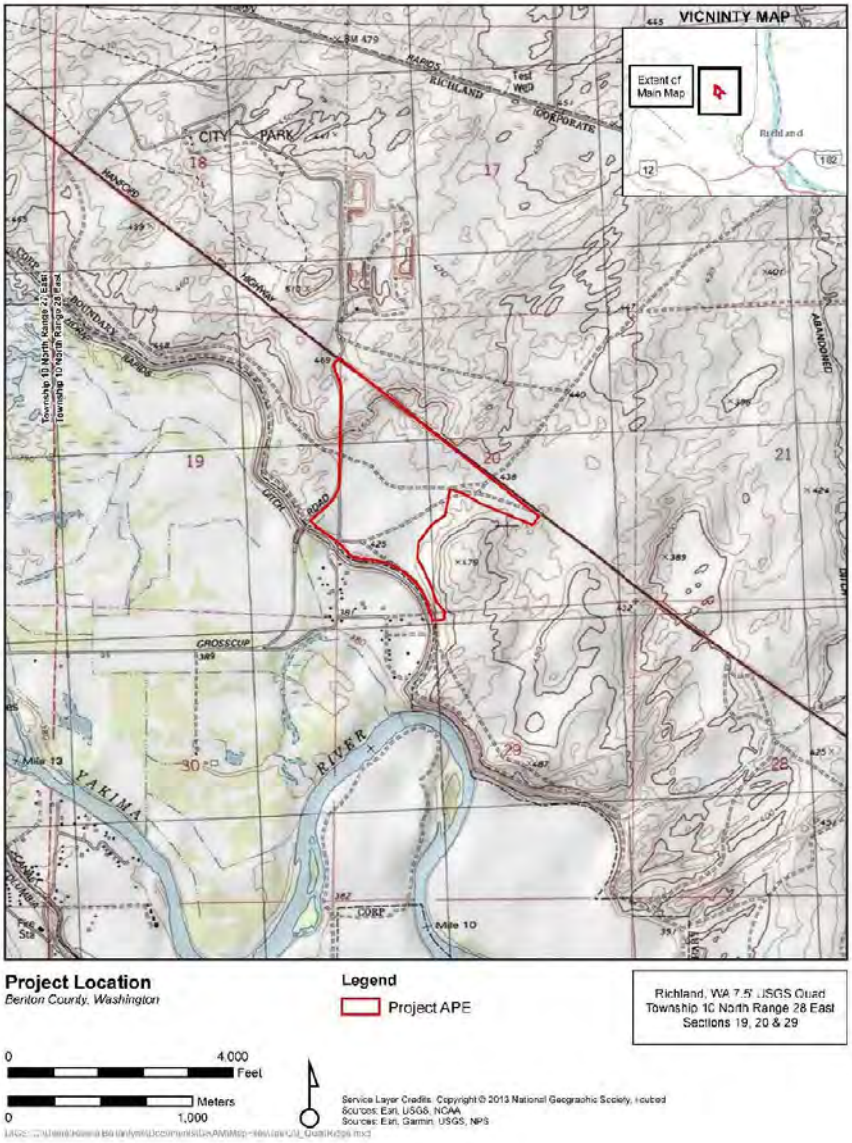

Figure 1. Project Area and USGS Topographic Map

Figure 2. Project Area and Aerial Imagery

6. Inadvertent Discovery Report

Quail Ridge Housing Development Inadvertent Discovery Plan

June 24, 2021

Project Location

USGS Quadrangle: Richland, Washington 7.5'
Township: 10 N, Range: 28 E
Section: 19, 20, & 29

Project Description

The project includes the construction of a housing development on approximately 59.5 hectares (147 acres) of land located south of Washington State Route 240 between Twin Bridges Road and Village Parkway in Richland, Washington. Project activities including excavation and grading, as well as other general construction activities, that will take place throughout the project area. The anticipated maximum depth of excavation for this project is approximately 3 meters (10 feet).

The project area is approximately 59.5 hectares (147 acres) and is located in Benton County, Section 19, 20, and 29 of Township 10N, Range 28E (Figures 1 and 2). The property overlaps all or part of the following Benton County tax lots:

- #119081000001004
- #120083000009006
- #120083000009008
- #120083000009009
- #120083000009013
- #120084000001002
- #129082020003000
- #129082020000011
- #129082020000012
- #129082020000013
- #129082020000038
- #129082020002000
- #120083000009012
- #120083000009014
- #120083000009015

Project Area

The Project area contains approximately 59.5 hectares (147 acres) located in Benton County, in Township 10 North, Range 28 East in Section 19, 20, and 29 of the Richland, WA 7.5' USGS Quadrangle.

Inadvertent Discovery Plan

This inadvertent discovery plan (IDP) was prepared to support project activities described above. This plan was prepared to provide field personnel a process for the inadvertent discovery of cultural resources and/or human remains identified during fieldwork for the project.

Recognizing Cultural Resources

A cultural resource discovery could be prehistoric or historic. Examples include the following:

- An accumulation of shell, burned rocks, or other food-related materials
- Bones or small pieces of bone
- An area of charcoal or very dark-stained soil with artifacts
- Stone tools or waste flakes (i.e. an arrowhead. or stone chips)
- Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years
- Buried railroad tracks, decking, or other industrial materials

When in doubt, assume the material is a cultural resource.

Onsite Responsibilities

STEP 1: Stop Work

If any employee, contractor, or subcontractor believes that he or she has uncovered a cultural resource at any point in the project, all work must stop immediately in the vicinity of the find. Notify the appropriate party(ies) as outlined in steps 2 through 4. The area surrounding the find must be secured using pin flags, stanchions and rope, or other appropriate delineation to provide for the security and protection of the discovery.

STEP 2: Notify the Archaeological Monitor

If there is an archaeological monitor for the project, notify that person. If there is a monitoring plan in place, the monitor will follow the procedure as described.

STEP 3: Notify the Project Manager

Notify the identified project manager of this project or other applicable contacts:

Project Manager
Jason Mattox, Principal Civil Engineer, PBS
400 Bradley Blvd, Suite 160, Richland, WA 99352
Phone: (509) 430-4252
Email: jason.mattox@pbsusa.com

Alternate Project Contact
TBD

Project manager responsibilities include the following:

- ***Protect the Find*:** The project manager is responsible for ensuring that the project takes appropriate steps to protect the discovery site while all necessary assessments and notifications are completed. As stated in steps 1 and 2, all work will stop immediately in the surrounding area, and the area will be secured to protect the integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to enter the area of the discovery. See the section of this plan titled "Resuming Work" for further instruction on how and when work may resume.

- ***Direct Project Activities Elsewhere Onsite:*** The project manager may direct project activities to continue in areas away from cultural resources for working in other areas prior to contacting the concerned parties.
- ***Contact the Project Archaeologist*:** If the assigned project archaeologist has not yet been contacted, the project manager must do so.

STEP 5: Notify the Professional Archaeologist

Notify the identified professional archaeologist serving as the archaeologist for this project (if a monitor is not present)

Professional Archaeologist(s)

Stacie Sexton, Professional Archaeologist, GRAM Northwest, LLC
1201 Jadwin Ave., Richland, WA 99352
Phone: (509) 713-6806
Email: stacie.sexton@gramnorthwest.com

Molly Swords, Professional Archaeologist, GRAM Northwest, LLC
1201 Jadwin Ave., Richland, WA 99352
Phone: (703) 283-5175
Email: molly.swords@gramnorthwest.com

The professional archaeologist's responsibilities include the following:

- ***Identify Find*:** The professional archaeologist will examine the area to determine if there is an archaeological find.
  - If it is determined not to be a cultural resource/archaeological find or human remains, work may proceed with no further delay.
  - If it is determined to be a cultural resource/archaeological find or human remains, the professional archaeologist will continue with all notifications.

  If the find may be human remains or funerary objects, the Project Archaeologist will ensure that a qualified physical anthropologist examines the find. **If the find is determined to be human remains, the procedure described in the section of this plan titled "DISCOVERY OF HUMAN REMAINS" will be followed.**
- ***Notify Appropriate Parties:*** If the find is determined to be a cultural resource, the professional archaeologist will notify the appropriate parties. Notifications may include the following:
  - ***Agency Contact:*** The professional archaeologist will contact the designated point of contact for the City of Richland.
  - ***Washington Department of Archaeology (DAHP)*:** The professional archaeologist will contact DAHP.
  - ***Tribes*:** If the discovery may be of interest to Native American Tribes, the professional archaeologist, the Agency point of contact, and the DAHP will coordinate with the interested and/or affected Tribes.

- ***Record the Find:*** The project archaeologist will work with DAHP and the consulting parties as appropriate to determine how to record the find. Methods for recording will likely require completion of a Washington State Archaeological Site or Isolate Form.

Resuming Work

Work outside of the discovery location may continue while documentation and assessment of the cultural resources proceed. The professional archaeologist must determine the final boundaries of the discovery location.

Work may continue at the discovery location only after the process outlined in this plan is followed and the project manager, DAHP, and any affected Tribes (if applicable) determine that appropriate documentation has been completed.

Discovery of Human Remains

The inadvertent discovery of human skeletal remains on non-federal and non-Tribal land in the state of Washington is implemented under RCW 68.50.645, 27.44.055, and 68.60.055. The information below in italics for the inadvertent discovery of human remains was obtained from the Washington State Department of Archaeology and Historic Preservation web page **(http://www.dahp.wa.gov/programs/human-remains-program/idp-language)**.

In the event that human remains are encountered during field-related project activities, the following steps will be implemented.

Step 1: Stop Work Immediately

If ground disturbing activities encounter human skeletal remains during the course of data collection or construction, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance.
(http://www.dahp.wa.gov/programs/human-remains-program/idp-language)

In order to secure the discovery, a temporary fencing system such as posts and rope or similar protection measures will be placed around the discovery. Work in the immediate area of the discovery will be discontinued, however; work outside the discovery area may continue.

When an inadvertent discovery is encountered, staff will take measures to avoid further disturbance of the area. Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Cultural materials shall not be moved from the location of the discovery. Photographs shall not be taken of bones unless photographs are needed to assist in the determination of the remains to be human or animal.

Step 2: Notification Process

The finding of human skeletal remains will be reported to the county medical examiner/coroner and local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or nonforensic.
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If the county medical examiner/coroner determines the remains are non-forensic, then they will report that finding to the Department of Archaeology and Historic Preservation (DAHP) who will then take jurisdiction over the remains. The DAHP will notify any appropriate cemeteries and all affected tribes of the find. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.
(http://www.dahp.wa.gov/programs/human-remains-program/idplanguage)

DAHP Contact

Guy Tasa, State Physical Anthropologist
Phone: (360) 586-3534
Email: Guy.Tasa@dahp.wa.gov

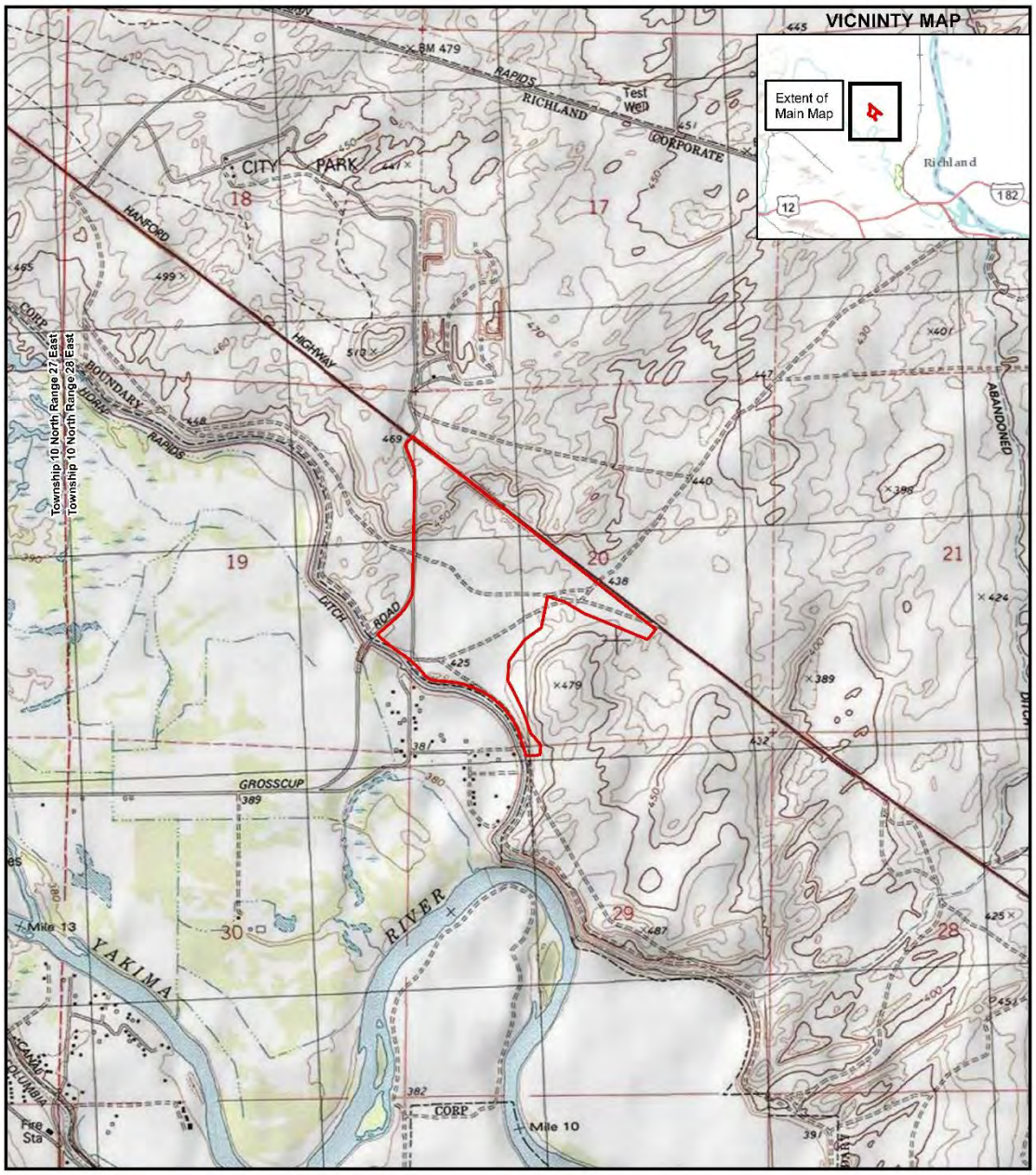

Figure 1. Project Area and USGS Topographic Map

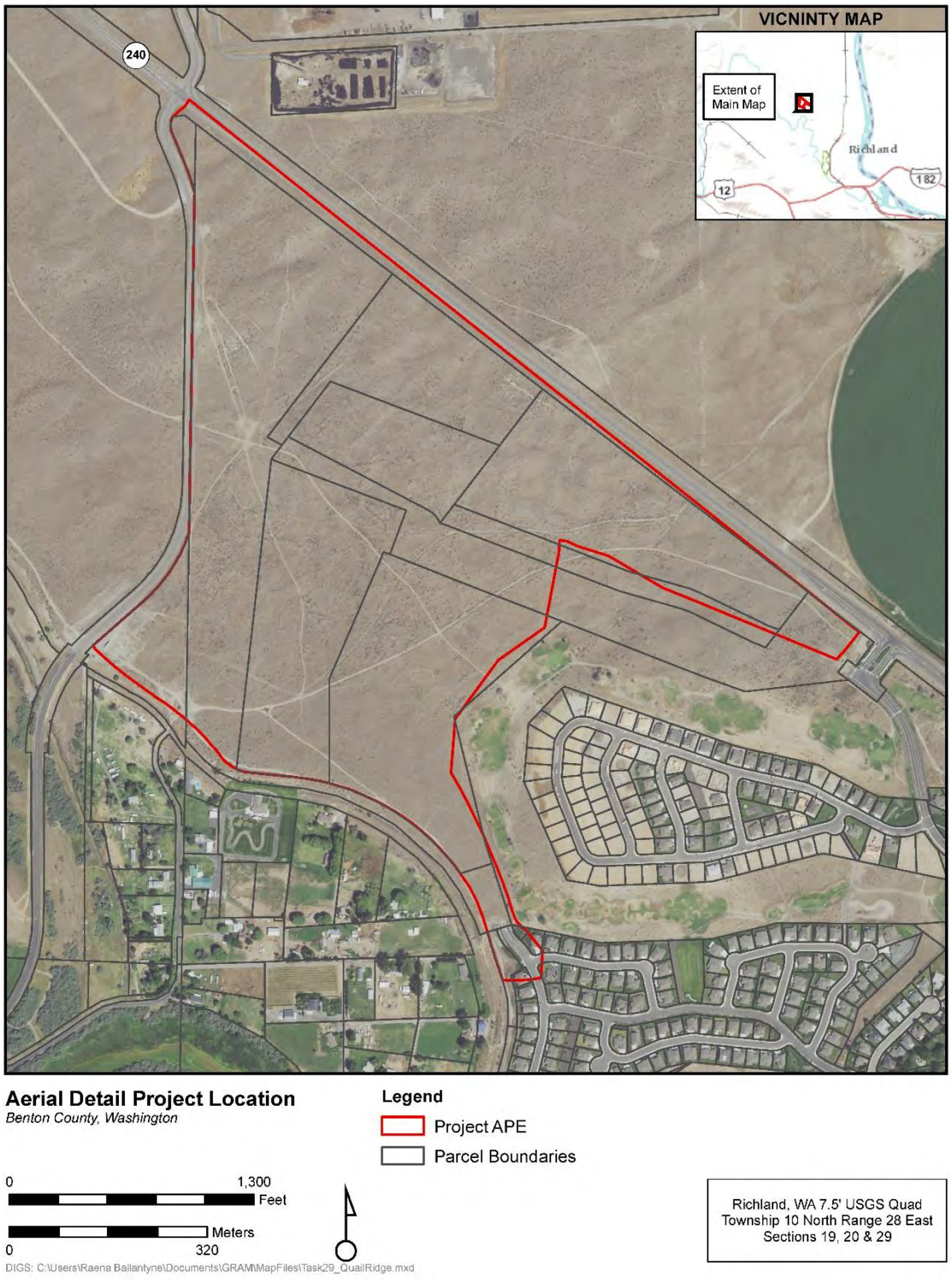

Figure 2. Project Area and Aerial Imagery

Exhibit 9

TWIN BRIDGES ROAD

EXTG 80' R/W

20' SEVA ROAD ESMT

PARCEL #1190810000001004
CITY OF RICHLAND

PARCEL #120083000009013
CITY OF RICHLAND

PARCEL #120083013634001
NELSON JIM R & SUSAN K

PARCEL #120083011510001
NELSON RICHARD C & DEANN M

PARCEL #120083011510005
MONSON JEREMIE S & JENNIFER

PARCEL #120083011510006
MORSE CARL & DENISE

HORN RAPIDS DITCH

EXTG 100' R/W

TRACT A

TRACT B

TRACT C
FUTURE DEVELOPMENT AREA

TRACT D

TRACT E

TRACT F

TRACT G

TRACT H
AMENITY LOT

TRACT J
~STORM POND~

TRACT K
~STORM POND~

ROAD A
ROAD B
ROAD C
ROAD D
ROAD E
ROAD F
ROAD G
ROAD H
ROAD I
ROAD J
ROAD K
ROAD L

PHASE 1
PHASE 2
PHASE 3

~QUAIL RIDGE PHASES 3-6~

VILLAGE PARKWAY

LOT LINE (TYP)

PHASE AND PROPERTY LINE (TYP)

SSMH (TYP)
SSMH FL: 417.00
SSMH FL 416.46
SSMH FL 415.97

SS CAP
IE 417.30

WL CAP

16" WL STUB (FUTURE EXTENSION TO TWIN BRIDGES ROAD)

CONNECT TO EXTG 10" IRR
CONNEC TO EXTG 16" SS IE: 415.75
CONNECT TO EXTG 12" WL
CONNECT TO EXTG 12" WL
CONNECT TO EXTG 10" IRR
CONNECT TO EXTG 10" IRR
CONNECT TO EXTG 12" SS
CONNECT TO EXTG 16" WL

TRACT POND

R-2S
R-3

Scale 1" = 100'
0 50 100 200

LEGEND

SS PROPOSED SANITARY SEWER LINE
WL PROPOSED WATERLINE
IRR PROPOSED IRRIGATION LINE

NOTES:

1. WATERLINE IN PLAT SHALL BE 8" MINIMUM DIAMETER PVC (C900) BUILT TO CITY OF RICHLAND STANDARDS.
2. SEWER IN PLAT SHALL BE 8" MINIMUM DIAMETER PVC BUILT TO CITY OF RICHLAND STANDARDS.
3. STORMWATER SHALL BE RETAINED ON-SITE AND DISPOSED OF IN ON ENGINEERED SYSTEM IN ACCORDANCE WITH CITY OF RICHLAND STANDARDS.
4. IRRIGATION LINE IN PLAT SHALL BE 6" MINIMUM DIAMETER PVC (C900) BUILT TO CITY OF RICHLAND STANDARDS.

PRELIMINARY
SUBJECT TO AGENCY REVIEW
NOT FOR CONSTRUCTION

Full Size Sheet Format Is 22x34; If Printed Size Is Not 22x34, Then This Sheet Format Has Been Modified & Indicated Drawing Scale Is Not Accurate.

Filename: L:\Projects\66000\66118\66118-003\Civil\CAD\Working\Sheets\PrelimPlat\PrelimUtility\PlanC01.dwg Layout Tab: LAYOUT1 User: Brandon Woods CAD Plot Date/Time: 4/30/2021 2:31:46 PM

PBS Engineering and Environmental Inc.
400 Bradley Blvd, Ste 106
Richland, WA 99352
509.942.1600
pbsusa.com

PBS

PRELIMINARY UTILITY PLAN FOR:

QUAIL RIDGE II - PHASE 1-3

A SUBDIVISION LOCATED IN THE CITY OF RICHLAND, WA.

811 Know what's below. Call before you dig.

DESIGNED:	DCC
CHECKED:	JLM
APRIL 2021	66118.003
SHEET ID	
SHEET	1 OF 1

7. Geotechnical Engineering Letter

March 7, 2025

Brock Argyropoulos
Pahlisch Homes, Inc.
12585 SW 68th Avenue
Tigard, Oregon 97223

Via email: brocka@pahlisch.com

Regarding: Geotechnical Engineering Report Addendum No. 1
Quail Ridge III
Village Parkway
Richland, Washington
PBS Project 25005044

Dear Mr. Argyropoulos:

PBS Engineering and Environmental LLC (PBS) completed a geotechnical engineering evaluation for development of the Quail Ridge residential subdivision and presented the results in a geotechnical engineering report (GER) dated November 17, 2020.[1]

The GER was developed in accordance with the appropriate local codes at the time, including seismic design criteria based on the 2018 International Building Code (IBC) with state of Washington amendments. Since delivery of the GER, the State of Washington has adopted the 2021 IBC with state of Washington amendments.[2] The purpose of this letter is to provide updated seismic design criteria based on current codes. This letter should be considered an addendum to and used only in conjunction with the full GER for the project.

PROJECT UNDERSTANDING

PBS understands the client plans to mass-grade and subdivide approximately 19 acres of the overall Quail Ridge development for construction of 75 single-family residences. PBS assumes one- to two-story homes built using wood framing or similarly lightweight materials. The locations of PBS' explorations, completed in 2020, in relation to existing site features as well as the approximate Quail Ridge III boundary are shown on the Site Plan, Figure 1.

SCOPE OF WORK

PBS completed the following scope of work.

Geotechnical Engineering Report Review

PBS reviewed the previously prepared GER, including exploration logs, analyses, and lab testing, for the original development, as well as the plans for the currently proposed development.

[1] PBS Engineering and Environmental Inc. (November 17, 2020). Geotechnical Engineering Report, Country Ridge Subdivision. Prepared for Pahlisch Homes, Inc. PBS Project 66265.000.
[2] IBC. (2021). International Building Code. Country Club Hills, IL: International Code Council, Inc. Washington State Amendments to the International Building Code.

Updated Seismic Parameters
PBS is providing updated seismic design criteria in accordance with the 2021 IBC with state of Washington amendments.

EXISTING SITE CONDITIONS
The GER for the project reports the site as undeveloped as of November 2020. Publicly available aerial photos indicate the site is effectively unchanged since delivery of the GER. The surface was generally vegetated with grasses and low-lying shrubs.

CONCLUSIONS AND RECOMMENDATIONS
Based on our observations, site conditions are consistent with the conditions observed and referenced in the GER.

Updated Seismic Parameters
The current seismic design criteria for this project are based on the 2021 International Building Code with state of Washington amendments. Based on subsurface conditions reported in the GER, Site Class D is appropriate for use in design. The seismic design criteria, in accordance with the 2021 IBC, are summarized in Table 1.

Table 1. 2021 IBC Seismic Design Parameters

Parameter	Short Period	1 Second
Maximum Credible Earthquake Spectral Acceleration	S_s = 0.41 g	S_1 = 0.16 g
Site Class	D	
Site Coefficient	F_a = 1.47	F_v = 2.29
Adjusted Spectral Acceleration	S_{MS} = 0.60 g	S_{M1} = 0.36 g
Design Spectral Response Acceleration Parameters	S_{DS} = 0.40 g	S_{D1} = 0.24 g

g= Acceleration due to gravity

CLOSING
We trust this letter meets your current needs. Please contact Clint Nealey at 509.375.7844 or clint.nealey@pbsusa.com with any questions or comments.

Sincerely,

Clint Nealey, PE
Project Geotechnical Engineer

Attachment:
Figure 1. Site Plan

CN:SB:rg

EXPLANATION

- TP-1 - Test pit name and approximate location with infiltration test (November 2020)
- TP-2 - Test pit name and approximate location (November 2020)
- Approximate site boudary

Notes: Nearmap imagery 2024

Coordinate System: NAD 1983 2011 StatePlane Washington South FIPS 4602 Ft US

SCALE: 1 inch = 400 feet

0 200 400 800 feet

SITE PLAN

QUAIL RIDGE III
RICHLAND, WASHINGTON

DATE: MAR 2025 · PROJECT: 25005044

PBS

FIGURE 1

8. Horn Rapids EIS

EIS ADDENDUM

Horn Rapids Master Planned Community

Prepared For

Columbia Triangle Venture

by

Butler & Associates

April 28, 1993

FACT SHEET

ACTION SPONSOR AND LEAD AGENCY

City of Richland
Community Development Department
505 Swift Blvd.
Box 190
Richland, WA 99352

LEAD AGENCY CONTACT PERSON

Jeff Rolph, Senior Planner
Telephone: (509) 943-7587

APPLICANT AND CONTACT PERSON

Columbia Triangle Ventures
14410 Bel-Red Road
Bellevue, WA 98007

Mike Miller, President — 644-2310
Pacific Properties

PROPOSED ACTION

The proposed Horn Rapids Master Planned Community is a major new mixed-use community on approximately 835 acres within the 6,000 acre Horn Rapids Triangle Community Planning area of north Richland. Proposed for construction over a 20-year period, the Master Planned Community will contain approximately 3,050 residential units intended to serve a wide variety of lifestyles and incomes. It will also contain centers for local services and employment in the form of approximately 83,000 square feet of commercial space and 105,000 square feet of office space. The community's recreational amenities will be abundant and include an 18-hole golf course (a separate project), two large joint use public park and school sites, two recreational clubs for homeowners in the community, and numerous small neighborhood parks, greenbelts, trails, and viewpoints.

EIS ADDENDUM AUTHORS AND PRINCIPAL CONTRIBUTORS

Butler & Associates — Principal Author
1235 20th Avenue East
Seattle, WA 98112

Shannon & Wilson, Inc. — Geotechnical Studies
1354 Grandridge Blvd.
Kennewick, WA 99336

J.U.B. Engineers, Inc.
2810 Clearwater Avenue
Suite 201
Kennewick, WA 99336

Transportation Studies

REQUIRED PERMITS AND APPROVALS

The Horn Rapids Master Planned Community will require the following permits and approvals:

City of Richland

- Master Plan Approval
- Zone reclassification
  - AG to R-1M (Single Family Residential - Medium Density)
  - AG to R-2 (High Density Residential)
  - AG to R-3 (Multiple-Family Residential)
  - AG to C-LB (Limited Business District)
  - AG to C-1 (Neighborhood Retail)
  - AG to PR (Public Reserve District)
- Subdivision approval
- Drainage plan approval
- Building permits

Department of Transportation

- Approval of controlled highway access (SR-240)

Other Applicable Regulations

City of Richland

- Comprehensive Plan
- Horn Rapids Community Plan
- City of Richland Municipal Code
  - Chapter 21.28 - Outdoor Light Fixtures
  - Ordinance 40-92 (Dust Ordinance)
  - Title 22 - Environment
  - Title 23 - Zoning
  - Title 24 - Plats and Subdivision
  - Title 26 - Shoreline Management

Air Pollution Control Authority

- General Regulation 80-7
- Washington Administrative Code, Chapter 173-400

LOCATION OF BACKGROUND DATA

City of Richland
Community Development Department
505 Swift Blvd.
Box 190
Richland, WA 99352

Butler & Associates
1235 20th Avenue East
Seattle, WA 98112

DATE OF ISSUANCE: April 28, 1993

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APPENDICES

1 Geotechnical Studies
2 Hydrogeologic Studies
3 Transportation Impact Study

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LIST OF FIGURES

SUMMARY

DESCRIPTION OF PROPOSED ACTION

Location

The Horn Rapids Master Planned Community is located within the City of Richland's Horn Rapids Community Planning Area (FIGURE 1). The project site includes approximately 835 acres bordered on the north by State Route 240, on the south by the Yakima River and adjoining floodplain, on the west by Grosscup Road, and on the east by the Lamb Weston industrial plant and spray field.

Project Description

The proposed Horn Rapids Master Planned Community is a major new mixed-use community on approximately 835 acres within the 6,000 acre Horn Rapids Triangle Community Planning area of north Richland. It represents the first major step in implementing the vision of a new community expressed in the Horn Rapids Community Plan.

The Horn Rapids Master Planned Community is shown in FIGURE 2. Proposed for construction over a 20-year period, the Master Planned Community contains approximately 3,050 residential units intended to serve a wide variety of lifestyles and incomes. It will also contain centers for local services and employment in the form of approximately 83,000 square feet of commercial space and 105,000 square feet of office space. The community's recreational amenities will be abundant and include an 18-hole golf course (a separate project), two large joint use public park and school sites, two recreational clubs for homeowners in the community, and numerous small neighborhood parks, greenbelts, trails, and viewpoints.

SEPA STRATEGY

Overview

This EIS Addendum is part of an overall strategy for SEPA compliance for the Horn Rapids Master Planned Community. The strategy, agreed to by Columbia Triangle Ventures and the City of Richland, consists of four basic elements which are summarized below:

Phased Review

The purpose of phased review is to focus on issues that are ready for decision and exclude from consideration issues already decided. (WAC 197-11-060(5)(b)) Phased review is appropriate where the sequence of proposals is from programmatic, such as the Horn Rapids Triangle Development Program, to proposals which are narrower in scope, such as the Horn Rapids Master Planned Community. (WAC 197-11-060(5)(c))

Expanded Checklist

The purpose of the expanded SEPA Environmental Checklist is to present more detailed information and analyses on the probable impacts of the project. The expanded checklist will assist City of Richland staff in defining the scope of the Addendum to the Horn Rapids Triangle Development Program FEIS. Even though an expanded Environmental Checklist is being prepared, a new Threshold Determination is not not required for the Horn Rapids Master Planned Community (see below).

EIS Addendum

The purpose of the Addendum is to add analysis and information, but not change or add to the probable significant adverse impacts identified in the existing Horn Rapids Triangle Development Development Program FEIS. (WAC 197-11-600(4)(c)) A new Threshold Determination or SEIS is not required if probable significant adverse environmental impacts are covered by the impacts and alternatives in the existing EIS. (WAC 197-11-600(3)(b)(ii)) When combined with adoption, the Addendum must be circulated to agencies and interested persons and organizations. (WAC 197-11-630(3)(a),(c))

FEIS Adoption

The purpose of adoption is to use the existing Horn Rapids Triangle Development Program FEIS in order to help the City comply with SEPA. (WAC 197-11-600(4)(a)), and to avoid duplication of preparing a new EIS on the proposal. The City cannot take action on the proposed Horn Rapids Master Planned Community until seven (7) days after statement of adoption is issued. (WAC 197-11-630(3)(a))

IMPACTS AND MITIGATION MEASURES

EARTH

Impacts

The most significant potential adverse impacts to the earth resulting from development of the Horn Rapids Master Planned Community include water and wind erosion, runoff from new impervious surfaces, and grading and fill activities.

There are two primary erosion-related concerns with regard to construction of the proposed development. The first is the potential for progressive erosion and slope stability, particularly along the bluff adjacent to the Yakima River. A second concern is wind erosion and dust resulting from any unprotected or unvegetated areas.

The addition of new impervious surfaces increases the potential for stormwater runoff from developed areas. Precise estimates of the amount of impervious surfaces at project buildout have not been developed. However, approximately 68 percent of the project site will be affected by new impervious surfaces. The extent will depend on building lot coverage and landscaping.

Over the 20-year life of the project, grading and filling of approximately 500,000 cubic yards will be occur. Grading and fill activities increase the potential for water-related erosion.

Mitigation

Water Erosion Buildings will be set back from the crest of the slope adjacent to the Yakima River a distance equal to 1.5 times the height of slope, or approximately 135 feet.

Impervious Surfaces/Grading and Fill The stormwater collection system proposed for the project is designed so that all surface water runoff will be conveyed and stored for recharge to soils and groundwater. No stormwater runoff will be discharged to the Yakima River or other surface water bodies. The system will be designed so that areas of recharge will be as close as possible to the point of collection.

Wind Erosion Geosynthetic slope protection is proposed on the face of the river escarpment. The selected system must be capable of allowing re-vegetation of the slope. An alternative may be a complete vegetative resurfacing program. In addition, the City of Richland's Ordinance 40-92 and APCA regulations require the control of dust in disturbed areas.

AIR

Impacts

Two general types of emissions could result from development of the Horn Rapids Master Planned Community. During site grading, and other related construction, dust could contribute to concentrations of suspended particulate matter in the project vicinity. Emissions from motor vehicles will increase, over the short related to project construction and over the long term the addition of approximately 32,513 daily vehicle trips at project buildout.

Mitigation

Fugitive Dust The project will comply with the City of Richland's Ordinance 40-92 (Dust Ordinance). The ordinance requires any person, firm or corporation which disturbs, excavates, grade, plows, or removes the top soil of any land area to take "affirmative measures to suppress and minimize the blowing and scattering of dust. . . ." In addition, the Benton-Franklin-Walla Walla Counties Air Pollution Control Authority's (APCA) General Regulation 80-7. contains specific provisions requiring control of visible emissions, particulate matter, fugitive emissions, and fugitive dust.

Vehicle Emissions Emissions from construction equipment and trucks can be reduced by using new and/or well-maintained equipment, and avoiding prolonged periods of vehicle idling. Secondary air quality impacts could be minimized by controlling the trucking of material to and from construction areas during peak travel times. In addition all construction equipment and trucks and automobiles operating in the State of Washington must meet federal emission standards, as well as the regulations contained in the Washington Clean Air Act (RCW 70.94) and Chapter 173 WAC for vehicle emissions.

WATER

Impacts

Groundwater Quantity The primary concern regarding groundwater quantity is the possibility of "mounding" of the groundwater and subsequent flooding of property and structures in the Weidle neighborhood. Groundwater mounding is a process whereby an existing groundwater system is overloaded by excess water from some outside source, usually a surface source.

Groundwater Quality One of the primary concerns of residents in the Weidle neighborhood is the potential impacts to groundwater from pesticides or herbicides applied in the planned community.

Storm Water Upon completion of the project, storm water runoff will be generated by impervious surfaces within the project including buildings, streets, and parking areas. The primary cause of major runoff events in this region is significant accumulation of snow during the winter months followed by sudden and warm

"Chinook" wind conditions. The "Chinook" winds cause a rapid melting of the snow pack, and accompanying peak flows of runoff. These conditions are exacerbated when the ground is frozen, preventing infiltration of runoff.

Mitigation

Groundwater Quantity In the case of the Horn Rapids Master Planned Community, the major potential source of excess groundwater is irrigation of the golf course and landscaping in residential and commercial uses. Balancing irrigation application rates with the requirements of vegetation can easily reduce the potential for groundwater mounding. An agronomist or soil scientist familiar with the design of balanced irrigation programs will be retained to design an irrigation program for the project which will allow irrigation of the golf course and other landscaping in the community while minimizing the amount of irrigation water used.

Groundwater Quality Three wells, including a new on-site well and two existing wells in the Weidle neighborhood, were sampled and tested for total petroleum hydrocarbons, pesticides, and herbicides. The results of the chemical tests indicate no detectable concentration of contaminants. These wells will continue to be monitored throughout project development. Minimizing future impacts of contaminants to groundwater will be addressed through implementation of a balanced irrigation program.

Storm Water The stormwater collection system proposed for the project is designed so that all surface water runoff will be conveyed and stored for recharge to soils and groundwater. No stormwater runoff will be discharged to the Yakima River or other surface water bodies. The system will be designed so that areas of recharge will be as close as possible to the point of collection.

PLANTS AND ANIMALS

Impacts

Vegetation within the developed areas of the Horn Rapids Master Planned Community will be destroyed during land clearing activities. Over the twenty-year buildout period for the project, approximately 570 acres of vegetation will be cleared for building sites, roads, parking and other facilities. Direct impacts of these activities on plants and animals include elimination of habitat and displacement or loss of resident wildlife populations.

Mitigation

Based on recommendations made by the Washington Department of Wildlife for the associated Horn Rapids Golf Course project, a number of measures are proposed to mitigate impacts to wildlife on the planned community site. They include building setbacks, phasing of development, protecting portions of the shrub-steppe habitat, revegetation of disturbed areas, incorporating wildlife habitat into planned open space.

ENVIRONMENTAL HAZARDS

Impacts

Two general types of environmental hazards could affect the Horn Rapids Master Planned Community. They include 1) potential radioactive emissions from nuclear facilities at the Hanford Federal Reservation and 2) spills and other release of waste materials during project construction.

Mitigation

Hanford Site An emergency response plan has been prepared by the U.S. Department of Energy (USDOE), Washington Public Power Supply System (WPPSS), and the Emergency Management offices of Benton, Franklin and Grant Counties.

Spills and Other Releases For emergencies arising from project construction activities, the risk of fire, explosion and release of hazardous substances can be minimized through the use of standard construction practices and traffic control measures. Project contractors will be required to undertake a number of measures to reduce environmental hazards.

NOISE

Impacts

Project Construction During project construction, there would be a temporary increase in sound levels near the site due to the use of construction vehicles and other heavy equipment.

Long Term Impacts Traffic impact studies conducted by J-U-B Engineers, Inc. predict the Horn Rapids Master Planned Community will generate 32,513 daily vehicle trips at project buildout. This increase in vehicle trips will result in a long term increase in vehicle noise in the Horn Rapids Triangle.

Mitigation

Project Construction The project contractors will use the following measures designed to minimize noise impacts during construction. These measures are intended to comply with the standards contained in RCW 70.107 (Noise Control Act of 1974) and WAC 173-60 (Maximum Environmental Noise Levels).

Long Term Impacts Vehicles in the State of Washington must comply with WAC 173-62 (Motor Vehicle Noise Performance Standards).

LAND AND SHORELINE USE

Impacts

Development of the proposed Horn Rapids Master Planned Community will result in the conversion of approximately 835 acres of undeveloped land to residential, commercial, and institutional uses over a twenty-year period. The community will contain approximately 3,050 residential units with an estimated resident population of 7,500 people.

Mitigation

The proposed Horn Rapids Master Planned Community is designed to be consistent with all applicable adopted land use plans and policies of the City of Richland. Those plans and policies include the terms of the "Horn Rapids Development and Option Agreement" between CTV and the City of Richland, the Comprehensive Plan, Horn Rapids Community Plan, Zoning Code, and Shoreline Master Program.

POPULATION AND HOUSING

Impacts

Development of the proposed Horn Rapids Master Planned Community will result in the conversion of approximately 835 acres of undeveloped land to residential and other uses over a twenty-year period. The community will contain approximately 3,050 residential units with an estimated resident population of 7,500 people. Based on the extent of planned uses, an estimated 581 people will be employed within the Master Planned Community at buildout.

Mitigation

The Horn Rapids Master Planned Community strives to achieve the goals of the Horn Rapids Community Plan by providing approximately 3,050 housing units of varying types, densities, and prices. Based on current plans and market analyses, the project contains a mix of housing types and prices to offer the public a full range of housing alternatives. In addition, Columbia Triangle Ventures (CTV) is working with the Affordable Housing Council to assure that the Master Planned Community helps meet local and regional goals for affordable housing.

AESTHETICS

Impacts

Existing views over the site from State Route 240, and from within the site, will be altered to the extent that the landscape will gradually change over the twenty-year buildout period from undeveloped shrub-steppe habitat to clusters of one and two-story residences surrounding fairways of the proposed golf course.

Mitigation

The proposed Horn Rapids Master Planned Community will contain over 267 acres of active and passive recreation and open space areas. This constitutes approximately 32 percent of the total project site. Parks and open space will include the golf course, two large community parks, and numerous neighborhood parks throughout the community. It will also include a network of greenbelts to provide visual buffers separating residential areas from one another. This network of parks, greenbelts, and other other open space will help to offset the visual impact of the Master Planned Community on the currently undeveloped shrub-steppe habitat.

LIGHT AND GLARE

Impacts

The Horn Rapids Master Planned Community site will gradually become a source of reflected glare from windows in the mornings and evenings. Lights on houses, schools, commercial buildings, and offices will be visible at night from the surrounding areas. Automobile headlights on this portion of State Route 240 will increase at night.

Mitigation

The Horn Rapids Master Planned Community will comply with all applicable regulations governing lighting, particularly Chapter 21.28 of the Richland Municipal Code (Outdoor Light Fixtures). Because of this compliance, light or glare from the project is not expected to result in any safety hazard.

RECREATION

Impacts

Population growth resulting from development of the Horn Rapids Master Planned Community will increase the demand for new park and recreational facilities. Use of of existing nearby county or city park facilities would also increase, including the need for maintenance of those facilities.

Mitigation

Recreational opportunities and open space are abundant in the Horn Rapids Master Planned Community. Over 267 acres, or approximately 32 percent of the total project, is currently proposed for active and passive recreational uses. These include a golf course, community and neighborhood parks, trails, and greenbelts.

HISTORIC AND CULTURAL PRESERVATION

Impacts

Construction activities on the project site could result in the alteration or destruction of historic resources or sites not yet identified.

Mitigation

If cultural resources are encountered during project construction, work will be halted in the immediate vicinity and the Washington State Office of Archaeology and Historic Preservation notified.

TRANSPORTATION

Impacts

Parking The Horn Rapids Master Planned Community will require approximately 7,131 off-street parking spaces. These include 1,540 spaces for commercial and office development, 3,720 spaces for single family residences, and 1,785 spaces for multifamily residences.

Vehicle Trips The project will generate an estimated 32,513 average daily vehicle trips at buildout.

Mitigation

A transportation impact study was conducted for the Horn Rapids Master Planned Community by J-U-B Engineers, Inc. and is contained in APPENDIX 3. The impact study identified a number of required improvements to SR 240 assuming full buildout of the project.

FIRE PROTECTION

Impacts

Based on current service ratios, the Fire Department estimates that the 3,050 residential units and approximate population of 7,500 at the Horn Rapids Master Planned Community will require the addition of one new fire station somewhere in the Horn Rapids area.

Mitigation

The Comprehensive Plan and Horn Rapids Community Plan direct the majority of future growth in Richland to areas capable of providing appropriate levels of service. In addition, tax revenues generated by future development in the Horn Rapids Triangle will be available to finance additional fire protection staff and equipment.

POLICE PROTECTION

Impacts

Based on current service ratios, the Police Department estimates that the Horn Rapids Master Planned Community, at buildout, will require an additional ten (10) officers. A new police district would have to be created when the project is approximately one-third developed. The new district would require five (5) new officers at that time. New facilities would include an office space which, according to the department, could be co-located with a new fire station in the area.

Mitigation

The Comprehensive Plan and Horn Rapids Community Plan direct the majority of future growth in Richland to areas capable of providing appropriate levels of service. In addition, tax revenues generated by future development in the Horn Rapids Triangle will be available to finance additional police protection staff and equipment.

SCHOOLS

Impacts

Based on 1990 Census data, there are .4567 K-12 students per household within the school district. Applying this factor to the 3,050 residential units proposed for the Horn Rapids Master Planned Community yields a projected public school enrollment of 1,393 students.

Mitigation

The master plan for the proposed Horn Rapids Master Planned Community designates two sites for public schools. The first site, located on the east side of the community, is 19 acres in size and will contain an elementary school and neighborhood park. The

second site, located on the west side of the community, is 30 acres in size and will contain an elementary school along with a neighborhood park.

ELECTRICITY

Impacts

Based on the electrical demand standards contained in the Horn Rapids Master Utility Plan and the proposed uses in the Horn Rapids Master Planned Community, the completed project will result in an estimated electrical demand of 44,013 kilowatts.

Mitigation

The Horn Rapids Triangle Master Utility Plan estimated the electrical load demand for buildout of all land uses proposed by the Horn Rapids Community Plan. The Master Utility Plan estimated an ultimate electrical demand of 515,338 kilowatts for the Horn Rapids Community Plan area at buildout. Electrical substations are located at the Horn Rapids Business Park and north of the City's sanitary landfill. Additional power and substation capacity can be obtained from an existing 115 kilovolt transmission line which serves the area.

WATER

Impacts

The largest portion of the demand for domestic water in the Horn Rapids Master Planned Community will result from the planned 3,050 residential units. Residential development in the project at buildout will result in an average daily demand of .76 million gallons per day (MGD). Commercial and office development will result in an additional demand of .04 MGD. Based on the projected enrollment of the schools planned for the project, estimated average daily demand for all schools is .02 MGD. Therefore, the total average daily demand for domestic water for the project at buildout is an estimated .82 MGD.

Mitigation

The Horn Rapids Triangle Master Utility Plan estimated the demand for water at buildout of all land uses proposed by the Horn Rapids Community Plan. The Master Utility Plan estimated an ultimate demand of 56.6 MGD for the Horn Rapids Community Plan area at buildout. The City's current supply capacity includes 49.2 MGD pumped, and 24.4 MGD from storage. A 30-inch main is available at the Horn Rapids Business Park. Capacity is 3.7 MGD at 50 PSI. Fire flow capacity is 4,000 gallons per minute (gpm).

WASTEWATER

Impacts

Based on residential flow criteria and a projected population of 7,500, the residential portion of the project will generate an estimated wastewater flow of 720, 000 GPD at full buildout. Commercial and office development will generate an additional

103,600. Schools will generate estimated wastewater flows of 37,755 GPD. Therefore, the total estimated wastewater flow resulting from the project at full buildout is 861,355 GPD.

Mitigation

Current plans by the City of Richland call for a new sewer trunk line extension (Horn Rapids Connection) to the project site. Preliminary engineering design calls for a 36-inch line to extend from McMurray Street in the Richland Core Area to the Horn Rapids Business Park and then west along SR 240. An additional 54-inch line, the Lower North Interceptor, is needed to connect the Horn Rapids area via the Horn Rapids Connection with the City's treatment plant. On-site wastewater improvements will be constructed concurrent with development phases.

STORM DRAINAGE

Impacts

Upon completion of the project, storm water runoff will be generated by impervious surfaces within the project including buildings, streets, and parking areas. The primary cause of major runoff events in this region is significant accumulation of snow during the winter months followed by sudden and warm "Chinook" wind conditions. The "Chinook" winds cause a rapid melting of the snow pack, and accompanying peak flows of runoff. These conditions are exacerbated when the ground is frozen, preventing infiltration of runoff.

Mitigation

The stormwater collection system proposed for the project is designed so that all surface water runoff will be conveyed and stored for recharge to soils and groundwater. No stormwater runoff will be discharged to the Yakima River or other surface water bodies. The system will be designed so that areas of recharge will be as close as possible to the point of collection.

SOLID WASTE

Impacts

Based on current per capita waste disposal rates in the City of Richland, residents of the Horn Rapids Master Planned Community could generate approximately 5,250 additional tons of waste per year at full project buildout, or an additional 21 percent of the current municipal waste stream. Commercial and office development would augment the waste stream.

Mitigation

The existing 114-acre parcel at the City's landfill has approximately 35 to 40 years of use remaining. The 135-acre parcel to the north has an estimated 50 additional years of capacity. Based on this expected capacity, the landfill can easily accommodate the waste disposal needs of the Horn Rapids Master Planned Community at buildout.

PROPOSED ACTION

PROJECT DESCRIPTION

Project Location

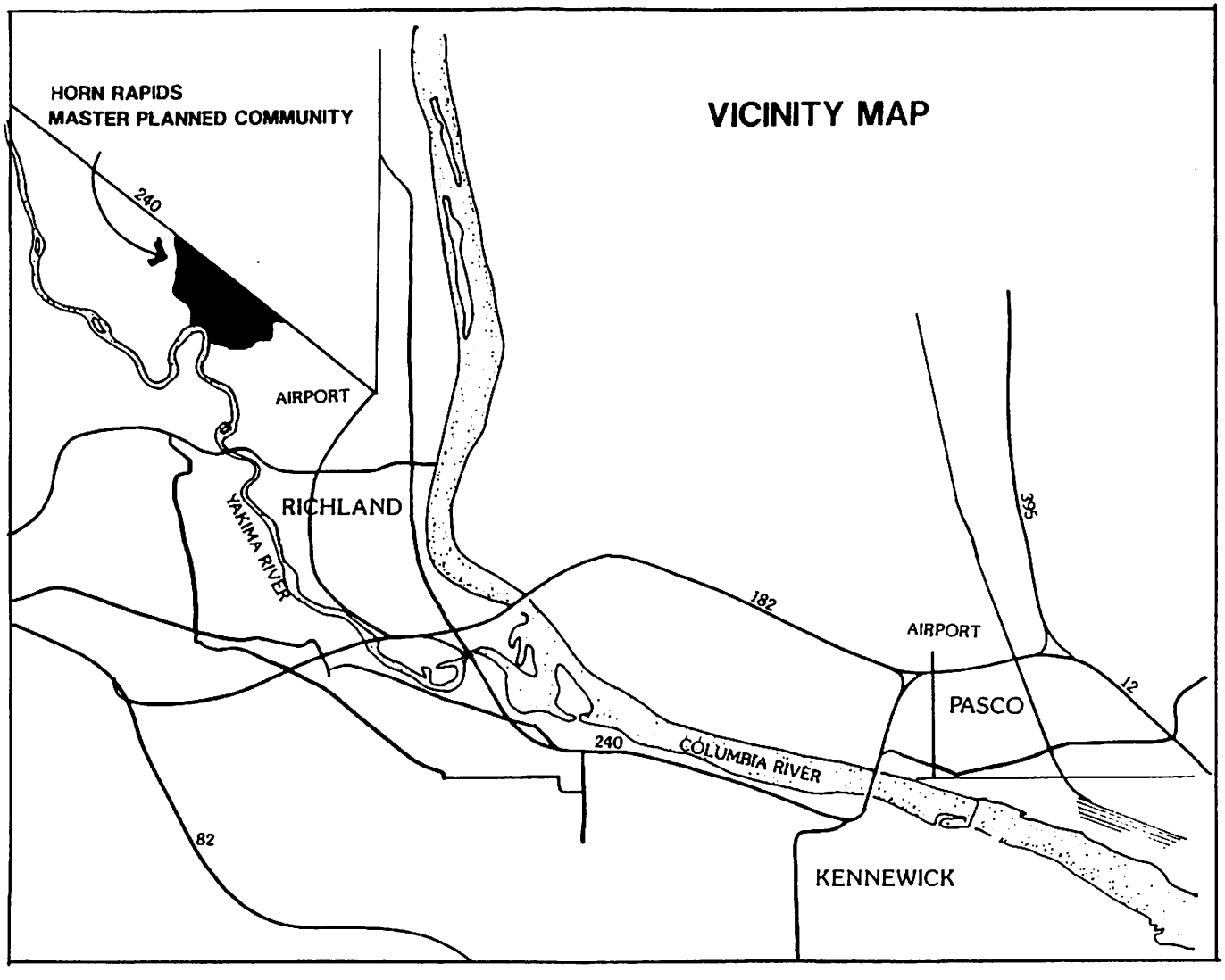
The Horn Rapids Master Planned Community is located within the City of Richland's Horn Rapids Community Planning Area (FIGURE 1). The Planning Area is bordered on the east by the Richland Core Area (SR-240/Bypass and Stevens Drive highways); on the north by Horn Rapids Road and the federal Hanford Reservation; on the west by the federal Arid Lands Ecology Reserve and the intersection of SR-240 and Snively Road; and on the south by the Yakima River and its associated floodplain, and the Horn Rapids Ditch.

The Horn Rapids Master Planned Community project site includes approximately 835 acres bordered on the north by State Route 240, on the south by the Yakima River and adjoining floodplain, on the west by Grosscup Road, and on the east by the Lamb Weston industrial plant and spray field. The site includes the approximate southwest half of Section 20, the northeast half of Section 29, and a triangular wedge in the western half of Section 28. All of these sections are located in Township 10 North, Range 28 East, Willamette Meridian.

Project Description

The proposed Horn Rapids Master Planned Community is a major new mixed-use community on approximately 835 acres within the 6,000 acre Horn Rapids Triangle Community Planning area of north Richland. It represents the first major step in implementing the vision of a new community expressed in the Horn Rapids Community Plan.

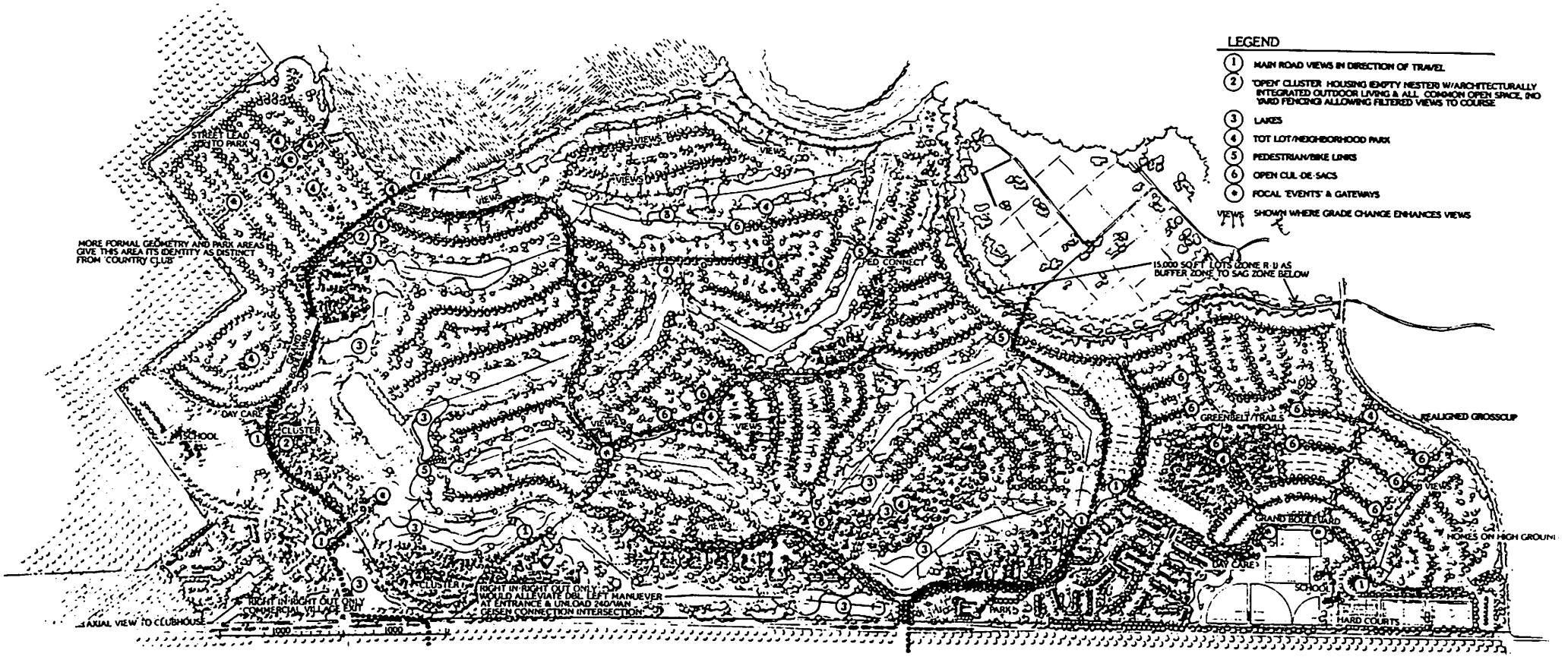
The Horn Rapids Master Planned Community is shown in FIGURE 2. Proposed for construction over a 20-year period, the Master Planned Community contains approximately 3,050 residential units intended to serve a wide variety of lifestyles and incomes. It will also contain centers for local services and employment in the form of approximately 83,000 square feet of commercial space and 105,000 square feet of office space. The community's recreational amenities will be abundant and include an 18-hole golf course (a separate project), two large joint use public park and school sites, two recreational clubs for homeowners in the community, and numerous small neighborhood parks, greenbelts, trails, and viewpoints. The following table summarizes the approximate acreage in the Master Plan devoted to each major land use category.



HORN RAPIDS MASTER PLANNED COMMUNITY

COLUMBIA TRIANGLE VENTURE

Figure 1



HORN RAPIDS MASTER PLANNED COMMUNITY

COLUMBIA TRIANGLE VENTURE

WORKING LAND PLAN
W/DESIGN COMMENTS

DAHLIN GROUP
ARCHITECTS - PLANNERS

Figure 2

Residential	190 acres
High Density Residential	260 acres
Golf Course	170 acres
Parks and Greenbelts	50 acres
Park/School	47 acres
Village Center Retail/Commercial	14 acres

Consistent with the policies of the Horn Rapids Community Plan, development of the Master Planned Community will begin at the southeast end of the site adjacent to SR 240 and nearest to downtown Richland. Later phases will progress outward to the south and west in an orderly fashion in order to ensure timely provision of public facilities and services. High intensity uses have been concentrated around the Village Center retail and commercial area and along SR 240. Densities gradually decline away from these areas, with the least intense uses located at the edges of the community.

The focus of the Master Planned Community will be an 18-hole golf course open to the public. (For the purpose of permitting and SEPA review, the golf course is a separate project.) The golf course will be complemented by approximately 97 acres of parks, greenbelts, playgrounds, recreational clubs, and trails.

The community will offer a variety of single family and multifamily residences. Single family homes will range from large view homes overlooking the Yakima River valley to homes of varying sizes fronting on the golf course, to more affordable homes on traditional neighborhood streets. Other units will be clustered in small village settings, or as townhouses in groupings of various sizes. Multifamily residences will consist of both apartments and smaller complexes of condominium homes.

Neighborhood services will be concentrated in the Village Center located near the main entrance on SR 240. Services available at the Village Center will include a grocery store, convenience retail, food service, event space and, possibly, a "courtyard" hotel to serve the nearby industrial uses.

Public facilities contemplated for the community include two elementary schools and day care facilities with adjacent athletic fields. One site is located near the Village Center, and the second site is located near Grosscup Road.

Project Phasing

Development of the Horn Rapids Master Planned Community is scheduled to occur over a period of approximately 20 years, beginning in the summer of 1993. Ultimate buildout of the community will depend on market conditions and housing cost factors.

The Phasing Plan in FIGURE 3 depicts the planned phasing of the community based on Community Plan policies and projected market demand and cost factors. The precise size and configuration of each phase will be modified in response to conditions at the time development of a particular phase is initiated.

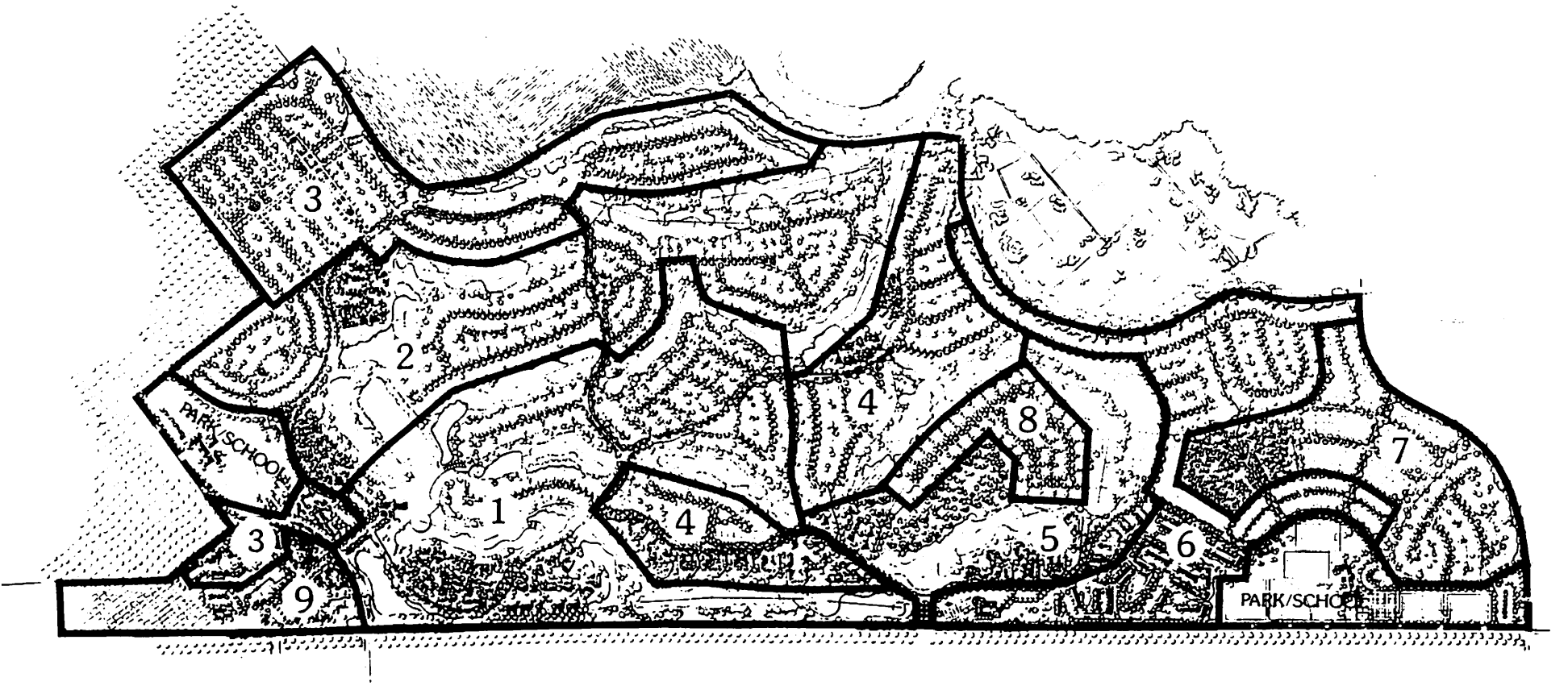
Phase one of the Master Planned Community, located in the central "golf course community", will begin construction in the summer of 1993 and will contain the following approximate of housing types:

Townhouses	50 Units
Single Family Homes Clustered in Villages	50 Units
High Density Single Family Homes	125 Units
Medium Density Single Family Homes	25 Units

The following table summarizes the information contained in FIGURE 3 and includes the estimated timing of remaining project phases.

Phase	Estimated Timing	Projected Uses
1	1993-1995	Residential, Golf Course
2	1995-1998	Residential, Recreation
3	1998-2002	Residential, Recreation
4	2003-2004	Residential, Recreation
5	2004-2006	Residential, Recreation
6	2007-2011	Residential, Recreation
7	2011-2012	Residential, Recreation
8	2013	Residential, Recreation
9	Based on market	Commercial and Retail

All times are approximate and depend on future market demand and cost factors. The projected uses are based on those contained in the conceptual Master Plan. Actual uses in any phase may vary based on market demand and cost factors. Phase 9 consists of the Village Center commercial and retail area. This phase will be constructed in response to market demand, making it difficult to estimate the timing of development.



HORN RAPIDS
COLUMBIA TRIANGLE VENTURE

ILLUSTRATIVE PLAN
PHASING PLAN

Figure 3

RELATION TO HORN RAPIDS DEVELOPMENT PROGRAM

Horn Rapids Triangle Development Program

The Horn Rapids Master Planned Community is part of an overall development program for the area known as the Horn Rapids Triangle. The development program was presented and discussed in the Horn Rapids Triangle Development Program - Final Environmental Impact Statement (December, 1981). The Horn Rapids Master Planned Community is part of the first phase of development under that program.

The Horn Rapids Triangle Development Program consists of four phases:

Community Plan The first phase consists of the Horn Rapids Community, adopted in 1981. The Community Plan contains policies which reflect desired community growth patterns in the area and are intended to define the direction and character of future development during later program phases. The Community Plan contains policies addressing natural environment, land use, transportation, parks, recreation and schools, utilities, services, and implementation.

Utility Services Master Plan The second phase consists of supplemental policies to the Community Plan for detailed engineering of the following capital facilities and utilities: water, wastewater, stormwater, solid waste, electrical, natural gas, and communications. For each element, the plan identifies the scope of service, proposed level of service and capacity, implementation measures.

Development Package (Phase 1) The third phase consists of providing basic services to designated industrial, commercial, and residential areas within the program area. The industrial area is proposed to consist of rail and utility systems within a 370-acre site. The commercial/residential area will consist of extension of basic water and wastewater services to 300 to 500 acres.

In the Horn Rapids Triangle Development Program - Final Environmental Impact Statement, this phase is identified as "Phase 1" of actual development of the Horn Rapids Community. The Horn Rapids Golf Course (see below) and the Horn Rapids Master Planned Community are part of that Phase 1 development.

Implementation Phase four of the Horn Rapids program includes a number of activities related the development of specific projects within the project area. Those activities include preparation of additional development package phases, amendments to the subdivision and zoning codes, subdivision of land, sale of parcels, and project construction.

Horn Rapids Golf Course Project

The Horn Rapids Golf Course Project is also part of the Phase 1 development package for Horn Rapids community. The project is the next step in implementing the Horn Rapids Community Plan and Horn Rapids Triangle Development Program. It is intended to stimulate planned residential and commercial development through development of a planned golf course community. Construction of the golf course is scheduled to begin in the spring of 1993.

CTV is proposing to develop the new municipal golf course on 190 acres of the approximate 835 acre Horn Rapids Community Phase 1 area. Development of the golf course will consist of:

Infrastructure Extension Activities will include extension of domestic and irrigation water, sewer and electrical lines; and construction of access roads.

Golf Course Facilities Golf course facilities will consist of an 18-hole regulation course with related tees, fairways, course obstacles, practice driving range, clubhouse, maintenance buildings, accessory parking, golf cart storage, cart paths, and other accessory equipment, landscaping and facilities.

Construction Activities Activities will include site clearing; rough grading; course shaping and drainage improvements (culverts); green and tee construction; installation of irrigation system (including pump station); cart paths; driving range improvements; fine grading, landscaping and related improvements; grassing and revegetation of rough areas and fairways; and construction of shelters, restrooms, drinking fountains, clubhouse, golf cart storage and maintenance buildings, and parking areas.

AFFECTED ENVIRONMENT, SIGNIFICANT IMPACTS AND MITIGATION MEASURES

NATURAL ENVIRONMENT

EARTH

AFFECTED ENVIRONMENT

The Horn Rapids Triangle lies in the Pasco Basin, which includes the Tri-Cities region and extends as far north as Othello. The area is part of the Badger Mountain-Red Mountain Trend and contains two geologic elements: the Grosscup Flats and Horn Rapids Lineament. Along the Yakima River from the Horn Rapids area to its confluence with the Columbia River, is a series of northwesterly aligned basalt knolls known as the Horn Rapids Lineament. These knolls probably result from weak folds occurring in the basaltic bedrock rather than erosion processes. The Horn Rapids Master Planned Community project site lies in the Grosscup Flat, an alluvial and glacial floodplain.

General Description

The Horn Rapids area is underlain by the Columbia river basalt lava flows at depth ranging from 150 to 200 feet. They are overlain by about 40 feet of compact silty clay, then by compact silty sands and gravels of the Ringold Formation. Above the Ringold Formation sediments re the deposits of the glacial Lake Missoula floods including the Pasco Gravels near the Columbia River, and the Touchet beds silts and fine sands toward the Yakima River. The gravels and sandy silts form the local soils.

The project site is relatively flat and comprised of wind formed ridges, shallow washes, and ditches. Several sand-filled depressions are scattered throughout the site, a result of the effects of wind and water erosion. The Yakima River and floodplain, together with the adjoining shoreline bluffs or escarpments are dominant physical features that border the project site.

Elevations on the project site range from a high point of 513 feet, to low points of less than 360 feet. Topography on the site varies considerably. Slopes range from less than one percent in many of the upland portions of the site to 67 percent on the escarpment adjacent to the Yakima River.

Soils

General subterranean conditions in the Grosscup Flat consist of the following:

0 - 10 Feet	Sandy, gravelly soils of various types
10 - 30 Feet	Pasco Gravels

30 - 150 Feet	Ringold formation, silts and clays, gravel and sand
150 - 10,000 Feet	Basaltic lava (no bedrock is exposed in this feature)

The project site falls within the Hezel-Quincy-Burbank soil association. These soils are gently sloping soils that have a loamy sand surface layer and are very deep to shallow over gravel, lacustrine material, or basaltic bedrock. The soils were formed from wind-blown sand, loamy sand, alluvium, or a combination of these materials. The occur at elevations ranging from 300 to 900 feet.

Quincy soils cover approximately 80 percent of the Horn Rapids Triangle area. These soils are deep loamy sands ranging in slope from 2 to 15 percent. One characteristic of this association is the long, narrow duned ridges extending considerable distances. This soil type is excessively drained, permeability is very rapid, and water holding capacity is low. Runoff on this soil is considered slow but the hazard of wind erosion is severe.

Burbank soils cover approximately 16 to 18 percent of the area. These soils consist of excessively drained, coarse-textured loamy sands and gravels. Slopes in this association range from 0 to 15 percent and average 4 percent. Permeability is very rapid, water holding capacity is low, and runoff is very slow. The hazard of water erosion is slight, but the hazard of wind erosion is severe.

In very small pockets (2 to 4 percent of the area), are found the Finley soil associations. These soils are fine sandy loams with very gravelled sub-layers. Slopes range from 0 to 15 percent. However, steep slopes are 20 percent or greater. Finley soils are very well drained. Permeability is moderately rapid, water holding capacity is low, and runoff is very slow to slow. Water erosion hazard is slight and wind erosion hazard is moderate. Finley soils have some susceptibility to frost action, but are highly stable when compacted.

Geologic Hazards

Two potential geologic hazards have been identified on the project site: erosion hazard/slope failure along the Yakima River, and seismic hazard.

Erosion Hazard A survey of the project site was conducted in March, 1993 by Shannon & Wilson, Inc. A major focus of the survey was the escarpment adjacent to the Yakima River.

Erosion on the escarpment above the abandoned irrigation canal has been caused primarily by off-road vehicle travel, which has denuded the western two-thirds of the escarpment face. The canal is effectively acting as a bench on the escarpment slope, collecting material eroded from above.

Erosion at the base of the slope, below the abandoned irrigation canal, is typified by several areas of mass wasting of material into the river. In at least one section, the erosion at the base of the river bank has progressed 10 feet northeasterly since 1983. This conclusion was based on a comparison of 1983 Soil Conservation Service aerial photographs to existing conditions. Observations further indicated that a nearly vertical erosive cut of 8 feet in height had been cut into the river bank, and had subsequently been re-covered with soil eroded from above (see APPENDIX 1).

The combination of natural and man-made erosion has combined to create a situation where sections of the escarpment face are eroding downhill to be carried away by the river. Simultaneously, the Yakima River is impacting the escarpment face by eroding into the toe of the escarpment face. The river channel at the base of the escarpment slope is on the outside of bend where the velocity of the river is the greatest, and where erosive impact of the river is expected to be most severe.

Seismic Hazard Records of seismic events in the Hanford-Richland area date to 1850 and indicate that the area is seismically active. In 1872, a large earthquake occurred in north-central Washington, approximately 81 miles north of the project site, with an estimated Richter magnitude of 7.0. In the central part of the Columbia Plateau, the largest historical earthquakes near the site were two earthquakes that occurred north of the site in 1918 and 1973, both with magnitudes of 4.4. The largest earthquake in the Columbia Plateau was the Milton-Freewater, Oregon, earthquake which occurred in 1936 and had a magnitude of 5.75. During the period from 1969 to 1989, there were numerous earthquakes in the area with Richter magnitudes between 3.0 and 5.0.

The Horn Rapids project site is located in Seismic Risk Zone 2B as defined in the Uniform Building Code. Earthquakes in this zone can be expected to cause moderate damage.

SIGNIFICANT IMPACTS

The most significant potential adverse impacts to the earth resulting from development of the Horn Rapids Master Planned Community include water and wind erosion, runoff from new impervious surfaces, and grading and fill activities. These impacts are discussed in the following sections.

Erosion

There are two primary erosion-related concerns with regard to construction of the proposed development. The first is the potential for progressive erosion and slope stability, particularly along the bluff adjacent to the Yakima River. A second concern is wind erosion and dust resulting from any unprotected or unvegetated areas.

In combination, these erosive forces will continue to cause the escarpment along the river to erode. Uphill of the abandoned canal,

erosion will tend to be localized to denuded areas, primarily represent a nuisance from dust. However, localized slope failures above the canal could also be caused by surface water runoff or excessive irrigation.

Erosion below the canal can be expected to progressively undermine the escarpment slope, eventually causing slope failure and possibly resulting in loss of acreage on top of the hill. Such slope failures could also cause the loss of structures placed within the potential failure area. The rate of erosion and possible loss of the slope cannot be predicted. However, slope failure from erosion of the river bank does not appear to be an immediate problem. Slope failure may be a gradual flattening of the slope or a dramatic event due to an outside occurrence such as flooding of the river or severe slope erosion due to heavy precipitation.

Impervious Surfaces

Precise estimates of the amount of impervious surfaces at project buildout have not been developed. However, a minimum of 32 percent of the project site, or over 267 acres, will remain in parks, golf course, and other active and passive recreation and open space. The amount of impervious surfaces on the remaining 68 percent of the project site will depend on the extent of building lot coverage and landscaping. The addition of new impervious surfaces increases the potential for stormwater runoff from developed areas.

Grading and Fill

Over the 20-year life of the project, grading and filling of approximately 500,000 cubic yards will be occur. Fill material is expected to be obtained from on-site sources. Filling and grading will be designed to minimize alteration of the natural topography of the project site.

Grading and fill activities increase the potential for water-related erosion. A filling and grading plan will be prepared and submitted to the City of Richland prior to construction of each project phase.

MITIGATION MEASURES

Measures to offset the potential impacts of the Horn Rapids Master Planned Community to the earth are proposed in three areas: water erosion, impervious surfaces/grading and fill, and wind erosion. Proposed mitigation measures are discussed in the following sections.

Water Erosion

Several measures are proposed to address the potential for continuing river bank erosion following completion of the project.

Building Setback Shannon & Wilson, Inc. is recommending a building setback from the crest of the slope at least equal to 1.5 times the height of the slope above river elevation. For example, along the middle of the escarpment where it is about 90 feet above the river, the recommended minimum setback from the crest of the slope be 135 feet. More refined recommendations for setbacks will

be made based on more detailed field exploration and laboratory testing (see APPENDIX 1).

Impervious Surfaces Grading and Fill

The stormwater collection system proposed by Hugh Goldsmith & Associates for the project is designed so that all surface water runoff will be conveyed and stored for recharge to soils and groundwater. No stormwater runoff will be discharged to the Yakima River or other surface water bodies. The system will be designed so that areas of recharge will be as close as possible to the point of collection.

Stormwater runoff from impervious surfaces will be conveyed via a biofiltration system consisting of grass-lines swales and retention areas. The swales will be constructed adjacent to the internal street network in the community. Stormwater will be conveyed by the grass-lined swales to the retention areas located in the community and neighborhood parks throughout the development. Additional retention areas will be provided in the Horn Rapids Golf Course, now under development. In areas where there is a potential that the volume of runoff may exceed the storage volume of the retention area under frozen ground conditions, recharge chambers will be installed four (4) feet below ground level to allow recharge to continue.

Wind Erosion

There are several proposed or existing measures which can offset the potential impacts of wind erosion:

Slope Protection Geosynthetic slope protection is proposed on the face of the river escarpment. These systems vary in configuration, from plastic cellular matrices fill with gravel and sand to systems which blanket the slope. The selected system must be capable of allowing re-vegetation of the slope. An alternative may be a complete vegetative resurfacing program. However, because of the relatively steep slope, such a system should be designed by an agronomist or soil scientist.

Richland Dust Ordinance In November, 1992 the City of Richland adopted Ordinance 40-92 (Dust Ordinance). The ordinance requires any person, firm or corporation which disturbs, excavates, grade, plows, or removes the top soil of any land area to take "affirmative measures to suppress and minimize the blowing and scattering of dust. . . ." Measures include, but are not limited to, adequate periodic sprinkling of the disturbed soil with water or other fluid, application of a chemical or physical soil binder, physical cover, adequate fencing, and effective corrugation of the surface. The ordinance provides for civil penalties or abatement for noncompliance.

APCA Regulations The Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (APCA) adopted General Regulation 80-7. Part B, Section 400-040 of the regulation contains specific

provisions requiring control of visible emissions, particulate matter, fugitive emissions, and fugitive dust.

State Regulations More recent regulations governing emissions, which are implemented by the APCA, are contained in WAC 173-400. WAC 173-400-040 contains regulations for the control of visible emissions, fallout of particulate matter, fugitive emissions, and fugitive dust.

AIR

AFFECTED ENVIRONMENT

The climate at the Horn Rapids Master Planned Community site and the surrounding region is characteristic of a semiarid steppe. Humidity is low, and winters are mild.

Average annual precipitation in the project area is 6.25 inches. More than 40 percent of the annual precipitation occurs from December through February. Snowfall accounts for about 38 percent of the total precipitation during the winter.

Prevailing winds are from the west-northwest, with a secondary maximum frequency from the southwest. Strong winds at the project site are associated with the southwesterly winds and afternoon "drainage" winds and thunderstorms during the summer. The "drainage" winds are generally from the northwest.

The project site is located within the South Central Washington Intrastate Air Quality Control Region (AQCR). As of 1990, none of the counties surrounding the project site was designated as a nonattainment area under the National Ambient Air Quality Standards (40 CFR 81.348), or applicable Washington state ambient air quality standards. Federal and state air quality regulations are implemented in this region by the Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (APCA).

Existing Sources of Emissions and Odor

The Lamb-Weston industrial plant and spray field is located to the east of the project site. Odors from the plant have been the source of complaints filed with the APCA in the past. Experience in the Richland Core Area further to the east indicate that the odors may be obnoxious to some, but not toxic. The impact of the plant on the project area is not anticipated to be significant, as the prevailing wind pattern is predominantly to the northeast. The City of Richland's sanitary landfill is located north of the project site, adjacent to SR-240 at the Grosscup Road intersection.

SIGNIFICANT IMPACTS

Two general types of emissions could result from development of the Horn Rapids Master Planned Community: 1) fugitive dust 2) vehicle emissions.

Fugitive Dust

During site grading, and other related construction, dust could contribute to concentrations of suspended particulate matter in the project vicinity. CTV will comply with the City of Richland's Ordinance 40-92 (Dust Ordinance), Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (APCA) General Regulation 80-7, and WAC 173-400 for the control of fugitive dust emissions (see section c. below).

Vehicle Emissions

Construction Site clearing, grading, construction, and paving will require the use of a number of different types of vehicles including backhoes, loaders, bulldozers, dump trucks, paving equipment, and water trucks. The number and types of vehicles to be used in the project are not known at this time. Engines in the trucks and other equipment emit air pollutants which could temporarily degrade local air quality during the demolition and paving process. Operation of these vehicles could also temporarily affect traffic flow in and around the project site, resulting in reduced travel speeds and corresponding increased vehicle emissions.

Long Term Vehicle Emissions According to the Transportation Impact Study conducted for the project by J-U-B Engineers, Inc., the Horn Rapids Master Planned Community will generate approximately 32,513 daily vehicle trips at project buildout. This long term increase in vehicle trips will also result in a gradual increase in vehicle emissions in the vicinity of the planned community.

MITIGATION MEASURES

Measures to offset the potential impacts of the Horn Rapids Master Planned Community to the air are proposed in three areas: fugitive dust, and vehicle emissions. Proposed mitigation measures are discussed in the following sections.

Fugitive Dust

In November, 1992 the City of Richland adopted Ordinance 40-92 (Dust Ordinance). The ordinance requires any person, firm or corporation which disturbs, excavates, grade, plows, or removes the top soil of any land area to take "affirmative measures to suppress and minimize the blowing and scattering of dust. . . ." Measures include, but are not limited to, adequate periodic sprinkling of the disturbed soil with water or other fluid, application of a chemical or physical soil binder, physical cover, adequate fencing, and effective corrugation of the surface. The ordinance provides for civil penalties or abatement for noncompliance.

The Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (APCA) adopted General Regulation 80-7. Part B, Section 400-040 of the regulation contains specific provisions requiring control of visible emissions, particulate matter, fugitive emissions, and fugitive dust.

More recent regulations governing emissions, which are implemented by the APCA, are contained in WAC 173-400. WAC

173-400-040 contains regulations for the control of visible emissions, fallout of particulate matter, fugitive emissions, and fugitive dust.

Grading and clearing for the project will be minimized in order to protect existing topographic features. Construction will be scheduled to avoid the high wind season. Interim or temporary irrigation, and/or water trucks will be used to reduce wind erosion to a minimum. Installation of grasses and landscaping will be phased to coincide with installation of permanent irrigation systems.

Vehicle Emissions

Construction Emissions from construction equipment and trucks can be reduced by using new and/or well-maintained equipment, and avoiding prolonged periods of vehicle idling. Secondary air quality impacts could be minimized by controlling the trucking of material to and from construction areas during peak travel times. In addition all construction equipment and trucks must meet state and federal vehicle emission standards.

Long Term Vehicle Emissions Automobiles imported into the State of Washington must meet federal emission standards, as well as the regulations contained in the Washington Clean Air Act (RCW 70.94) and Chapter 173 WAC for vehicle emissions.

Odors

The impact of the Lamb-Weston plant on the project area is not anticipated to be significant, as the prevailing wind pattern is predominantly to the northeast. In addition, effective management of the plant's clarifyer and spray fields along with a dilution unit for the fryer roof has reduced the number of complaints significantly.

WATER

AFFECTED ENVIRONMENT

The Horn Rapids Master Planned Community is located within the Yakima River basin. The project site is approximately seven miles upstream of the confluence of the Yakima River and Columbia River.

Surface Water

The project site is adjacent to the Yakima River and its associated floodplain.Throughout much of the year, surface water movement is not evident on the site. Shallow washes and ditches exist on the site which may convey surface water during periods of heavy precipitation.

An abandoned concrete-lined canal is located on the southern edge of the site adjacent to the Yakima River. The canal was formerly operated by the Richland Irrigation District and the Atomic Energy Commission for service to lands which are now part of the City of Richland. The canal formerly conveyed water diverted from the left bank of the Yakima River at the Horn Rapids Dam. However, the

canal has not been used for an estimated 20 years, and portions upstream of the site have been destroyed.

Groundwater

In response to concerns expressed by residents of the Weidle neighborhood (adjacent to the project site), CTV retained Shannon & Wilson, Inc. to conduct hydrogeologic studies of the site. The focus of the studies was the potential for irrigation on the site to cause adverse impacts to groundwater, primarily in the form of groundwater "mounding", or impacts from pesticides or herbicides applied at the site.

Groundwater Quantity A groundwater monitoring well was installed on the project site on March 15 and March 16, 1993 (see APPENDIX 2). Nine (9) existing wells, three (3) in the Weidle neighborhood and six (6) in other areas adjacent to the site, were selected for review of well log data from the Department of Ecology.

Based on observations made during installation of the on-site monitoring well, and on well log data obtained from Ecology, the primary near-surface aquifer is the unconfined layer composed primarily of the Pasco gravel soils. In the area of West Richland and north Richland, the unconfined gravel layer is encountered across the entire Yakima River Valley, and extends south and east into the Columbia River.

To define groundwater flow within and adjacent to the project, groundwater elevations were measured in three wells: the new monitoring well on the project site, a private residential well in the Weidle neighborhood west of the site, and a well on the Lamb-Weston property east of the site. Based on measurements of these wells and groundwater and surface water elevation information from Ecology, the City of Richland, and a recent U.S. Department of Energy study, the groundwater gradient across the site appears to trend in an east-southeasterly direction.

Groundwater Quality Three wells, including the new on-site well and two existing wells in the Weidle neighborhood, were sampled and tested for total petroleum hydrocarbons, pesticides, and herbicides. These tests were intended to detect the potential contaminants which may be associated with irrigation practices in the Horn Rapids Master Planned Community. The results of the chemical tests indicate no detectable concentration of contaminants.

SIGNIFICANT IMPACTS

The most significant potential adverse impacts to water resulting from development of the Horn Rapids Master Planned Community include groundwater quantity, groundwater quality, and storm water. These impacts are discussed in the following sections.

Groundwater Quantity

The primary concern regarding groundwater quantity is the possibility of "mounding" of the groundwater and subsequent flooding of property and structures in the Weidle neighborhood.

Groundwater mounding is a process whereby an existing groundwater system is overloaded by excess water from some outside source, usually a surface source. The excess water migrates down to the existing groundwater surface and, if environmental conditions don't allow the excess water to flow away quickly enough (due to low soil transmissivity), groundwater elevations rise at the point of water influx. Groundwater elevations adjacent to the point of influx also rise, with the rise of groundwater elevation tapering down to the original water surface profile away from the point of influx.

Groundwater Quality

One of the primary concerns of residents in the Weidle neighborhood is the potential impacts to groundwater from pesticides or herbicides applied in the planned community. To address this concern three wells, including the new on-site well and two existing wells in the Weidle neighborhood, were sampled and tested for total petroleum hydrocarbons, pesticides, and herbicides. These tests were intended to detect the potential contaminants which may be associated with irrigation practices in the Horn Rapids Master Planned Community. The results of the chemical tests indicate no detectable concentration of contaminants. Specific measures to minimize the risk of pollutants migrating into groundwater as the project are below.

Storm Water

Upon completion of the project, storm water runoff will be generated by impervious surfaces within the project including buildings, streets, and parking areas. The primary cause of major runoff events in this region is significant accumulation of snow during the winter months followed by sudden and warm "Chinook" wind conditions. The "Chinook" winds cause a rapid melting of the snow pack, and accompanying peak flows of runoff. These conditions are exacerbated when the ground is frozen, preventing infiltration of runoff.

MITIGATION MEASURES

Measures to offset the potential impacts of the Horn Rapids Master Planned Community to water are proposed in three areas: groundwater quantity, groundwater quality, and storm water. Proposed mitigation measures are discussed in the following sections.

Groundwater Quantity

In the case of the Horn Rapids Master Planned Community, the major potential source of excess groundwater is irrigation of the golf course and landscaping in residential and commercial uses. Mounding can occur only if a) the amount of irrigation exceeds the evaporation rate from soil or the evapotranspiration rate from vegetation, b) the amount of water which exceeds the evaporation or evapotranspiration rate is sufficient to migrate downward to the groundwater table, and c) the transmissivity of the aquifer is low enough to cause the excess water to "back up" in the groundwater system, causing mounding.

Balancing irrigation application rates with the requirements of vegetation can easily reduce the potential for groundwater mounding. Based on the results of its groundwater investigations, Shannon & Wilson, Inc. have recommended that an agronomist or soil scientist familiar with the design of balanced irrigation programs be retained to design an irrigation program for the project which will allow irrigation of the golf course and other landscaping in the community while minimizing the amount of irrigation water used.

Groundwater Quality

To address the concern regarding potential impacts from pesticides or herbicides applied at the site three wells, including the new on-site well and two existing wells in the Weidle neighborhood, were sampled and tested for total petroleum hydrocarbons, pesticides, and herbicides. These tests were intended to detect the potential contaminants which may be associated with irrigation practices in the Horn Rapids Master Planned Community. The results of the chemical tests indicate no detectable concentration of contaminants.

Minimizing future impacts of contaminants to groundwater will be addressed through implementation of a balanced irrigation program. CTV will retain an agronomist or soil scientist familiar with the design of balanced irrigation programs to design an irrigation program for the project which will allow irrigation of the golf course and other landscaping in the community while minimizing the amount of contaminants which move into the groundwater.

Storm Water

The stormwater collection system proposed for the project is designed so that all surface water runoff will be conveyed and stored for recharge to soils and groundwater. No stormwater runoff will be discharged to the Yakima River or other surface water bodies. The system will be designed so that areas of recharge will be as close as possible to the point of collection.

Stormwater runoff from impervious surfaces will be conveyed via a biofiltration system consisting of grass-lines swales and retention areas. The swales will be constructed adjacent to the internal street network in the community. Stormwater will be conveyed by the grass-lined swales to the retention areas located in the community and neighborhood parks throughout the development. Additional retention areas will be provided in the Horn Rapids Golf Course, now under development. In areas where there is a potential that the volume of runoff may exceed the storage volume of the retention area under frozen ground conditions, recharge chambers will be installed four (4) feet below ground level to allow recharge to continue.

More details on the design of the stormwater collection system will be contained in the Master Stormwater and Water Quality Plan, to be submitted along with the Phase 1 application package.

PLANTS AND ANIMALS

AFFECTED ENVIRONMENT

This section describes the plant and animal resources of the project site with emphasis on species that might be affected by development of the Horn Rapids Master Planned Community. Plants and animals are addressed jointly because of the close association of natural vegetation and habitat.

Plants

The Horn Rapids Triangle area is characterized as shrub-steppe. The low productivity and number of plant species in the area reflect the region's low annual precipitation, the low water-holding capacity of the the sandy soil, and the occasionally very cold winters.

In the early 1800's, the dominant vegetation in the area was big sagebrush, with an understory of perennial bunchgrasses. Today, cheatgrass, an introduced species, is the dominant plant in areas that were cultivated 40 years ago, as well as on previously grazed areas at lower elevations.

More than 240 species of plants in ten major plant communities have been identified in the Horn Rapids area. The plant communities include 1) sagebrush/bluebunch wheatgrass, 2) sagebrush/cheatgrass-Sandberg's bluegrass, 3) sagebrush-bitterbrush/cheatgrass, 4) greasewood/cheatgrass-saltgrass, 5) winterfat/Sandberg's bluegrass, 6) thyme buckwheat/Sandberg's bluegrass, 7) cheatgrass-tumble mustard, 8) willow, 9) spiny hopsage, and 10) sand dunes. (U.S. Department of Energy, Office of New Production Reactors, Draft EIS for the Siting, Construction, and Operation of New Production Reactor Capacity, Document DOE/EIS-0144D, April, 1991)

Endangered and Threatened Species TABLE 1 lists federal and state threatened, endangered or candidate species of plants known to occur, or which could occur, in the Horn Rapids Triangle area.

Studies conducted by the Department of Energy (DOE) on the Hanford Federal Reservation indicate it is unlikely that the plant species listed above occur on the Horn Rapids project site. Columbia yellow cress occurs in the riparian areas along the Hanford Reach of the Columbia River. The nearest known population of Columbia milk-vetch is in the northwestern portion of Hanford near Vernita. Hoover's desert parsley was not found in the DOE Hanford studies.

Animals

The Horn Rapids area provides habitat for numerous animal species including 15 species of reptile and amphibians, 125 species of birds, and 30 species of mammals. The Yakima River supports a variety of fish and other aquatic organisms.

TABLE 1

Threatened and Endangered Plant Species

Common Name	Scientific Name	Federal Status	State Status
Columbia yellow cress	Rorippa columbiae	Candidate	Endangered
Columbia milk-vetch	Astagalus columbianus	Candidate	Threatened
Hoover's desert parsley	Lomatium tuberosum	Candidate	Threatened

(Source: U.S. Department of Energy, Office of New Production Reactors, Draft EIS for the Siting, Construction, and Operation of New Production Reactor Capacity, Document DOE/EIS-0144D, April, 1991)

Amphibians and Reptiles The side-blotched lizard is the most abundant reptile and can be found throughout the area. The most common snakes are the gopher snake, western yellow-bellied racer, and Pacific rattlesnake. Rarely occurring in the area are striped whipsnakes and desert night snakes. Toads and frogs occur along the Yakima River.

Birds The horned lark and western meadowlark are the most abundant nesting birds in the shrub-steppe. The area support populations of chukar and gray partridge, primarily in the Rattlesnake Hills to the west. Wastewater ponds on the Hanford reservation are important habitats for songbirds, shorebirds, ducks, and geese. The most important resident waterfowl species is the Canada goose, whose nesting habitat is confined to the islands of the free-flowing reach of the Columbia River. Forster's tern, ring-billed gulls, and California gulls also nest on these islands. The Columbia and Yakima Rivers also serve as major resting areas for migrant waterfowl. Several species of hawks and owls use the Hanford-Horn Rapids area for foraging and nesting.

Mammals Approximately 30 species of mammals have been identified in the Hanford-Horn Rapids area, most of which are rodents. These include the Great Basin pocket mouse, deer mouse, Townsend's ground squirrel, northern pocket gopher, western harvest mouse, house mouse, Norway rat, northern grasshopper mouse, and least chipmunk. Nuttall's cottontail rabbits and black-tailed jackrabbits are widely distributed throughout the area. Muskrats and porcupines have been along the shorelines of streams, ponds, and ditches, and beavers are residents of the sloughs along the Columbia and Yakima Rivers. Raccoons, skunks, bobcats, mink, and badgers are also present in the area. The coyote is the principal mammalian predator in the area. Large mammals include elk (primarily in the Rattlesnake Hills) and mule deer (primarily in the Rattlesnake Hills and along the Columbia and Yakima Rivers). Seven species of bat are also present.

Aquatic Species The Columbia and Yakima Rivers support a large and diverse community of plankton, benthic invertebrates, and fish. Previous Hanford-related studies identify 44 species of fish in the Hanford Reach of the Columbia River. Species include chinook salmon, sockeye salmon, coho salmon, and steelhead trout which use both rivers as migration routes to and from upstream spawning areas. Other fish of importance to sport fishermen are the whitefish, white sturgeon, smallmouth bass, crappie, catfish, walleye, and perch. Nongame fish present in the rivers include carp, shiners, suckers, and squawfish.

Endangered and Threatened Species TABLE 2 lists federal and state threatened, endangered or candidate species of animals known to occur, or which could occur, in the Horn Rapids Triangle area.

TABLE 2

Threatened and Endangered Animal Species

Common Name	Scientific Name	Federal Status	State Status
Common loon	Gavia immer	Not listed	Candidate
White pelican	Pelecanus erythrorhychos	Not listed	Endangered
Peregrine falcon	Falco peregrinus	Endangered	Endangered
Bald eagle	Haliaeetus leucocephalus	Threatened	Threatened
Swainson's hawk	Buteo swainsoni	Candidate	Not listed
Western sage grouse	Centrocercus urophasianus phaios	Candidate	Not listed
Ferruginous hawk	Buteo regalis	Candidate	Threatened
Sandhill crane	Grus canadensis	Not listed	Endangered
Long-billed curlew	Numenius americanus	Candidate	Not listed
Giant Columbia River limpet	Fisherola (= Lanx) nuttali	Candidate	Not listed
Giant Columbia River spire snail	Fluminicola (= Lithoglyphus) columbiana		

(Source: U.S. Department of Energy, Office of New Production Reactors, Draft EIS for the Siting, Construction, and Operation of New Production Reactor Capacity, Document DOE/EIS-0144D, April, 1991)

Two species of birds listed as threatened or endangered by both the Federal government and State of Washington occur in the Hanford-Horn Rapids area. The peregrine falcon is an occasional migrant through the area but does not nest there. The bald eagle is a regular winter resident and forages on dead salmon and waterfowl along the Columbia and Yakima Rivers. However, it does not nest in the area.

Bird species which appear on the State list that are not on the Federal list include the white pelican (endangered), sandhill crane (endangered), and ferruginous hawk (threatened). Both species could occur in the project area. The white pelican forages for fish in the shallow areas of Columbia and Yakima Rivers. The sandhill crane migrates through the area and could be found along the river. The ferruginous hawk nests on electrical transmission towers on the Hanford site and forages throughout the area.

Several bird species are candidates for either the state or Federal list. The common loon, a candidate for the state list, occurs on both rivers during migration and in the winter. The long-billed curlew, candidate for the Federal list, nests throughout the Hanford-Horn Rapids area. The Swainson's hawk, candidate for the Federal list, forages throughout the area and nests at the old Hanford Townsite.

The giant Columbia River limpet and giant Columbia River spire snail are found in the Columbia and Yakima Rivers. The limpet is relatively abundant, while the snail is less common. Both are candidates for the Federal list, but do not appear on the state list. Although Federal candidate species do not receive legal protection under the Endangered Species Act, the U.S. Fish & Wildlife Service recommends that impacts to these species be considered in project planning.

SIGNIFICANT IMPACTS

Vegetation within the developed areas of the Horn Rapids Master Planned Community will be destroyed during land clearing activities. Over the twenty-year buildout period for the project, approximately 570 acres of vegetation will be cleared for building sites, roads, parking and other facilities.

Direct impacts of these activities on plants and animals include elimination of habitat and displacement or loss of resident wildlife populations. The magnitude of the impacts depends on the location and density of development. As habitat is eliminated, wildlife must relocate to new areas. Since most habitats are assumed to be at their capacity to support wildlife, displaced animals may perish or displace other animals.

MITIGATION MEASURES

Based on recommendations made by the Washington Department of Wildlife for the associated Horn Rapids Golf Course project, the following measures will be incorporated into project design and construction in order to mitigate impacts to wildlife on the planned community site:

Building Setbacks Set back lots and buildings from the edge of the bluff adjacent to the Yakima River and its associated floodplain in order to retain an area of shrub-steppe habitat, and reduce impacts to the floodplain.

Phased Development Phase the development, and related vegetative clearing, to retain natural vegetation and defer impacts as long as possible.

Project Design Plan, develop, and construct sites, buildings, and other improvements to minimize the destruction of natural vegetation. Remnants of the shrub-steppe habitat should be retained in planned open space between clusters of residential development.

Revegetation To the extent possible, revegetate disturbed areas with native species and landscape with trees and shrubs that are useful to wildlife.

Habitat Incorporate wildlife habitat into utility corridors, stormwater facilities, trails, and other areas in the planned community.

ENVIRONMENTAL HAZARDS

AFFECTED ENVIRONMENT

The Horn Rapids Triangle borders the Hanford Site on the south. Three types of facilities are operated at the site:

Nuclear Reactor Plants The Washington Public Power Supply System (WPPSS) operates Plant 2, a commercial reactor that has produced electricity since May, 1984. The Fast Flux Test Facility is U.S. Department of Energy research reactor that is currently on "standby". Other reactors, such as the N-Reactor, operated previously but have been shut down and the nuclear fuel removed.

Fuel Storage Spent nuclear fuel is stored in the 100-K area on the Hanford Site pending completion of disposal plans and facilities.

Waste Storage and Treatment Radioactive waste and chemicals used in the processing of waste are stored at several locations at Hanford including the 200 and 300 areas. Most of the waste is stored in large tanks which are located underground near the center of the Hanford Site. Work is underway to build treatment facilities to transform the waste into stable forms for long term storage. Low level waste will be mixed with cement in the grout facility and stored in vaults. High level waste will be processed into glass logs at the Hanford Waste Vitrification Plant when it becomes operational near the turn of the century.

SIGNIFICANT IMPACTS

Two general types of environmental hazards could affect the Horn Rapids Master Planned Community. They include 1) potential radioactive emissions from nuclear facilities at the Hanford Federal Reservation and 2) spills and other release of waste materials during project construction.

Hanford Reservation

Under federal guidelines, there are four types of emergencies which could occur at nuclear power facilities, including those on the Hanford Reservation, and which are basis for emergency response. TABLE 3 describes each type of emergency.

Spills and Other Releases

The potential for minor spills or releases of other hazardous or toxic substances could be present during project construction. The most probable time for an occurrence is during the operation of construction equipment and vehicles and transport of petroleum and paving products. Leakage of petroleum products, including fuels, oil, grease, hydraulic fluids, and lubricants from construction equipment. These substances could drain either directly into the Yakima River or indirectly via stormwater flows. The extent of

TABLE 3

Emergency Action Levels
Nuclear Power Facilities

Class	Description	Example Conditions
Unusual Event	Unusual events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.	Fuel damage; abnormal coolant temperature and/or pressure; failure of a safety or relief valve; loss of offsite power; fire within the plant lasting more than 10 minutes; loss of containment integrity requiring technical shutdown; security threat; natural phenomenon such as earthquake.
Alert	Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of EPA exposure levels.	Failure of steam generator tubes; steam line break; primary coolant leak; loss of offsite and onsite power; release of radioactivity to containment or fuel building; fire affecting safety systems; severe natural phenomenon such as earthquake.
Site Area Emergency	Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Releases may exceed EPA guidelines near site boundary.	Known loss of coolant; degraded core; steam line breaks; loss of offsite and onsite power for more than 15 minutes; major damage to spent fuel; fire compromising safety systems; imminent loss of physical control of the plant; severe natural phenomenon such as earthquake.
General Emergency	Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential loss of containment integrity. Releases are expected to exceed EPA exposure levels offsite for more than the immediate site area.	Exposure levels high enough to consider evacuation within 2 miles of the site boundary; loss of 2 of 3 fission product barriers; loss of physical control of the facility; conditions that make release of large amounts of radioactivity possible in a short time period, such a core melt.

Source: U.S. Nuclear Regulatory Commission/Federal Emergency Management Agency, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, (NUREG-0654, FEMA-REP-1), November, 1980.

impacts resulting from accidental discharge of petroleum products during construction depends upon the amount and duration of the spill. Project construction practices are intended to minimize the risk of accidental spills or discharges to the Yakima River. Specific mitigation measures are outlined in section 2 below.

MITIGATION MEASURES

Mitigation measures address potential radioactive emissions from nuclear facilities at the Hanford Federal Reservation and 2) spills and other release of waste materials during project construction. Those measures are discussed in the following sections.

Hanford Site

An emergency response plan has been prepared by the U.S. Department of Energy (USDOE), Washington Public Power Supply System (WPPSS), and the Emergency Management offices of Benton, Franklin and Grant Counties. Basic features of the plan which affect future residents of the Horn Rapids Master Planned Community include the following:

Sirens If there is a problem at WPPSS Plant 2, persons within a 10-mile radius of the plant (this includes the Horn Rapids Master Planned Community site) will hear sirens sound continuously for three minutes or longer. These sirens are a signal to evacuate the area and tune to the Emergency Broadcast Radio Station KONA (610 AM or 105.3 FM) for more information. Other radio and TV stations may also broadcast emergency information.

Alert Radios Residents within the emergency planning zone in Benton County (including the project site) are provided with emergency alert radios. These radios would be turned on automatically by a signal transmitted just before an emergency broadcast system message.

Announcements When possible, emergency workers from the Sheriff's, police and fire department would verify notification by driving through the area broadcasting announcements on loudspeakers.

Possible Actions Depending on the class of emergency (described above), residents might be told that no actions are necessary, asked to prepare to shelter or evacuate, or asked to shelter or evacuate immediately.

Evacuation Residents will be provided with instructions on what to do if asked to evacuate and maps indicating evacuation routes and the location of the nearest Assistance Center. For the purposes of evacuation, the project site is located in Section 3. The primary evacuation route for residents in this section is west on Grosscup Road and south on Harrington Road to SR 224, and then on to Benton City. An alternative route is south on Stevens Drive or George Washington Way through Richland.

The designated Assistance Center for Section 3 is the Kiona Benton Middle School located at 913 Horne Drive in Benton. Assistance Centers provide lodging, food, first aid care, social services and, if necessary, decontamination.

CTV will consult with the Benton County Emergency Management Agency to review the existing plans for evacuation, and identify needed revisions and/or improvements which can best protect the future residents of the Horn Rapids Master Planned Community.

Spills and Other Releases

For emergencies arising from project construction activity, special emergency services which could be required in response to an explosion or release of hazardous or toxic substances include fire department personnel with hazardous materials training and appropriate equipment.

For emergencies arising from project construction activities, the risk of fire, explosion and release of hazardous substances can be minimized through the use of standard construction practices and traffic control measures. Project contractors will be required to undertake a number of measures to reduce environmental hazards. Those measures include the following:

Close Connections All connections to the surface drainage system from the site will be closed in the event of a spill or discharge.

Erosion Control Erosion control facilities will be installed prior to performing any earthwork on the site, and maintained in working order throughout the project.

NOISE

AFFECTED ENVIRONMENT

Existing sources of noise in the vicinity of the Horn Rapids Master Planned Community include State Route 240 and aircraft at the Richland Airport, which is approximately one mile southeast of the project site. In the past, the airport was the source of numerous noise complaints filed with the Port of Benton County, the Air Pollution Control Authority, and the City of Richland. Changes in site design at the airport along with the elimination of certain types of aircraft which serve the site have significantly reduced the complaints.

SIGNIFICANT IMPACTS

Project Construction During project construction, there would be a temporary increase in sound levels near the site due to the use of construction vehicles and other heavy equipment. Construction will require the cutting and drilling of wood, concrete and metal; welding equipment; and the use of compressors. The project will require the use of a number of different types of vehicles including backhoes, loaders, bulldozers, dump trucks, paving equipment, and water trucks. The number of vehicles to be used in the project is not

known at this time. Noise generated by these activities is highly variable. Equipment may not operate or may idle for long periods of time, depending on construction phasing. At some point, however, all the equipment may be operating simultaneously and would generate sound levels at the high end of acceptable levels, or which temporarily exceed current regulations.

Long Term Impacts Traffic impact studies conducted by J-U-B Engineers, Inc. predict the Horn Rapids Master Planned Community will generate 32,513 daily vehicle trips at project buildout. This increase in vehicle trips will result in a long term increase in vehicle noise in the Horn Rapids Triangle.

MITIGATION MEASURES

Project Construction The project contractors will use the following measures designed to minimize noise impacts during construction. These measures are intended to comply with the standards contained in RCW 70.107 (Noise Control Act of 1974) and WAC 173-60 (Maximum Environmental Noise Levels):

Limited Hours Work will generally be limited to the hours of 7:00 AM to 6:00 PM. If work is necessary after 10:00 PM, it will comply with the noise limitations in WAC 173-60-40 (b) and (c).

Operating Rules Objectionable noise will be minimized by observing the following rules:

1. Equip air compressors with silencing packages.
2. Equip jackhammers with silencers on the air outlet.
3. When possible, equipment that can be electrically driven instead of gas or diesel will be utilized.

Objectionable Noise The standards define objectionable noise received on neighboring properties as any noise exceeding the limits specified in WAC 173-60-040.

Noise Limits The standards define noise limits (in dBA) for residential, commercial, and industrial uses on receiving properties.

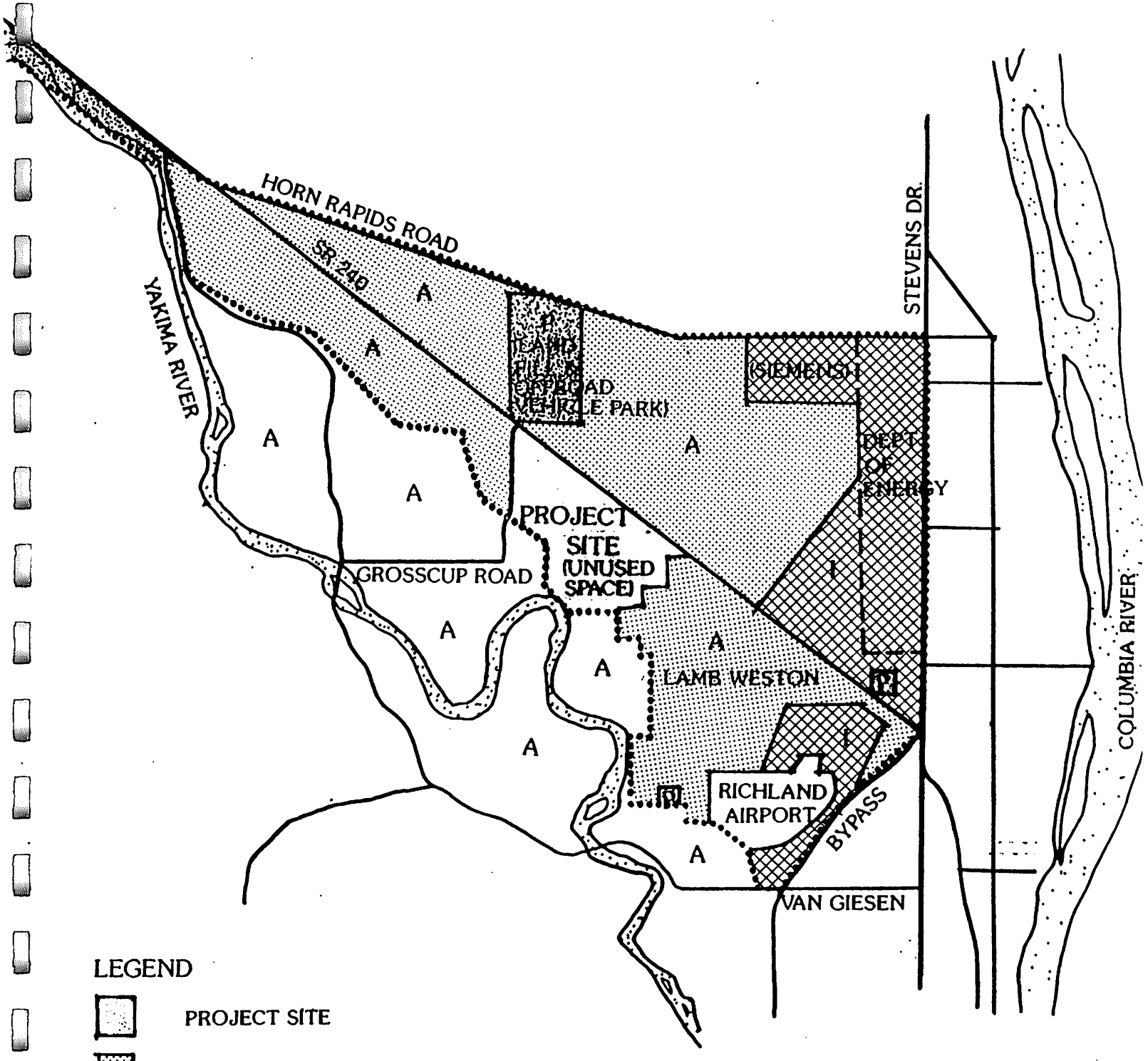
Long Term Impacts

Vehicles in the State of Washington must comply with WAC 173-62 (Motor Vehicle Noise Performance Standards). No other mitigation measures are proposed.

LAND AND SHORELINE USE

AFFECTED ENVIRONMENT

Existing land use on the Horn Rapids Master Planned Community site is shown in FIGURE 4. The site is currently undeveloped open space. Use of the site is limited to informal recreational activities.



LEGEND

- PROJECT SITE
- A — AGRICULTURE
- I — INDUSTRIAL
- P — PUBLIC
- ..... PLANNING AREA BOUNDARY

EXISTING LAND USES IN THE HORN RAPIDS VICINITY

Figure 4

The Horn Rapids Business Park is located directly to the north of the project site and is partially built out with industrial uses. The City of Richland's sanitary landfill and Horn Rapids Off-Road Vehicle (ORV) Park are located directly across SR-240 to the northwest. Large portions of the remaining area north of SR-240 are leased to a local farmer for agricultural use. Available evidence suggests that the project site may have been used for agriculture prior to 1942.

Adjacent to the project site on the south is the Yakima River and its associated floodplain. The floodplain is partially developed with small-tract rural residential development. The Lamb-Weston potato processing plant is adjacent to the project site on the southeast. Also to the southeast is the Waniwasha Indian Cemetery.

Exxon Nuclear's fabrication facility is located in the northeast portion of the Horn Rapids Triangle adjacent to Horn Rapids Road. and Richland Airport are located in southeast and the area. The Department of Energy's warehousing and distribution facilities and bus lot are at the extreme eastern edge of the area, adjacent to Stevens Drive.

Comprehensive Plan

The City of Richland's Comprehensive Plan was updated in 1988. The Comprehensive Plan designates the Horn Rapids Triangle as an area expected to acommodate ". . . .a full range of urban uses and activities including the expansion of industrial development around the Richland Airport and north of SR 240 and easterly of the sanitary landfill. Public facilities and commercial land uses are proposed to be activity centers or focal points for residential uses located around them . . "

The Comprehensive Plan map is shown in FIGURE 5. The map designates the Master Planned Community site for residential development of 8 dwelling units per acre, with associated public facilities, parks, schools, and community and neighborhood commercial uses.

Horn Rapids Community Plan

The Horn Rapids Community Plan was adopted in 1981. The community plan contains specific goals and policies for long term development in the Horn Rapids Triangle and is intended to augment the Comprehensive Plan.

Specific elements of the plan focus on natural systems and environment, land use, transportation, parks and recreation and schools, utilities, community services, and implementation. The Land Use Plan map (FIGURE 6) designates the Horn Rapids Master Planned Community site for residential development with associated community and neighborhood commercial centers, and public facilities.

Zoning

The Horn Rapids Master Planned Community site is currently designated Agricultural Use District (AG) in the City of Richland's

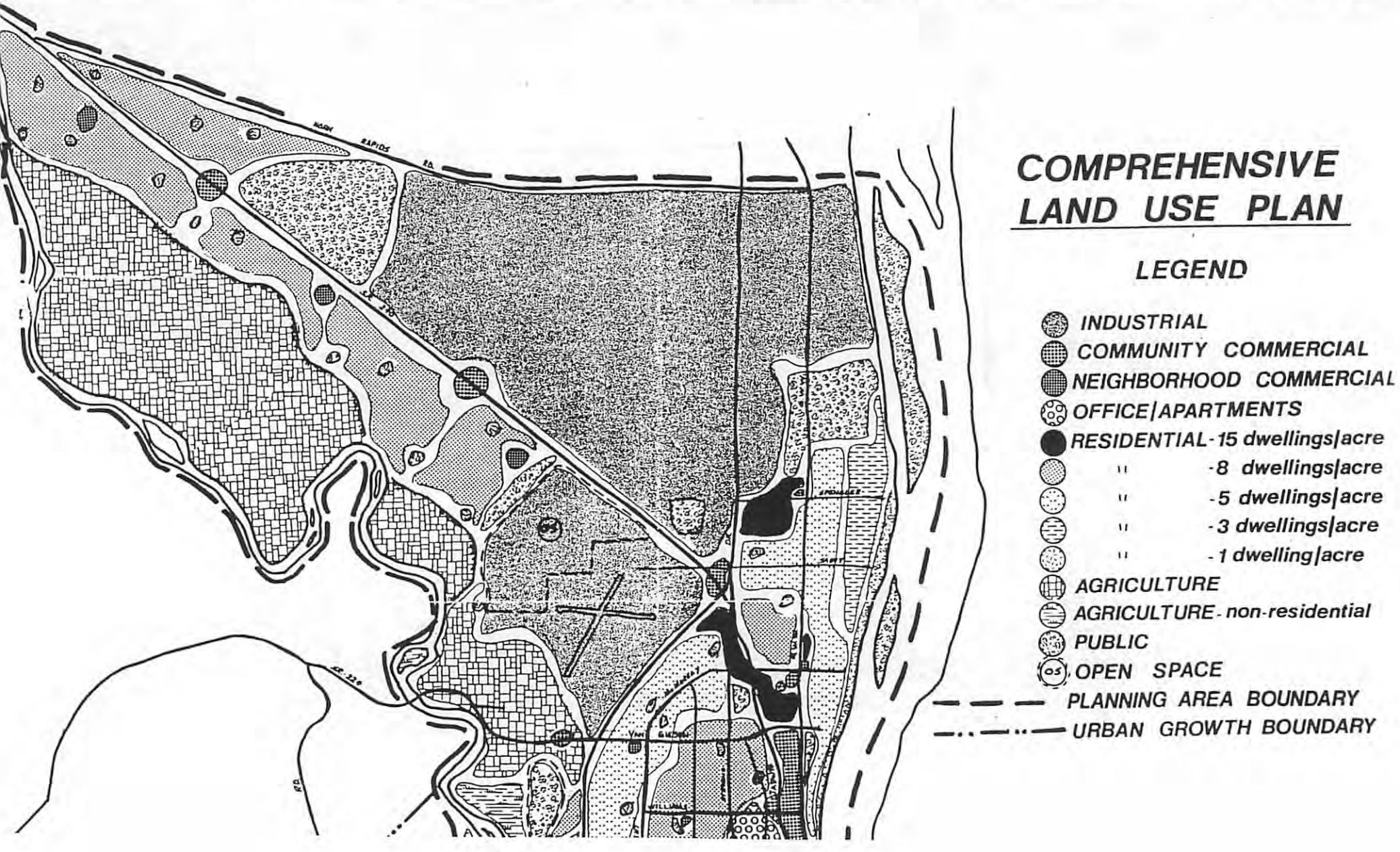
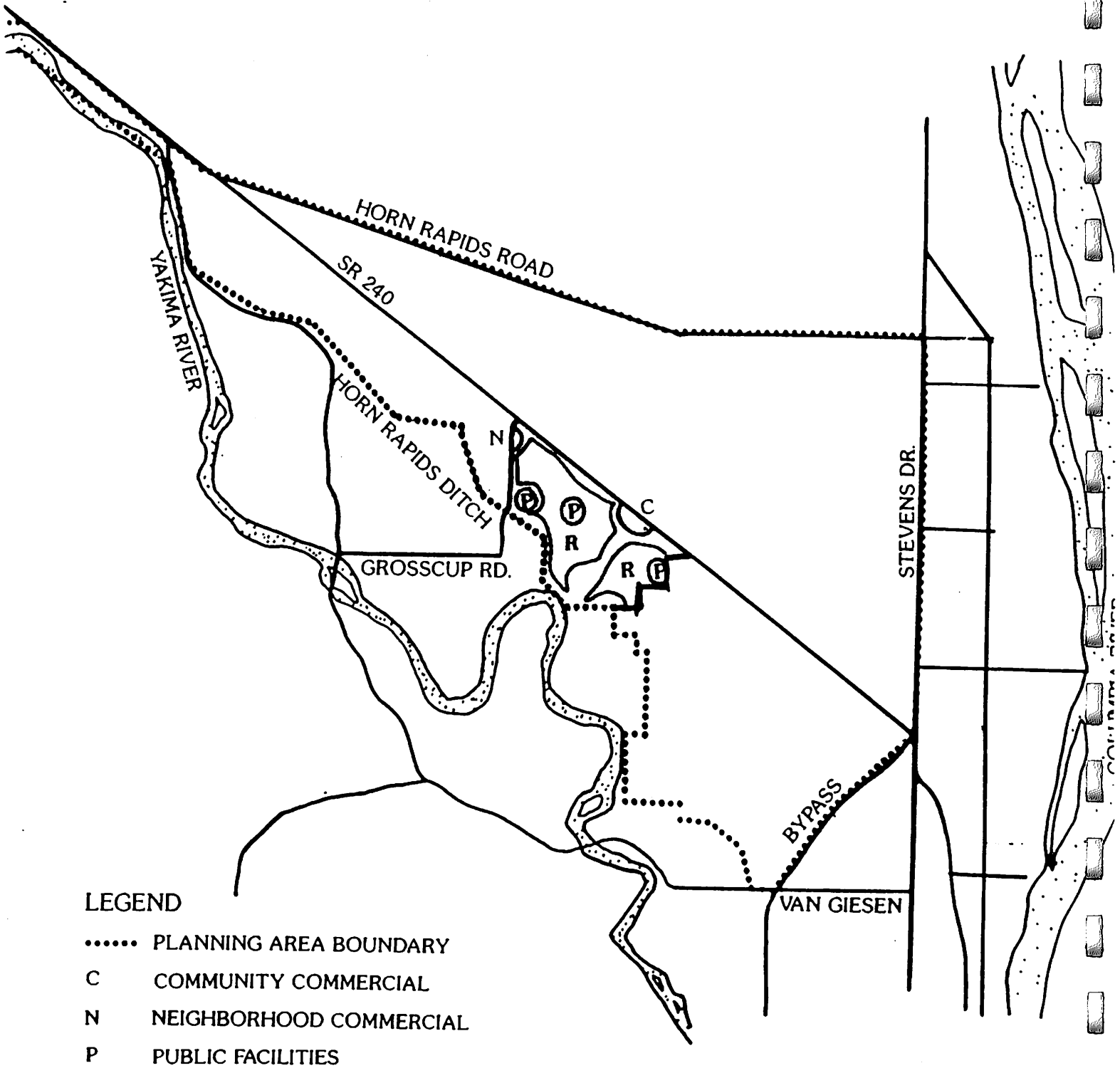

COMPREHENSIVE
LAND USE PLAN
LEGEND
INDUSTRIAL
COMMUNITY COMMERCIAL
NEIGHBORHOOD COMMERCIAL
OFFICE/APARTMENTS
RESIDENTIAL - 15 dwellings/acre
" - 8 dwellings/acre
" - 5 dwellings/acre
" - 3 dwellings/acre
" - 1 dwelling/acre
AGRICULTURE
AGRICULTURE - non-residential
PUBLIC
OS OPEN SPACE
PLANNING AREA BOUNDARY
URBAN GROWTH BOUNDARY

Figure 5



HORN RAPIDS COMMUNITY PLAN
LAND USE PLAN FOR
THE PROJECT SITE

Figure 6

zoning code (RMC 23.14). The purpose of the district is to permit essentially open lands use such as grazing lands or pasture, agriculture, and development of part-time small tract farming and other compatible uses such as cemeteries, parks, and recreational or similar uses. Permitted uses include agriculture, single family dwellings, golf courses, cemeteries, parks, playgrounds, wildlife refuges, structures related to public utilities, carnival tents, and manufactured homes of a temporary nature.

Shoreline Master Program

The City of Richland's Shoreline Master Program designates this portion of the shoreline as Conservancy. This designation applies to the 1,700 lineal feet of escarpment directly adjacent to the Yakima River. According to the Shoreline Master Program and RMC 26.09, the Conservancy environment ". . . seeks to satisfy some of the needs of the community relative to the present and future location of recreation areas serving existing and proposed population concentrations and to provide a continuous flow of recreational uses and benefits without substantial adverse modification of the shoreline character. Recognized uses in the Conservancy Environment are those which are generally non-consumptive of the physical and geological resources of the land water areas.

Development policies for the Conservancy Environment include the following:

1. *Give consideration to the maintenance of natural, cultural, aesthetic, historic, archaeological and recreational resources over other development activities.*

2. *Allow only those uses which can utilize the physical and biological resources of the area on a sustained yield basis while minimally reducing opportunities for other future uses of the resources of the area.*

3. *Encourage activities and uses of a non-permanent nature which do not substantially degrade the existing character of a Conservancy Environment.*

4. *Restrict new developments to those which are compatible with the natural and biological limitations of the land and water and which will not substantially alter the character of the Conservancy Environment.*

5. *Encourage streamway rehabilitation projects which will restore or enhance the natural streamway character.*

6. *Encourage publicly owned use area and/or commercially oriented recreational uses to provide appropriate public access to the shoreline without impinging upon the rights of the private property owner.*

7. *Prohibit commercial or industrial uses which do not enhance the purposes of the Conservancy Environment.*

8. *Require that new developments be designed to preclude the need for structural flood control protection.*

The specific use regulations for the Conservancy Environment (RMC 26.21) prohibit residential and commercial development. Passive recreation activities are permitted, while active recreation uses are permitted only with a Special Use Permit. Shoreline protection is also permitted only with a Special Use Permit.

Sensitive Areas

No portions of the Horn Rapids Master Planned Community site are currently designated as environmentally sensitive. The City of Richland is currently in the process of developing its Interim Regulations for Critical Areas and Resource Lands pursuant to the Growth Management Act. Critical Area maps and regulations have not been adopted.

SIGNIFICANT IMPACTS

Development of the proposed Horn Rapids Master Planned Community will result in the conversion of approximately 835 acres of undeveloped land to residential, commercial, and institutional uses over a twenty-year period. The community will contain approximately 3,050 residential units with an estimated resident population of 7,500 people.

Residential	190 acres
High Density Residential	260 acres
Golf Course	170 acres
Parks and Greenbelts	50 acres
Park/School	47 acres
Village Center Retail/Commercial	14 acres

Implementation of the Master Plan for the project will require reclassification of approximately 561 acres of land currently zoned for agriculatural uses, to residential, commercial, and public use zones in the following categories:

AG to R-1M (Single Family Residential - Medium Density)
AG to R-2 (High Density Residential)
AG to R-3 (Multiple-Family Residential)
AG to C-LB (Limited Business District)
AG to C-1 (Neighborhood Retail)
AG to PR (Public Reserve District)

The first phase of the development will begin construction in the summer of 1993. The first phase will contain 250 residences in the following housing types:

Townhouses	50 Units
Single Family Homes Clustered in Villages	50 Units
High Density Single Family Homes	125 Units
Medium Density Single Family Homes	25 Units

The following table summarizes the estimated timing and projected uses in remaining project phases.

Phase	Estimated Timing	Projected Uses
1	1993-1995	Residential, Golf Course
2	1995-1998	Residential, Recreation
3	1998-2002	Residential, Recreation
4	2003-2004	Residential, Recreation
5	2004-2006	Residential, Recreation
6	2007-2011	Residential, Recreation
7	2011-2012	Residential, Recreation
8	2013	Residential, Recreation
9	Based on market	Commercial and Retail

MITIGATION MEASURES

The proposed Horn Rapids Master Planned Community is designed to be consistent with all applicable adopted land use plans and policies of the City of Richland. Those plans and policies are discussed below.

Shoreline Management

In response to the policies and regulations contained in the City of Richland's Shoreline Master Program, no residential or commercial uses, including residential lots, associated with the Horn Rapids Master Planned Community will be located within designated Conservancy Environment. Uses within the 200-foot Conservancy Environment will be limited to passive recreation in the form of trails and river access or view point parks. The extent of continued equestrian use of the shoreline trail (an active recreation use) has not been determined.

Land Use Plans and Policies

The proposed Horn Rapids Master Planned Community is consistent with policies and designations in both the 1981 Horn Rapids Community Plan and the 1988 City of Richland Comprehensive Plan. It is also intended to comply with the terms and conditions of the "Horn Rapids Development and Option Agreement" between CTV and the City of Richland. The agreement sets forth the process and requirements under which CTV will prepare and implement the master plan for this City-owned property in the Horn Rapids Triangle.

POPULATION AND HOUSING

AFFECTED ENVIRONMENT

TABLE 4 contains the populations for Benton and Franklin Counties for the years 1980, 1985, and 1990, projections for the years 1995 and 2000.. The population of the two counties increased dramatically in 1990 an again in 1991, after rebounding from declines in 1988 and early 1989. Bi-county population is estimated to have increased by approximately 3,000 between April 1, 1990 and April 1, 1991, with an additional increase of 3,000 through April of 1992.

The Tri-Cities area of Richland, Kennewick, and Pasco accounts for more than 60 percent of the total population within the region. Approximately 26 percent of people in Benton County, and approximately 41 percent of people in Franklin County reside in unincorporated areas.

By 2000, the Bi-county area population is projected to increase from its 1990 level of 150,030 to 166,575, an increase of 11 percent. Factors contributing to this anticipated growth are related directly to projected increases in employment in non-agricultural jobs in the region, primarily at the Hanford Reservation. The Washington state Employment Security Department projects a minimum of 6,400 new non-agricultural jobs over the next few years. Projections by local employers such as Westinghouse, GTE and Battelle are for even higher rates of growth.

Housing

In 1988, approximately 4,600 housing units were vacant in the Tri-Cities region. Average single family home prices had declined from a peak of $73,100 in 1981 to $58,800. Since the second quarter of 1988, the local real estate market has experienced a significant turnaround. Through June, 1990 the average price of a single family home increased at about 1 percent per month to $65,000. There was a 50 percent increase in the number of single family units sold per month and a significant decline in the number of new units available for sale. Rental housing also became increasingly scarce.

By April, 1991 the average sales price for single family homes had increased to $75,200. In the same year, 461 new units were constructed. By contrast, development of new multifamily units had virtually ceased.

Based on projected population growth, there will be a demand for approximately 1,000 new housing units each year over the next decade. Of those, approximately 700 will single family units, and the remainder will be multifamily units. There will also be a demand for affordable housing, priced from $80,000 to $120,000.

TABLE 4

Existing and Projected Population

Region	1980	1985	1989	1990	1995	2000
Benton County						
Richland	33,578	30,508	29,970	32,320		
Kennewick	34,397	36,990	36,880	42,160		
Other	41,469	37,702	37,250	38,080		
Total County	109,444	105,200	104,100	112,560	114,972	123,358
Franklin County						
Pasco	18,425	18,700	17,560	20,340		
Other	16,602	17,000	16,640	17,130		
Total County	35,027	35,700	34,200	37,470	40,503	43,317
TOTAL	114,459	140,900	138,300	150,030	155,475	166,675

Source: Columbia Triangle Venture, "Horn Rapids Market Summary", January 25, 1992.

SIGNIFICANT IMPACTS

Development of the proposed Horn Rapids Master Planned Community will result in the conversion of approximately 835 acres of undeveloped land to residential and other uses over a twenty-year period. The community will contain approximately 3,050 residential units with an estimated resident population of 7,500 people.

Employment

TABLE 5 contains estimated employment for the planned commercial, office and school facilities in the project. Based on the extent of these planned uses, an estimated 581 people will be employed within the Master Planned Community at buildout.

MITIGATION MEASURES

The Horn Rapids Community Plan calls for the City of Richland to provide for and encourage a maximum choice of living environments and a variety of residential densities to meet the housing needs of people of all economic levels. The Horn Rapids Master Planned Community strives to achieve those goals by providing approximately 3,050 housing units of varying types, densities, and prices. Based on current plans and market analyses, the project contains a mix of housing types and prices to offer the public a full range of housing alternatives. Those housing types are summarized in TABLE 6.

The actual number and mix of housing units built over the projected 20-year buildout period for the community will vary from the numbers in TABLE 6 based on actual housing demand and other market factors in the Richland area. However, it will continue to be a goal of the Master Planned Community to offer a variety of housing types throughout the community and to create neighborhoods of varying sizes and identities.

To meet the housing needs of people of varying income levels, a wide range of prices will be offered. In addition, Columbia Triangle Ventures (CTV) is working with the Affordable Housing Council to assure that the Master Planned Community helps meet local and regional goals for affordable housing. TABLE 7 summarizes the price ranges for by housing type. The prices are based on 1993 housing prices and will change based on market demand and cost factors.

The first phase of the Master Planned Community will begin construction in the summer of 1993. A total of 200 housing units will be constructed and contain the following approximate mix of housing types:

Townhouses	50 Units
Single Family Homes Clustered in Villages	50 Units
High Density Single Family Homes	125 Units
Medium Density Single Family Homes	25 Units

TABLE 5

Estimated Employment

Land Use	Acres	Square Feet	Jobs/ 1000 Sq. Ft.	Jobs/Acre	Estimated Employees
Commercial		83,000	2/1000		166
Office		105,000	3/1000		315
Schools	30			3.3	100
				TOTAL	581

TABLE 6

Summary of Housing Types

Housing Type	Number of Dwelling Units
Apartments	490
Condominiums	250
Townhouses, Duplex & Triplex	450
Single Family Cluster in Villages	510
Small Lot Single Family Cottages	650
High Density Single Family Homes	250
Medium Density Single Family Homes	450
TOTAL	3,050

TABLE 7

Estimated Housing Price Ranges

Housing Type	Estimated Price Range
Apartments	$450 - $1,000/mo
Condominiums	$69,000 - $85,000
Townhouses, Duplex & Triplex	$75,000 - $100,000
Single Family Cluster in Villages	$85,000 - $105,000
Small Lot Single Family Cottages	$99,000 - $120,000
High Density Single Family Homes	$110,000 - $140,000
Medium Density Single Family Homes	$130,000 - $250,000

AESTHETICS

AFFECTED ENVIRONMENT

The project site is rolling shrub steppe comprised of wind formed ridges, shallow washes, and ditches. Several sand-filled depressions are scattered throughout the site, a result of the effects of wind and water erosion. The Yakima River and floodplain, together with the adjoining shoreline bluffs or escarpments are dominant physical features that border the project site. There are no buildings or other structures on the site.

SIGNIFICANT IMPACTS

The maximum height of buildings in the Horn Rapids Master Planned Community will most likely not exceed two stories. Final building heights and configurations will be determined prior to submittal of bid documents for Phase 1 development.

Existing views over the site from State Route 240, and from within the site, will be altered to the extent that the landscape will gradually change over the twenty-year buildout period from undeveloped shrub-steppe habitat to clusters of one and two-story residences surrounding fairways of the proposed golf course.

MITIGATION MEASURES

The proposed Horn Rapids Master Planned Community will contain over 267 acres of active and passive recreation and open space areas. This constitutes approximately 32 percent of the total project site. Parks and open space will include the golf course, two large community parks, and numerous neighborhood parks throughout the community. It will also include a network of greenbelts to provide visual buffers separating residential areas from one another. This network of parks, greenbelts, and other other open space will help to offset the visual impact of the Master Planned Community on the currently undeveloped shrub-steppe habitat which now dominates the site.

LIGHT AND GLARE

AFFECTED ENVIRONMENT

There are currently no existing sources of light or glare on the project site. There are no off-site sources of light or glare which are expected to affect the Horn Rapids Master Planned Community.

SIGNIFICANT IMPACTS

The Horn Rapids Master Planned Community site will gradually become a source of reflected glare from windows in the mornings and evenings. However, the glare will be at a distance and location that will pose a hazard.

Lights on houses, schools, commercial buildings, and offices will be visible at night from the surrounding areas. This represents a

significant change from the existing undeveloped conditions on the site.

Automobile headlights on this portion of State Route 240 will increase at night. The most significant increase will be during peak travel times in the early morning (1,584 AM Peak Hour Departures) and early evening (2,124 PM Peak Hour Arrivals), particularly during the winter months.

MITIGATION MEASURES

The Horn Rapids Master Planned Community will comply with all applicable regulations governing lighting, particularly Chapter 21.28 of the Richland Municipal Code (Outdoor Light Fixtures). Because of this compliance, light or glare from the project is not expected to result in any safety hazard.

RECREATION

AFFECTED ENVIRONMENT

There are few developed parks or recreation areas in the vicinity of the Horn Rapids Master Planned Community site. The Horn Rapids Off-Road Vehicle (ORV) Park is located directly across SR-240 from the site to the northwest.

The project site and surrounding area are used for a variety of other recreational activities. The shoreline bluff overlooking the Yakima River and floodplain is used as an equestrian trail. The trail generally runs along the bluff adjacent to the Horn Rapids Ditch. Other informal recreational activities on or near the site include off-road vehicle use, rifle and pistol shooting, and fishing.

The undeveloped Horn Rapids County Park is located at the northwestern tip of the Horn Rapids Triangle, between SR-240 and the Yakima River. The Horn Rapids Community Plan proposes that this site eventually be annexed to the City and developed as a Community Park in order to provide an attractive entrance to the City.

Throughout the Richland area, the City of Richland provides outdoor recreational opportunities through the development and management of community and neighborhood parks. Various types of playfield and playground activities are available. In addition, the City operates its outdoor municipal pool, located in the Richland Core Area, during the summer months. The Richland School District also provides indoor and outdoor recreation facilities for its students. These facilities are also utilized by the citizens of Richland. Other popular recreational activities in the region include hang gliding, sailing, water skiing, flying, parachuting, bicycling, boating, and sightseeing.

The Horn Rapids Community Plan proposes several park sites and numerous trails for the master planned community site. It generally

identifies three community park sites, two of which are associated with schools. In addition, it proposes two neighborhood park sites. Numerous trails are proposed on the site, including the bluff overlooking the Yakima River and adjacent to the Horn Rapids Ditch.

SIGNIFICANT IMPACTS

Population growth resulting from development of the Horn Rapids Master Planned Community will increase the demand for new park and recreational facilities. Use of of existing nearby county or city park facilities would also increase, including the need for maintenance of those facilities.

Because there are no developed recreation facilities or uses on the project site, any displacement which occurs will affect only those recreation uses which have occurred informally on the site. Those include equestrian use, off-road vehicle use, rifle and pistol shooting, and fishing.

MITIGATION MEASURES

Recreational opportunities and open space are abundant in the Horn Rapids Master Planned Community. Over 267 acres, or approximately 32 percent of the total project, is currently proposed for active and passive recreational uses. (The actual acreages and percentages will vary as the community is built out over the next 20 years.)

The most apparent recreational feature will the 18-hole golf course and clubhouse, now under construction. The golf course and clubhouse are a separate project, addressed in the Horn Rapids Golf Course Project Final Environmental Impact Statement (City of Richland, May, 1991).

Parks

Two large joint-use public park and school sites will provide opportunities for a variety of active recreation in the community. The first site is approximately 17 acres in size and is prominently located to the south of the main entrance, near the future Kingston Road extension. It is proposed to be a combined neighborhood playground and elementary school. As shown in FIGURE 2, the site could accommodate a soccer field, three youth baseball or softball fields, an adult baseball or softball field, four outdoor tennis courts, the elementary school playground, and off-street parking.

A much larger joint-use community playfield and elementary school site is located adjacent to SR 240 near Grosscup Road. The site is approximately 30 acres in size and provides convenient access for neighbors and people living outside the Horn Rapids area. As shown in FIGURE 2, this large playfield and school site could accommodate four soccer fields, two adult baseball or softball fields, a youth baseball of softball field, eight outdoor tennis courts, the elementary school playground, and two off-street parking areas. The City of Richland will determine the actual number, type, and

location of recreational facilities on the site prior to park development.

Numerous smaller neighborhood parks have been placed throughout the community to serve a variety of both active and passive recreation needs. Ranging in size from 1/4 acre to over 2 acres, these parks will provide essential outdoor space for adults and children. Some of the smaller parks may be developed as "tot lots", while others will provide passive views and vistas. The larger parks may provide space for informal activities, neighborhood functions, or family gatherings. Potential locations include street ends with views, promontories above the Yakima River, and sites located conveniently to individual neighborhoods.

Trails and Greenbelts

A network of greenbelts will add an important passive element to the community's recreation and open space system. A network of greenbelts provide visual buffers separating residential areas from one another. Pathways within the greenbelts provide the linkages among neighborhoods and between neighborhoods and community activity centers such as parks and schools.

The greenbelt pathways also form an integral part of the overall trail system in the community. The system can accommodate joggers, pedestrians, or bicyclists along numerous routes throughout the community. Some trails will meander through passive recreation areas such as greenbelts. Others will follow more active connectors such as interior roadways. At SR 240, Grosscup Road, and the Kingston Road extension the trail system will eventually tie in to the regional trail system called for in the Horn Rapids Triangle Community Plan.

HISTORIC AND CULTURAL PRESERVATION

AFFECTED ENVIRONMENT

No landmarks or evidence of historic, archaeological, scientific, or cultural importance are known to exist on the project site. The Richland area, particularly riverine and associated upland areas, is generally considered to be rich in sites of potential archaeological importance. Artifacts and fossils have been previously uncovered, generally during excavation associated with new development. In addition, extensive archaeological surveys have been conducted on the Hanford Reservation.

The Yakima and Columbia Rivers in the vicinity of the Horn Rapids Triangle have been used by the Indians of the region for salmon fishing, both prior and subsequent to the coming of white explorers and settlers to the area. Today, descendents of these native Indians still build wooden platforms at Horn Rapids Dam and spear salmon in much the same manner as their ancestors.

The Waniwasha Indian Cemetery overlooks the Yakima River about three quarters of a mile north of the SR 224/West Richland Bridge

(south of the project site). The cemetery was acquired for preservation by the Confederate Tribes and Bands of the Yakima Indian Nation.

There are no places or objects on or next to the Horn Rapids Master Planned Community site which are known to be on, or eligible for, a local, state, or national register of historic places.

SIGNIFICANT IMPACTS

Construction activities on the project site could result in the destruction of historic resources or sites not yet identified.

MITIGATION MEASURES

Because there are no known places or objects on, or known to be eligible for, a local, state, or national register of historic places, nor landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the project site, no mitigation measures are required. However, if cultural resources are encountered during project construction, work will be halted in the immediate vicinity and the Washington State Office of Archaeology and Historic Preservation notified.

TRANSPORTATION

AFFECTED

Existing highways and streets which serve the Horn Rapids Master Planned Community are shown in FIGURE 1. SR 240 is a minor arterial highway route between Richland and Vantage with Partial Access Control. The intersection of SR 240 with SR 240 Bypass Highway is currently signalized and is primarily impacted during the morning and evening shift changes at the U.S. Department of Energy Hanford Reservation, to the north of the intersection.

Grosscup road is a local access road from SR 240 to West Richland. It also provides access to the Richland municipal landfill and the Horn Rapids ORV Park, both north of the SR 240/Grosscup Road intersection.

As currently proposed, all access to and from the project site will be directly onto SR 240 or Grosscup Road. The City of Richland's Comprehensive Growth Plan currently shows a future extension of Kingston Road north from Van Giesen Street (SR 224), through the project site, intersecting with SR 240 and continuing north to Horn Rapids Road. The Kingston Road extension is not funded and currently has no schedule for construction. If Kingston Road is extended to provide alternate access to the site, it could significantly change the traffic distribution patterns generated by the project.

The Horn Rapids Master Planned Community site is currently not served by public transit. The nearest transit stop is between 1.5 and 2 miles to the east

SIGNIFICANT IMPACTS

Development of the Horn Rapids Master Planned Community will have impacts on traffic and transportation in two primary areas: parking and vehicle trips. Impacts in these two areas are discussed in the following sections.

Parking

TABLE 8 contains estimates for off-street parking requirements based on the Horn Rapids Master Planned Community as currently proposed. The estimates are based on the standards contained in RMC Title 23, Chapter 23.74, Section 100 - Parking Standards and Requirements. Parking estimates are subject to change based on market conditions and the ultimate configuration of project uses at the end of the projected 10-year buildout.

Vehicle Trips

Design years 1994, 1999, and 2008 were selected as the analysis periods which represent traffic impacts in the first year, fifth year, and fifteenth year (full buildout). TABLE 9 summarizes the trip generation volumes for each of these three years, and the total estimated trips for the project.

The Horn Rapids Master Planned Community is expected to generate significant increases in traffic volume on adjacent roadways at full project development. Total ADT generated from the project is estimated to be 32,513 trips. This does not include an additional 645 ADT generated by the golf course (a separate project). Annual rates of traffic growth are estimated to be 1.5% on SR 240 adjacent to the project, and 3.0% on the SR 240 Bypass Highway.

MITIGATION MEASURES

A transportation impact study was conducted for the Horn Rapids Master Planned Community by J-U-B Engineers, Inc. and is contained in APPENDIX 3. The impact study identified the following required improvements assuming full buildout of the project:

SR 240/SR 240 Bypass Intersection

The primary impact to this intersection will be AM peak hour eastbound left turns and PM peak northbound left turns. By 1999, it is anticipated that additional left turn lane storage will be required on eastbound SR 240. Double left turn land movements may be required on the eastbound SR 240 and the northbound Bypass Highway by the years 2001 and 2005, respectively.

Project Entrance No. 1/SR 240 Intersection

Project Entrance 1 will serve as the main entrance to the commercial uses at the east end of the project site. This entrance is not planned until late in the project's development. At full development a signal, along with center left turn lane, right turn deceleration land, and acceleration lane are recommended on SR 240.

TABLE 8

Estimated Off-Street Parking Requirements

Proposed Use	Standard (RMC 23.74.100)	Proposed Size/Area	Required Spaces
Single Family	2 Spaces/Dwelling Unit	1,860 Units	3,720
Multifamily	1.5 Spaces/Dwelling Unit	1,190 Units	1,785
Elementary Schools	2 Spaces/Classroom	2 at 20 Rooms	80
Day Care	2 Spaces/Staff	2 w/ 20 Staff Each	40
Parks	1 Space/2000 Square Feet	31 Acres	675
Winery	1 Space/400 Square Feet	19,000 Square Feet	48
Hotel	1 Space/Room	80 Rooms	80
Restaurant	1 Space/100 Square Feet	9,000 Square Feet	90
Retail	1 Space/300 Square Feet	34,000 Square Feet	113
Office	1 Space/250 Square Feet	105,000 Square Feet	420
Bank	1 Space/250 SF less 3/drive-thru	9,000 SF w/2 drive-thru	30
Church	1 Space/4 Seats	200 Seats	50
		TOTAL	7,131

(Source: Richland Municipal Code, Title 23, Chapter 23.74, Section 23.74.090 - 100)

TABLE 9

Estimated Trip Generation Volumes

Proposed Use	Number of Units	Area (GFA/Acres)	Average Daily Trips
Project Year 1994			
Single Family	200		1,954
Project Year 1999			
Single Family	800		7,006
Multifamily	200		1,256
Project Year 2008			
Single Family	1,182		10,037
Multifamily	640		3,624
Elementary Schools		38,000	449
Day Care		12,000	951
Parks		31 Acres	174
Winery		19,000	61
Hotel	80		645
Restaurant		9,000	1,848
Retail		34,000	1,325
Office		105,000	1,456
Bank		9,000	1,662
Church		7,000	65
		TOTAL	32,513

(Source: J-U-B Engineers, Inc., Draft Report, Horn Rapids Development, Transportation Impact Study, March, 1993)

Project Entrance No. 2/SR 240 Intersection

Project Entrance 2 will be constructed in 1993 and will serve as the main project entrance. This entrance will be designed and located in accordance with the City of Richland's conceptual plans for the extension of Kingston Road.

In 1994, a center left turn lane, right turn deceleration pocket, and acceleration land will be required. In 1999, a full right turn deceleration lane will be required, and the center left turn storage will require extension. A signal will probably be required sometime between 1999 and 2008.

Project Entrance No. 3/SR 240 Intersection

Project Entrance 3 will be the second entrance constructed and will be required after approximately 600 units of housing are constructed. A center left turn land, right turn deceleration lane, and acceleration lane will be required on SR 240. Based on anticipated LOS, a signal will probably be required sometime between 1999 and 2008.

Project Entrance No. 4/SR 240 Intersection

Project Entrance 4 will be a secondary entrance to serve the west end of the development and a proposed elementary school. A center left turn lane, right turn deceleration lane, and acceleration lane will be required on SR 240. This intersection will be monitored closely at full development for the need for signalization.

Grosscup Road/SR 240 Intersection

The transportation impact study projected that, by 2008, northbound Grosscup Road will be at LOS B and southbound Grosscup Road will be at LOS D. Therefore, no improvements are recommended at this intersection.

SR 240 Bypass Highway to Project Entrance No. 3

At full development, the Horn Rapids Master Planned Community will generate over 24,000 Average Daily Trips (ADT) on SR 240. The traffic analysis assumed that the character of the highway would change from rural to suburban after approximately 1,200 housing units, corresponding to approximately 16,000 ADT. After 16,000 ADT, the portion of SR 240 from the SR 240 Bypass Highway to Project Entrance 3 will probably require widening to four lanes with left turn lanes at intersections in order to maintain LOS D.

Internal Project Roads

Internal roads in the Horn Rapids Master Planned Community will function well as two (2) lane facilities with left turn lanes at major intersections in the residential areas. Four (4) lanes with left turn lanes are recommended in commercial areas. Separate left and right turn lanes will be required at all project entrance intersections with SR 240. Sufficient future right-of-way should be reserved at each entrance to accommodate the potential extension of roads across SR 240.

FIRE PROTECTION

AFFECTED ENVIRONMENT

Fire protection will be provided to the Horn Rapids Master Planned Community by the Richland Fire Department. The department currently has 52.5 total personnel, of which 45 are line personnel and 7.5 are support and administrative staff. The department is currently negotiating with WPPSS to provide fire protection services to Plant No. 2 on the Hanford Reservation. If negotiations are successful, the department would add 6 new firefighters and one (1) reserve 1,500 gpm pumper. In addition, the department expects to add one new administrative staff in July, 1993.

The current rating by the Washington Survey and Rating Bureau for the Richland Fire Department is Class 3. The department will be evaluated and rated again in May, 1993 at which time it anticipates the rating of Class 3 to be maintained.

The Fire Department currently operates three stations:

Station 71 Station 71 is located at 1000 George Washington Way. Equipment at the station include 1 first line ambulance, 1 reserve ambulance, 1 first line 1,500 gpm pumper, 1 reserve 1,500 gpm pumper, 1 100-foot aerial with 1,500 pumping capacity, and 1 command vehicle. Station 71 also houses all of the department's administrative staff and facilities.

Station 72 Station 72 is located in south Richland at 150 Gage Blvd. Equipment at the station includes 1 first line ambulance, 1 first line 1,500 gpm pumper, 1 brush truck, and 1 hazardous materials response vehicle which serves the tri-county area.

Station 73 Station 73 is located at 1900 Jadwin Avenue, and is the closest fire station to the Horn Rapids Master Planned Community site at approximately 2.5 miles. Equipment at the station includes 1 first line 1,500 gpm pumper, 1 first line ambulance, and 1 pumper tanker. Currently, there are at least 3 staff at the station 24 hours a day. That will increase to 5 staff if service is extended to WPPSS Plant No. 2.

The Fire Department's current average response time to calls is 5 minutes. Over the past 10 years, the ratio of firefighters to 1000 population has remained consistent at approximately 1.5/1000. The ratio of firefighters to 1000 residential dwelling units is 3.5/1000.

SIGNIFICANT IMPACTS

Based on current service ratios, the Fire Department estimates that the 3,050 residential units and approximate population of 7,500 at the Horn Rapids Master Planned Community will require the addition of one new station somewhere in the Horn Rapids area. The new station will require 9 to 12 staff, including 3 officers, and the following equipment: 1 first line 1,500 gpm pumper, 1 first line ambulance, and 1 brush truck. The department was not able to estimate the point during the project development process at which the new station would need to be constructed.

MITIGATION MEASURES

The Comprehensive Plan and Horn Rapids Community Plan direct the majority of future growth in Richland to areas capable of providing appropriate levels of service. In addition, tax revenues generated by future development in the Horn Rapids Triangle will be available to finance additional fire protection staff and equipment.

POLICE PROTECTION

AFFECTED ENVIRONMENT

Police protection will be provided to the Horn Rapids Master Planned Community by the Richland Police Department. The department currently has 50.5 total personnel, of which 44 are officers.

The department's main office is at 505 Swift Blvd. in Richland, approximately 2 miles from the project site. An additional precinct station is located in south Richland near Middle Springs.

The Police Department has no current plans for expansion of facilities or staff. A request for 2 additional officers in the 1993 budget was not approved. The department plans to request 2 additional officers in the 1994 budget.

The current ratio of officers to 1000 population is 1.31/1000, compared to the statewide average of 1.6/1000. The department considers the current ratio to be a minimum, but acceptable given the City's relatively low crime rate.

SIGNIFICANT IMPACTS

Based on current service ratios, the Police Department estimates that the Horn Rapids Master Planned Community, at buildout, will require an additional ten (10) officers. A new police district would have to be created when the project is approximately one-third developed. The new district would require five (5) new officers at that time. New facilities would include an office space which,

according to the department, could be co-located with a new fire station in the area.

MITIGATION MEASURES

The Comprehensive Plan and Horn Rapids Community Plan direct the majority of future growth in Richland to areas capable of providing appropriate levels of service. In addition, tax revenues generated by future development in the Horn Rapids Triangle will be available to finance additional police protection staff and equipment.

SCHOOLS

AFFECTED ENVIRONMENT

The project site is located within, and will be served by, Richland School District 400. There are currently no school facilities within the Horn Rapids Triangle area.

SIGNIFICANT IMPACTS

Based on 1990 Census data, there are .4567 K-12 students per household within the school district. Applying this factor to the 3,050 residential units proposed for the Horn Rapids Master Planned Community yields a projected public school enrollment of 1,393 students. Using school district data for elementary, middle, and high school, projected enrollments for the planned community are contained in TABLE 10.

MITIGATION MEASURES

The master plan for the proposed Horn Rapids Master Planned Community designates two sites for public schools. The first site, located on the east side of the community, is 19 acres in size and will contain an elementary school and neighborhood park. The second site, located on the west side of the community, is 30 acres in size and will contain an elementary school along with a neighborhood park.

ELECTRICITY

AFFECTED ENVIRONMENT

Electrical power for the Horn Rapids Master Planned Community will be provided by the City of Richland, which operates its own municipal system and purchases electrical power from the Bonneville Power Administration. Substations are located at the Horn Rapids Business Park to the east of the site, where 8 megavolt amperes and a 2-substation connector are available. A second substation is located north of the City's sanitary landfill and adjacent to Horn Rapids Road. Additional power and substation capacity can be obtained from an existing 115 kilovolt transmission line which serves the area. Distribution facilities include overhead and underground lines operated at 12,470 and 7,200 volts.

TABLE 10

Projected School Enrollment

Type of School	% of Total Enrollment	Estimated Project Enrollment
Elementary School	50	697
Middle School	23	320
High School	27	376
TOTAL	100	1,393

Source: Richland School District

SIGNIFICANT IMPACTS

The Horn Rapids Master Planned Community will require electrical power to be provided by the City of Richland. Power will be extended from the Horn Rapids Business Park to the east of the site, where 8 megavolt amperes and a 2-substation connector are available. Another existing substation is located north of the sanitary landfill and adjacent to Horn Rapids Road. Additional power and substation capacity can be obtained from an existing 115 kilovolt transmission line which serves the area.

The 1981 Horn Rapids Triangle Master Utility Plan estimated the electrical load demand for buildout of all land uses proposed by the Horn Rapids Community Plan. The Master Utility Plan estimated an ultimate electrical demand of 515,338 kilowatts for the Horn Rapids Community Plan area at buildout.

The Master Utility Plan also contained standards for electrical demand ("load densities") by land use. Those standards allow an estimate of electrical demand for the Horn Rapids Master Planned Community. The estimates of electrical demand are contained in TABLE 11.

Based on the electrical demand standards contained in the Master Utility Plan and the proposed uses in the Horn Rapids Master Planned Community, the completed project will result in an estimated electrical demand of 44,013 kilowatts.

MITIGATION MEASURES

The Horn Rapids Triangle Master Utility Plan estimated the electrical load demand for buildout of all land uses proposed by the Horn Rapids Community Plan. The Master Utility Plan estimated an ultimate electrical demand of 515,338 kilowatts for the Horn Rapids Community Plan area at buildout. Electrical substations are located at the Horn Rapids Business Park and north of the City's sanitary landfill. Additional power and substation capacity can be obtained from an existing 115 kilovolt transmission line which serves the area.

WATER

AFFECTED ENVIRONMENT

Domestic water supply is provided by the City of Richland. The City's current supply capacity includes 49,200,000 gallons per day (49.2 MGD) pumped, and 24,430,000 (24.4 MGD) from storage. A 30-inch main is available at the Horn Rapids Business Park. Capacity is 3.7 MGD at 50 PSI. Fire flow capacity is 4,000 gallons per minute (gpm).

Irrigation

Water used for irrigation by residences and other uses within the planned community will be provided separately from water used for domestic purposes. The source of irrigation water will be a portion of the City of Richland's existing approved surface water right for

TABLE 11

Estimated Electrical Demand

Customer Class	Demand Standard	Units/Area in Project	Electrical Demand (KW)
Single Family	15 KW/Unit	1,860 Units	27,900
Multifamily	7.5 KW/Unit	1,190 Units	8,925
Elementary Schools	25 KW/Acre	30 Acres	750
Commercial/Office	87 KW/Acre	74 Acres	6,438
		TOTAL	44,013

(Source: City of Richland Horn Rapids Triangle Master Utility Plan, July, 1981)

withdrawal of water from the Columbia River. The surface water right (No. S4-29941) was approved in September, 1989 by the Department of Ecology. The quantity of withdrawal in the approved water right is 20,196 gallons per minute (GPM). The portion of that withdrawal proposed for irrigation in the planned community is 5,000 GPM. A portion of that allocation will also be used for irrigation of the Horn Rapids Golf Course.

SIGNIFICANT IMPACTS

TABLE 12 contains estimated demand for domestic water in the completed Horn Rapids Master Planned Community. Estimates are based on water usage criteria for three basic classes of land use in the proposed project: residential (250 GPD/Unit), commercial/office (500 GPD/Acre), and schools (20 GPD/Student).

The largest portion of the demand for domestic water in the Horn Rapids Master Planned Community will result from the planned 3,050 residential units. Assuming average use of 250 gpd for each residential unit, residential development in the project at buildout will result in an average daily demand of .76 MGD. Commercial and office development will result in an additional demand of .04 MGD. Based on the projected enrollment of the schools planned for the project, estimated average daily demand for all schools is .02 MGD. Therefore, the total average daily demand for domestic water for the project at buildout is an estimated .82 MGD.

Providing the project with domestic water will require extension of the existing 30-inch water line that currently serves the Horn Rapids Business Park. The line was designed and constructed to extended westward along SR 240 to serve future development. On-site water improvements will be constructed concurrent with development phases.

MITIGATION MEASURES

The Horn Rapids Triangle Master Utility Plan estimated the demand for water at buildout of all land uses proposed by the Horn Rapids Community Plan. The Master Utility Plan estimated an ultimate demand of 56.6 MGD for the Horn Rapids Community Plan area at buildout. The City's current supply capacity includes 49.2 MGD pumped, and 24.4 MGD from storage. A 30-inch main is available at the Horn Rapids Business Park. Capacity is 3.7 MGD at 50 PSI. Fire flow capacity is 4,000 gallons per minute (gpm).

WASTEWATER

AFFECTED ENVIRONMENT

Wastewater collection and treatment are provided by the City of Richland. The City recently constructed a new secondary treatment plant. The treatment plant currently has an average demand of 8.9 million gallons per day (MGD), and peak demand of 12.3 MGD. The plant is designed to serve a population of 68,500 (compared to

TABLE 12

Estimated Water Demand

Use	Size	GPD/Unit	GPD/Acre	GPD/ Student	Average Daily Demand (MGD)
Residential	3,050 Units	250			.76
Schools	1,017 Students			20	.02
Commercial/Office	74 Acres		500		.04
				TOTAL	.82

(Sources: City of Richland Horn Rapids Triangle Master Utility Plan, July, 1981; City of Dupont, Comprehensive Land Use Plan FEIS, Appendix f, Water Supply Plan, Entranco Engineers, January, 1985)

the 1990 population of 32,320) and is considered adequate to serve Richland through the year 2000. A 12-inch main currently extends to the Horn Rapids Business Park.

SIGNIFICANT IMPACTS

TABLE 13 contains estimated wastewater flows for the completed Horn Rapids Master Planned Community. Estimates are based on wastewater loading criteria for three basic classes of land use in the proposed project: residential (60 GPD/Resident), commercial/office (800 GPD/Acre), and schools (15 GPD/Student). An infiltration-inflow rate of 600 GPD/Acre was added for residential and commercial uses, and 750 GPD/Acre was added for schools. These infiltration-inflow rates are averages for new sewer construction.

Based on the residential flow criteria and a projected population of 7,500, the residential portion of the project will generate an estimated wastewater flow of 720, 000 GPD at full buildout. Commercial and office development will generate an additional 103,600. Schools will generate estimated wastewater flows of 37,755 GPD. Therefore, the total estimated wastewater flow resulting from the project at full buildout is 861,355 GPD.

MITIGATION MEASURES

Current plans by the City of Richland call for a new sewer trunk line extension (Horn Rapids Connection) to the project site. Preliminary engineering design calls for a 36-inch line to extend from McMurray Street in the Richland Core Area to the Horn Rapids Business Park and then west along SR 240. An additional 54-inch line, the Lower North Interceptor, is needed to connect the Horn Rapids area via the Horn Rapids Connection with the City's treatment plant. On-site wastewater improvements will be constructed concurrent with development phases.

STORM DRAINAGE

AFFECTED ENVIRONMENT

There are currently no storm drainage facilities on the Horn Rapids Master Planned Community site. The stormwater collection system proposed for the project is designed so that all surface water runoff will be conveyed and stored for recharge to soils and groundwater. No stormwater runoff will be discharged to the Yakima River or other surface water bodies.

SIGNIFICANT IMPACTS

Upon completion of the project, storm water runoff will be generated by impervious surfaces within the project including buildings, streets, and parking areas. The primary cause of major runoff events in this region is significant accumulation of snow during the winter months followed by sudden and warm "Chinook" wind conditions. The "Chinook" winds cause a rapid melting of the snow pack, and accompanying peak flows of runoff. These

TABLE 13

Estimated Wastewater Flows

Use	Acres	Pop	Flow GPD/Res	Flow GPD/Acre	Flow GPD/Stud	Infil/Inflow GPD/Acre	Average Daily Flow (GPD)
Residential	450	7,500	60			600	720,000
Schools	30	1,017			15	750	37,755
Commer/ Office	74			800		600	103,600
						TOTAL	861,355

(Sources: City of Richland Horn Rapids Triangle Master Utility Plan, July, 1981; City of Dupont, Comprehensive Land Use Plan FEIS, Appendix F, Wastewater Disposal Plan, Entranco Engineers, January, 1985)

conditions are exacerbated when the ground is frozen, preventing infiltration of runoff.

MITIGATION MEASURES

The stormwater collection system proposed for the project is designed so that all surface water runoff will be conveyed and stored for recharge to soils and groundwater. No stormwater runoff will be discharged to the Yakima River or other surface water bodies. The system will be designed so that areas of recharge will be as close as possible to the point of collection.

Stormwater runoff from impervious surfaces will be conveyed via a biofiltration system consisting of grass-lines swales and retention areas. The swales will be constructed adjacent to the internal street network in the community. Stormwater will be conveyed by the grass-lined swales to the retention areas located in the community and neighborhood parks throughout the development. Additional retention areas will be provided in the Horn Rapids Golf Course, now under development. In areas where there is a potential that the volume of runoff may exceed the storage volume of the retention area under frozen ground conditions, recharge chambers will be installed four (4) feet below ground level to allow recharge to continue.

SOLID WASTE

AFFECTED ENVIRONMENT

Collection and disposal of solid waste is provided by the City of Richland. The City's sanitary landfill is located to the north of the project site adjacent to SR 240 at the Grosscup Road intersection. The landfill was constructed in 1974 and consists of two parcels. The first parcel is 114 acres in size and permitted for use. To the north, a second parcel of 135 acres is future expansion and is not currently permitted.

Within the 114-acre site, 57 acres is active landfill. The remaining 57 acres is used for sludge disposal and disposal of petroleum-contaminated soils. None of the existing landfill is lined. However, a portion of the site is equipped with vadose zone monitoring devices to monitor for potential migration of leachate to groundwater.

Assuming an annual growth rate of 2 percent in the municipal waste stream, the 114-acre parcel has approximately 35 to 40 years of use remaining. The 135-acre parcel has an estimated 50 additional years of capacity. However, the City has indicated that the current growth rate is less than 2 percent due to recycling and other related programs.

SIGNIFICANT IMPACTS

The City of Richland estimates that approximately 25,000 tons of municipal waste is currently disposed in the landfill each year. Based on the City's current population, this means each person in Richland disposes of approximately .7 tons of waste each year. Based on this estimate, residents of the Horn Rapids Master Planned Community could generate approximately 5,250 additional tons of waste per year at full project buildout, or an additional 21 percent of the municipal waste stream. Commercial and office development would augment the waste stream.

The City of Richland is in the process of converting its solid waste collection system to an "automated" process using specialized trucks and containers. This will increase the daily rate of household collection from the current 700 homes/day/truck to 1,500 homes/day/truck. For the Horn Rapids Master Planned Community, this means approximately two additional routes will be required at project buildout. An additional cost to the City will be the approximate 3,050 new solid waste containers for residences in the community.

MITIGATION MEASURES

Assuming an annual growth rate of 2 percent in the municipal waste stream, the 114-acre parcel at the landfill has approximately 35 to 40 years of use remaining. The 135-acre parcel to the north has an estimated 50 additional years of capacity. However, the City has indicated that the current growth rate is less than 2 percent due to recycling and other related programs. Based on this expected capacity, the landfill can easily accommodate the waste disposal needs of the Horn Rapids Master Planned Community at buildout.

REFERENCES

Benton-Franklin-Walla Walla Counties Air Pollution Control Authority, General Regulation 80-7, July 1, 1980.

City of Dupont, Comprehensive Plan and Land Use Zoning Code - Final Environmental Impact Statement, Technical Appendix, May, 1985.

City of Richland, CIP Project Description - Horn Rapids Residential Development.

City of Richland, Comprehensive Plan, Ordinance 11-88, August 15, 1988.

City of Richland, Davis, Bill, to Joe Wilson, "Mitigation of Trip Generation at Horn Rapids Golf Course", May 10, 1991.

City of Richland, Davis, Bill, to Joe Wilson, "Estimated Trip Generation for Horn Rapids Golf Community", May 2, 1991.

City of Richland, Horn Rapids Community Plan, 1981.

City of Richland, Horn Rapids Development and Option Agreement (Draft), November 16, 1992.

City of Richland, Horn Rapids Golf Course Project - Final Environmental Impact Statement, May, 1991.

City of Richland, Horn Rapids Triangle Master Utility Plan, July, 1981.

City of Richland, Horn Rapids Triangle Development Program - Final Environmental Impact Statement, December, 1981.

City of Richland, King, Joseph C., to Stanley R. Arlt, "Horn Rapids Groundwater Concerns - Recommendations", May 6, 1991.

City of Richland, King, Joseph C., to Stanley R. Arlt, "Groundwater Concerns in Horn Rapids Area - Recommendations", April 17, 1991.

City of Richland, Municipal Code, Title 21, Chapter 21.28 - Outdoor Light Fixtures.

City of Richland, Municipal Code, Title 22, Chapter 22.09 - State Environmental Policy Act.

City of Richland, Municipal Code, Title 23 - Zoning.

City of Richland, Municipal Code, Title 24 - Plats and Subdivision.

City of Richland, Municipal Code, Title 26 - Shoreline Management.

City of Richland, Ordinance 40-92 (Dust Ordinance), November 2, 1992.

City of Richland, Preliminary Draft Horn Rapids Community Plan, October, 1980.

City of Richland, Shoreline Master Program, June, 1979.

Confederated Tribes and Bands of the Yakima Indian Nation, Jack W. Fiander to Tom Lampson, May 17, 1991.

Davidson, Michael J., to Tom Lampson, April 17, 1991.

Columbia Triangle Venture, "Horn Rapids Market Summary", January 25, 1992.

J-U-B Engineers, Inc., Draft Report, Horn Rapids Development, Transportation Impact Study, Richland, Washington, March, 1993

Rolph, Jeff, to John Holmes, Memorandum (No Letterhead), April 17, 1991.

Shannon & Wilson, Inc., Final Report; Task 1 - Geotechnical Studies, Horn Rapids Triangle Development, Richland, Washington, March 1993.

Shannon & Wilson, Inc., Report of Task 2 - Hydrogeologic Studies, Horn Rapids Triangle Development, Richland, Washington, March 30, 1993.

Shannon & Wilson, Inc., Revised Final Report; Task 1 - Geotechnical Studies, Horn Rapids Triangle Development, Richland, Washington, April 1, 1993.

Tri-City Industrial Development Council, Employment and Housing Report, (No Date)

U.S. Department of Energy, Office of New Production Reactors, Draft EIS for the Siting, Construction, and Operation of New Production Reactor Capacity, Document DOE/EIS-0144D, April, 1991.
U.S. Nuclear Regulatory Commission/Federal Emergency Management Agency, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, (NUREG-0654, FEMA-REP-1), November, 1980.
Washington Administrative Code, Chapter 173-400, General Regulations for Air Pollution.
Washington Public Power Supply System, 1993 Calendar and Emergency Information.
Washington State Department of Ecology, Application for Surface Water No. S4-29941, September 22, 1989.
Washington State Department of Ecology, Brenden McFarland to Herb Everett, May 29, 1991.
Washington State Department of Transportation, Richard L. Larson to Herb Everett, June 11, 1991.
Washington State Department of Wildlife, Ted A. Clausing to Herb Everett, June 6, 1991.

APPENDIX 1

Final Report
Task 1: Geotechnical Studies

Horn Rapids Triangle Development
Richland, Washington

Shannon & Wilson, Inc.

April, 1993

H-1033-01

Revised Final Report
Task I Geotechnical Studies
Horn Rapids Triangle Development
Richland, Washington

APRIL 1993

Columbia Triangle Ventures
14410 Bel-Red Road, Suite 200
Bellevue, Washington 98007

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
1354 Grandridge Boulevard
Kennewick, Washington 99336 •1037
509 •735 •1280

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
FAIRBANKS
ANCHORAGE
SAINT LOUIS

April 22, 1993

Columbia Triangle Ventures
14410 Bel-Red Road, Suite 200
Bellevue, Washington 98007

Attn: Mr. Mike Miller

RE: CLARIFICATION OF GEOTECHNICAL RECOMMENDATIONS FOR HORN RAPIDS TRIANGLE DEVELOPMENT, RICHLAND, WASHINGTON

In response to our telephone conversation of April 15, 1993, we have reviewed the information contained in our Revised Final Report of the Task 1 Geotechnical Studies for the Horn Rapids Triangle Development dated April 1, 1993. This clarification specifically addresses the slope protection and the building set-back requirement recommendations contained in that report.

The rip-rap or wire gabion slope protection discussed in the "Escarpment Erosion" section of the report was recommended to minimize further erosion of the toe of the escarpment along the Yakima River. At this location, the river bends sharply to the east and then southeast, and has resulted in erosion of the escarpment toe. It is expected that without installation of erosion protection, erosion will continue along the base of the escarpment.

The building set back recommendations presented in the report are based upon the assumption that no erosion protection has been installed. Because of the continued escarpment erosion and the potential for slope failure, the set back recommendations were, of necessity, estimated conservatively.

Over time, as the river erodes the toe of the slope, it can be expected that some loss of the slope will occur both through simple erosion and through slope failure, reducing the set back distance. We are not, however, able to predict the rate at which this loss may occur. The slope failure may be a gradual flattening of the slope or a dramatic event due to an outside occurrence such as flooding of the river or severe slope erosion due to heavy precipitation.

1354 GRANDRIDGE BOULEVARD
KENNEWICK, WASHINGTON 99336
509•735•1280 FAX 509•735•6474

SHANNON & WILSON, INC.

We hope that this clarification meets your present needs. If you have any further questions, please contact us at your convenience.

Sincerely,

SHANNON & WILSON, INC.

Dee J. Barrie, P.E.
Branch Manager

BJW:DJB:RHG/ejh

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
FAIRBANKS
ANCHORAGE
SAINT LOUIS

April 1, 1993

Columbia Triangle Ventures
14410 Bel-Red Road
Bellevue, Washington 98007

Attn: Mr. Mike Miller

RE: REVISED FINAL REPORT OF TASK I GEOTECHNICAL STUDIES FOR THE HORN RAPIDS TRIANGLE DEVELOPMENT, RICHLAND, WASHINGTON

We have completed the TASK I geotechnical studies as outline in our proposal of March 2, 1993. This letter summarizes our observations and presents our preliminary design recommendations and recommendations for further exploration.

The original report was presented on March 15, 1993. Subsequent to that time, Columbia Triangle Ventures requested clarification of the section regarding building set-back from the crest of the escarpment along the Yakima River. This report incorporates the modifications discussed with Columbia Triangle Ventures personnel during a meeting on March 24, 1993.

BACKGROUND

Columbia Triangle Ventures has been selected by the City of Richland to develop a residential and mixed use development in the Horn Rapids area west of Richland, Washington. The property includes about 658 acres on a tract bordered on the north by Washington State Route 240, on the west by Grosscup Road, on the east by an abandoned canal, and on the south by the same canal and the Yakima River. This tract includes the approximate southwest half of Section 20, the northeast half of Section 29, and a triangular wedge in the western half of Section 28. All of these sections are located in Township 10 North, Range 28 East, Willamette Meridian (see Figure 1). The proposed development will include a golf course, residential building areas, and some commercial areas. Initial construction will be centered around the golf course.

1354 GRANDRIDGE BOULEVARD
KENNEWICK, WASHINGTON 99336
509•735•[illegible] FAX 509•735•6474

SCOPE OF SERVICES

To support the design development and the proposed amendments to the existing Environmental Impact Statements (EIS's) concerning the site, Shannon & Wilson was retained to provide geotechnical engineering services, hydrogeological engineering services, and environmental engineering services. This report concerns the geotechnical engineering services.

The proposed Task I geotechnical engineering services were subdivided into three subtasks. The scope for each subtask is listed below. For the purposes of this report, subtasks 2 and 3 have been combined.

1. Review the 1981 and 1991 Horn Rapids Triangle EIS's and provide a summary of the information regarding site geology and soil conditions for use in the technical appendices of a proposed EIS amendment.

2. Perform geologic reconnaissance of the site to identify areas requiring further study for definition of site-specific geologic or geotechnical characteristics required to provide specific construction recommendations.

3. Perform visual evaluation of the river bluffs to provide preliminary recommendations for building set-backs and slope protection.

4. Provide a letter report summarizing our observations and findings. Site-specific construction recommendations would not be provided in the Task I report.

TASK I GEOTECHNICAL STUDIES

Review of 1981/1991 Horn Rapids Triangle EIS's

The 1981 EIS[1] summarizes the geology and soils of the Horn Rapids Triangle area. The geologic characterization was based upon an unnamed 1978 study of the area performed by the Rockwell

Hanford Company. That report indicated that the Horn Rapids Triangle is located within a geologic subarea known as the Pasco Basin.

The soils were characterized in accordance with the 1971 Benton County Area Soil Survey[2]. The 1971 survey was, however, limited to the area south of the Yakima River, which was the old boundary for the Atomic Energy Commission property (the Hanford Reservation), and the area of the proposed 1993 development was not included in the 1971 study. Nonetheless, the authors of the 1981 EIS extrapolated the descriptions of the 1971 study to the soils of the 1993 study area. The soils were characterized in accordance with U.S. Department of Agriculture soil classification system, and are represented by three local soil series including the Burbank, Hezel, and Quincy series. These soils were characterized as consisting of loam, loamy sands, and loamy sands with gravel layers. The soils reportedly slope gently, from 0 to 20%, with locally steeper areas.

In geologic terms, the soils at the site were subdivided into three subgroups. These subgroups included fine sand and silt soils (known locally as "Touchet Beds", in reference to the soil type section), dune soils consisting of re-worked Touchet soils, and the sand and gravel soils belonging to the Pasco Gravels. The Touchet soils generally consist of fine-grained fluvial silt and sand. The dune materials consist of Touchet materials that have been eroded by wind and redeposited as dunes. The Pasco gravels consist of material ranging in size from sand to cobbles.

The primary geotechnical issues delineated by the 1981 EIS included the location of the site in Seismic Risk Zone 2B[3], and brief mention of potential development difficulties along the escarpment adjacent to the Yakima River.

The 1991 EIS[4] primarily referenced the previous 1981 EIS[1] insofar as technical material relating to geotechnical or geological matters. However, the 1991 EIS did indicate that the steepest slope on the site was a grade of about 25%, and that the only indications of unstable soils was that the site soils were subject to wind erosion.

March, 1993 Geologic Site Reconnaissance

The reconnaissance task was started near the west end of the abandoned canal, adjacent to Grosscup Road, at the intersection of the canal and Sections 19 and 20 in T10N, R28E[5] (see Figure 1). The mapping was conducted mostly uphill of the canal, adjacent to an existing trail. The canal is located downhill of the main HRT property, and may or may not be included within the boundary on this section of the site. The section of slope at the beginning of the project is located on a cut-off meander of the Yakima River. The former river channel eroded the slope presently located downhill of the canal. The slope between the trail and the canal was at a grade of about 3.5:1 (h:v), or a grade of about 29%. Where exposed, the slope material appeared to consist of fluvial silty sand and poorly graded sand overlaid by wind-blown sand and silt material.

Travelling east and south along the trail, to the boundary of sections 20 and 29, the elevation of the trail increases steadily, and the downhill slope (between the trail and the canal) becomes steeper to about 2:1, or a grade of about 50%. This 2:1 slope continues to about the intersection of the slope and canal with the existing Yakima River channel. The slope and canal intersect with the Yakima River channel near the center of the northwest quarter of Section 29.

The slope which follows the river forms the main escarpment referenced in previous reports. Along the escarpment, the slopes uphill and downhill of the canal become steep, approaching 1.5:1 (67%), and several areas of slope erosion along the river bank were observed. Erosion above the canal appears to have occurred primarily along the western two-thirds of the escarpment, where off-road vehicle travel has denuded the escarpment face. The canal is effectively acting as a bench on the escarpment slope, and has collected the material eroded from uphill of the canal (see Figure 2).

Erosion below the canal is typified by several areas of mass wasting of the slope material into the river. In at least one section, the erosion observed on the escarpment along the Yakima River appears to have progressed about 10 feet northeasterly since 1983. This conclusion is based upon

a comparison of conditions observed in a 1983 Soil Conservation Service aerial photo to those conditions presently observed at the site. A nearly vertical erosive cut about 8 feet high which had been cut into the river bank and subsequently re-covered with soil eroded from above can be observed in the subject area. The combination of river and traffic-induced erosion has combined to create a condition in which sections of the escarpment face are eroding downhill to be carried away by the river. In combination, the Yakima River is impacting the escarpment face by eroding into the toe of the escarpment face. The river channel at the base of the escarpment slope is on the outside of a bend where the velocity of the river is the greatest, and where the erosive impact of the river is expected to be most severe (see Figure 3).

The geologic section of the escarpment was partially exposed along the river. Where exposed, the section was mapped from river level uphill to the trail adjacent to the crest of the escarpment. Assuming a nominal river elevation of 370 feet Above Mean Sea Level near the center of the northwest quarter of Section 29, the exposed section appeared as follows:

370' - 380': Dense, grey, Poorly Graded GRAVEL with Sand terrace; moist, slightly cemented, with nearly horizontal layers of material ranging in size from silt to cobbles. This material appeared to represent the Pasco Gravels.

380' - 460': Loose to medium dense, tan-grey SILT/Silty SAND; dry, slightly cemented to non-cemented, with minor layers of gravel, layered nearly horizontally. This material is typical of the Touchet silt and sand soils.

From the east end of the escarpment along the river, near the middle of Section 29, the property boundary continues eastward along the abandoned canal. This section of the property follows another cut-off meander of the Yakima River. Along this section of the property, the downhill slope (above and below the canal) varies from a grade of about 1.5:1(67%) to 2.5:1(40%). It was observed that the river bank on the tract of land below the canal has been protected with heavy rip rap consisting of concrete rubble (see Figure 4).

Away from the river, distinct lowlands were observed in the southeast quarter of Section 20 and the wedge of the project contained within Section 28. These lowlands appear to be areas eroded by wind (deflated), with some dunes overlaid onto the deflated area at the extreme northeast corner of the property. Some of the slopes bordering the lowlands are relatively steep. In section 20, the steepest slopes are about 6:1, or 17%. In section 28, along the east-facing slopes (the steepest), the grade varies from about 4:1 to 3:1, or 25% to 33%.

The soils forming the dunes appeared to consist of weathered Touchet material.

Overall, the Horn Rapids Triangle area can be characterized as a fluvial plain consisting of silt and sand soils overlaying gravel and sand soils at depth. The fluvial plain has subsequently been eroded by wind (as evidenced by the deflated area) and by water (as evidenced by the existing and former channels along the Yakima River).

Analysis and Recommendations

The primary concerns for construction in the proposed development will be progressive erosion and slope stability, especially along the Yakima River bluff. As a secondary factor, wind erosion and dust production of any unprotected or unvegetated surfaces will also be a factor.

Escarpment Erosion

Unless minimized, the combination of erosion mechanisms will continue to cause the escarpment to progressively erode. Erosion uphill of the canal will tend to be localized to the denuded areas, and will primarily represent a nuisance from dust. However, localized slope failures above the canal could also be precipitated by excessive irrigation.

Erosion below the canal can be expected to progressively undermine the escarpment slope, eventually causing slope failure and possibly resulting in loss of acreage on top of the hill. Such slope failures could also cause the loss of structures placed within the potential failure area. Although slope failure from erosion of the river bank does not appear to be an immediate

problem, there is the potential that one significant flooding season could cause damaging erosion. It should be noted that the erosion observed during our March 1993 observations appeared to be relatively recent and was likely caused by normal river flow.

To minimize and slow the effects of the wind and river erosion, we recommend that a two-phase erosion control program be undertaken.

The first phase of erosion control would include placement of erosion protection along the bank of the river, extending into the river to an elevation at least 3 feet below mean low water elevation and extending at least 2 feet above the anticipated 100 year flood elevation. The bank protection may consist of rip rap or rock gabions (rock-filled wire baskets).

The second phase of erosion protection would include protection of the escarpment face from off-road vehicle travel and wind erosion. Because the site is relatively steep and subject to wind erosion, we recommend that a geosynthetic slope protection system be placed. Geosynthetic slope protection systems vary in configuration from plastic cellular matrices filled with gravel and sand to systems which blanket the slope. The selected system must be capable of allowing re-vegetation of the slope. As an alternative, a completely vegetative resurfacing program may be applicable. However, due to the relatively steep slope and semi-arid local conditions, such an erosion protection system should be designed by an agronomist or soil scientist specializing in that area.

The erosion protection plan will require input from government agencies. Any construction along a river, such as the rip rap erosion protection proposed above, may require input and permitting from the Washington Department of Ecology, Benton County, The U.S. Army Corps of Engineers, and a number of other state agencies. We recommend that we be retained to research the necessary permits and permit documentation required to accommodate design and construction in accordance with state and federal regulations.

Building Set-Back from Escarpment Along Yakima River

Our observations of the upper soil column near the crest of the escarpment suggests that the critical slope and foundation soil type will include the silt or silty sand Touchet soils. The silty soil is expected to have low to moderate shear strength when near it's natural dry moisture condition. However, if the moisture content of the silt or silty sand soil is increased (possibly because of excess irrigation), the shear strength of the soil would be expected to be reduced, thus possibly precipitating slope failure. Without field or laboratory tested soil characteristics, the recommended building set-back from the crest of the escarpment must, therefore, be conservative. For the purposes of this preliminary geotechnical investigation, we recommend that the building set-back from the crest of the slope be at least equal to 1.5 times the height of the slope above river elevation. For example, along the middle of the escarpment where the crest of the escarpment is about 90 feet above river elevation, we recommend that the minimum set-back from the crest of the slope be 135 feet. This set-back would yield an effective slope of 3:1 between the toe of the exisitng slope and a proposed residential structure.

In order to provide more refined (and possibly less restrictive) set-back recommendations, we recommend that the escarpment be further explored by a minimum of two exploratory borings to define the characteristics of the soils forming the escarpment. More refined recommendations of set-back can only be made with soil characteristics based upon field exploration and laboratory testing of the slope soils. For planning purposes, the closest recommended set-back between the slope crest and any residential structure would be not less than 50 feet.

Because of the potentially adverse impact of excessive runoff or groundwater acting upon the slope, we further recommend that a program be undertaken to limit the amount of irrigation water used adjacent to or within 100 feet of the slope. For the purposes of conservation of resources, this program should also be considered for use on the entire development. The irrigation program should limit irrigation to only the amount necessary to sustain vegetation. The irrigation plan should be formulated by an agronomist or soil scientist specializing in this area.

LIMITATIONS

The analyses, conclusions, and recommendations contained in this preliminary report are based upon site conditions as determined by limited surficial exploration, and further assume that the geologic section observed along the Yakima River is representative of the subsurface conditions under all sections of the escarpment, i.e. the subsurface conditions are not significantly different from those disclosed by the field explorations.

This report is not intended as a final report for design and construction of slopes or slope protection systems. Therefore, we reiterate our recommendations that additional exploration take place to refine the building set-back requirements, and that the environmental impact of a slope protection system be researched.

If there is substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes or construction at the site, it is recommended that this report be reviewed to determine the applicability of the conclusions and recommendations concerning the changed conditions or time lapse.

This report was prepared for the exclusive use of the Owner and Architect and/or Engineer in the design of the structure. It should be made available to prospective contractors and/or the Contractor for information on factual data only, and not as a warranty of subsurface conditions included in this report, such as those inferred by discussions of subsurface conditions included in this report.

The scope of services for this preliminary report did not include any environmental assessment or evaluation regarding the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below the site or for the evaluation of disposal of contaminated soils or groundwater should any be encountered.

We have prepared the attachment "Important Information About Your Geotechnical Engineering Report" to help our clients more clearly understand the limitations of this report. Please consider it as an integral part of this report.

Sincerely,

SHANNON & WILSON, INC.

BRIAN J. WILLIAMS STATE OF WASHINGTON 29217 REGISTERED PROFESSIONAL ENGINEER 4/2/93
EXPIRES: 3/19/95

DEE J. BURRIE STATE OF WASHINGTON 25903 REGISTERED PROFESSIONAL ENGINEER 4/1/93
EXPIRES: 2/26/95

Brian J. Williams, P.E., P.G.
Senior Engineer

Dee J. Burrie, P.E.
Branch Manager

BJW:DJB:WPG/ejh

Enclosures: References
Figure 1 Vincity Map
Figure 2-4 Site Photos
Important Information About Your Geotechnical Engineering Report

REFERENCES

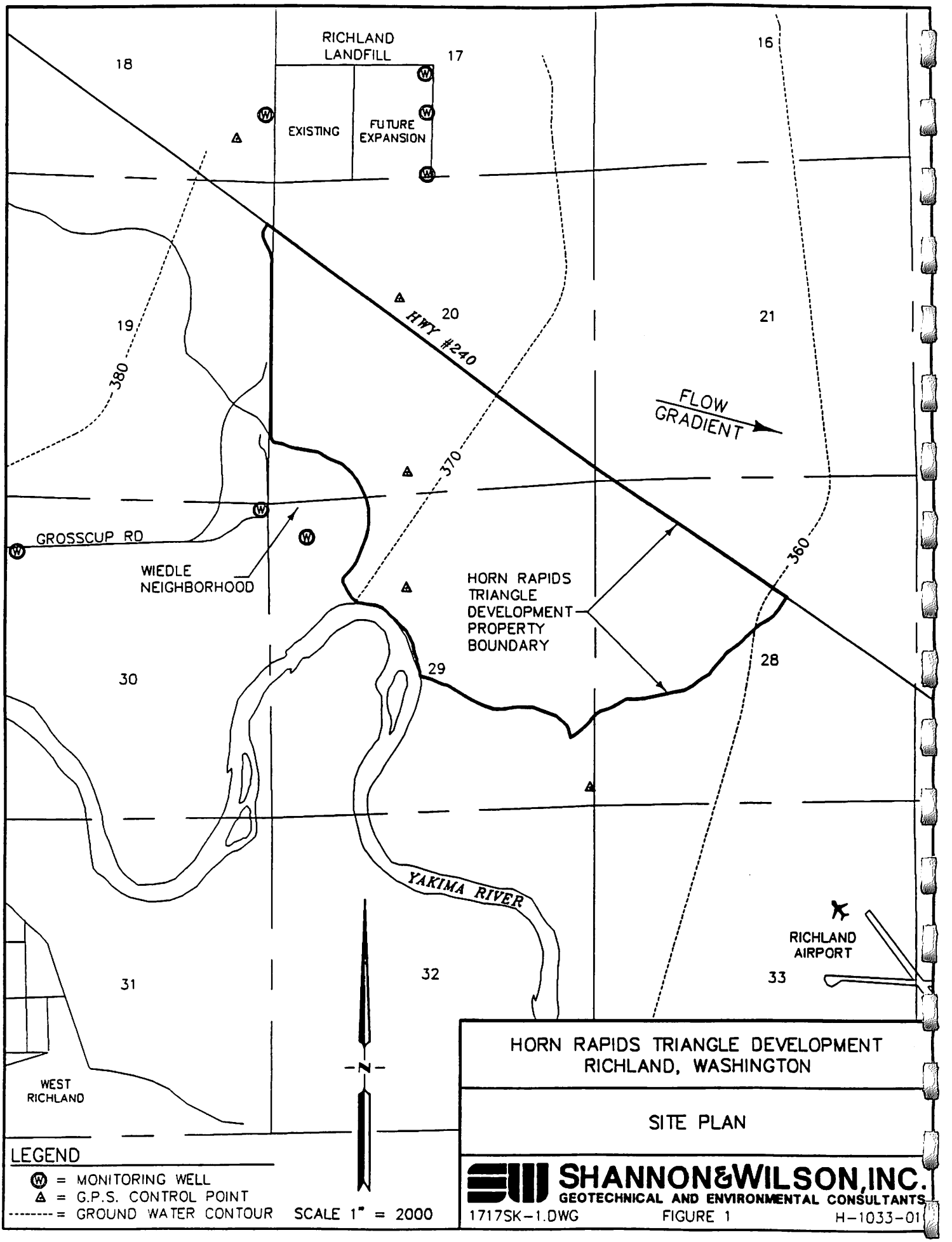
1. Horn Rapids Triangle Final Environmental Impact Statement, City of Richland, Washington, 1981.

2. United States Department of Agriculture, Soil Conservation Service Soil Survey, Benton County Area, Washington, July, 1971.

3. International; Conference of Building Officials Uniform Building Code, 1991.

4. Horn Rapids Golf Course Project Final Environmental Impact Statement, City of Richland, Washington, 1991.

5. United States Geological Survey 7.5 minute Topographic Series, Richland, Washington, AMS 2176 IN SE, 1978./


RICHLAND LANDFILL
EXISTING
FUTURE EXPANSION
18
17
16
19
20
21
HWY #240
380
370
360
FLOW GRADIENT
GROSSCUP RD
WIEDLE NEIGHBORHOOD
HORN RAPIDS TRIANGLE DEVELOPMENT PROPERTY BOUNDARY
30
29
28
YAKIMA RIVER
RICHLAND AIRPORT
31
32
33
WEST RICHLAND
N
LEGEND
W = MONITORING WELL
△ = G.P.S. CONTROL POINT
------- = GROUND WATER CONTOUR
SCALE 1" = 2000
HORN RAPIDS TRIANGLE DEVELOPMENT
RICHLAND, WASHINGTON
SITE PLAN
SHANNON&WILSON,INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
1717SK-1.DWG
FIGURE 1
H-1033-01

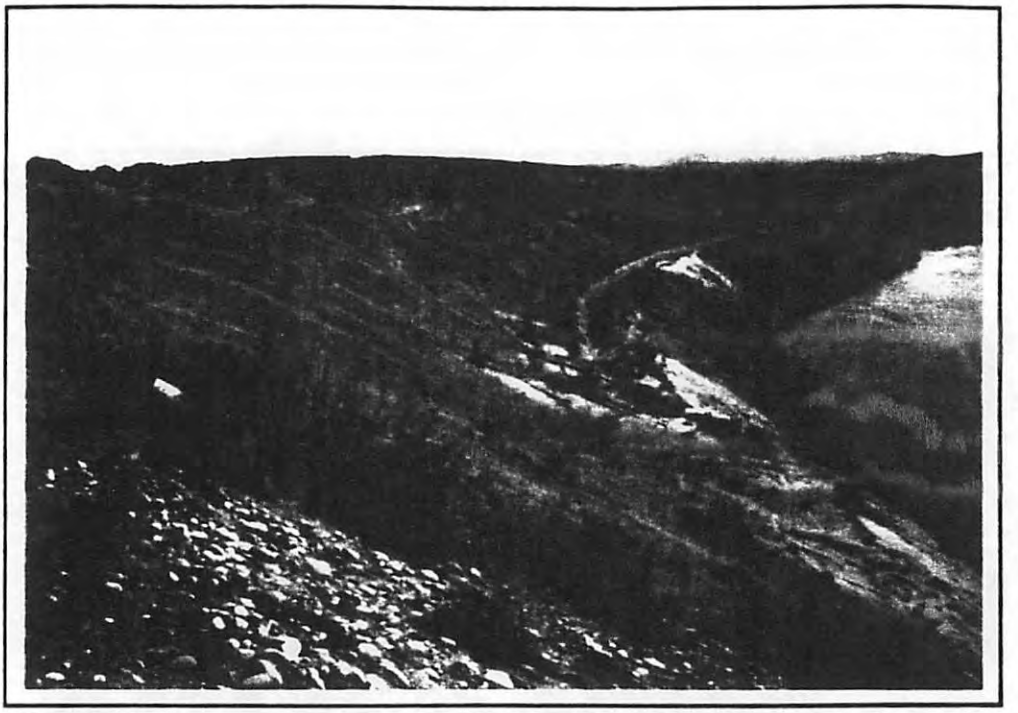


Figure 2. View to east from west of escarpment. Off-road vehicle tracks have denuded areas uphill of the the can, precipitating erosion. Note that abandoned canal is filled with eroded soil from uphill.

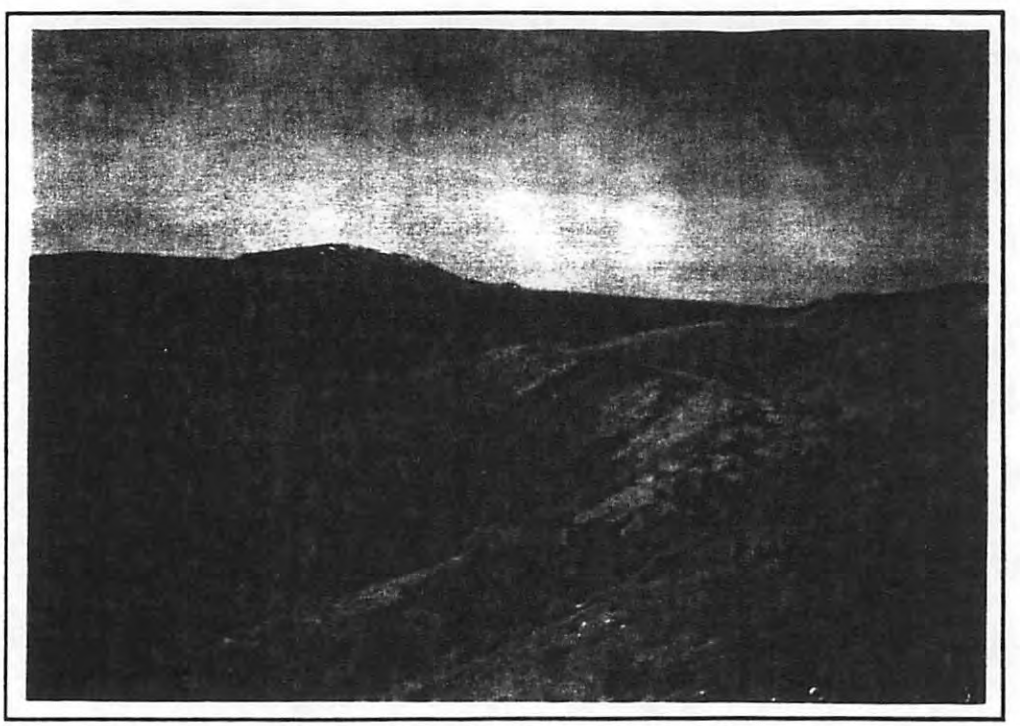


Figure 3. View to west from east end of escarpment. Areas of erosion below the canal exhibit no vegetation. Arrow pointed right indicates primary erosion zone at toe of slope. Curved arrow indicates direction of current.

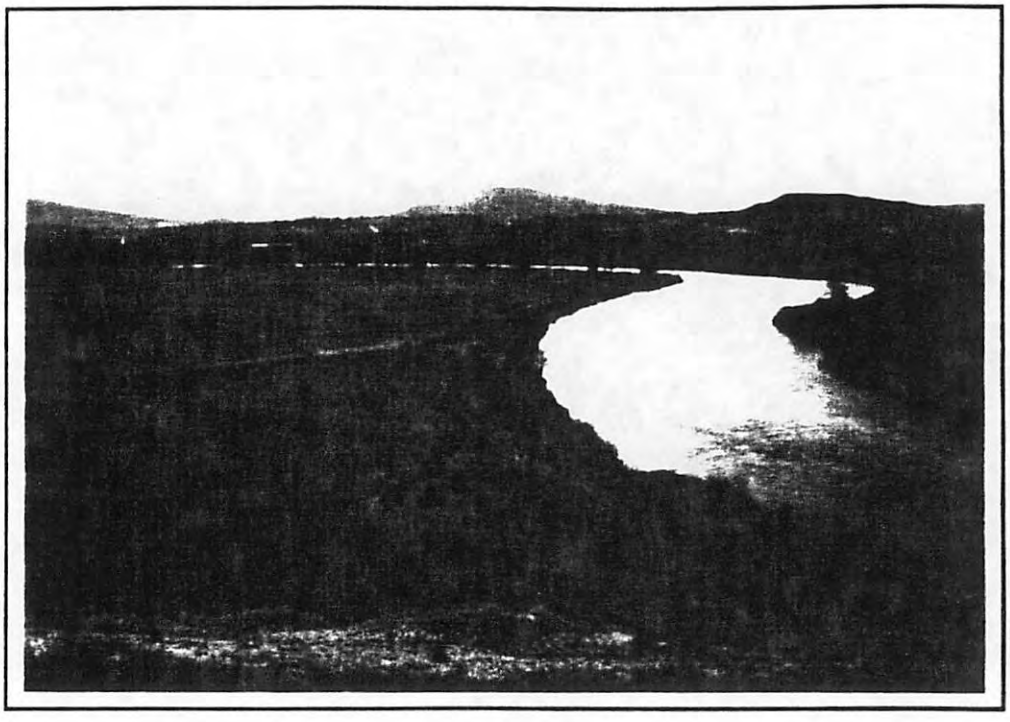


Figure 4. Tract of land downstream from 1993 HRT project area. Concrete rubble rip rap can be observed along the river bank. The top of the abandoned canal is at the bottom of the photo.

Important Information About Your Geotechnical Engineering/ Subsurface Waste Management (Remediation) Report

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS.

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer/geoscientist.

AN ENGINEERING REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical engineering/subsurface waste management (remediation) report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, have the consulting engineer(s)/scientist(s) evaluate how any factors which change subsequent to the date of the report, may affect the recommendations. Unless your consulting geotechnical/ civil engineer and/or scientist indicates otherwise, your report should not be used: 1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); 2) when the size, elevation, or configuration of the proposed project is altered; 3) when the location or orientation of the proposed project is modified; 4) when there is a change of ownership; or 5) for application to an adjacent site. Geotechnical/civil engineers and/or scientists cannot accept responsibility for problems which may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural changes or human influence. Because a geotechnical/waste management engineering report is based on conditions which existed at the time of subsurface exploration, construction decisions should not be based on an engineering report whose adequacy may have been affected by time. Ask the geotechnical/waste management consultant to advise if additional tests are desirable before construction starts. For example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/waste management report. The geotechnical/civil engineer and/or scientist should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST GEOTECHNICAL RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help minimize their impact. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your geotechnical engineer's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual

subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize conclusions. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE GEOTECHNICAL ENGINEERING/SUBSURFACE WASTE MANAGEMENT (REMEDIATION) REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical engineering/subsurface management (remediation) report. To help avoid these problems, the geotechnical/civil engineer and/or scientist should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological and waste management findings and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE ENGINEERING/WASTE MANAGEMENT REPORT.

Final boring logs developed by the geotechnical/civil engineer and/or scientist are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical engineering/waste management reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To minimize the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/waste management report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical engineering/subsurface waste management (remediation) is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical/waste management consultants. To help prevent this problem, geotechnical/civil engineers and/or scientists have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the engineer's or scientist's liabilities to other parties; rather, they are definitive clauses which identify where the engineer's or scientist's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your engineer/scientist will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

APPENDIX 2

Final Report
Task 2: Hydrogeologic Studies

Horn Rapids Triangle Development
Richland, Washington

Shannon & Wilson, Inc.

April, 1993

H-1033-02

Final Report
Task II
Hydrogeologic Studies
Horn Rapids Triangle Development
Richland, Washington

APRIL 1993

Columbia Triangle Ventures
14410 Bel-Red Road
Bellevue, Washington 98007

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
1354 Grandridge Boulevard
Kennewick, Washington 99336 •1037
509 • 735 •1280

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
FAIRBANKS
ANCHORAGE
SAN JUAN

April 7, 1993

Columbia Triangle Ventures
14410 Bel-Red Road, Suite 200
Bellevue, Washington 98007

Attn: Mr. Mike Miller

RE: REPORT OF TASK II HYDROGEOLOGIC STUDIES FOR THE HORN RAPIDS TRIANGLE DEVELOPMENT

We have completed the TASK II hydrogeologic studies as outlined in our proposal of March 2, 1993. This letter summarizes our observations and findings.

BACKGROUND

Columbia Triangle Ventures has been selected by the City of Richland to develop a residential and mixed use development in the Horn Rapids area west of Richland, Washington (see Figure A-1). The property includes about 658 acres on a tract bordered on the north by Washington State Route 240, on the west by Grosscup Road, on the east by an abandoned canal, and on the south by the same canal and the Yakima River. This tract includes the approximate southwest half of Section 20, the northeast half of Section 29, and a triangular wedge in the western half of Section 28. All of these sections are located in Township 10 North, Range 28 East, Willamette Meridian. The proposed development will include a golf course, residential building areas, and some commercial areas. Initial construction will be centered around the golf course.

Appendix A of this report contains the site and vicinity map, Figure A-1, and the exploratory boring and well log, Figure A-2. Appendix B of this report contains the results of tests performed on water samples to determine the presence of pesticides, herbicides, or petroleum hydrocarbons on the site or upstream of the site. Appendix C contains our standard enclosure, "Important Information About Your Geotechnical Report".

1354 GRANDRIDGE BOULEVARD
KENNEWICK, WASHINGTON 99336
509•735•1280 FAX 509•735•6474

SCOPE OF SERVICES

To support the design development and the proposed amendments to the existing Environmental Impact Statements (EIS's)[1,2] concerning the site, Shannon & Wilson was retained to provide geotechnical engineering services, hydrogeological engineering services, and environmental engineering services. This report concerns the hydrogeologic engineering services.

The proposed Task II hydrogeologic engineering services were subdivided into six subtasks. The scope of work for each subtask is listed below.

1. Install at least one groundwater monitoring well to determine the elevation of the groundwater table under the development.

2. Provide sampling and laboratory analysis services to determine water quality parameters initially encountered both on and off the site.

3. Monitor existing wells in the Weidle neighborhood to determine the initial elevation of groundwater in off-site wells adjacent to the site. Monitoring will include an initial event of water level measurement and water sampling for chemical evaluation, and two additional water level measuring events.

4. Provide a horizontal and elevation survey to accurately locate the existing residential wells, the existing City of Richland Wells, one monitoring well at the adjacent Lamb-Weston site, and the location and elevation of the new monitoring well. This step provides a baseline for water elevation conditions at and adjacent to the site.

5. Review existing well logs and historical information for areas adjacent to the site, with specific emphasis on water level elevations and locations of the wells to formulate a local groundwater model.

6. Provide a letter report summarizing our observations and findings. The report would include a log of the new monitoring well, results of the laboratory analyses, a map of the surveyed well elevations and locations, an interpretation of the existing groundwater conditions as related to gradient, and general recommendations for control of irrigation at the proposed golf course.

For the purposes of this report, subtasks 2 and 3, and subtasks 4 and 5 were combined.

TASK II HYDROGEOLOGIC STUDIES

Installation of Groundwater Monitoring Well MW-1

One groundwater monitoring well, designated MW-1, was installed on March 15 and March 16, 1993. The location of the well is shown on Figure A-1, and the log of the well and completion is shown on Figure A-2.

Columbia Triangle personnel indicated that residents of the Weidle neighborhood (adjacent to the site) have concerns that irrigation on the proposed site may cause adverse impacts to groundwater, possibly in the form of groundwater mounding or impacts from pesticides or herbicides potentially used at the site. The well was, therefore, installed to establish a baseline for groundwater elevation and groundwater quality on the site prior to construction.

Because of the potential impacts of groundwater elevation changes, the monitoring well was installed to accommodate potentially large fluctuations in groundwater, with approximately 10 feet of slotted well screen above and below the first encountered groundwater surface. Based on well log information obtained from the Washington Department of Ecology[3], it was anticipated that the upper groundwater unit would consist of an unconfined sand or gravel layer corresponding approximately to the elevation of the nearby Yakima River.

The well was drilled using 6-inch diameter ODEX air-rotary equipment. Samples of the cuttings were obtained for each of the major soil types observed. Groundwater was first observed at a depth of approximately 65 feet beneath the ground surface, and the well boring was then extended to about 79 feet beneath the ground surface. The well was then installed with approximately 10 feet of screen installed both above and below the groundwater table. The screen section of the well was then backfilled with No. 8-12 Colorado Silica Sand to an elevation of 3.5 feet above the top of the well screen. The well was sealed to within 1.5 feet of the surface using bentonite chips hydrated with water from the potable supply system of the City of Richland. The well was completed above the surface with a hinged locking monument and three steel guard posts.

Upon completion of well construction, the well was developed by pumping with a down-hole bladder-type pump. Approximately 70 gallons (or approximately 40 well volumes) of water was removed from the well during development. At the end of the development period, the water being discharged had visually cleared, and no sediment was observed.

The geology encountered within the well boring included primarily sand from the surface to a depth of about 65 feet, where a unit containing both sand and gravel was encountered (see Figure 2). The sand and gravel unit extended to the bottom of the boring.

Sampling of Well MW-1 and Adjacent Wells

Three wells, including MW-1 and two residential wells MW-2 and MW-3[4,5], were sampled and the samples submitted to an analytical laboratory for testing of total petroleum hydrocarbons, pesticides, and herbicides. The location of the wells is shown on Figure A-1. The analytical suite was selected to detect the potential contaminants which may be associated with a agriculturally-intense development such as a golf course.

The results of the chemical tests are enclosed in Appendix B. The results indicate no detectable concentration of contaminants.

Groundwater Regime

The geology of the Horn Rapids Triangle area can be characterized as a fluvial plain consisting of silt and sand soils overlaying gravel and sand soils at depth. The existing highlands, which include the proposed development, consist primarily of water-deposited silt and sand soils known locally as Touchet soils[1,2]. Lower in the geologic section, near the groundwater table, primarily gravel soils are encountered. The near-surface component of these gravel soils is known locally as the Pasco Gravels, and may contain materials ranging in size from sand to cobbles[1,2,3,7]. The gravel materials are exposed in outcrop along the steep escarpment adjacent to the Yakima River, in that part of the development in Section 29[8].

Based on the observations made during installation of the project well MW-1 (see Figure A-2), and on well log data obtained from the Washington Department of Ecology[3], the primary near-surface aquifer is the unconfined layer composed primarily of the Pasco gravel soils referenced above. In the area of West Richland and north Richland, the unconfined gravel layer is encountered across the entire Yakima River valley[3,7], and extends south and east into the Columbia River[7].

To define the groundwater flow within and directly adjacent to the project, groundwater elevations were measured in the new monitoring well MW-1, one private residential well (designated MW-2)[4] in the Weidle neighborhood west of the site, and one well on the Lamb-Weston property east of the site. The locations of the wells are shown on Figure A-1.

Based on the elevation survey results, the groundwater gradient across the site appears to trend in an east-southeasterly direction. Approximate groundwater elevation contours and the direction of the flow gradient are shown on Figure A-1. Figure A-1 also includes groundwater and surface water elevation information from the Department of Ecology[2], the City of Richland, Washington[6], and one report referencing groundwater in the North Richland area[7].

Discussion and Recommendations for Water Table Control

Based on discussions with Columbia Triangle Ventures personnel and adjacent landowners, the primary concern regarding groundwater is the possibility of mounding of the groundwater and subsequent flooding of property and structures in the upstream Weidle neighborhood.

Groundwater mounding is a process whereby an existing groundwater system is "overloaded" by excess water from some outside source, usually some surface source. The excess water migrates down to the existing groundwater surface, and if the natural conditions don't allow the excess water to flow away quickly enough (low soil transmissivity), groundwater elevations rise at the point of water influx. The water elevations adjacent to the point of influx also rise, with the rise in groundwater elevation tapering down to the original water surface profile away from the point of influx.

Groundwater is already relatively high in the Weidle neighborhood. On March 23, 1993, the groundwater was measured at 8.1 feet below the ground surface in well MW-2[4]. The influx of water from any source may be sufficient to cause a rise of the groundwater elevation sufficient to cause flooding of basements in the area of the measured well[4].

In the case of the Horn Rapids Triangle development, the major potential source for excess water is irrigation of the golf course. Mounding of the groundwater can occur only if three conditions are met, specifically:

1. If the amount of irrigation exceeds the evaporation rate from soil or the evapotranspiration rate from vegetation,

2. If the amount of water which exceeds the evaporation or evapotranspiration rate is sufficient to migrate downward to the groundwater table,

3. If the transmissivity of the aquifer is low enough to cause the excess water to "back up" in the groundwater system.

All three factors must occur, or mounding cannot take place.

Although the mechanisms which could result in mounding are very complex, balancing irrigation application rates with the vegetation requirements can easily reduce the potential for groundwater mounding difficulties. We recommend that an agronomist or soil scientist familiar with the design of balanced irrigation programs be retained to design an irrigation program which will allow greening of the golf course facilities while minimizing the amount of irrigation water used.

LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based upon site conditions as they presently exist, and further assume that the exploratory well boring is generally representative of the subsurface conditions under all portions of the proposed development, i.e. the subsurface conditions are not significantly different from those disclosed by the field explorations.

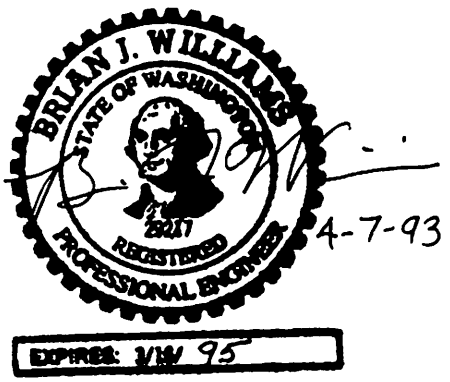
If there is substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes or construction at the site, it is recommended that this report be reviewed to determine the applicability of the conclusions and recommendations concerning the changed conditions or time lapse.

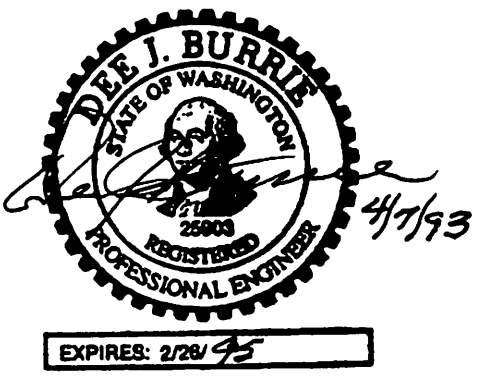
This report was prepared for the exclusive use of Columbia Triangle Ventures in the design of the Horn Rapids Triangle development. It should be made available to prospective contractors and/or the Contractor for information on factual data only, and not as a warranty of subsurface conditions included in this report, such as those interpreted from the boring logs and discussions of subsurface conditions included in this report.

We have prepared the attachment "Important Information About Your Geotechnical Engineering Report" to help our clients more clearly understand the limitations of this report. Please consider it as an integral part of this report.

Sincerely,

SHANNON & WILSON, INC.





Brian J. Williams, P.E., P.G.
Senior Engineer

Dee J. Burrie, P.E.
Branch Manager

BJW:DJB:FWP/ejh

Enclosures:
REFERENCES
APPENDIX A - FIGURES
APPENDIX B - TEST RESULTS
APPENDIX C - IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

REFERENCES

1. Horn Rapids Triangle Final Environmental Impact Statement, City of Richland, Washington, 1981.

2. Horn Rapids Golf Course Project Final Environmental Impact Statement, City of Richland, Washington, 1991.

3. Washington State Department of Ecology, Well logs for sections 13, 23, 24, 25, and 26 in Township 10 North/Range 27 East, and sections 19, 20, 27, 28, 29, and 30 in Township 10 North/Range 28 East, Willamette Meridian.

4. Private well belonging to Mr. Garry Mclain, Weidle Road, West Richland, Washington.

5. Private well belonging to Mr. Michael McComb, Weidle Road, West Richland, Washington.

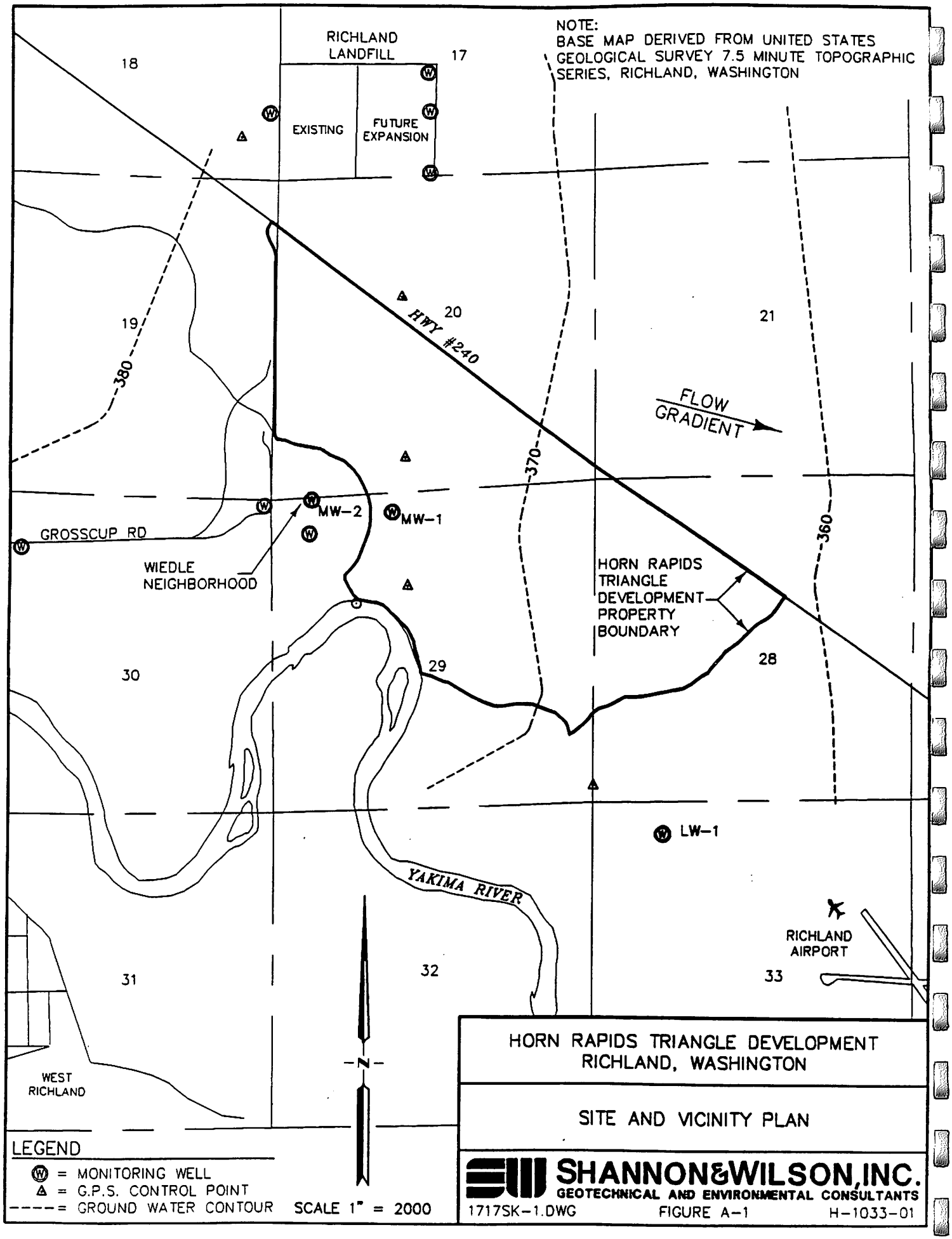
6. Richland Landfill well data obtained from the City of Richland, Washington, March, 1993.

7. "Phase 1 Remedial Investigation Report, 1100-EM-1 Operable Unit, Hanford Federal Reservation", U. S. Department of Energy, 1990.

8. United States Geological Survey 7.5 minute Topographic Series, Richland, Washington, AMS 2176 IN SE, 1978.

APPENDIX A

FIGURES


NOTE:
BASE MAP DERIVED FROM UNITED STATES GEOLOGICAL SURVEY 7.5 MINUTE TOPOGRAPHIC SERIES, RICHLAND, WASHINGTON
RICHLAND LANDFILL
EXISTING
FUTURE EXPANSION
18
17
19
20
21
30
29
28
31
32
33
HWY #240
380
370
360
FLOW GRADIENT
MW-2
MW-1
GROSSCUP RD
WIEDLE NEIGHBORHOOD
HORN RAPIDS TRIANGLE DEVELOPMENT PROPERTY BOUNDARY
LW-1
YAKIMA RIVER
RICHLAND AIRPORT
WEST RICHLAND
-N-
LEGEND
W = MONITORING WELL
△ = G.P.S. CONTROL POINT
---- = GROUND WATER CONTOUR
SCALE 1" = 2000
HORN RAPIDS TRIANGLE DEVELOPMENT
RICHLAND, WASHINGTON
SITE AND VICINITY PLAN
SHANNON&WILSON,INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
1717SK-1.DWG
FIGURE A-1
H-1033-01

LOG & AS-BUILT DIAGRAM

GEOLOGIC LOG

Driller: Environmental West Explorations
Completion Date: 03-16-93
Ground Elevation: Approx. 439.8 ft.

Ground Surface

brown, Well-Graded SAND; dry to moist, medium to very fine grained.

35

tan-brown, Silty SAND; dry to moist, fine to very fine grained, with non-plastic fines, slightly cemented.

65

brown-black, Silty SAND with Gravel; wet to saturated, with minor silt.

Bottom of Well at 79.0 Feet

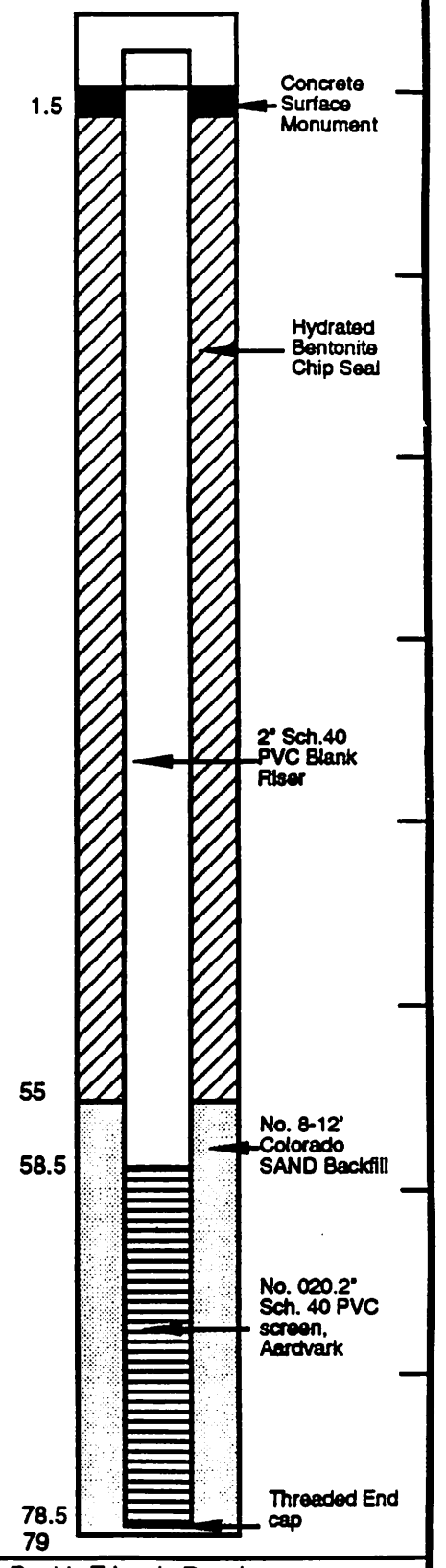
Hydrologic Unit: Unsaturated Zone; Saturated Zone

Depth in Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80

Water Level: Groundwater Encountered 65.5 feet 3-23-93

AS-BUILT

Top of Casing Elevation = 442.64 feet



Drilling Method: 8" ODEX
Sampling Method: Drill Cuttings

Note: The contacts represent the approximate soil types and the actual transitions may be gradual.

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

March 1993 H-1033-02

Horn Rapids Triangle Development
Richland, Washington

MONITORING WELL MW-1

FIG. A-2

APPENDIX B

TEST RESULTS

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3008-B 16th Avenue West
Seattle, WA 98119
FAX: (206) 283-5044

March 31, 1993

Brian Williams, Project Leader
Shannon & Wilson, Inc.
1354 Grandridge Boulevard
Kennewick, WA 99336

Dear Mr. Williams:

Enclosed are the results from the testing of material submitted on March 25, 1993 from Project H-1033-02, Horn Rapids.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

Stephen D. Zappone
Chemist

SDZ/dp

Enclosures

FAX: (509) 735-6474

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3008-B 16th Avenue West
Seattle, WA 98119
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SDZ/dp

Enclosures

FAX: (509) 735-6474

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED PESTICIDES BY GC/ECD

Results Reported as µg/L (ppb)

Sample ID	MW-1-01	MW-2-01	MW-3-01
Analyte:			
2,4,5,6-Tetrachlora *m*-xylene (surrogate)	91%	97%	97%
BHC - Alpha	<1	<1	<1
BHC - Beta	<1	<1	<1
BHC - Gamma	<1	<1	<1
BHC - Delta	<1	<1	<1
Heptachlor	<1	<1	<1
Aldrin	<1	<1	<1
Heptachlor epoxide	<1	<1	<1
Endosulfan I	<1	<1	<1
DDE/Dieldrin	<2	<2	<2
Endrin	<1	<1	<1
Endosulfan II	<1	<1	<1
DDD	<1	<1	<1
Endrin aldehyde	<1	<1	<1
DDT/Endosulfan sulfate	<2	<2	<2
Endrin ketone	<1	<1	<1
Methoxychlor	<1	<1	<1
Dibutyl chlorendate (surrogate)	93%	88%	92%

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED PESTICIDES BY GC/ECD

Results Reported as µg/L (ppb)
Quality Assurance

Sample #	Tap Water Blank
Analyte:	
2,4,5,6-Tetrachlora *m*-xylene (surrogate)	79%
BHC - Alpha	<1
BHC - Beta	<1
BHC - Gamma	<1
BHC - Delta	<1
Heptachlor	<1
Aldrin	<1
Heptachlor epoxide	<1
Endosulfan I	<1
DDE/Dieldrin	<2
Endrin	<1
Endosulfan II	<1
DDD	<1
Endrin aldehyde	<1
DDT/Endosulfan sulfate	<2
Endrin ketone	<1
Methoxychlor	<1
Dibutyl chlorendate (surrogate)	61%

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED PESTICIDES BY GC/ECD

Results Reported as % Recovery
Quality Assurance

Sample #	Tap Water Matrix Spike % Recovery	Tap Water Matrix Spike Duplicate % Recovery	Spike Level
Analyte:			
2,4,5,6-Tetrachlora *m*-xylene (surrogate)	120%	120%	
BHC - Alpha	101%	89%	1
BHC - Beta	83%	82%	1
BHC - Gamma	110%	111%	1
BHC - Delta	105%	100%	1
Heptachlor	112%	112%	1
Aldrin	105%	120%	1
Heptachlor epoxide	101%	116%	1
Endosulfan I	107%	112%	1
DDE/Dieldrin	100%	95%	1
Endrin	109%	112%	1
Endosulfan II	96%	105%	1
DDD	100%	100%	1
Endrin aldehyde	100%	110%	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED PESTICIDES BY GC/ECD

Results Reported as % Recovery
Quality Assurance

Sample #	Tap Water Matrix Spike % Recovery	Tap Water Matrix Spike Duplicate % Recovery	Spike Level
Analyte:			
DDT/Endosulfan sulfate	110%	104%	1
Endrin ketone	105%	111%	1
Methoxychlor	10%	10%	1
Dibutyl chlorendate (surrogate)	130%	130%	

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS BY IR (METHOD 418.1) (MODIFIED TO REPORT RESULTS AS DIESEL)

Results Reported as mg/L (ppm)

Sample #	Total Petroleum Hydrocarbons
MW-1-03	0.2
MW-2-03	<0.2
MW-3-03	<0.2
Field Blank	<0.2
Quality Assurance	
Tap Water Blank	<0.2
Tap Water (Matrix Spike) % Recovery	110%
Tap Water (Matrix Spike Duplicate) % Recovery	110%
Spike Level	5

FRIEDMAN & BRUYA, INC.
ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED HERBICIDES BY GC/ECD

Results Reported as µg/L (ppb)

Sample ID	MW-1-02	MW-2-02	MW-3-02
Analyte:			
Dalapon	<0.2	<0.2	<0.2
Dicamba	<2	<2	<2
Dichlorprop	<2	<2	<2
2,4-D	<2	<2	<2
2,4,-DB	<20	<20	<20
2,4,5-T	<0.2	<0.2	<0.2
Dinoseb	<2	<2	<2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED HERBICIDES BY GC/ECD

Results Reported as µg/L (ppb)
Quality Assurance

Sample #	Tap Water Blank
Analyte:	
Dalapon	<0.2
Dicamba	<2
Dichlorprop	<2
2,4-D	<2
2,4,-DB	<20
2,4,5-T	<0.2
Dinoseb	<2

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED HERBICIDES BY GC/ECD

Results Reported as % Recovery
Quality Assurance

Sample #	Tap Water Matrix Spike % Recovery	Tap Water Matrix Spike Duplicate % Recovery	Spike Level
Analyte:			
Dalapon	13%	<10%	100
Dicamba	<10%	<10%	100
Dichlorprop	<10%	22%	100
2,4-D	59%	17%	100
2,4,-DB	<10%	<10%	100
2,4,5-T	<10%	<10%	100
Dinoseb	97%	83%	100

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 31, 1993
Date Received: March 25, 1993
Project: H-1033-02, Horn Rapids

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR CHLORINATED HERBICIDES BY GC/ECD

Results Reported as % Recovery
Quality Assurance

Sample #	Spike Blank	Spike Level
Analyte:		
Dalapon	100%	100
Dicamba	100%	100
Dichlorprop	100%	100
2,4-D	100%	100
2,4,-DB	100%	100
2,4,5-T	100%	100
Dinoseb	100%	100

Shannon & Wilson, Inc.

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

11500 Olive Blvd., Suite 276
St. Louis, MO 63141
(314) 872-8170

2055 Hill Road
Fairbanks, AK 99707
(907) 479-0600

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

Chain of Custody Record

1354 Grandridge Blvd.
Kennewick, WA 99336
(509) 735-1280
FAX: (509) 735-6774

Page 1 of
Laboratory F+B
Attn:

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	A2: Pesticides 8080	A4: Herbicides 8150	TPH 418.1				Total Number of Containers	Remarks/Matrix
MW-1-01	38638		3-23			X						1	Water
MW-1-02	38639		3-23				X					1	"
MW-1-03	38640		3-23					X				1	"
MW-2-01	38641		3-23			X						1	"
MW-2-02	38642		3-23				X					1	"
MW-2-03	38643		3-23					X				1	"
MW-3-01	38644		3-23			X						1	"
MW-3-02	38645		3-23				X					1	"
MW-3-03	38646		3-23					X				1	"
Field Blank	38647		3-23					X				1	"

38638 38644 38646 38640 38643 38647 Composited for TPH 418.1

Project Information	
Project Number	H-1033-02
Project Name	Hanford
Contact	Brian Williams
Ongoing Project?	Yes ☒ No ☐
Sampler	Brian Williams

Sample Receipt	
Total Number of Containers	
COC Seals/Intact? Y/N/NA	
Received Good Cond./Cold	
Delivery Method: (attach shipping bill, if any)	

Instructions

Requested Turn Around Time: ASAP

Special Instructions

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: B.J.W. Time: 15:15	Signature: Time:	Signature: Time:
Printed Name: Brian J. Williams Date: 3-24-93	Printed Name: Date:	Printed Name: Date:
Company: Shannon+Wilson, Inc.	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time: 10:30	Signature: Time:	Signature: Time:
Printed Name: C. HICKS Date: 3-25-93	Printed Name: Date:	Printed Name: Date:
Company: United Parcel Service	Company:	Company:

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

F-19-91/UR

No. 11591

APPENDIX C

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Important Information About Your Geotechnical Engineering/ Subsurface Waste Management (Remediation) Report

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS.

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer/geoscientist.

AN ENGINEERING REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical engineering/subsurface waste management (remediation) report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, have the consulting engineer(s)/scientist(s) evaluate how any factors which change subsequent to the date of the report, may affect the recommendations. Unless your consulting geotechnical/ civil engineer and/or scientist indicates otherwise, your report should not be used: 1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); 2) when the size, elevation, or configuration of the proposed project is altered; 3) when the location or orientation of the proposed project is modified; 4) when there is a change of ownership; or 5) for application to an adjacent site. Geotechnical/civil engineers and/or scientists cannot accept responsibility for problems which may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural changes or human influence. Because a geotechnical/waste management engineering report is based on conditions which existed at the time of subsurface exploration, construction decisions should not be based on an engineering report whose adequacy may have been affected by time. Ask the geotechnical/waste management consultant to advise if additional tests are desirable before construction starts. For example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/waste management report. The geotechnical/civil engineer and/or scientist should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST GEOTECHNICAL RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help minimize their impact. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your geotechnical engineer's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual

subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize conclusions. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE GEOTECHNICAL ENGINEERING/SUBSURFACE WASTE MANAGEMENT (REMEDIATION) REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical engineering/subsurface management (remediation) report. To help avoid these problems, the geotechnical/civil engineer and/or scientist should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological and waste management findings and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE ENGINEERING/WASTE MANAGEMENT REPORT.

Final boring logs developed by the geotechnical/civil engineer and/or scientist are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical engineering/waste management reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To minimize the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/waste management report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical engineering/subsurface waste management (remediation) is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical/ waste management consultants. To help prevent this problem, geotechnical/civil engineers and/or scientists have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the engineer's or scientist's liabilities to other parties; rather, they are definitive clauses which identify where the engineer's or scientist's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your engineer/scientist will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

APPENDIX 3

Draft Report
Horn Rapids Development

Transportation Impact Study
Richland, Washington

J-U-B Engineers, Inc.

March, 1993

DRAFT REPORT

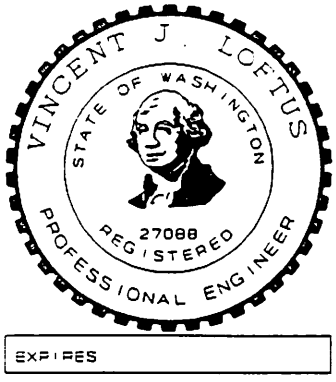
HORN RAPIDS DEVELOPMENT

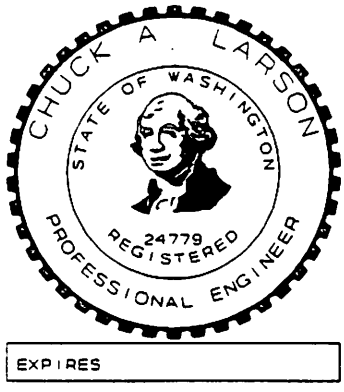
TRANSPORTATION IMPACT STUDY
RICHLAND, WASHINGTON

MARCH 1993

Prepared For:

Columbia Triangle Ventures
Bellevue, Washington





Prepared By:

J-U-B ENGINEERS, Inc.
2810 W. Clearwater Avenue, Suite 201
Kennewick, Washington 99336
(509) 783-2144

TABLE OF CONTENTS

HORN RAPIDS DEVELOPMENT

I. STUDY OBJECTIVES

The objective of this study is to determine the overall impact of the proposed **Horn Rapids Development** on adjacent roadways in Richland, Washington. The intersections analyzed include; 1) SR 240 and the Bypass Highway; 2) Four (4) proposed Project Entrance Roads onto SR 240; 3) SR 240 and Grosscup Road. The transportation study objectives will anticipate both correlation of community growth to forecast traffic loading, as well as entrance visibility, circulations, distribution, and traffic control needs. Figure 1 depicts the site location in relation to the area road system.

Columbia Triangle Ventures of Bellevue, Washington, proposes to construct a multi-use planned development in the Horn Rapids Area northwest of Richland. The proposed residential development would include over 2000 single family detached, townhouse, duplex, and apartment dwelling units, an 18 hole golf course, sports fields, numerous parks and recreation centers, 105,000 square feet Gross Floor Area (GFA) of office space, an 80 suite hotel, a winery, two (2) elementary schools, two (2) day care facilities, a church, 34,000 GFA retail, 2 restaurants, and a drive in bank. The proposed development is to be built on vacant property located directly south of SR 240, west of the Lamb-Weston Processing Plant, and east of Grosscup Road. The development would be visible from and directly adjacent to SR 240.

Construction of the golf course and 200 single family houses is scheduled to begin in 1993 with completion in 1994. An additional 800 units of single family housing and 200 apartments are scheduled to be complete by 1999. The full development is projected for completion by 2008.

Traffic volumes and improvement recommendations are analyzed assuming the construction phasing schedule above. The results of this study will serve to identify impacts created by the development on adjacent roadways, with recommendations for improvements.

It is important to note that the analysis is based on the assumption that all access to and from the development will be directly onto SR 240 or Grosscup Road. The City of Richland's Comprehensive Growth Plan currently shows a future extension of Kingston

Road from Van Giesen to the main Project Entrance #2 and on north to Horn Rapids Road. The Kingston Road extension is not funded and currently has no schedule for construction. If Kingston Road is extended to provide alternate access to the site, it could significantly change the traffic distribution patterns generated by the Horn Rapids Development. In this event, traffic impacts of the future project entrances and associated improvements should be re-evaluated.

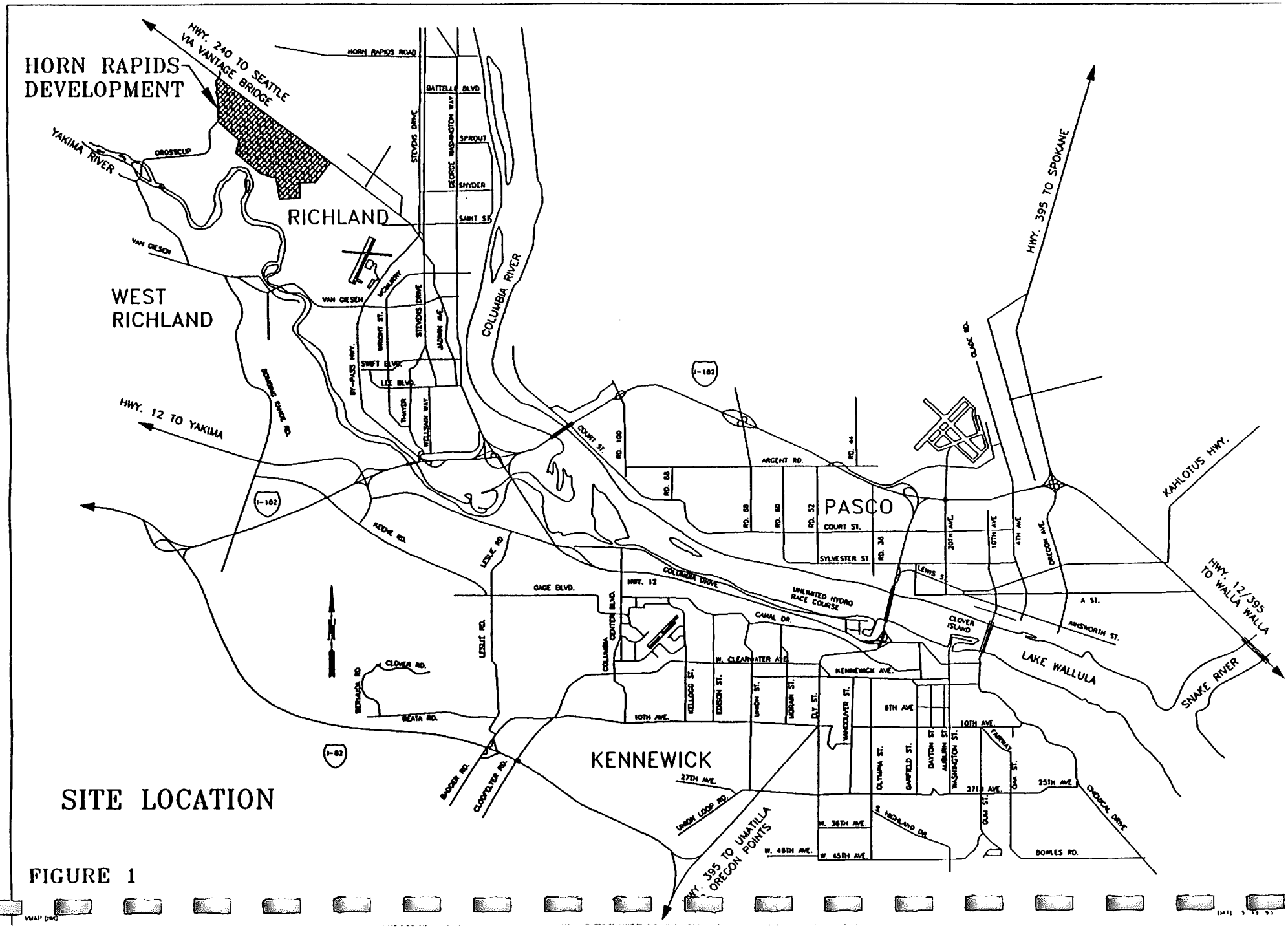

HORN RAPIDS DEVELOPMENT
HWY. 240 TO SEATTLE VIA VANTAGE BRIDGE
YAKIMA RIVER
GROSSCUP
HORN RAPIDS ROAD
BATTELLE BLVD
SPROUT
SNYDER
SAINT S.S.
STEVENS DRIVE
GEORGE WASHINGTON WAY
RICHLAND
VAN GIESEN
WEST RICHLAND
WRIGHT ST.
JADWIN AVE.
COLUMBIA RIVER
SWIFT BLVD.
LEE BLVD.
THAYER
WILLSON WAY
BY-PASS HWY.
BOMBING RANGE RD.
HWY. 12 TO YAKIMA
I-182
COURT ST.
RD. 100
RD. 88
RD. 68
RD. 60
RD. 52
RD. 44
RD. 36
ARGENT RD.
PASCO
COURT ST.
SYLVESTER ST.
HWY. 395 TO SPOSKANE
CLARK RD.
KAHLOTUS HWY.
HWY. 12/395 TO WALLA WALLA
KEENE RD.
LESLIE RD.
GAGE BLVD.
HWY. 12
COLUMBIA DRIVE
UNLIMITED HYDRO RACE COURSE
CANAL DR.
CLOVER ISLAND
LEWIS ST.
A ST.
AINSWORTH ST.
LAKE WALLULA
SNAKE RIVER
COLUMBIA CENTER BLVD.
W. CLEARWATER AVE.
KENNEWICK AVE.
CLOVER RD.
BENTON RD.
BEATA RD.
10TH AVE.
KELLOGG ST.
EDISON ST.
UNION ST.
MORAIN ST.
ELY ST.
VANCOUVER ST.
8TH AVE
10TH AVE.
OLYMPIA ST.
GARFIELD ST.
DAYTON ST.
AUBURN ST.
WASHINGTON ST.
FAIRVIEW
OAK ST.
25TH AVE.
CHEMICAL DRIVE
BOWLES RD.
KENNEWICK
27TH AVE.
UNION LOOP RD.
W. 36TH AVE.
W. 46TH AVE.
W. 45TH AVE.
HIGHLAND DR.
BADGER RD.
CLODFELTER RD.
HWY. 395 TO UMATILLA OREGON POINTS
SITE LOCATION

FIGURE 1

II. RESEARCH METHODOLOGY

In developing the conclusions of this study, research methodology involved collecting and analyzing traffic data in seven major areas. Each of these seven areas and sources of data are described as follows:

(1) **SITE VISITS** - Site visits to the proposed development were conducted to review anticipated traffic access locations and observe traffic movement at all major roadways surrounding the site.

(2) **INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)** - The ITE Trip Generation Manual (1991-5th Edition) provided the basis for determination of traffic levels attracted to the proposed development site. ITE trip generating rates are nationally recognized and have been successfully applied to other development projects.

(3) **FIELD TRAFFIC COUNTS** - To verify available traffic data, peak hour traffic turning movement counts were conducted at the intersection of SR 240 and the Bypass Highway on March 9, 1993. Daily traffic counts were also taken on SR 240 west of the Horn Rapids Business Park from March 5 through March 9, 1993.

(4) **HIGHWAY CAPACITY MANUAL (HCM)** - The Highway Capacity Manual, Special Report 209, 1985 Edition and supporting computer software, were used to calculate forecast operating level of service of both turning and through lanes at all project intersections.

(5) **MANUAL OF TRAFFIC SIGNAL DESIGN** - The Manual of Traffic Signal Design (1982) published by the Institute of Transportation engineers was the basis for evaluating signalization.

(6) **MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)** - The Manual of Uniform Traffic Control Devices (1988) was the basis for evaluating auxiliary lane requirements.

(7) **WSDOT DESIGN MANUAL** - The Washington State Department of Transportation Design Manual, Revision No. 93-01 was the basis of highway improvements on SR 240.

III. EXISTING AND PLANNED TRAFFIC CONDITIONS

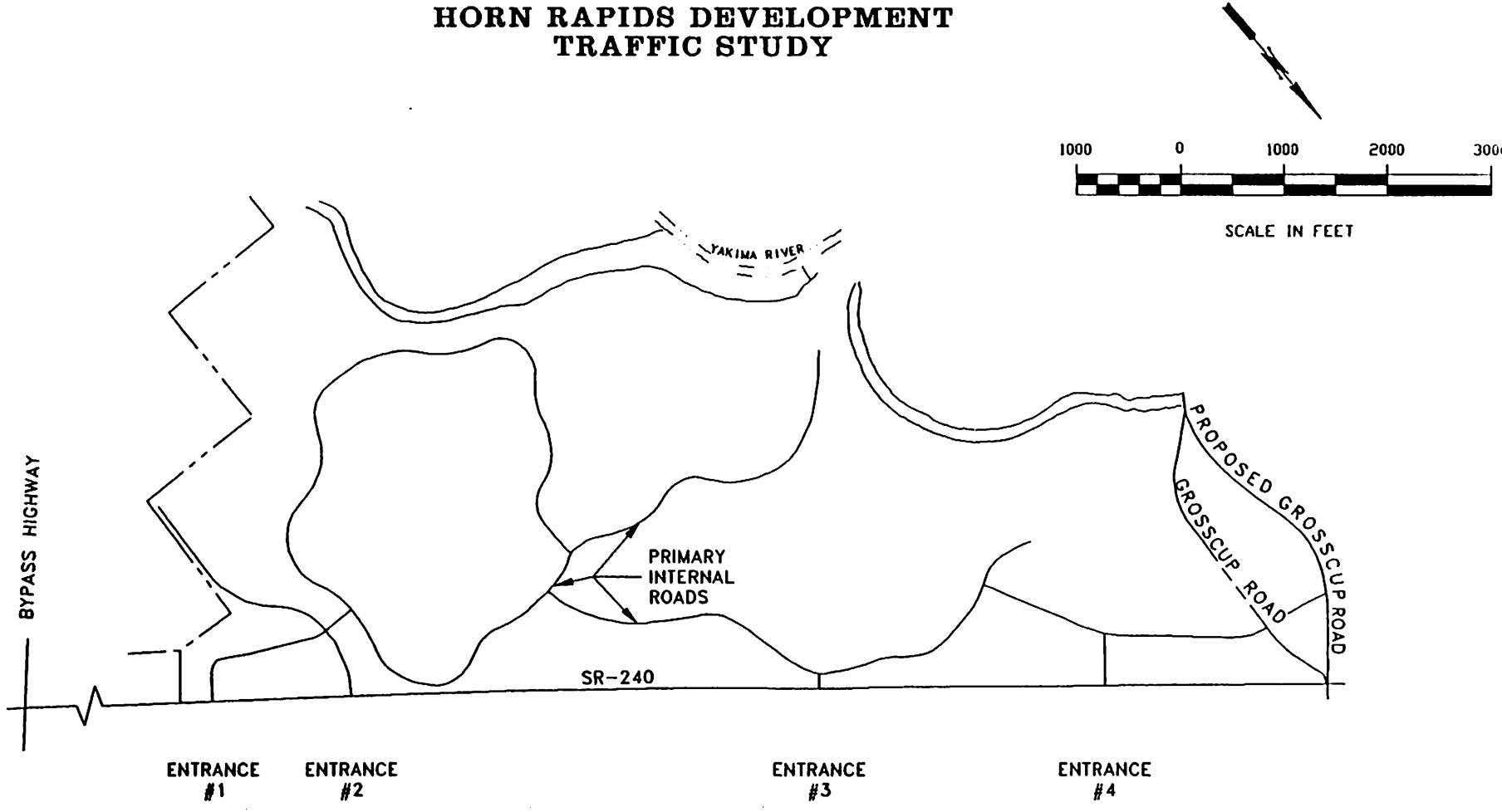
The overall concept layout in Figure 2 is the basis for traffic assumptions and corresponding traffic generation judgements. Primary internal roads and proposed access points onto SR 240 are shown. The future commercial development would be located in the northeast corner of the site and would be accessed mainly by entrances #1 and #2. SR 240 is a minor arterial highway route between Richland and Vantage with Partial Access Control. The SR 240 intersection with the Bypass Highway is currently signalized and is primarily impacted during the morning and evening shift changes at the U.S Department of Energy Hanford Reservation to the north of the intersection. Turning movements at the intersection were recorded in March during the P.M. peak and are shown in Figure 3.

Grosscup Road is a local access road from SR 240 to West Richland. It also provides access to the Richland Landfill and the Off Road Vehicle Park. SR 240 is currently undeveloped from Grosscup Road east through the project limits. Traffic counts for SR 240 were taken in March and the P.M. Peak Hour Volumes are also shown on Figure 3. The P.M. peak hour volumes in the project vicinity occurred between 4:00 P.M. and 5:00 P.M. It is expected that Project Entrance #3 will be required after approximately 600 housing units are constructed. By 1999, 1200 housing units are expected to be built and should be adequately served by entrances #2 and #3. Entrance #4 will be required sometime after 1200 units as development begins to occur in the eastern part of the site.

Computer traffic analyses were conducted on each of the proposed project entrances and the intersection of Grosscup Road and SR 240. To evaluate the operating level of service (LOS) at the various phases, a brief explanation of intersection capacity LOS is included in the appendix. Generally, an LOS of A or B is excellent for traffic flow during peak conditions. An LOS of C or D is usually considered acceptable in peak conditions.

The capacity analysis was conducted assuming unsignalized intersections with SR 240.

HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY



MIXED USE RESIDENTIAL DEVELOPMENT
CONCEPT LAYOUT

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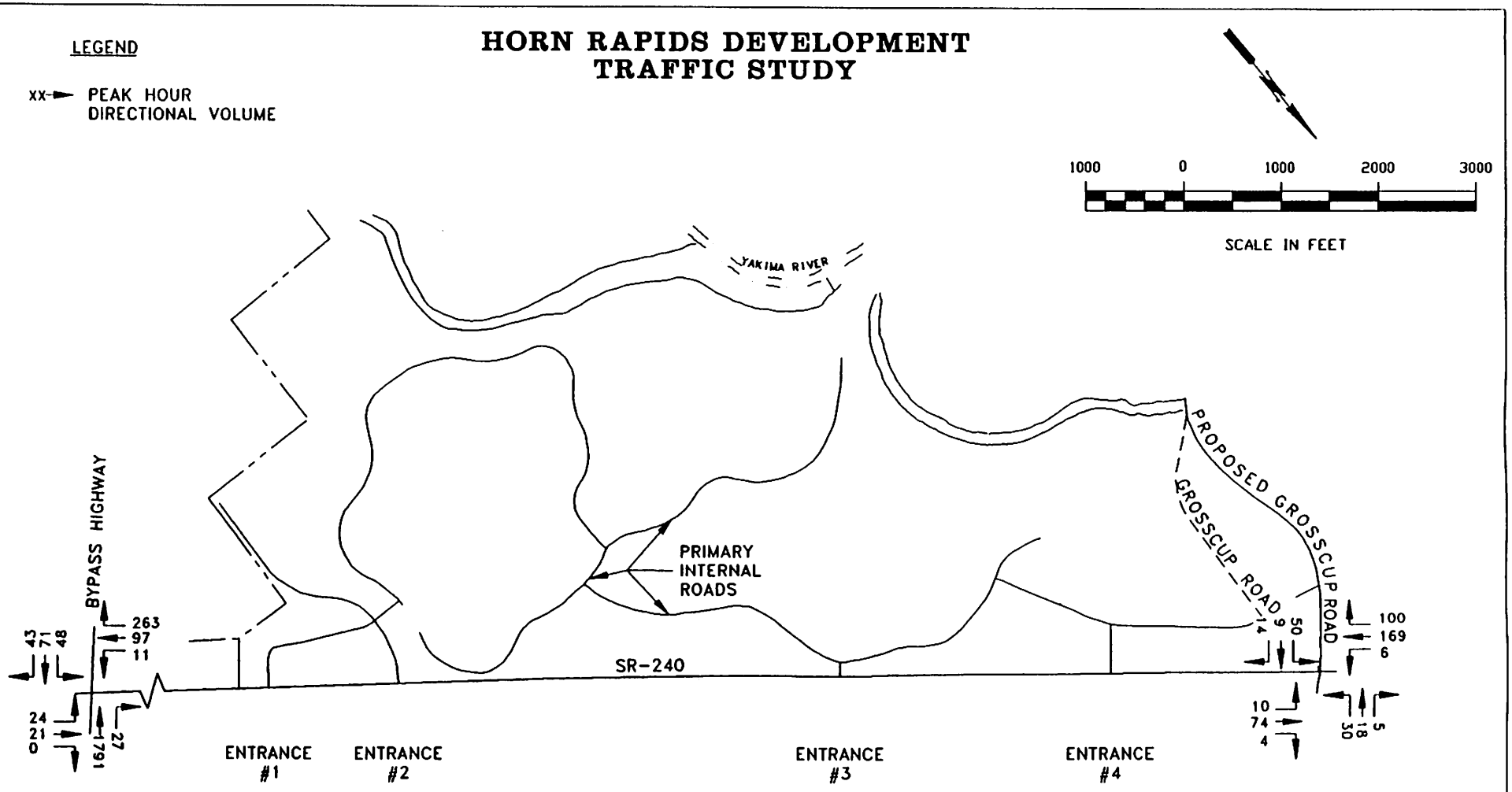
FIGURE 2

DWG FIG2A

HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY



PRE-DEVELOPMENT - 1993
P.M. PEAK HOUR
TRAFFIC VOLUMES

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FIG 3

DWG FIG3A

DATE: 4-2-93

IV. PROJECT TRAFFIC VOLUMES

An important element in evaluating the traffic impacts from a proposed development is establishing accurate trip generation data and reasonable traffic distribution assumptions. The traffic impacts created by the proposed development will relate to increased volume on all adjacent roadways. The approach to establishing traffic impacts are as follows: 1) Estimate the number of trips generated by the development; 2) Estimate the distribution of trips to the actual roadways; 3) Incorporate the added trips to existing traffic volumes and; 4) Compare the impacts of increased traffic volumes, against the existing traffic volumes. Each of these steps are discussed in detail below.

TRIP GENERATION

The Institute of Transportation Engineers (ITE), Trip Generation Manual, Copyrighted 1991, is the basis for estimating projected trip generation rates and volumes for this study.

The proposed Multi-Use development is a residential golf course community containing offices and a shopping/service area. The trips generated by the site are calculated by individual uses with the following descriptions:

The **Single Family** trip generation rates are based on ITE Land Use 210 - Single Family Detached Housing with the following equations:

Average Weekday,	Ln	(T)	=	0.921 Ln	(X)	+ 2.698
P.M. Peak Hour,	Ln	(T)	=	0.902 Ln	(X)	+ 0.528
A.M. Peak Hour,	Ln	(T)	=	0.867 Ln	(X)	+ 0.398

Where: T = Number of Trips (Typical)
X = Number of Dwelling Units

The **Apartment** trip generation rates are based on ITE Land Use 220 - Apartment with the following equations:

Average Weekday,	Ln	(T)	=	1.024 Ln	(X)	+ 1.710
P.M. Peak Hour,	Ln	(T)	=	0.928 Ln	(X)	− 0.118
A.M. Peak Hour,		T	=	0.491	(X)	+ 3.391

The **Townhouse and Duplex** trip generation rates are based on ITE Land Use 230 - Residential Condominium/Townhouse with the following equations:

Average Weekday,	Ln	(T)	=	0.850 Ln	(X) + 2.565
P.M. Peak Hour,	Ln	(T)	=	0.818 Ln	(X) + 0.368
A.M. Peak Hour,	Ln	(T)	=	0.787 Ln	(X) + 0.314

The **Winery** trip generation rates are based on ITE Land Use 140-Manufacturing with the following equations:

Average Weekday,	T	=	3.883	(X) – 13.112
P.M. Peak Hour,	T	=	0.748	(X) + 0.100
A.M. Peak Hour,	T	=	0.850	(X) – 21.617

Where: X = 1,000 Square Feet Gross Floor Area

The **Hotel** trip generation rates are based on ITE Land Use 310 - Hotel with the following equations:

Average Weekday,		T	=	8.80	(X) – 59.208
P.M. Peak Hour,	Ln	(T)	=	0.957 Ln	(X) – 0.070
A.M. Peak Hour,		T	=	0.785	(X) – 30.549

Where: X = Number of Occupied Rooms

The **Golf Course** trip generation rates are based on ITE Land Use 430 - Golf Course with the following equations:

Average Weekday,	Ln	(T)	=	1.237 Ln	(X) + 2.894
P.M. Peak Hour,		T	=	3.50	(X) – 2.60
A.M. Peak Hour,	Ln	(T)	=	2.284 Ln	(X) – 2.704

Where: X = Number of Holes

The **Elementary School** trip generation rates are based on ITE Land Use 520 - Elementary School with the following equations:

Average Weekday,	Ln	(T)	=	0.718 Ln	(X) + 3.496
P.M. Peak Hour,	Ln	(T)	=	0.641 Ln	(X) + 2.338
A.M. Peak Hour,	Ln	(T)	=	0.622 Ln	(X) + 2.558

Where: X = 1,000 Square Feet Gross Floor Area

The **Day Care** trip generations are based on Land Use 565 - Day Care Center with the following equations:

Average Weekday,		T	=	79.26	(X)
P.M. Peak Hour,	Ln	(T)	=	0.758 Ln	(X) + 3.025
A.M. Peak Hour,	Ln	(T)	=	0.501 Ln	(X) + 3.301

Where: X = 1,000 Square Feet Gross Floor Area

The **Park and Sports Field** trip generations are based on ITE Land Use 411 - City park with the following equations:

Average Weekday,	Ln	(T)	=	-401 Ln	(X) + 3.780
P.M. Peak Hour,	N/A (Peaks at times other than that of adjacent traffic)				
A.M. Peak Hour,	N/A (Peaks at times other than that of adjacent traffic)				

Where: X = Acres

The **Church** trip generation rates are based on ITE Land Use 560 - Church with the following equations:

Average Weekday,		T	=	9.32	(X)
P.M. Peak Hour,	Ln	(T)	=	0.699 Ln	(X) + 0.299
A.M. Peak Hour,		T	=	1.37	(X)

Where: X = 1,000 Square Feet Gross Floor Area

The **Office** trip generation rates are based on ITE Land Use 710 - General Office Building with the following equations:

Average Weekday,	Ln	(T)	=	0.756 Ln	(X) + 3.765
P.M. Peak Hour,	Ln	(T)	=	0.737 Ln	(X) + 1.831
A.M. Peak Hour,	Ln	(T)	=	0.777 Ln	(X) + 1.674

Where: X = 1,000 Square Feet Gross Floor Area

The **Retail** trip generation rates are based on ITE Land Use 810 - Retail - General Merchandise with the following equations:

Average Weekday,	Ln (T)	=	1.12 Ln (X) + 3.24	
P.M. Peak Hour,	T	=	4.804	(X)
A.M. Peak Hour,	N/A (Peaks at times other than that of adjacent traffic)			

Where: X = 1,000 Square Feet Gross Floor Area

The **Restaurant** trip generation rates are based on ITE Land Use 832 - High Turnover (Sit-Down) Restaurant with the following equations:

Average Weekday,	T	=	205.36	(X)
P.M. Peak Hour,	T	=	16.26	(X)
A.M. Peak Hour,	T	=	15.70	(X)

Where: X = 1,000 Square Feet of Gross Floor Area

The **Bank** trip generation rates are based on ITE Land Use 912 - Drive In Bank with the following equations:

Average Weekday,	Ln (T)	=	0.562 Ln (X) + 6.81	
P.M. Peak Hour,	T	=	43.63	(X)
A.M. Peak Hour,	N/A (Peaks at times other than that of adjacent traffic)			

Where: X = 1,000 Square Feet of Gross Floor Area

TABLE 1
TRIP GENERATION VOLUMES

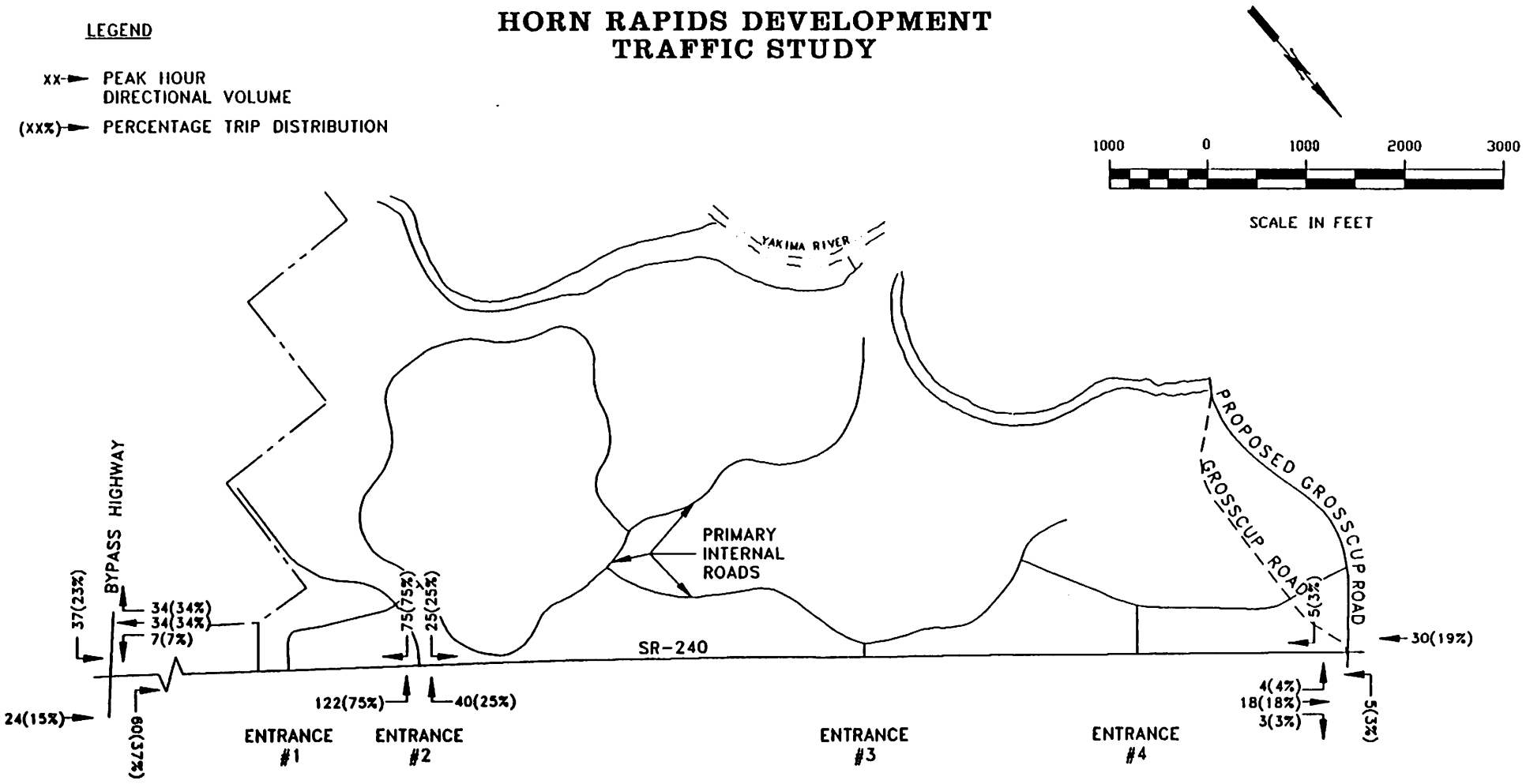
GENERATOR	UNITS	AREA (GFA)	AVERAGE DAILY TRIPS	A.M. PEAK HOUR DEPARTURES	P.M. PEAK HOURS ARRIVALS	P.M. PEAK HOURS DEPARTURES
DESIGN YEAR 1994 - SINGLE FAMILY	200	---	1,954	109 (74%)	131 (65%)	71 (35%)
GOLF COURSE	18 HOLES	---	645	84 (83%)	31 (52%)	29 (48%)
DESIGN YEAR 1999 - SINGLE FAMILY	800	---	7,006	362 (74%)	457 (65%)	246 (35%)
APARTMENTS	200	---	1,256	508 (74%)	83 (68%)	39 (32%)
DESIGN YEAR 2008 - SINGLE FAMILY	1,182	---	10,037	99 (83%)	651 (65%)	351 (35%)
APARTMENTS	237	---	1,494	128 (83%)	97 (68%)	45 (32%)
TOWNHOUSE	403	---	2,130	0 (7%)	129 (66%)	66 (34%)
WINERY	---	19,000	61	13 (40%)	7 (53%)	28 (46%)
HOTEL	80 SUITES	---	645	8 (17%)	33 (54%)	28 (46%)
ELEMENTARY SCHOOL	---	38,000	449	50 (40%)	58 (56%)	47 (44%)
DAY CARE	---	12,000	951	43 (46%)	62 (46%)	73 (54%)
PARKS	31 ACRES	---	174	N/A	N/A	N/A
OFFICE	---	105,000	1,456	22 (11%)	33 (17%)	160 (83%)
CHURCH	---	7,000	65	5 (50%)	3 (54%)	2 (46%)
RETAIL	---	34,000	1,325	82 (50%)	82 (50%)	81 (50%)
RESTAURANT	---	9,000	1,848	71 (50%)	79 (54%)	67 (46%)
BANK	---	9,000	1,662	N/A	188 (48%)	204 (52%)
TOTAL			33,158	1584	2,124	1,537

HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY

LEGEND

XX→ PEAK HOUR DIRECTIONAL VOLUME

(XX%)→ PERCENTAGE TRIP DISTRIBUTION



DESIGN YEAR - 1994
P.M. PEAK HOUR 4:00 - 5:00
PROJECT ARRIVALS AND DEPARTURES

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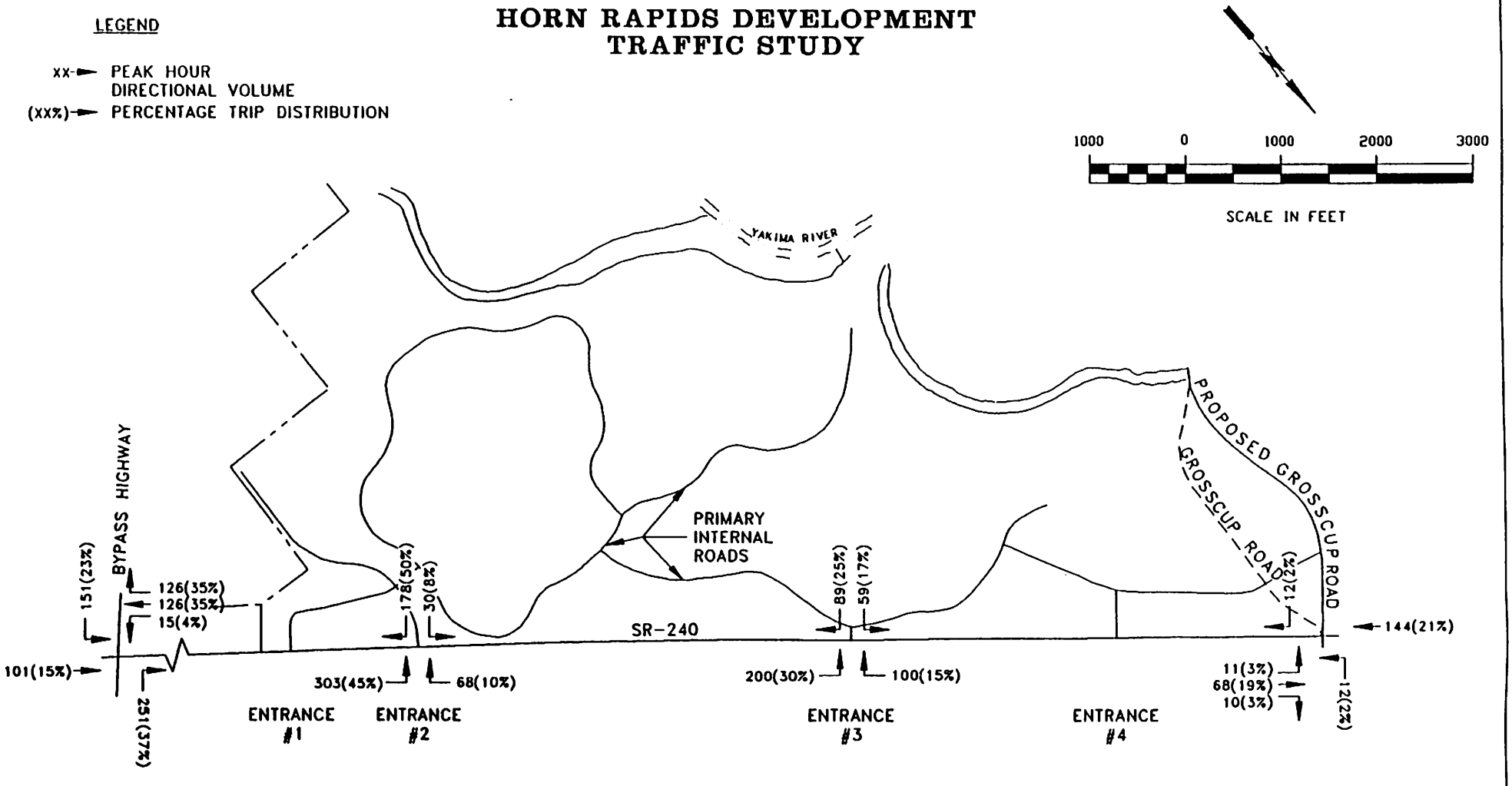
HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY



DESIGN YEAR - 1999
P.M. PEAK HOUR 4:00 - 5:00
PROJECT ARRIVALS AND DEPARTURES

FIGURE 5

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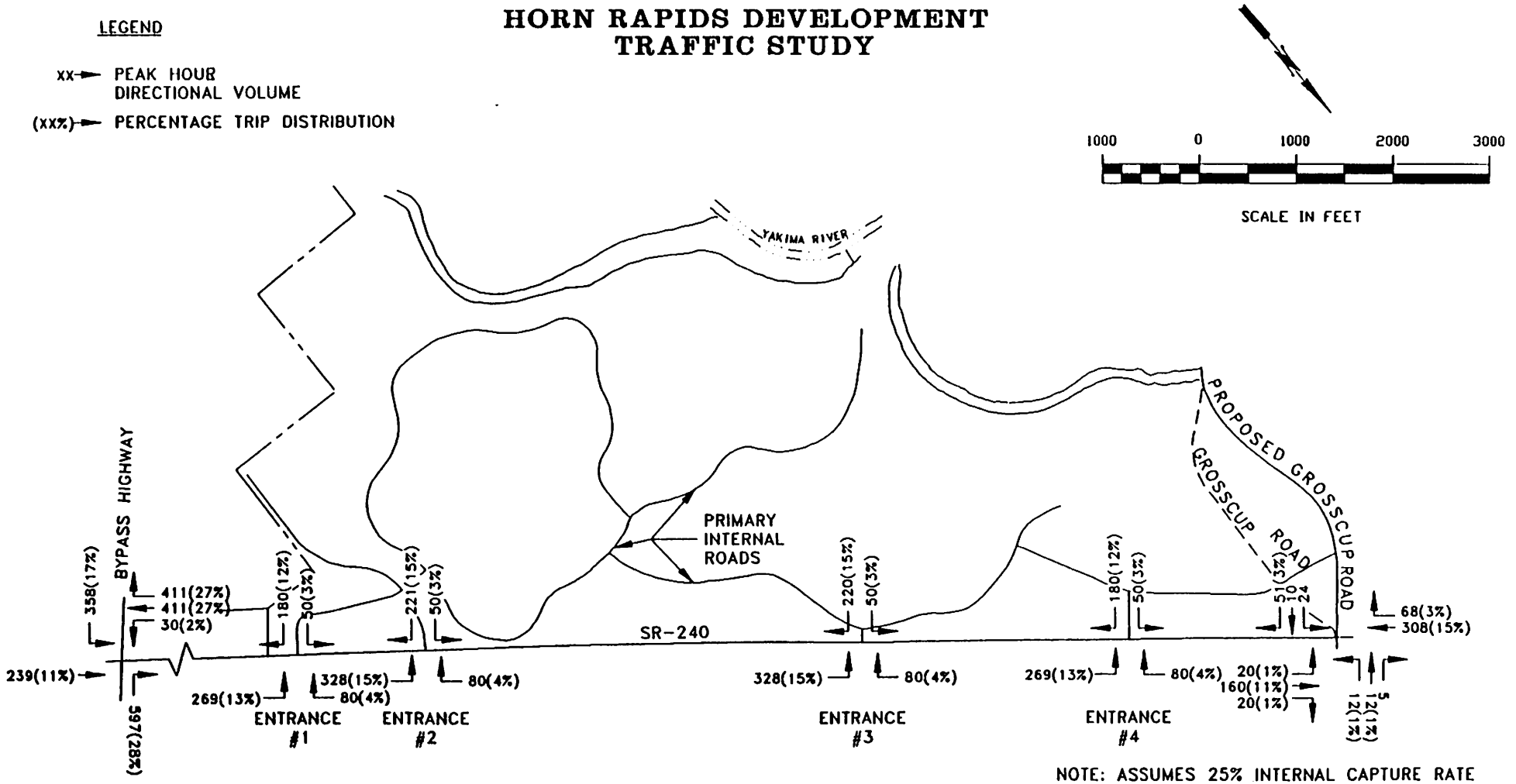
HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY

LEGEND

xx→ PEAK HOUR DIRECTIONAL VOLUME

(xx%)→ PERCENTAGE TRIP DISTRIBUTION



NOTE: ASSUMES 25% INTERNAL CAPTURE RATE

DESIGN YEAR - 2008
P.M. PEAK HOUR 4:00 - 5:00
PROJECT ARRIVALS AND DEPARTURES

J-U-B
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PROJECTED TRAFFIC VOLUMES

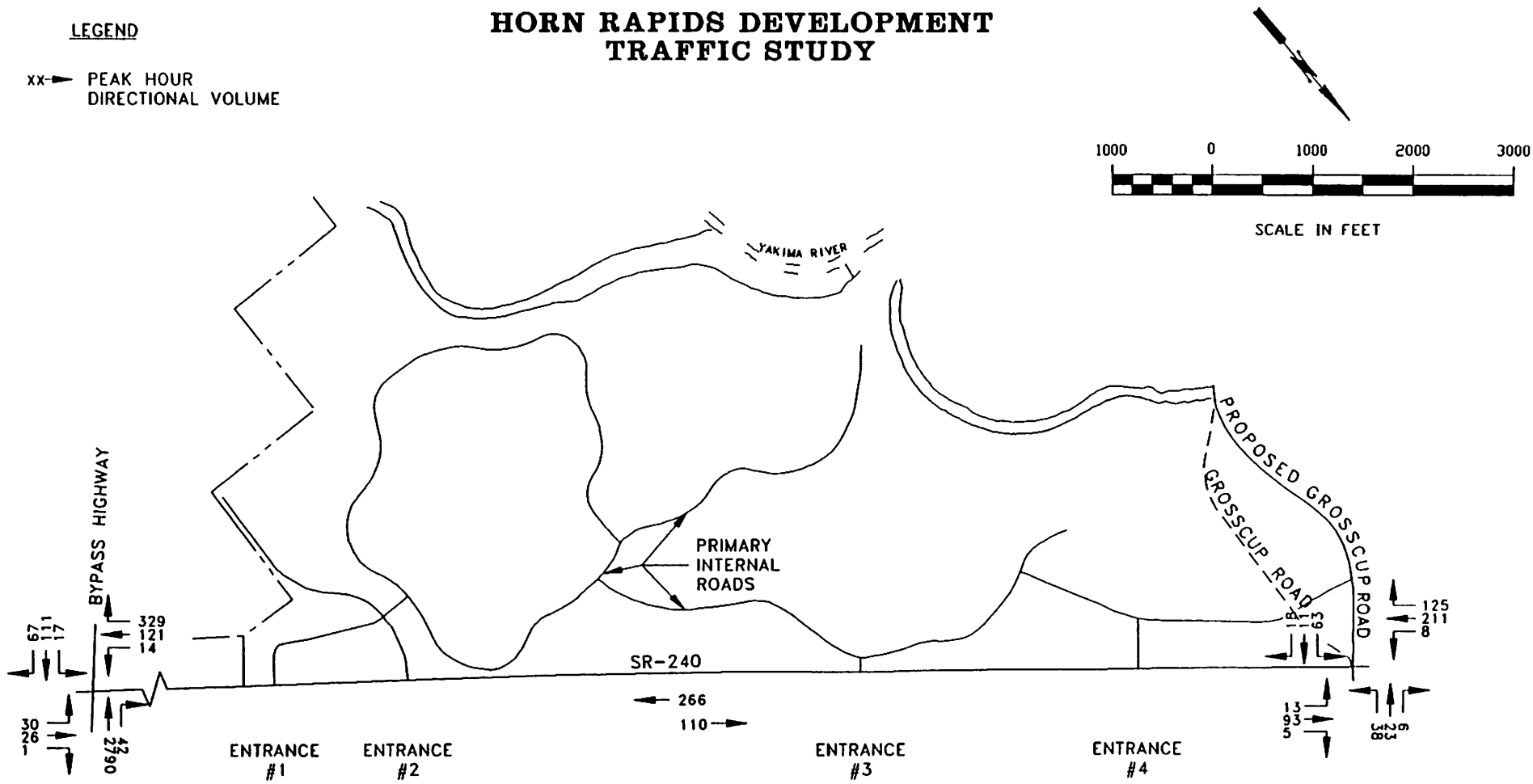
Design year 1994, 1999, and 2008 have been selected as the analysis periods which represents traffic impacts in the first year, fifth year, and fifteenth year, when full development occurs. The estimated project traffic volumes are combined with the existing area traffic volumes (the existing volumes were presented in Figure 3) to determine the total traffic impact of the project. The annual growth rates on SR 240 has been estimated at 1.5% and 3% for the Bypass Highway. Figure 7 depicts the projected year 2008 P.M. peak hour volumes for **pre-development background** traffic based on these annual growth rates. Project generated traffic volumes are added to pre-development traffic volumes to compare the impacts.

Figures 8, 9, and 10 depict the year 1994, 1999, and 2008 respectively, arrival and departure P.M. peak hour volumes for the area roadways, with both project and existing traffic combined. Figure 8 shows 200 units of housing and the golf course only, Figure 9 shows an additional 1000 units of housing and Figure 10 shows full development. These figures are the basis for detailed intersection capacity analysis and evaluation of project impacts.

HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY

LEGEND

xx→ PEAK HOUR DIRECTIONAL VOLUME



PRE-DEVELOPMENT - 2008
P.M. PEAK HOUR 4:00 - 5:00
TRAFFIC VOLUMES

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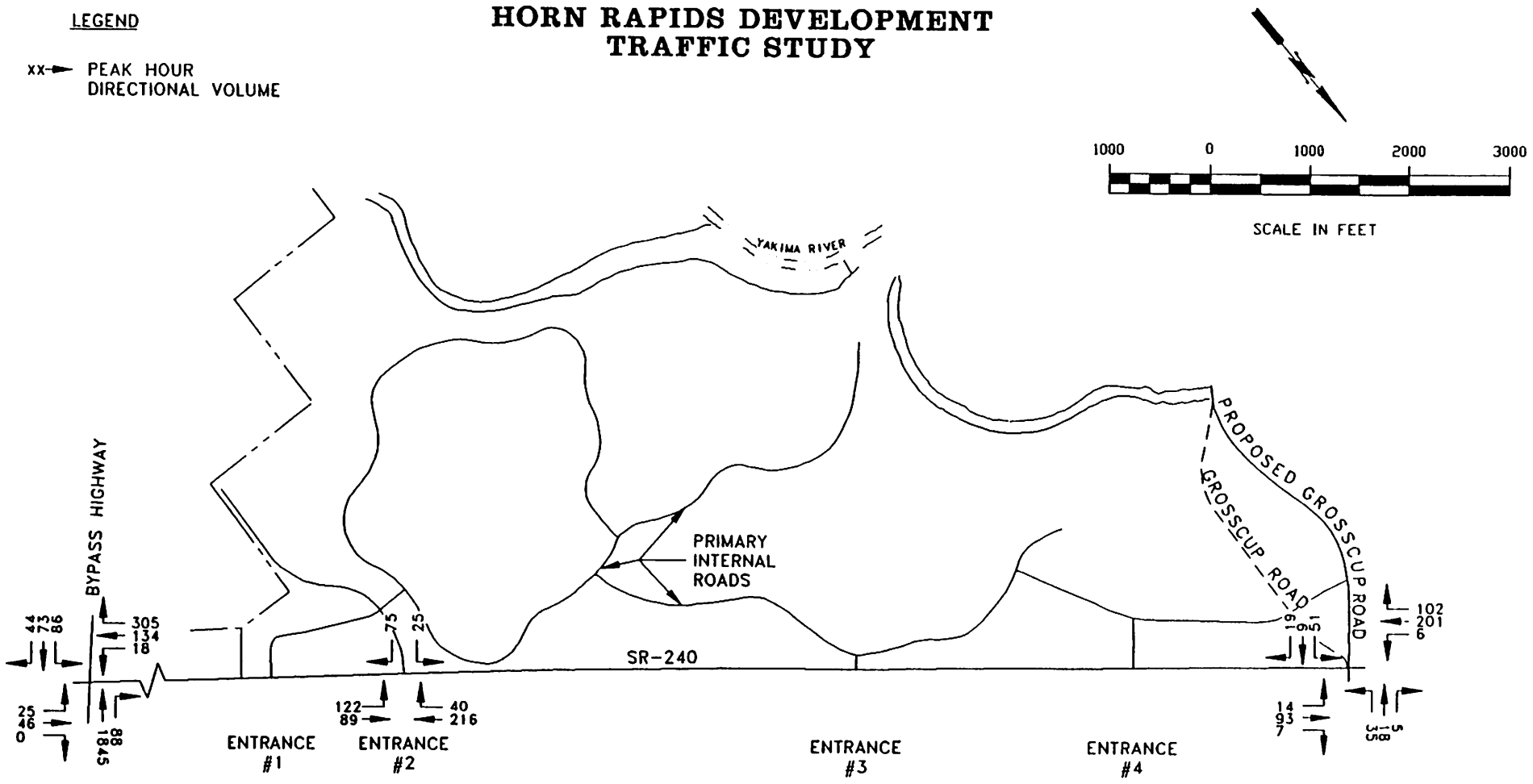
DWG FIG7A DATE 4-2-93

HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY



DESIGN YEAR - 1994
P.M. PEAK HOUR 4:00 - 5:00
TRAFFIC VOLUMES

FIGURE 8

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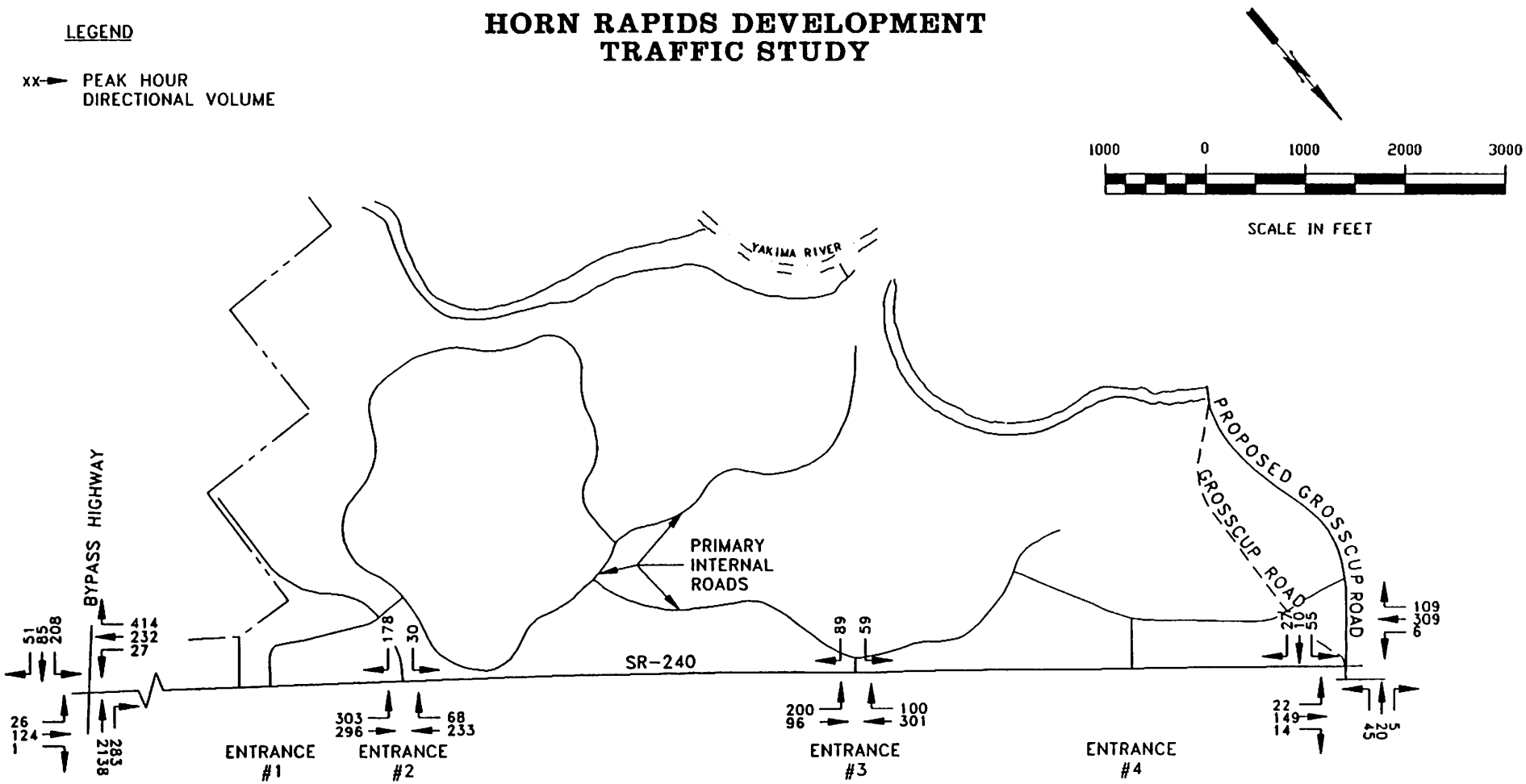
DWG FIGBA

DATE: 4-7-93

HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY



DESIGN YEAR - 1999
P.M. PEAK HOUR 4:00 - 5:00
TRAFFIC VOLUMES

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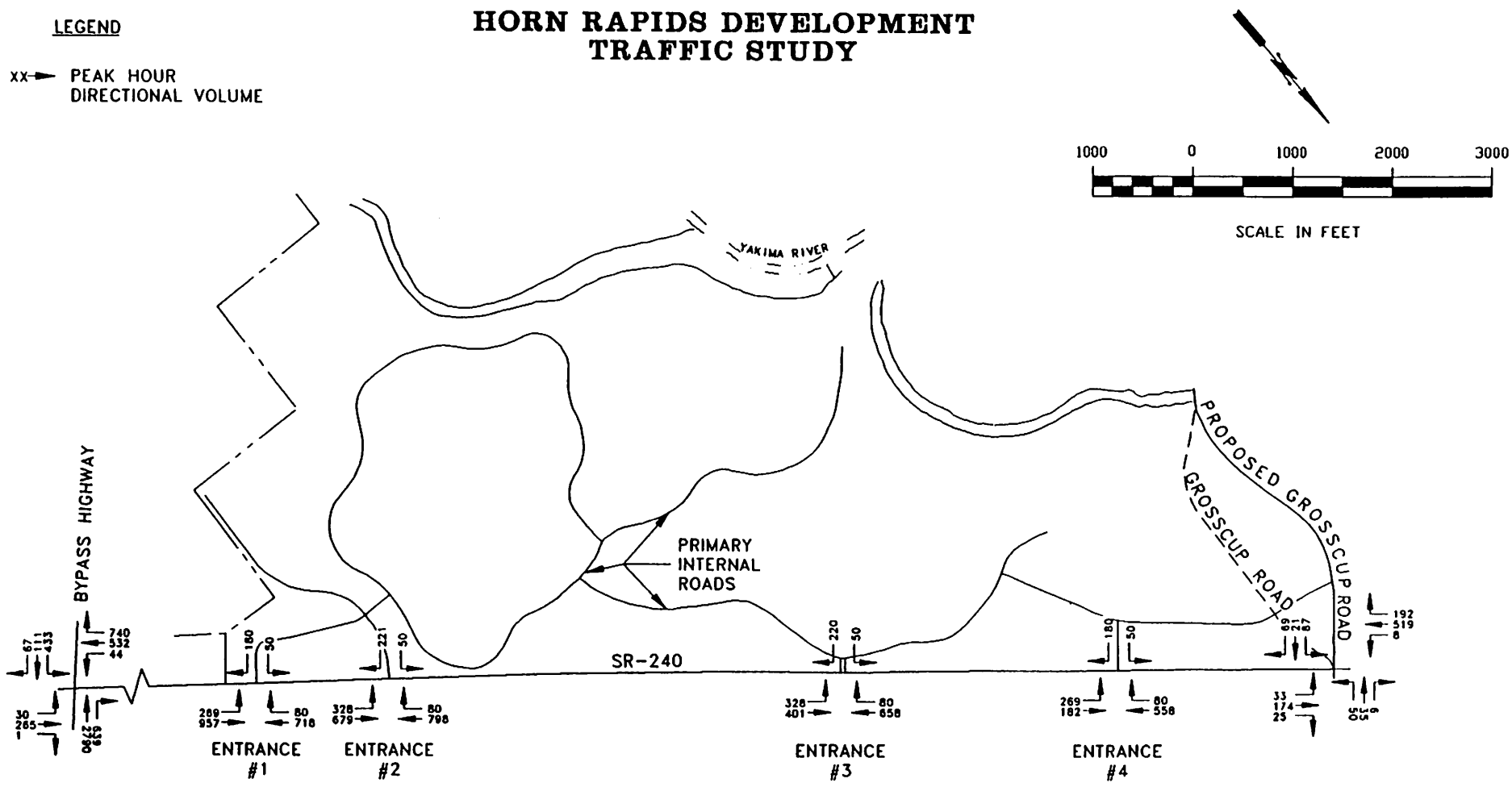
FIGURE 9

DWG FIG9A

DATE 4-2 93

HORN RAPIDS DEVELOPMENT
TRAFFIC STUDY



DESIGN YEAR - 2008
P.M. PEAK HOUR 4:00 - 5:00
TRAFFIC VOLUMES

FIGURE 10

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Engineers Surveyors Planners

DWG. FIG10A

DATE: 4-2-93

V. PROJECT TRAFFIC IMPACTS

Computerized intersection capacity analysis was conducted on the four (4) proposed project entrances and the intersection of Grosscup Road and SR 240. For analysis purposes, they were treated as unsignalized. Overall intersection operation levels of adjacent roadways before and after the project are outlined in Table 2 for Years 1994, 1999, and 2008 for both Pre- and Post-Development. The capacity computer analysis calculations are provided in the appendix.

TABLE 2

INTERSECTION LEVEL OF SERVICE
P.M. PEAK HOUR

INTERSECTION	LANE DIRECTION	POST-DEVELOPMENT YEAR 1994	POST-DEVELOPMENT YEAR 1999	POST-DEVELOPMENT YEAR 2008
SR 240 and Project Entrance #1				
Westbound	LT	---	---	E
Northbound	LT	---	---	F
	RT	---	---	A
SR 240 and Project Entrance #2				
Westbound	LT	A	B	F
Northbound	LT	C	E	F
	RT	A	A	A
SR 240 and Project Entrance #3				
Westbound	LT	---	B	E
Northbound	LT	---	D	F
	RT	---	A	A
SR 240 and Project Entrance #4				
Westbound	LT	---	---	D
Northbound	LT	---	---	F
	RT	---	---	A
SR 240 and Grosscup Road				
Eastbound	LT	A	A	A
Westbound	LT	A	A	B
Northbound	LT	B	C	E
	TH	A	B	D
	RT	A	A	A
Northbound	LT	B	C	E
	TH	A	C	D
	RT	A	A	A

Signal warrant analysis was also conducted on each proposed project entrance roadway and Grosscup Road. It was determined that signals may be warranted at project entrances #2 and #3 sometime before full development. Project Entrance #1 may also warrant a signal. There are 11 criteria established in the "Manual of Uniform Traffic Control Devices" for determining if a signal is warranted. Under most circumstances, more than one of the warrants should be satisfied before a signal is installed. The satisfaction of a warrant, however, does not always completely justify signalization. The appropriate signal warrant analyses which were evaluated are summarized in Table 3.

TABLE 3
SIGNAL WARRANT ANALYSIS

WARRANT	WARRANT ACHIEVED? YEAR 2008				
	ENTRANCE #1	ENTRANCE #2	ENTRANCE #3	ENTRANCE #4	GROSSCUP ROAD
# 1 - Minimum Vehicular Volume	No	No	No	No	No
# 2 - Interruption of Continuous Traffic	Yes	Yes	Yes	No	No
# 8 - Combination of Warrants	No	Yes	Yes	No	No
# 9 - Four Hour Volume	Yes	Yes	Yes	Yes	No
#11 - Peak Hour Volumes	No	Yes	Yes	No	No

The following observations were identified at each intersection within the project vicinity:

SR 240 AND BYPASS HIGHWAY INTERSECTION

The primary project impact to this intersection will be A.M. peak hour eastbound left turns and P.M. peak northbound left turns. It is anticipated that double left turn lane movements may be required on the eastbound SR 240 and the northbound Bypass Highway by the years 2001 and 2005 respectively. By 1999 it is anticipated that additional left turn lane storage will be required on eastbound SR 240.

PROJECT ENTRANCE #1

Project Entrance #1 will serve as the main entrance to the commercial activities at the project. This entrance is not planned until late in its development. If unsignalized at

full development, northbound lefts will be at LOS F and westbound lefts will be at LOS E. Based on poor levels of operation and meeting two (2) warrants in Table 3, a signal will likely be required here at full development. A center left turn lane, right turn deceleration lane, and acceleration lane are recommended on SR 240.

PROJECT ENTRANCE #2

Project Entrance #2 will be constructed in 1993 and will serve as the main project entrance. This entrance will be located in accordance with the City of Richland's conceptual extension of Kingston Road. In 1994, northbound left will be at LOS C. A center left turn lane, a right turn deceleration pocket, and acceleration lane are required initially.

In 1999, northbound lefts will function at LOS E and westbound lefts will function at LOS B. On SR 240 a full right turn deceleration lane will be required and the center left turn storage will need to be extended. If still unsignalized by 2008, both northbound and westbound lefts would experience LOS F. A signal will likely be required sometime between 1999 and 2008.

PROJECT ENTRANCE #3

Project Entrance #3 will be the second entrance constructed and will be required after approximately 600 units of housing. A center left turn lane, right turn deceleration lane and acceleration lane will be required on SR 240. By 1999 northbound lefts will be at LOS D and westbound lefts will be at LOS B. In 2008, if still unsignalized, northbound lefts will experience LOS F and westbound lefts will be at LOS E. A signal will likely be required sometime between 1999 and 2008.

PROJECT ENTRANCE #4

Project Entrance #4 will be a secondary entrance to serve the east end of the development and a proposed elementary school. A center left turn lane, right turn deceleration lane, and acceleration lane will be required on SR 240. Northbound lefts will function at LOS F and westbound lefts will experience LOS D. This intersection should be watched closely for the need for a signal after full development.

GROSSCUP ROAD AND SR 240 INTERSECTION

It is assumed that any project generated traffic accessing on Grosscup Road will use the Grosscup Road\SR 240 intersection. In 1994, northbound and southbound lefts will function at LOS B. In 1999, Grosscup Road north and south will function at LOS C. By 2008, northbound Grosscup Road will be at LOS B and southbound will be at LOS D. No improvements are required at this intersection.

SR 240 BYPASS HIGHWAY TO PROJECT ENTRANCE

Using equations from the ITE Trip Generation Manual, we have estimated the Average Daily Trips (ADT) generated by the project to be 33,158. The Manual suggests that 15% to 45% of trips generated by a multi-use development like Horn Rapids could be internally generated. This internal capture reduces the impact to the adjacent roadways. Assuming a 25% internal capture rate, the full project development will distribute over 24,000 ADT onto SR 240. Our analysis assumed the character of SR 240 changing from rural to suburban after approximately 1200 housing units. Under the suburban classification, a three lane facility can serve up to 16,000 ADT at LOS D. After achieving 16,000 ADT, the stretch of SR 240 from the Bypass Highway to Project Entrance #3 will probably need to be widened to four lanes with left turn lanes at intersections to maintain an LOS D. This need is based on the assumption that background traffic on SR 240 will grow at 1.5% annually.

INTERNAL PROJECT ROADS

The internal project roads will function well as two (2) lane facilities with left turn lanes at major intersections in the residential areas. Four (4) lanes with left turn lanes are recommended in commercial areas. Separate left and right turn lanes are required at all proposed project entrance intersections with SR 240. Sufficient future right-of-way should be provided at each entrance to accomodate the potential extension of roadways across SR 240 heading northeast.

VI. CONCLUSIONS AND RECOMMENDATIONS

The proposed Multi-Use Horn Rapids Development is expected to generate significant traffic volume increases on adjacent roadways by the time it is fully developed. Total average daily traffic generated from the proposed full development would be approximately 33,158. Assuming 15% to 45% internal capture rate ADT contributing to SR 240 would range from 28,185 to 18,237. Weekday 4:00 P.M. to 5:00 P.M. traffic is expected to generate the peak periods of flow which corresponds to the existing peak volume periods in this vicinity.

Based on detailed traffic counts, analysis and assumptions of traffic distribution, the following conclusions and recommendations are summarized for the project. Annual traffic growth rates on SR 240 adjacent to the project and on the Bypass Highway are assumed to be 1.5% and 3.0% respectively.

1) Traffic distribution patterns and intersection capacity analysis were conducted assuming SR 240 and Grosscup Road provide the only access to and from the development. If Kingston Road is extended from Van Giesen to Horn Rapids Road, north of the project, it could significantly affect distribution patterns and intersection capacities. Re-evaluation of project entrance impact should be required.

2) The annual traffic growth rate was assumed at 1.5% on SR 240 adjacent to the site. The area adjacent to the site is currently undeveloped but is positioned well for future industrial and commercial development. The Horn Rapids Development could serve as an attraction for this additional development.

3) Right turn deceleration lane, center left turn lane, and acceleration lane are warranted on SR 240 at each project entrance. The length of lanes and configuration should be as recommended in the **WSDOT Design Manual.** Separate left and right turn lanes are required on the entrance roads. Future right-of-way should be provided at each entrance to accomodate possible continuation to the northeast across SR 240.

4) Project Entrance #2 will be constructed in 1993 and will serve as the main project entrance. Project Entrance #3 will be required in 3-5 years after approximately 600 units of housing are complete. After 1999, Project Entrance #4 will be required to better distribute traffic onto SR 240. Project Entrance #1 will function as the main commercial entrance and should be constructed with the initial commercial developments, planned for later phases of the project.

5) SR 240 will probably need to be a four (4) lane facility with left turn lanes at intersections from the Bypass Highway through Project Entrance #3, depending on the actual internal capture rate of the Horn Rapids project and the future development of other properties adjacent to SR 240.

6) Project Entrance intersections were analyzed as unsignalized through design year 2008 and Levels of Service were summarized in Table 2. Signal Warrant analysis indicated signals will probably be warranted at Project Entrances #1, #2, and #3 by full development. Computer Capacity analysis indicate these intersections would operate at LOS C in the year 2008 if signalized. These intersections should be closely monitored on an annual basis to determine the actual warrant period for signal installation.

7) Internal project roads should be four (4) lanes with separate left turn lanes in commercial areas. Separate left turn lanes should be provided at all internal project intersections.

8) Additional northbound and eastbound left turn capacity will be required at the SR 240/Bypass Highway intersection by the year 2001. The SR 240 Metropolitan Transportation Study is now in progress. It will project traffic impacts and recommend improvements to the SR 240 Road system in Richland. The SR 240/Bypass Highway intersection is being analyzed as a part of that study. At 3% annual traffic growth, it is likely a seven lane facility with dual left turn lanes will be recommended by design year 2008.

9) It is difficult to reliably project traffic impacts beyond ten (10) years. Close monitoring of actual traffic and biannual movement traffic counts are required to determine the actual schedule for improvements recommended in this study.

10) SR 240 is currently classified as a Minor Arterial with partial access control. The Washington State Department of Transportation (WSDOT) Highway Design Manual recommends a minimum spacing of ½ mile between intersections. Variances from this spacing recommendation are sometimes allowed with justification. Project Entrances #2 and #3 will initially meet this spacing requirement. When Entrance #4 is constructed it will be slightly under ½ mile from Entrance #3 and from Grosscup Road. Project Entrance #1 will only be slightly more than ¼ mile from Entrance #2. Based on discussions with WSDOT officials, it is recommended that the developer submit the plan in full to WSDOT and the City of Richland and pursue implementation of access permits now for all four (4) of the proposed project entrances.

LEVEL OF SERVICE

LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS*

Level of Service for signalized intersections is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level of service criteria are stated in terms of the average stopped delay per vehicle for a 15 minute analysis period.

Delay may be measured in the field, or may be estimated using procedures presented later in this chapter. Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ration, and v/c ratio for the lane group or approach in question.

Level of Service A describes operation with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of Service B describes operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for L.O.S. A, causing higher levels of average delay.

Level of Service C describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or larger cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level of Service D describes operations with delay in the range of 25.1 to 40.0 seconds per vehicles. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E describes operations with delay in the range 40.1 to 60.0 seconds per vehicles. This is considered to be the limit of acceptable delay. These high delays values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level of Service F describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

* Taken from City of Moses Lake Traffic Study, 1982.

CAPACITY ANALYSIS COMPUTER PRINTOUTS

TRIP DISTRIBUTION

The estimated distribution of project generated trips by the proposed development assumes traffic will arrive and depart from the site in the general direction from which they came. Most of the traffic is expected to come from the Richland direction.

Figures 4, 5, and 6 illustrate the estimated project traffic assignments for general paths of development generated trips under peak conditions. The trips generated by the project were assigned to the area roadway network based upon distribution assumptions and the trip generation volume of Table 1. Figure 4 identifies P.M. peak hour project arrival and departure trips for 200 units of housing and the golf course all expected to use Entrance #2, the main project entrance. Figure 5 identifies P.M. peak hour arrivals and departures for an additional 1000 units of housing with another access to SR 240 at Entrance #3. Figure 6 shows P.M. peak arrivals and departures of the full development.

Figure 6 assumes a 25% capture rate of trips generated within the project. The ITE, Trip Generation Manual suggests that in Multi-Use Developments such as Horn Rapids, some of the trips made to on-site facilities would be generated from residents within the development. The Manual suggests this internal capture rate ranges from 15% to 45% of trips generated. We have assumed 25% of the P.M. peak trips generated would be internal and would not use the intersections on SR 240.

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... PROJECT ENTRANCE #1

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 03/27/93

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... PROJECT ENTRANCE #1, DESIGN YEAR 2008

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	269	50	--
THRU	718	957	0	--
RIGHT	80	0	180	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	2	2	--

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	NB	6.50	5.50	0.00	5.50
MAJOR LEFTS	WB	6.00	6.00	0.00	6.00
MINOR LEFTS	NB	8.50	8.50	0.00	8.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #1
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #1, DESIGN YEAR 2008

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
NB LEFT	55	35	8	8	-47	F
RIGHT	198	701	701	701	503	A
MAJOR STREET						
WB LEFT	296	366	366	366	70	E

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #1
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #1, DESIGN YEAR 2008

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... PROJECT ENTRANCE #2

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 0-27-1993

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	122	25	--
THRU	216	89	0	--
RIGHT	40	0	75	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	2	2	--

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	NB	6.50	5.50	0.00	5.50
MAJOR LEFTS	WB	6.00	6.00	0.00	6.00
MINOR LEFTS	NB	8.50	8.50	0.00	8.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #2
DATE AND TIME OF THE ANALYSIS..... 0-27-1993 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 1994

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
NB LEFT	28	349	306	306	278	C
RIGHT	83	966	966	966	883	A
MAJOR STREET						
WB LEFT	134	747	747	747	613	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #2
DATE AND TIME OF THE ANALYSIS..... 0-27-1993 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 1994

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... PROJECT ENTRANCE #2

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 3-27-1993

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 1999

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	303	30	--
THRU	233	296	0	--
RIGHT	68	0	178	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	2	2	--

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	NB	6.50	5.50	0.00	5.50
MAJOR LEFTS	WB	6.00	6.00	0.00	6.00
MINOR LEFTS	NB	8.50	8.50	0.00	8.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #2
DATE AND TIME OF THE ANALYSIS..... 3-27-1993 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 1999

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
NB LEFT	33	159	97	97	64	E
RIGHT	196	942	942	942	746	A
MAJOR STREET						
WB LEFT	333	709	709	709	376	B

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #2
DATE AND TIME OF THE ANALYSIS..... 3-27-1993 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 1999

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... PROJECT ENTRANCE #2

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 3-27-1993

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 2008

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	328	50	--
THRU	798	679	0	--
RIGHT	80	0	221	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	2	2	--

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	NB	6.50	5.50	0.00	5.50
MAJOR LEFTS	WB	6.00	6.00	0.00	6.00
MINOR LEFTS	NB	8.50	8.50	0.00	8.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #2
DATE AND TIME OF THE ANALYSIS..... 3-27-1993 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 2008

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
NB LEFT	55	35	0	0	-55	F
RIGHT	243	672	672	672	429	A
MAJOR STREET						
WB LEFT	361	328	328	328	-33	F

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #2
DATE AND TIME OF THE ANALYSIS..... 3-27-1993 ;. P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #2, DESIGN YEAR 2008

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... PROJECT ENTRANCE #3

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 03/27/93

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... PROJECT ENTRANCE #3, DESIGN YEAR 2008

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	328	50	--
THRU	658	401	0	--
RIGHT	80	0	220	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	2	2	--

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	NB	6.50	5.50	0.00	5.50
MAJOR LEFTS	WB	6.00	6.00	0.00	6.00
MINOR LEFTS	NB	8.50	8.50	0.00	8.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #3
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #3, DESIGN YEAR 2008

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
NB LEFT	55	44	6	6	-49	F
RIGHT	242	728	728	728	486	A
MAJOR STREET						
WB LEFT	361	401	401	401	40	E

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #3
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #3, DESIGN YEAR 2008

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... PROJECT ENTRANCE #4

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 03/27/93

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... PROJECT ENTRANCE #4, DESIGN YEAR 2008

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	269	50	--
THRU	558	182	0	--
RIGHT	80	0	180	--

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	2	2	--

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	-----	---	---	-

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	---	---	---

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	NB	6.50	5.50	0.00	5.50
MAJOR LEFTS	WB	6.00	6.00	0.00	6.00
MINOR LEFTS	NB	8.50	8.50	0.00	8.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #4
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #4, DESIGN YEAR 2008

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
NB LEFT	55	105	46	46	-9	F
RIGHT	198	773	773	773	575	A
MAJOR STREET						
WB LEFT	296	458	458	458	162	D

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... PROJECT ENTRANCE #4
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... PROJECT ENTRANCE #4, DESIGN YEAR 2008

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... GROSSCUP ROAD

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 03/27/93

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... GROSSCUP INTERSECTION, DESIGN YEAR 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	6	14	51	35
THRU	201	93	9	18
RIGHT	102	7	19	5

NUMBER OF LANES AND LANE USAGE

	EB	WB	NB	SB
LANES	1	1	1	1

LANE USAGE LTR LTR

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	N
SOUTHBOUND	0.00	90	35	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS					
	NB	6.50	6.50	0.00	6.50
	SB	6.50	6.50	0.00	6.50
MAJOR LEFTS					
	EB	5.50	5.50	0.00	5.50
	WB	5.50	5.50	0.00	5.50
MINOR THROUGHS					
	NB	7.50	7.50	0.00	7.50
	SB	7.50	7.50	0.00	7.50
MINOR LEFTS					
	NB	8.00	8.00	0.00	8.00
	SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... GROSSCUP ROAD
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... GROSSCUP INTERSECTION, DESIGN YEAR 1994

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH		LOS
MINOR STREET									
NB LEFT	56	419	400	>	400	>	343	>	B
THROUGH	10	476	469	> 451	469	> 365	459	>B	A
RIGHT	21	676	676	>	676	>	655	>	A
MINOR STREET									
SB LEFT	39	387	369	>	369	>	330	>	B
THROUGH	20	443	436	> 408	436	> 344	416	>B	A
RIGHT	6	824	824	>	824	>	818	>	A
MAJOR STREET									
EB LEFT	7	995	995		995		988		A
WB LEFT	15	787	787		787		772		A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... GROSSCUP ROAD
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... GROSSCUP INTERSECTION, DESIGN YEAR 1994

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... GROSSCUP ROAD

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 03/27/93

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... GROSSCUP INTERSECTION DESIGN YEAR 1999

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	6	22	55	45
THRU	309	149	10	20
RIGHT	109	14	27	5

NUMBER OF LANES AND LANE USAGE

	EB	WB	NB	SB
LANES	1	1	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	N
SOUTHBOUND	0.00	90	35	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS					
	NB	6.50	6.50	0.00	6.50
	SB	6.50	6.50	0.00	6.50
MAJOR LEFTS					
	EB	5.50	5.50	0.00	5.50
	WB	5.50	5.50	0.00	5.50
MINOR THROUGHS					
	NB	7.50	7.50	0.00	7.50
	SB	7.50	7.50	0.00	7.50
MINOR LEFTS					
	NB	8.00	8.00	0.00	8.00
	SB	8.00	8.00	0.00	8.00

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... GROSSCUP ROAD
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... GROSSCUP INTERSECTION DESIGN YEAR 1999

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p		ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH		LOS
MINOR STREET										
NB LEFT	61	307	>	286	>	286	>	226	>	C
THROUGH	11	358	>	349	>	345	349	> 244	338	>C B
RIGHT	30	587	>	587	>		587	>	558	> A
MINOR STREET										
SB LEFT	50	277	>	257	>	257	>	208	>	C
THROUGH	22	329	>	321	>	287	321	> 210	299	>C C
RIGHT	6	764	>	764	>		764	>	759	> A
MAJOR STREET										
EB LEFT	7	929		929			929		922	A
WB LEFT	24	687		687			687		663	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... GROSSCUP ROAD
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... GROSSCUP INTERSECTION DESIGN YEAR 1999

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 55

PEAK HOUR FACTOR..... 1

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... S.R. 240

NAME OF THE NORTH/SOUTH STREET..... GROSSCUP ROAD

NAME OF THE ANALYST..... VJL

DATE OF THE ANALYSIS (mm/dd/yy)..... 03/27/93

TIME PERIOD ANALYZED..... P.M. PEAK HOUR

OTHER INFORMATION.... GROSSCUP INTERSECTION DESIGN YEAR 2008

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	8	33	87	50
THRU	519	174	21	35
RIGHT	192	25	69	6

NUMBER OF LANES AND LANE USAGE

	EB	WB	NB	SB
LANES	2	2	2	2

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	0.00	90	35	Y

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS					
	NB	6.50	5.50	0.00	5.50
	SB	6.50	5.50	0.00	5.50
MAJOR LEFTS					
	EB	6.00	6.00	0.00	6.00
	WB	6.00	6.00	0.00	6.00
MINOR THROUGHS					
	NB	8.00	8.00	0.00	8.00
	SB	8.00	8.00	0.00	8.00
MINOR LEFTS					
	NB	8.50	8.50	0.00	8.50
	SB	8.50	8.50	0.00	8.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... GROSSCUP ROAD
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... GROSSCUP INTERSECTION DESIGN YEAR 2008

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH		LOS
MINOR STREET									
NB LEFT	96	149	115		115		19		E
THROUGH	23	186	175	>	175	>	152	>	D
RIGHT	76	740	740	> 422	740	> 323	664	>B	A
MINOR STREET									
SB LEFT	55	109	89		89		34		E
THROUGH	39	157	147	>	147	>	109	>	D
RIGHT	7	995	995	> 168	995	> 123	988	>D	A
MAJOR STREET									
EB LEFT	9	796	796		796		787		A
WB LEFT	36	416	416		416		380		B

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... S.R. 240
NAME OF THE NORTH/SOUTH STREET.... GROSSCUP ROAD
DATE AND TIME OF THE ANALYSIS..... 03/27/93 ; P.M. PEAK HOUR
OTHER INFORMATION.... GROSSCUP INTERSECTION DESIGN YEAR 2008

9. Critical Areas Report

Quail Ridge III
Critical Areas Report
Richland, Washington

Date: March 2025

Prepared for: Pahlisch Homes, Inc.
210 SW Wilson Avenue, Suite 100
Bend, Oregon 97702

Prepared by: AKS Engineering & Forestry, LLC
Emma Eichhorn, Natural Resource Specialist
Stacey Reed, PWS, Senior Scientist
eichhorne@aks-eng.com | (503) 563-6151 Ext. 153

Project Area: Parcels 120083020010000, and portions of Parcels 120083020009000, 120083000009023 and 120082020003000 and of Township 10N, Range 28E, Section 20
Richland, Benton County, Washington

AKS Job Number: 9141

AKS ENGINEERING & FORESTRY
9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

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Figures

Appendices

Introduction

AKS Engineering & Forestry, LLC (AKS) was contracted by Pahlisch Homes, Inc. (Applicant) to conduct a Critical Areas Assessment for the Quail Ridge III residential subdivision project. The project area is approximately 19.89 acres and consists of Benton County Parcels 120083020010000 and 120083000009023, and portions of Benton County Parcels 120083020009000 and 120082020003000. The site is located south of Washington State Route 240 (SR 240) and north of Village Parkway within the City of Richland, Benton County, Washington, at latitude 46.335006°, longitude -119.336093° (Figures 1 and 2).

AKS conducted a site visit on March 4, 2025, and determined that no potentially jurisdictional Fish and Wildlife Habitat Conservation Areas (FWHCAs), including priority habitat and species, are present within the project area. The site does not contain habitat for priority species ferriginous hawk or burrowing owl, or priority shrubsteppe habitat. A critical areas assessment was conducted by PBS Engineering and Environmental (PBS) in 2021 for the adjacent portions of the subdivision, which also documented no regulated FWHCAs in the immediate vicinity. Their report was approved by the City of Richland under file No. S2021-206.

This report has been prepared to meet Chapter 22.10.200 of Article IV Fish and Wildlife Habitat Conservation Areas of Richland Development Code (RDC).

General Site Description and Land Use History

The project area is undeveloped and located adjacent to existing residential development. There are several unimproved dirt roads and footpaths transecting the property. Review of Google Earth aerial photos shows unimproved roads have been present within the project area since prior to 1996. The surrounding land uses include residential subdivisions to the south and east and agricultural land use to the north and west. SR 240 borders the project area to the north and Village Parkway borders the project area to the south. The City's landfill is located to the north of the project area. Scattered trash was observed throughout the project area during the site visit on March 4, 2025.

The topography of the project area consists of generally flat terrain. The project area is dominant in cheatgrass (*Bromus tectorum*), cereal rye (*Secale cereale*), rubber rabbitbrush (*Ericameria nauseosa*), and snow buckwheat (*Eriogonum niveum*). Big sagebrush (*Artemesia tridentata*), hedge mustard (*Sisymbrium altissimum*), a salsify species (*Tragopogon spp.*), perennial rye grass (*Lolium perenne*), prickly Russian-thistle (*Salsola* tragus), an amaranth species (*Amaranth* spp.), Menzies' fiddleneck (*Amsinckia tessellata*), common yarrow (*Achillea millefolium*), and balsamroot (*Balsamorhiza* spp.) were present in lesser amounts.

Background Mapping

Soils

According to the Natural Resources Conservation Service (NRCS) Benton County Washington Area Soil Survey Map, the following soil units are mapped within the project site (Figure 3):

- Quincy loamy sand (Unit QuD), 2 to 15 percent slopes; Non-hydric
- Quincy loamy sand (Unit QuE), 0 to 30 percent slopes; Non-hydric

Wetland and Waters Mapping

According to the US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) map, no wetlands are mapped in the project area (Figure 4).

According to the Washington State Department of Natural Resources (DNR) Water Type map, no water courses are mapped within the project area (Figure 5).

The DNR Washington Natural Heritage Program (WNHP) map does not show wetlands of high conservation value or known rare plants in the project area. According to WNHP, presence of gray cryptantha (*Cryptantha leucophaea)* was noted within 0.5 miles and is listed as a state sensitive species. Gray cryptantha was not observed within the project area during the site visit on March 4, 2025.

According to the City of Richland Critical Areas Map, no critical areas are mapped within the project area.

Washington Department of Fish and Wildlife Priority Habitat and Species Mapping

The Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) map indicates the potential for ferruginous hawks (*Buteo reglalis*) and burrowing owl (*Athene cunicularia*) to have the potential to be present in the vicinity of the project area. Ferruginous hawks are designated as an Endangered species in Washington state. Ferruginous hawks are known to nest on power line towers in the vicinity of the project area. No power line towers are present within the project area.

According to the WDFW species profile, ferruginous hawks prefer arid grasslands and shrubsteppe habitats. Breeding generally occurs from late April through July. According to the WDFW species profile, they prey primarily on small to medium-size mammals including rabbits, ground squirrels, mice, and pocket gophers.

Previously recorded observations of burrowing owl dens have been documented to the east of the project area, near the Horn Rapids Golf Course. Burrowing owls are designated as a Candidate species in Washington state. According to the WDFW *Threatened and Endangered Wildlife in Washington: 2012 Annual Report*, burrowing owls prefer grassland and shrubsteppe habitats. Burrowing owls are ground nesting and are known to use unoccupied burrows from other mammals such as badgers. Hatchlings typically emerge in May and at two to three weeks, the young begin to use other burrows near their primary nesting burrow (WDFW *Management Recommendations for Washington's Priority Species: Vol. IV: Birds)*.

The WDFW PHS map indicates potential priority shrubsteppe habitat within the vicinity of the project area (Figure 6). According to WDFW's *Priority Habitat and Species List* (updated June 2023), shrubsteppe is defined as "having one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of native shrubs, typically dominated by big sagebrush." Healthy shrubsteppe supports a surface layer of cryptobiotic crust (a thin crust composed of mosses, lichens, algae, and bacteria). Priority shrubsteppe habitat will typically have an average of at least 30 percent shrub canopy cover.

Site Visit Methods

A site visit was conducted on March 4, 2025, by AKS qualified biologists Margret Harburg and Jess Jones to document whether priority habitat and/or species were present in the project area. To ensure coverage of the entire site, the entire site was traversed in meandering transects spaced 25 feet apart, noting vegetation type and percent areal cover, topographic features, evidence of wildlife utilization, and other notable features. The weather conditions during the site visit were ±50 degrees Fahrenheit, with no

precipitation, and partly cloudy with an average wind speed of 5 miles per hour. According to WDFW, the burrowing owl is small, typically creating a burrow opening of 4-6-inches wide. The project area was traversed documenting and diameter of any burrow opening and notes on whether each burrow appeared active (occupied) or inactive (unoccupied). Physical indicators of potential active burrowing owl burrows include signs of fresh scratching, prey pellets, fecal stains, and/or feathers.

Shrubsteppe habitat was assessed using the field methodology outlined in Appendix 9 of WDFW's *Management Recommendations for Washington's Priority Habitats: Shrubsteppe* (updated September 2020), which includes an assessment of the percent cover of continuous native sagebrush layer, co-dominant herbaceous vegetation, lack of invasive vegetation species, and presence of biological soil crust.

Common and scientific names of plants are shown as listed on the US Department of Agriculture (USDA) NRCS Plants online database. Representative site photographs are included in Appendix A.

Site Visit Results

Shrubsteppe

Herbaceous vegetation within the project area was dominant in invasive cheatgrass and non-native cereal rye, with lesser amounts of non-native and native herbs. None of the grasses documented in the project area meet the definition of "perennial bunchgrass" required for WDFW priority shrubsteppe habitat. Native woody vegetation (big sagebrush) was mostly scattered and totaled ±10 percent absolute cover across the entire project area. One continuous patch of big sagebrush had ±25 percent absolute cover. No cryptobiotic soil crust was observed. Due to having less than 30 percent continuous cover of native sagebrush, no perennial bunchgrasses, and a lack of cryptobiotic soil crust, the project area does not meet WDFW's definition for priority habitat shrubsteppe.

Burrowing Owl

During the site visit on March 4, 2025, only one potentially active burrow with at least an approximately 5-inches-wide burrow opening was observed (Photo D, Appendix A). In addition, a total of 12 small +/-1-inch wide burrows were observed along the roadside ditch, likely occupied by mice or meadow voles (*Microtus* spp.), along with +/- 24 collapsed burrows documented throughout the project area. Each of the burrows appeared inactive and old. All burrows observed lacked evidence of active owl presence such as prey pellet, fecal stains, food scraps, footprints, or evidence of recent ground disturbance/scratching. Many of the burrows were collapsed with spider webs across the openings, lacking evidence of recent use. For these reasons, the burrows observed on-site were determined not to be used by burrowing owl during the March 2025 site visit.

According to the WDFW species profile, burrowing owls prefer habitats with an adequate and diverse supply of food, which mainly consists of insects, small mammals, birds, and reptiles. During the site visit on March 4, 2025, only potential evidence of mice (small burrows) were observed. No evidence of common prey species, including rabbits or reptiles, were observed. Due to a lack of diverse food availability, lack of obvious signs of active burrowing owl burrows, and no visual observations of any owls during the site visit, it is our best professional opinion that no burrowing owls are present within the project area.

Ferruginous Hawk

During the June 2023 site visit, no ferruginous hawks were observed. No nests were observed on the ground within the project area, or on power line towers in the vicinity of the project area. According to a

1991 survey of ferruginous hawk nests conducted by Washington Cooperative Fish and Wildlife Research Unit (WCFWRU), ±73 percent of the nests surveyed were at least 1.25 miles from active roads and urbanized areas, a testament to the need for disturbance-free nesting habitat. The project area is surrounded by active roads and residential development. Considering a lack of adequate prey, no observations of nests, and proximity to residential development and high-traffic roads, it is our best professional opinion that the project area is not suitable habitat for ferruginous hawks.

Conclusions

Due to a lack of FWHCA in the project area, this project is compliant with standards listed under RMC Chapter 22.10. The project site does not contain any FWHCAs regulated by the City under Chapter 22.185 of RDC.

Statement of Preparation

This assessment was prepared in accordance with the Washington State Department of Fish and Wildlife Priority Species and Habitat Management Recommendations reporting standards and in accordance with the City of Richland's Critical Areas Ordinance (Chapter 22.10). Fieldwork and reporting were conducted by qualified professionals with experience conducting similar projects in Washington. Information contained in this document should be considered preliminary and used at your own risk until it has been reviewed and approved in writing by the appropriate local, state, or federal agencies with jurisdiction over natural resources on the site.

Qualifications

Emma Eichhorn is an AKS Natural Resource Specialist with over seven years of direct experience conducting plant and wildlife surveys for public and private clients throughout Washington and Oregon. Emma has a bachelor's degree in Biology from Portland State University.

Stacey Reed is a qualified scientist/biologist with 25 years of experience providing natural resource services to private and public clients throughout Washington and Oregon. Stacey has a bachelor's degree from The Evergreen State College in Washington, with coursework emphasis on Environmental Science and Restoration Ecology. Throughout her career, Stacey has conducted terrestrial PHS surveys, including assessments for large-scale wind farm and linear pipeline projects in Klickitat County.

Emma Eichhorn
Natural Resource Specialist
Report Preparation

Stacey Reed, PWS
Senior Scientist
Report QA/QC

Literature Cited and Referenced

Azerrad, J.M., K.A. Divens, M.F. Livingston, M.S. Teske, H.L. Ferguson, and J.L. Davis. 2011. *Management Recommendations for Washington's Priority Habitats: Managing Shrub-steppe in Developing Landscapes*. Olympia (WA): Washington Department of Fish and Wildlife.

Azerrad, J.M., K.A. Divens, M.F. Livingston, M.S. Teske, H.L. Ferguson, and J.L. Davis. 2011. *Site-specific Management: How to Avoid and Minimize Impacts of Development to Shrub-steppe*. Olympia (WA): Washington Department of Fish and Wildlife.

DNR. 2025. *Washington National Heritage Program Rare Plants and High-Quality Wetlands Database*. Olympia (WA) Washington State Department of Natural Resources. Available at: https://www.dnr.wa.gov/NHPwetlandviewer [Accessed March 2025].

DNR. 2025. *Forest Practices Application Mapping Tool*. Olympia (WA): Washington State Department of Natural Resources. Available at: https://fpamt.dnr.wa.gov/ [Accessed March 2025].

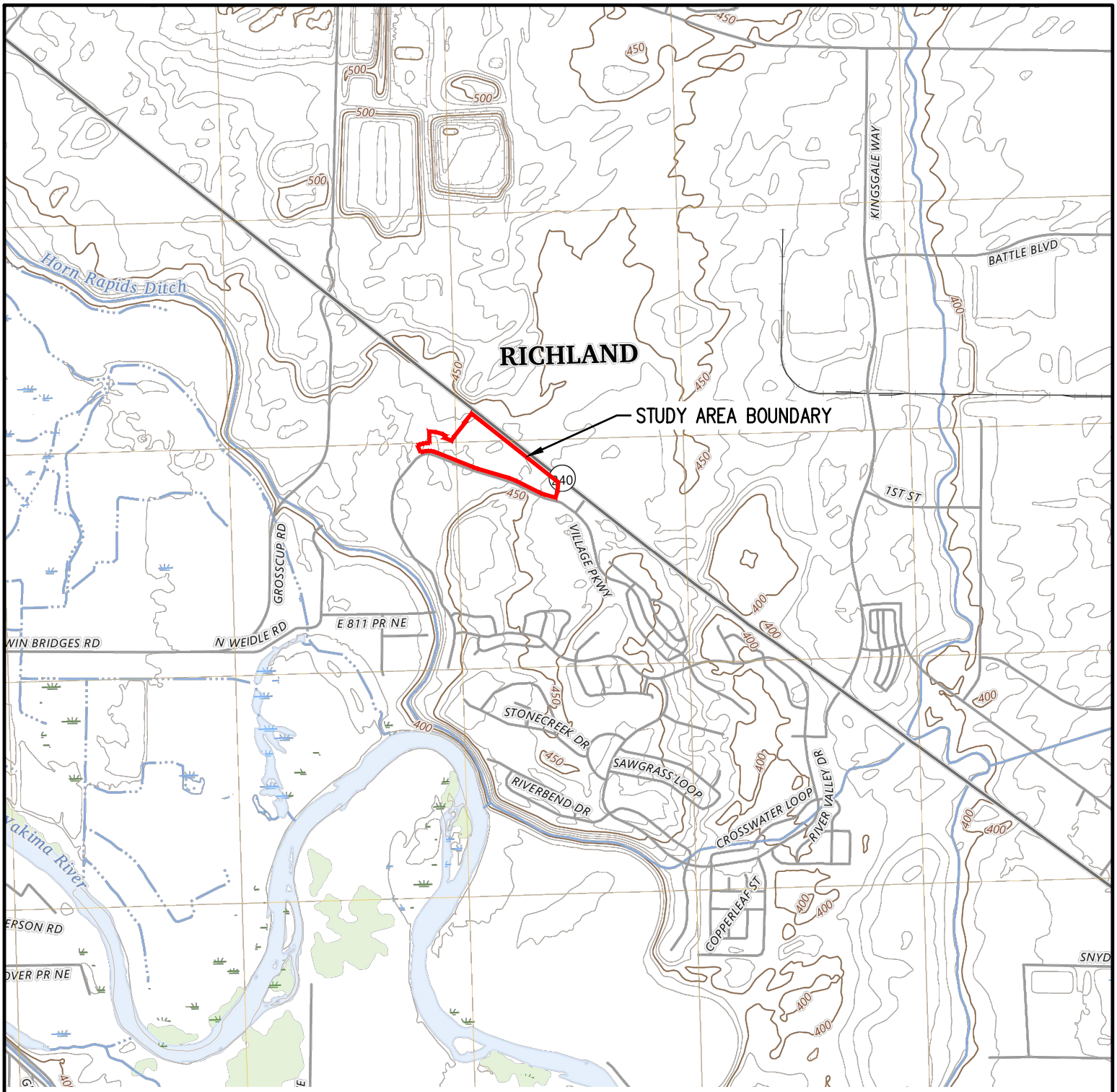
NRCS. 2025. *Web soil survey*. Washington (DC): Natural Resources Conservation Service. Available at: http://websoilsurvey.nrcs.usda.gov/app/ [Accessed March 2025].

USFWS. 2025. *Wetlands Mapper*. Washington (DC): US Fish and Wildlife Service. Available at: https://www.fws.gov/wetlands/data/Mapper.html [Accessed March 2025].

WDFW. 2020. *Management Recommendations for Washington's Priority Habitats: Shrubsteppe.* Olympia (WA): Washington Department of Fish and Wildlife.

WDFW. 2025. *Priority Habitats and Species Data*. Olympia (WA): Washington Department of Fish and Wildlife. https://wdfw.wa.gov/conservation/phs/ [Accessed March 2025].

WCFWRU. 1991. *Washington Gap Analysis Predicted Distribution Map: Ferruginous Hawk (Buteo regalis)*. Seattle (WA): University of Washington.



USGS 7.5' TOPOGRAPHIC SERIES QUADRANGLE:
RICHLAND, WA (2023)

N

SCALE: 1"= 2000 FEET

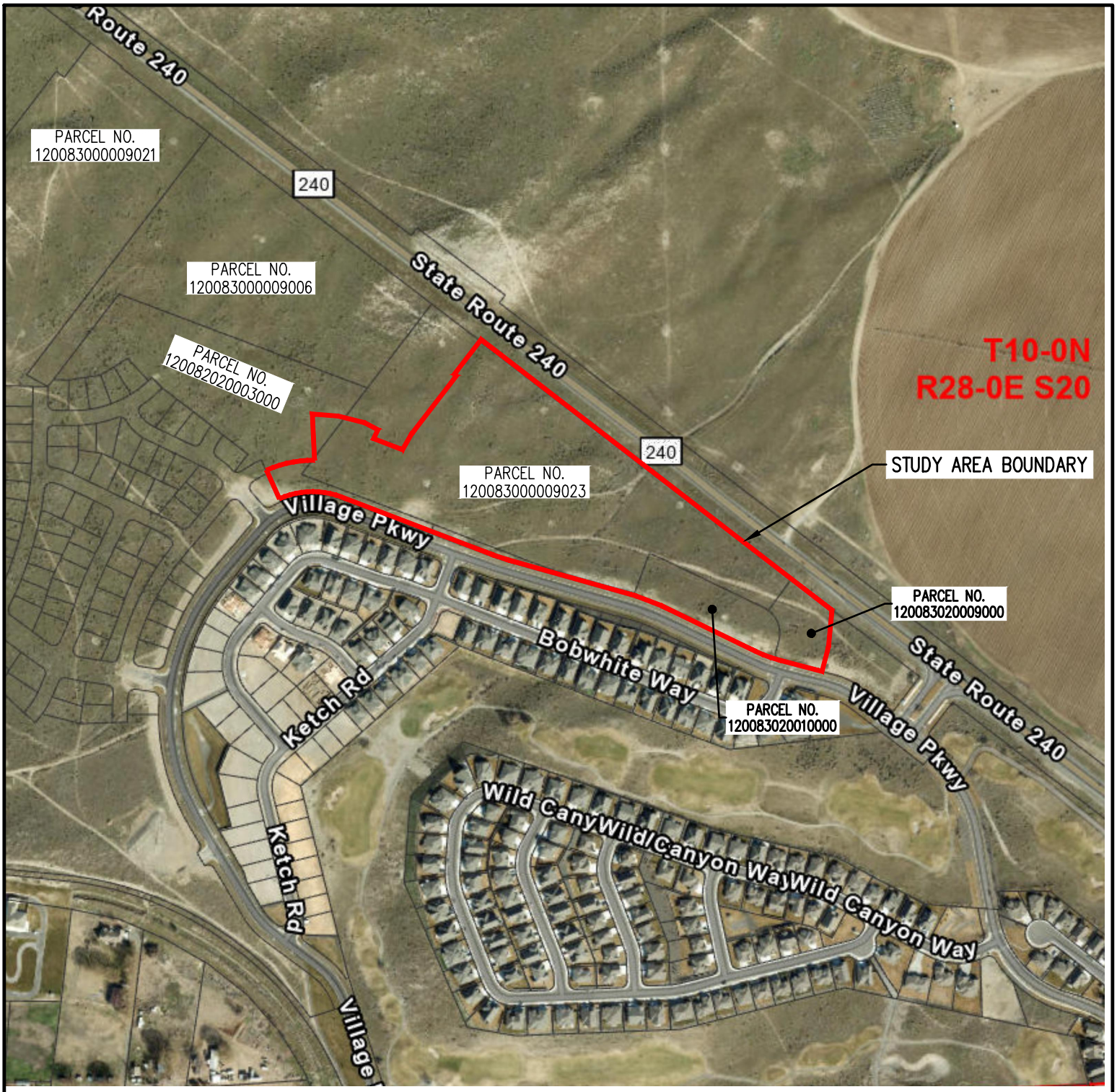
2000 0 400 1000 2000

ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 03/10/2025

USGS VICINITY MAP **QUAIL RIDGE III CRITICAL AREAS ASSESSMENT**	FIGURE 1
AKS ENGINEERING & FORESTRY, LLC 9600 NE 126TH AVE, STE 2520 VANCOUVER, WA 98682 P: 360.882.0419 F: 360.882.0426 aks-eng.com	DRWN: GPM CHKD: EE AKS JOB: 9141

DWG: 9141 PHASE 5 BACKGROUND FIGURES | FIGURE 1



N

SCALE: 1"= 500 FEET

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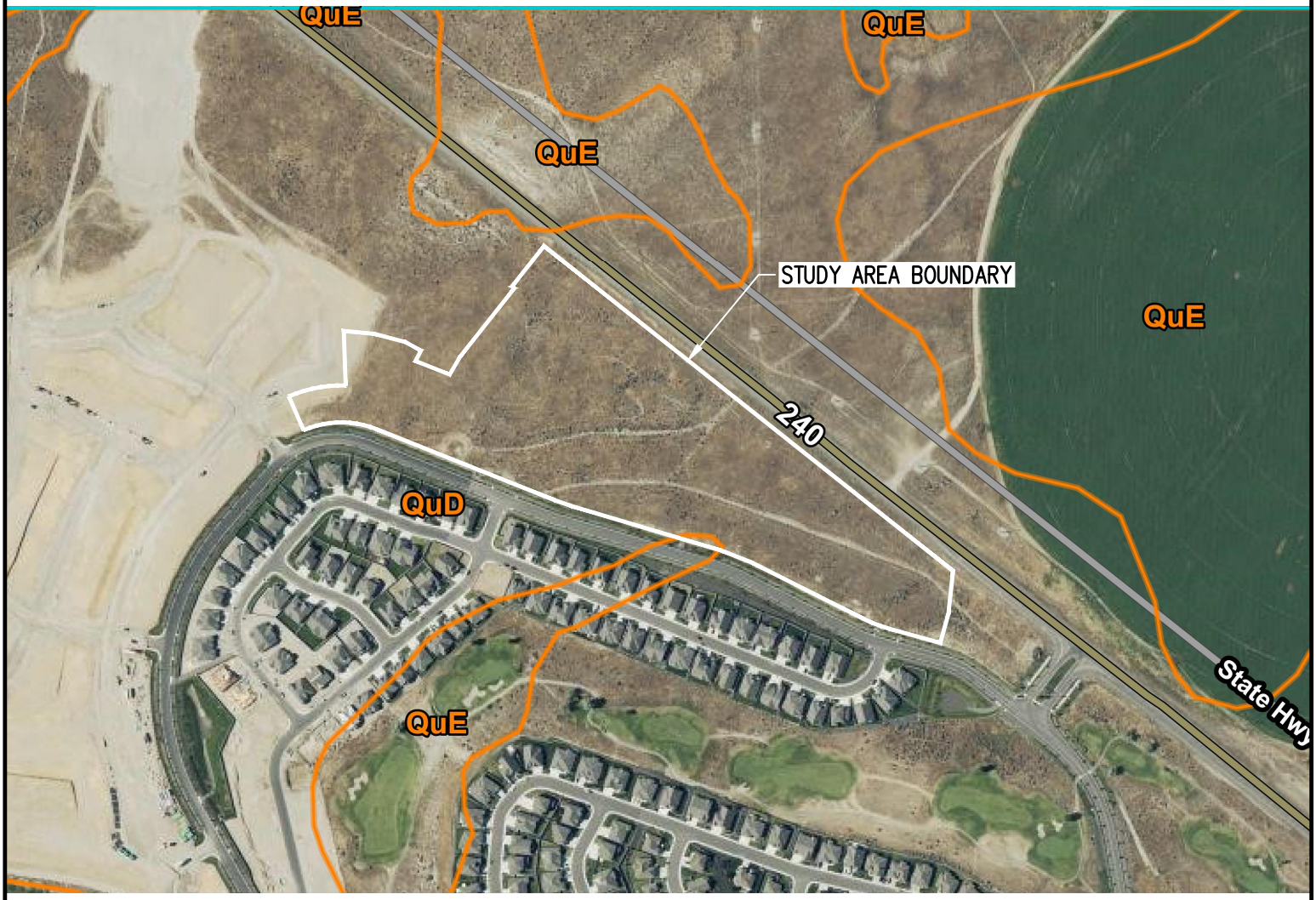
ORIGINAL PAGE SIZE: 8.5" X 11"

BENTON COUNTY
SEC. 20, T.10N., R.28E.
PARCEL NO. 120083020010000 AND PORTIONS OF
PARCELS NO. 120082020003000,
120083020009000, 120083000009023, AND R.O.W

DATE: 03/10/2025

PARCEL MAP QUAIL RIDGE III CRITICAL AREAS ASSESSMENT	FIGURE 2
AKS ENGINEERING & FORESTRY, LLC 9600 NE 126TH AVE, STE 2520 VANCOUVER, WA 98682 P: 360.882.0419 F: 360.882.0426 aks-eng.com	DRWN: GPM CHKD: EE AKS JOB: 9141

DWG: 9141 PHASE 5 BACKGROUND FIGURES | FIGURE 2



MAP UNIT SYMBOL	MAP UNIT NAME
QUD	QUINCY LOAMY SAND, 2% TO 15% SLOPES; NON-HYDRIC
QuE	QUINCY LOAMY SAND, 0% TO 30% SLOPES; NON-HYDRIC

N

SCALE: 1"= 500 FEET

500 0 100 250 500

ORIGINAL PAGE SIZE: 8.5" X 11"

NRCS WEB SOIL SURVEY FOR
BENTON COUNTY

DATE: 03/10/2025

NRCS SOIL SURVEY MAP
QUAIL RIDGE III CRITICAL AREAS ASSESSMENT

FIGURE 3

AKS ENGINEERING & FORESTRY, LLC
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Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

US FISH & WILDLIFE SERVICE
NATIONAL WETLAND INVENTORY

N

SCALE: 1"=1000 FEET

1000 0 200 500 1000

ORIGINAL PAGE SIZE: 8.5" x 11"

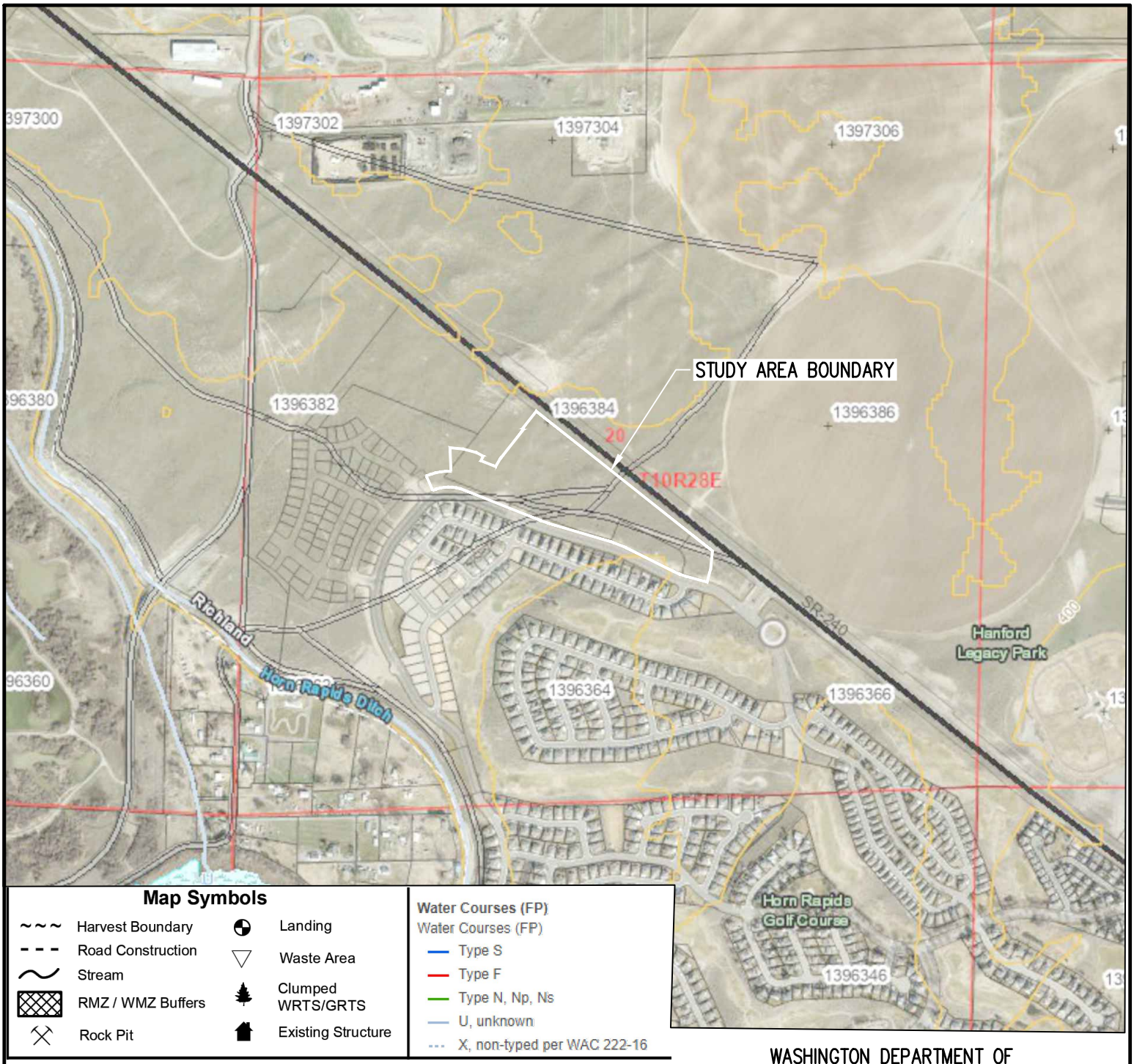
DATE: 03/10/2025

NATIONAL WETLAND INVENTORY MAP
QUAIL RIDGE III CRITICAL AREAS ASSESSMENT

FIGURE 4

AKS ENGINEERING & FORESTRY, LLC
9600 NE 126TH AVE, STE 2520
VANCOUVER, WA 98682
P: 360.882.0419 F: 360.882.0426 aks-eng.com

DRWN: GPM
CHKD: EE
AKS JOB: 9141



WASHINGTON DEPARTMENT OF NATURAL RESOURCES (2025)

N

SCALE: 1"=1000 FEET

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ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 03/10/2025

DNR WATER TYPE MAP
QUAIL RIDGE III CRITICAL AREAS ASSESSMENT

FIGURE 5

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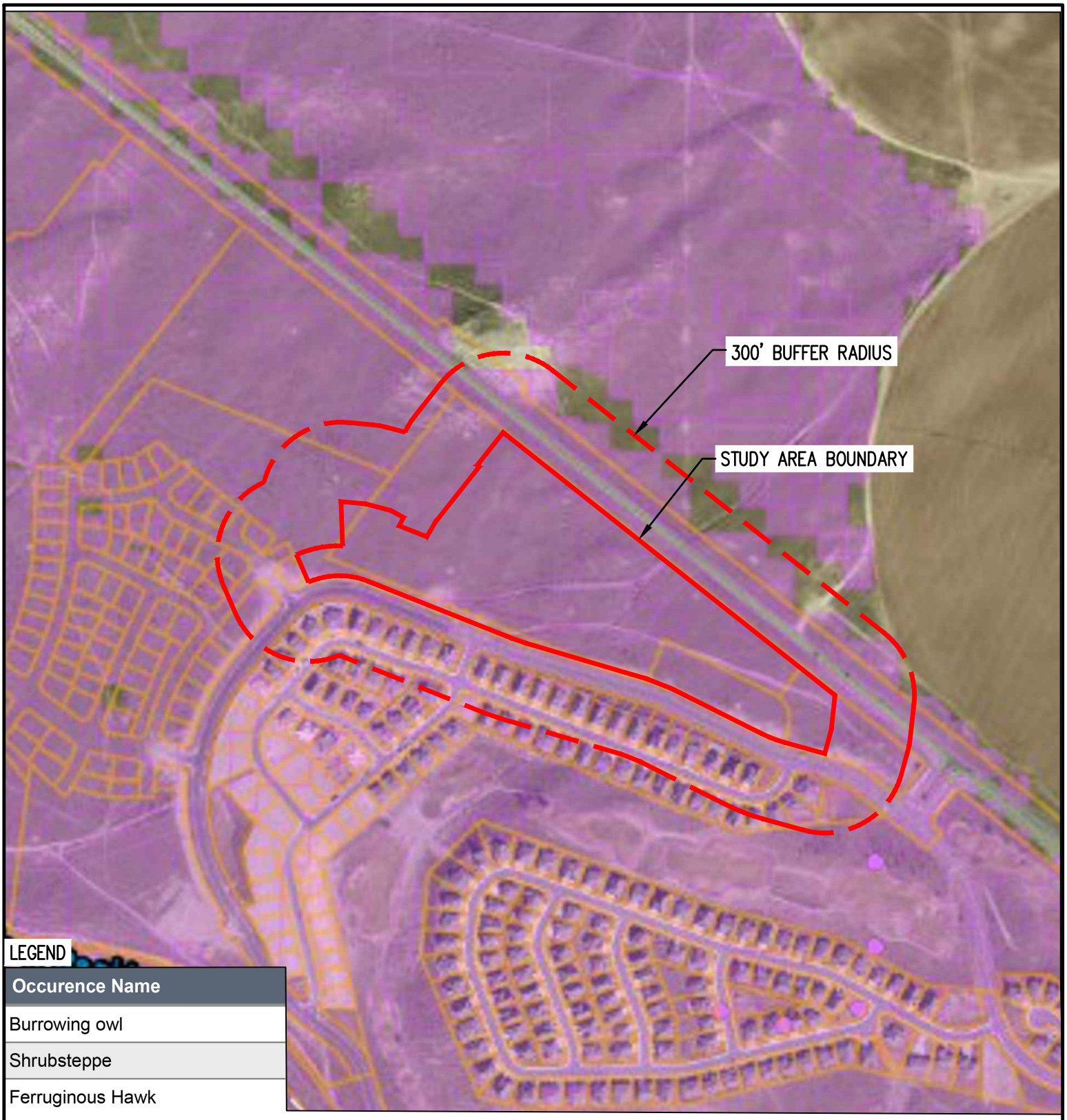
CHKD: EE
AKS JOB: 9141



LEGEND

Occurence Name
Burrowing owl
Shrubsteppe
Ferruginous Hawk

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (2025)

N

SCALE: 1"= 500 FEET

500 0 100 250 500

ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 03/10/2025

PRIORITY HABITAT AND SPECIES MAP
QUAIL RIDGE III CRITICAL AREAS ASSESSMENT

FIGURE 6

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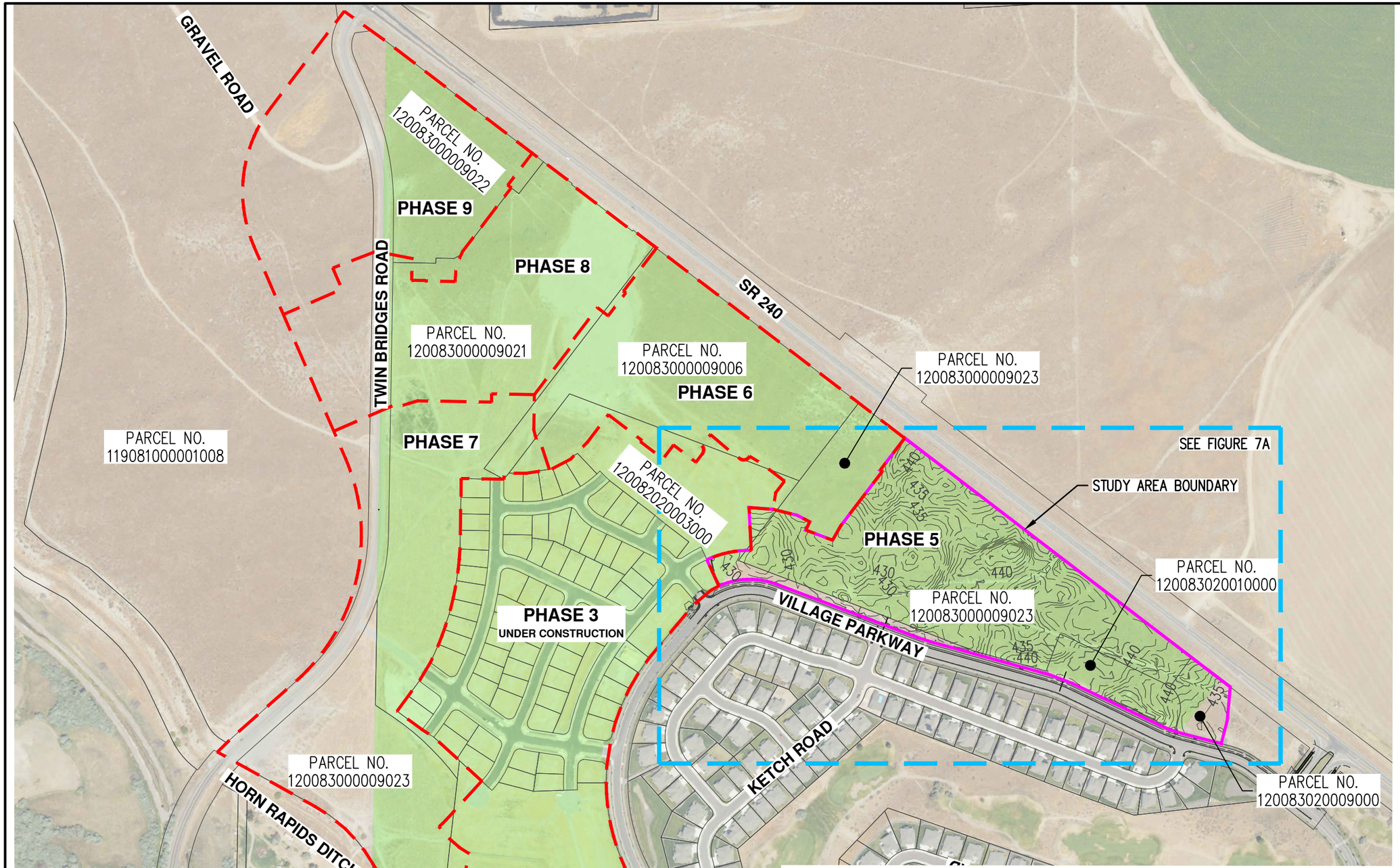
VANCOUVER, WA 98682
P: 360.882.0419 F: 360.882.0426 aks-eng.com

DRWN: GPM
CHKD: EE
AKS JOB: 9141



N

SCALE: 1"= 400 FEET

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ORIGINAL PAGE SIZE: 11" x 17"

LEGEND (COLOR COPY):

CRITICAL AREAS ASSESSMENT CONDUCTED BY PBS ENGINEERING AND ENVIRONMENTAL INC. AND APPROVED BY CITY OF RICHLAND UNDER FILE NO. S2021-206

AKS ENGINEERING & FORESTRY, LLC (AKS) CONDUCTED A SITE VISIT ON MARCH 04, 2025. NO PRIORITY SPECIES OR HABITAT WERE DOCUMENTED IN THE STUDY AREA.

1-FOOT INTERVAL GROUND CONTOURS DERIVED FROM AKS PROFESSIONAL LAND SURVEY (2022) WITH SUBMETER ACCURACY. PARCEL PROPERTY LINES OBTAINED FROM GIS DATABASE. AERIAL DERIVED FROM NAIP (2023).

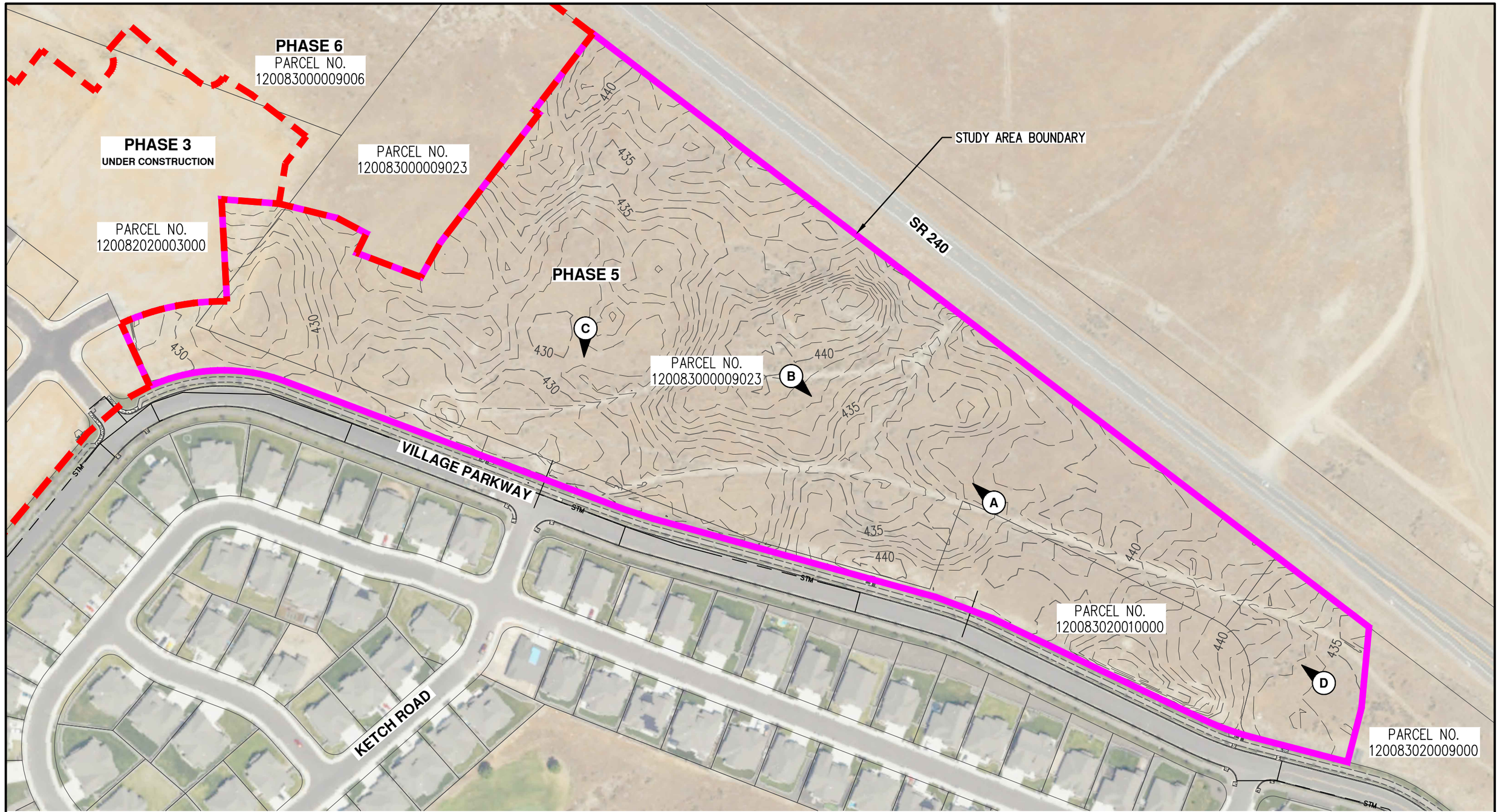
DATE: 03/10/2025

CRITICAL AREAS EXISTING CONDITIONS OVERVIEW	FIGURE 7
QUAIL RIDGE III CRITICAL AREAS ASSESSMENT	

AKS ENGINEERING & FORESTRY, LLC
9600 NE 126TH AVE, STE 2520
VANCOUVER, WA 98682
360.882.0419 WWW.AKS-ENG.COM

DRWN: GPM
CHKD: EE
AKS JOB: 9141

DWG: 9141 PHASE 5 CAA EXCOND | FIGURE 7



LEGEND (COLOR COPY):

(A) PHOTO POINT LOCATION AND ORIENTATION

AKS ENGINEERING & FORESTRY, LLC (AKS) CONDUCTED A SITE VISIT ON MARCH 04, 2025. NO PRIORITY SPECIES OR HABITAT WERE DOCUMENTED IN THE STUDY AREA.

1-FOOT INTERVAL GROUND CONTOURS DERIVED FROM AKS PROFESSIONAL LAND SURVEY (2022) WITH SUBMETER ACCURACY. PARCEL PROPERTY LINES OBTAINED FROM GIS DATABASE. AERIAL DERIVED FROM NAIP (2023).

N

SCALE: 1"=150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 11" x 17"

DATE: 03/10/2025

CRITICAL AREAS EXISTING CONDITIONS	FIGURE
QUAIL RIDGE III CRITICAL AREAS ASSESSMENT	**7A**
AKS ENGINEERING & FORESTRY, LLC 9600 NE 126TH AVE, STE 2520 VANCOUVER, WA 98682 360.882.0419 WWW.AKS-ENG.COM	DRWN: GPM CHKD: EE AKS JOB: 9141

DWG: 9141 PHASE 5 CAA EXCOND | FIGURE 7A

Appendix A: Site Representative Photographs

Photo A. View of the study area looking northwest. Cheatgrass, rabbit-brush, and snow buckwheat are dominant, along with scattered big sagebrush.

Photo B. View of the study area looking southeast. Interstate 240 runs along the north boundary of the study area. No nests were observed on the power poles along Interstate 240.

Photo C. View of typical conditions in the study area looking south. Residential development is present immediately south of the study area.

Photo D. View of ±5 inch diameter burrow hole observed within the study area. The burrow lacked evidence of owl activity, such as food scraps, prey pellet, or footprints/scratching.

Photos taken by Margret Harburg and Jess Jones on March 4, 2025.