



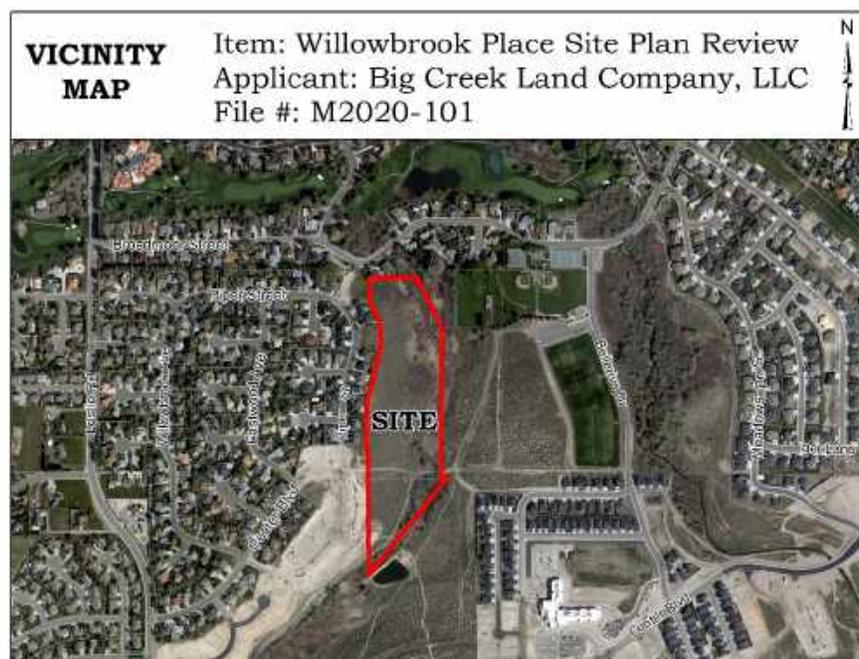
## CITY OF RICHLAND NOTICE OF APPLICATION, PUBLIC HEARING & OPTIONAL DNS (M2020-101 & EA2020-114)

Notice is hereby given that Big Creek Land Company, LLC has submitted a Site Plan Review application for the development of an approximately 14-acre site, with six (6) multi-family residential buildings containing up to 96 dwelling units, a clubhouse and covered parking structures together with associated parking and landscaping areas. The project site is located east of the terminus of John Court and is zoned R-3 (Multiple-Family Residential). The property is described as Tracts A & B, Willowbrook No. 1 (Lots 2 & 3 Record Survey #3864) and Tract B, Willowbrook No. 2, Phase 4A, located in the southeast quarter of the southwest quarter of Section 36, Township 9 North, Range 28 East, and within the northeast quarter of the northwest quarter of Section 1, Township 8 North, Range 28 East, W.M., Benton County, WA.

A virtual public hearing on the proposed site plan review will be held before the Hearing Examiner on Monday, December 14, 2020 at 6:00.

**Environmental Review:** The proposal is subject to environmental review. The City of Richland is lead agency for the proposal under the State Environmental Policy Act (SEPA) and has reviewed the proposed project for probable adverse environmental impacts and expects to issue a determination of non-significance (DNS) for this project. The optional DNS process in WAC 197-11-355 is being used. This may be your only opportunity to comment on the environmental impacts of the proposed development. The environmental checklist and related file information are available to the public and can be viewed at [www.ci.richland.wa.us](http://www.ci.richland.wa.us).

Any person desiring to express their views or to be notified of any decisions pertaining to this application should notify Mike Stevens, Planning Manager, 625 Swift Blvd., MS-35, Richland, WA 99352. Comments may also be faxed to (509) 942-7764 or emailed to [mstevens@ci.richland.wa.us](mailto:mstevens@ci.richland.wa.us). Written comments should be received no later than 5:00 p.m. on Friday, October 30, 2020.



*\*Please note that pursuant to RMC 23.48.010, the purpose of the site plan approval process is to facilitate project design that is compatible with adjacent land uses and is in keeping with the physical constraints of the project site. **The site plan review is not intended to determine whether a particular land use activity is appropriate on a particular site.** Land uses that are otherwise permitted in this title shall not be denied through the site plan review process unless such uses cannot meet the development and/or performance standards required for the use.*



## SITE PLAN REVIEW APPLICATION

Multi-Family  Commercial

**Note: A Pre-Application meeting is required prior to submittal of an application.**

### APPLICANT INFORMATION

Applicant Name: Big Creek Land Company, LLC

Address: 1950 W. Bellerive Lane #107

City: Coeur d'Alene

State: ID

Zip: 83814

Phone Number: (208) 930-4697

Email: cliff@buildmort.com

### PROPERTY INFORMATION

Legal Description: See attached Site Plan

Size of Area (sq. ft.): +/- 14 Acres

Comprehensive Plan Designation: Medium Density Residential

Zoning Classification: R3

General Description of Property Location: Willowbrook Subdivision at the intersection of Piper Street and Center Boulevard

### DESCRIPTION OF PROPOSAL

96-Unit Multi-Family Apartments. See attached Site Plan

Gross Floor Area of Building: 8500 sf

Approximate Time Table of Construction (start – end):  
Summer 2020- Summer 2021

Total Dwelling Units: 96

Number of Required Parking Spaces:  
96 units x 1.5 = 144 Req'd

Comments or Additional Information: See attached submittals

**APPLICATION MUST INCLUDE**

1. Completed Application and Filing Fee
2. 2 – Full Size Copies of proposed Site Plan
3. 1 – 11 x 17 reduction of Site Plan
4. Other information as determined by Administrator

I authorize employees and officials of the City of Richland the right to enter and remain on the property in question to determine whether a permit should be issued and whether special conditions should be placed on any issued permit. I have the legal authority to grant such access to the property in question.

I also acknowledge that if a permit is issued for land development activities, no terms of the permit can be violated without further approval by the permitting entity. I understand that the granting of a permit does not authorize anyone to violate in any way any federal, state, or local law/regulation pertaining to development activities associated with a permit.

I hereby certify under penalty of perjury under the laws of the State of Washington that the following is true and correct:

1. I have read and examined this permit application and have documented all applicable requirements on the site plan.
2. The information provided in this application contains no misstatement of fact.
3. I am the owner(s), the authorized agent(s) of the owner(s) of the above referenced property, or I am currently a licensed contractor or specialty contractor under Chapter 18.27 RCW or I am exempt from the requirements of the Chapter 18.27 RCW.
4. I understand this permit is subject to all other local, state, and federal regulations.

*Note: This application will not be processed unless the above certification is endorsed by an authorized agent of the owner(s) of the property in question and/or the owner(s) themselves. If the City of Richland has reason to believe that erroneous information has been supplied by an authorized agent of the owner(s) of the property in question and/or by the owner(s) themselves, processing of the application may be suspended.*

Applicant Printed Name: \_\_\_\_\_

*CLIFFORD EMMERT*

Applicant Signature: \_\_\_\_\_

*Clifford Emmert*

Date \_\_\_\_\_

*5/7/20*

# **SEPA ENVIRONMENTAL CHECKLIST**

## ***Purpose of checklist:***

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

## ***Instructions for applicants:***

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

## ***Instructions for Lead Agencies:***

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

## ***Use of checklist for nonproject proposals:***

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

## ***A. Background*** [HELP]

1. Name of proposed project, if applicable: **Willowbrook Place Apartments**
2. Name of applicant: **Big Creek Land Company, LLC**
3. Address and phone number of applicant and contact person:

Cliff Mort  
Big Creek Land Company, LLC  
1950 W. Bellerive Lane #107  
Coeur d'Alene, Idaho 83814  
(208) 930-4607  
cliff@buildmort.com

4. Date checklist prepared: **May 18, 2020**
5. Agency requesting checklist: **City of Richland, Washington**
6. Proposed timing or schedule (including phasing, if applicable):  
**Construction to begin in the Summer of 2020 and to be completed in the Summer of 2021.**
7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.  
**No, this application contains the entire project.**
8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.  
**A Critical Area Report and Buffer Averaging Plan as well as a Wildlife Habitat Assessment Report have been prepared by Wetland Resources, Inc. for the subject property and the proposed project. Both reports have been submitted to the City of Richland for review.**
9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.  
**No, there are no other proposals affecting the subject property that we are aware of.**
10. List any government approvals or permits that will be needed for your proposal, if known.  
**A Multi-Family Site Plan Review Application will need to be reviewed and approved by the City of Richland as well as the necessary construction permits for the installation of utilities and infrastructure to serve the project. Utilities and infrastructure include domestic and irrigation water, sanitary sewer, stormwater facilities and street improvements. The Multi-Family Site Plan Review Application has been submitted concurrently with this Checklist.**
11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)  
**The intent is to develop 96 units of apartments on approximately 14 acres. New access roads, parking lot, sewer, water and utilities will need to be constructed to serve the proposed project.**

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

**A copy of the Preliminary Site Plan, legal descriptions and other pertinent information is submitted herewith as a part of the Multi-Family Site Plan Review Application. The project is located in the northwest quarter of Section 1, Township 8 North, Range 28 East, WM and also in the southwest quarter of Section 36, Township 9 North, Range 28 East, WM.**

## **B. Environmental Elements** [\[HELP\]](#)

### **1. Earth** [\[help\]](#)

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other \_\_\_\_\_

**The project is hilly and slopes from West to East at less than 10% average grade.**

b. What is the steepest slope on the site (approximate percent slope)? +/- **14%**

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

**The soils are native to the site and consist of sandy and silty loam according to the USDA Web Soil Survey. These are well-draining soils that are suitable for residential development. Reference is made to the *Critical Area Report* for more information regarding soils and wetlands.**

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. **No.**

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

**Rough grading of the site will generate approximately 10,000 CY of cut and fill. This will establish the building pad elevations as well as the rough grade for the access and parking lot sections. Structural fill is not anticipated to be imported, as all required material will be generated on-site. Buffer areas are shown on the Preliminary Site Plan.**

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

**There is the possibility of slight erosion due to the construction on-site. Temporary and permanent BMPs will be used to minimize the potential of any erosion, as well as ESC measures. An ESC Plan will be submitted to the City for review and approval prior to construction.**

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

**Approximately 20% of the subject property will be covered with impervious surface after buildout of the apartment buildings.**

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

**Engineering standard BMPs, ESC measures and common accepted construction practices will be used to reduce and/or control erosion risk. An ESC plan will be submitted to the City of Richland for review and approval prior to construction.**

## 2. Air [\[help\]](#)

- a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

**Dust and exhaust from construction vehicles during construction. Dust will be minimized by a Dust Control Program that will be enforced during construction and detailed on an ESC Plan. The only anticipated emissions to the air post-construction will be from typical residential uses (ie. fireplace, etc.) and general automobile exhaust.**

- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

**No known off-site emissions or odors.**

- c. Proposed measures to reduce or control emissions or other impacts to air, if any:

**A strict dust control program will be enforced during construction. Water will be used to mitigate any dust generated during construction.**

## 3. Water [\[help\]](#)

- a. Surface Water: [\[help\]](#)

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

**There are wetlands located on the subject property. They are located east of the proposed building envelopes. Reference is made to the *Critical Area Report and Buffer Averaging Plan* that has been prepared and has been submitted to the City of Richland as a part of this proposed project.**

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

**There will be work within 200' of the wetlands. A *Critical Area Report and Buffer Averaging Plan* has been submitted for this project to the City of Richland, and reference is made to said report for additional information.**

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material. **N/A**

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. **No**
- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.  
**The proposed construction is not within the 100-year floodplain.**
- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. **No**

b. Ground Water: [\[help\]](#)

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.  
**No ground water will be withdrawn. Stormwater will be disposed of into the ground in accordance with the City of Richland standards and requirements, as well as those of the State of Washington Department of Ecology.**
- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.  
**No waste material will be discharged into the ground.**

c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.  
**Stormwater runoff will be disposed of through conventional drywells and grassy swales in accordance with the City of Richland and the State of Washinton Department of Ecology standards and regulations. This includes stormwater from driveways, sidewalks, streets and roofs. Pollutants contained in the stormwater will be mitigated and/or removed through the grassy swales prior to entering drywells. This water is not anticipated to flow into other waters.**
- 2) Could waste materials enter ground or surface waters? If so, generally describe.  
**There is a minimal risk that, post-construction, residential users could potentially have waste materials and/or household chemicals that enter the ground.**
- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe. **No**

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

**Grassy swales and other BMPs, as approved, will be utilized to control surface and runoff water.**

#### 4. **Plants** [help]

- a. Check the types of vegetation found on the site:

deciduous tree: alder, maple, aspen, other

evergreen tree: fir, cedar, pine, other

shrubs

grass

pasture

crop or grain

Orchards, vineyards or other permanent crops.

wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other

water plants: water lily, eelgrass, milfoil, other

other types of vegetation **Reference is made to the *Critical Area Report and Buffer Averaging Plan*.**

- b. What kind and amount of vegetation will be removed or altered?

**All existing native grasses and vegetation will be removed within the construction area and during the construction process.**

- c. List threatened and endangered species known to be on or near the site.

**Reference is made to the *Wildlife Habitat Assessment Report* prepared by Wetland Resources, Inc. and submitted to the City of Richland as a part of this application.**

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

**A Conceptual Landscape Plan has been submitted to the City of Richland as part of this project. A Formal Landscape Plan will be prepared and submitted to the City of Richland for review and approval prior to construction. All landscaping will be in accordance with the City of Richland standards and requirements, this includes all common areas, street trees and general landscaping.**

- e. List all noxious weeds and invasive species known to be on or near the site.

**Reference is made to the *Critical Area Report and Buffer Averaging Plan* and the *Wildlife Habitat Assessment Report*, both of which have been submitted to the City of Richland as part of this project.**

#### 5. **Animals** [help]

- a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:

**Native birds include the Song Sparrow, Red-Winged Blackbird, Mallard Duck, Northern Flicker, Anna's Hummingbird, Killdeer, American Crane, White-Crowned Sparrow, Sharp-Shinned Hawk, House Finch, Glaucus-Winged Gull, California Quail and Brewer's Sparrow**

mammals: deer, bear, elk, beaver, other:

**Native animals/mammals include the Black-Tailed Jackrabbit, Eastern Cottontail and Douglas Squirrel**

fish: bass, salmon, trout, herring, shellfish, other \_\_\_\_\_ **None observed**

- b. List any threatened and endangered species known to be on or near the site.  
**Reference is made to the *Wildlife Habitat Assessment Report* submitted to the City of Richland as a part of this application.**
- c. Is the site part of a migration route? If so, explain.  
**Yes, Richland is within the Pacific Flyway. No other migration route is known. Reference is made to the *Wildlife Habitat Assessment Report* submitted to the City of Richland as a part of this application.**
- d. Proposed measures to preserve or enhance wildlife, if any:  
**Reference is made to the *Wildlife Habitat Assessment Report* submitted to the City of Richland as a part of this application.**
- e. List any invasive animal species known to be on or near the site.  
**Reference is made to the *Wildlife Habitat Assessment Report* submitted to the City of Richland as a part of this application.**

## **6. Energy and Natural Resources** [\[help\]](#)

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.  
**Electricity and natural gas will be installed in accordance with the requirements of the local utility provider.**
- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. **No**
- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:  
**No specific measures proposed at this time.**

## **7. Environmental Health** [\[help\]](#)

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.  
**There is a small risk of chemical exposure and fire during construction. Standard safety precautions shall be used by the contractor at all times.**
- 1) Describe any known or possible contamination at the site from present or past uses.  
**None known**
- 2) Describe existing hazardous chemicals/conditions that might affect project development

and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

**None known**

- 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

**There will be no toxic chemicals stored onsite during construction.**

- 4) Describe special emergency services that might be required.

**None anticipated during or after construction, other than normal emergency services.**

- 5) Proposed measures to reduce or control environmental health hazards, if any:

**No specific measures proposed at this time.**

*b. Noise*

- 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

**No known noise pollution.**

- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

**Noise pollution will be prevalent during construction. Construction hours will be in accordance with those established by the City of Richland. The only anticipated noise post-construction would be from normal residential activities.**

- 3) Proposed measures to reduce or control noise impacts, if any:

**None proposed; however all construction activity will occur during normal allowable hours.**

**8. Land and Shoreline Use** [\[help\]](#)

- a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

**The project site currently vacant. The property to the East and South is wetlands, and the property to the West is developed as Residential. The proposed land uses are similar and compatible with the surrounding existing uses.**

- b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? **No**

- 1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how: **No**

- c. Describe any structures on the site. **None**
- d. Will any structures be demolished? If so, what? **None**
- e. What is the current zoning classification of the site?  
**The current zoning designation is R3.**
- f. What is the current comprehensive plan designation of the site?  
**Medium Density Residential**
- g. If applicable, what is the current shoreline master program designation of the site? **N/A**
- h. Has any part of the site been classified as a critical area by the city or county? If so, specify.  
**Yes, the subject property is part of the Aquifer Recharge Area as designated by The City of Richland. Reference is made to the *Critical Area Report and Buffer Averaging Plan* which has been submitted to the City of Richland as a part of this application.**
- i. Approximately how many people would reside or work in the completed project?  
**There are 96 units proposed, at 2.5 people per unit, there would be approximately 240 people living in the project.**
- j. Approximately how many people would the completed project displace?  
**The proposed project would displace 0 people.**
- k. Proposed measures to avoid or reduce displacement impacts, if any: **N/A**
- L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:  
**The project is compatible with the existing surrounding land uses and is in accordance with the goals and policies of the Comprehensive Plan and future land uses.**
- m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any: **N/A**

**9. Housing** [\[help\]](#)

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.  
**There are 96 apartment units proposed. This would service low- and middle-income families.**
- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. **N/A**
- c. Proposed measures to reduce or control housing impacts, if any: **N/A**

## 10. Aesthetics [\[help\]](#)

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?  
**Multi-story units are proposed to be a maximum height of 40' from average ground level, in accordance with the City of Richland standards.**
- b. What views in the immediate vicinity would be altered or obstructed?  
**The subject property is located on a small hillside located downhill from adjacent residential uses, therefore, there will be minimal obstruction to views from existing residences.**
- c. Proposed measures to reduce or control aesthetic impacts, if any:  
**The project will be developed in accordance with City of Richland Zoning Ordinance and Building Code requirements.**

## 11. Light and Glare [\[help\]](#)

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?  
**Minimal light glare will be produced from lights on the apartments and street lights that will be used for lighting the parking lot and travelways. This glare will be during evening and nighttime hours.**
- b. Could light or glare from the finished project be a safety hazard or interfere with views?  
**No safety hazard is anticipated from light glare.**
- c. What existing off-site sources of light or glare may affect your proposal? **N/A**
- d. Proposed measures to reduce or control light and glare impacts, if any:  
**All lighting will be installed in accordance with City of Richland standards and requirements.**

## 12. Recreation [\[help\]](#)

- a. What designated and informal recreational opportunities are in the immediate vicinity?  
**The Amon Wasteway Drainage and Claybell Park are located in the immediate vicinity of the proposed project.**
- b. Would the proposed project displace any existing recreational uses? If so, describe. **No**
- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:  
**There is a proposed pedestrian pathway/trail that will front the wetlands/open space. This trail could be used for a variety of recreational activities including walking, jogging, biking, scenic viewing, etc... The applicant also has proposed a paved trailway that will connect to the existing trail in Claybell Park thus providing pedestrian access to the park and providing a safe walking connection for students attending the new school.**

### 13. *Historic and cultural preservation* [\[help\]](#)

- a. 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. **None known**
- b. Are there any landmarks, features, or other evidence of Indian 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. **None known**
- c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.  
**A cursory review of available GIS data and online resources was conducted.**
- d. 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. **N/A**

### 14. *Transportation* [\[help\]](#)

- a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.  
**Proposed access to the subject property will be from Piper Street and Center Boulevard, which are public rights-of-way maintained by the City of Richland. A secondary access is proposed to connect to Broadmoor Street.**
- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?  
**The Ben Franklin Transit system serves the City of Richland. The nearest transit routes are the 123 and 110 routes.**
- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?  
**The proposed project will have approximately 230 total parking spaces. No parking spaces will be eliminated.**
- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).  
**New roads will be constructed to serve the proposed project in accordance with the City of Richland standards and requirements, but improvements to existing roads are not anticipated.**
- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. **No**
- f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would

be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

**According to the ITE Trip Generation Manual, an apartment unit (*Land Use Code 220*) will generate 7.32 trips per day per unit. This equates to 703 vehicle trips per day. Peak volumes will occur during the AM and PM peak hours ("rush hour"). A *Traffic Impact Analysis* has been prepared by Gibson Traffic Consultants and has been submitted to the City of Richland as a part of this application. Reference is hereby made to said study.**

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe. **No**

h. Proposed measures to reduce or control transportation impacts, if any:

**No specific measures are proposed at this time. The project will generate additional tax base and revenue, as well as Transportation Impact Fees, that will help to offset any additional traffic impacts. A *Traffic Impact Analysis* has been prepared and is submitted as a part of the proposed project.**

#### **15. Public Services** [\[help\]](#)

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

**It is anticipated that the project will have minimal impact on public services.**

b. Proposed measures to reduce or control direct impacts on public services, if any.

**No specific measures are proposed, however additional needs will be offset by the increased tax base and the additional tax revenue created.**

#### **16. Utilities** [\[help\]](#)

a. Circle utilities currently available at the site:

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system,  
other \_\_\_\_\_

**Electricity, natural gas, water, refuse service, telephone, sanitary sewer are all available to serve the subject property and are located immediately adjacent to the site.**

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

**All necessary utilities will be extending to and through the proposed project as required. The following is a list of service/utility providers for the proposed project:**

**Electricity: Richland Energy Services**

**Natural Gas: Cascade Natural Gas**

**Refuse Service: Richland Solid Waste Utility**

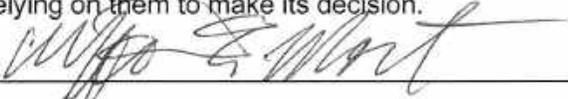
**Sanitary Sewer: Richland Wastewater Utility**

**Domestic Water: Richland Water Utility**

Irrigation Water: Richland Water Utility

**C. Signature [HELP]**

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

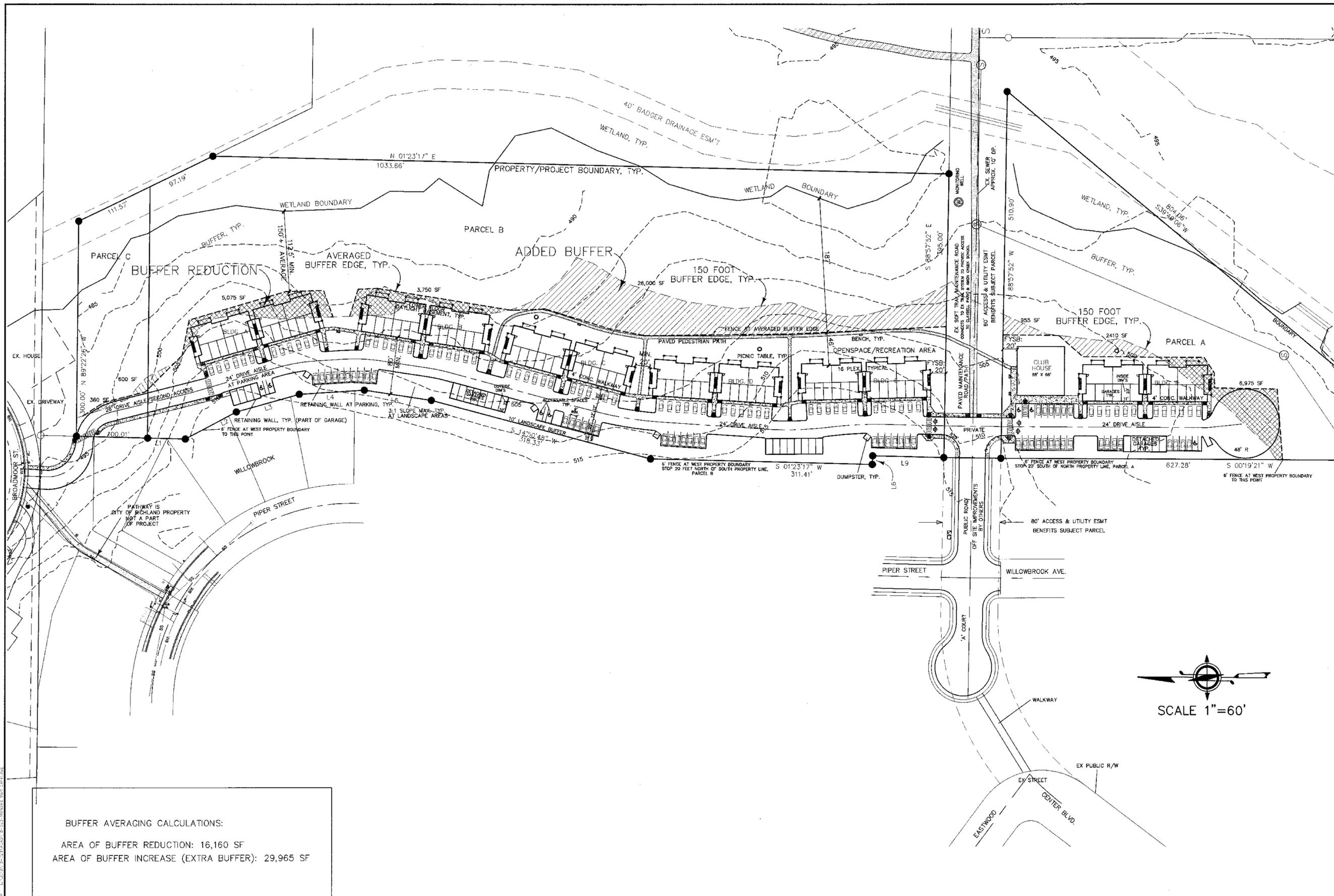
Signature: 

Name of signee Cliff Mort

Position and Agency/Organization Manager, Big Creek Land Company, LLC

Date Submitted: 5-29-20

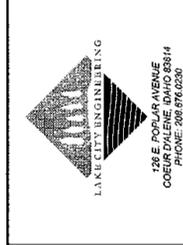




BUFFER AVERAGING CALCULATIONS:  
 AREA OF BUFFER REDUCTION: 16,160 SF  
 AREA OF BUFFER INCREASE (EXTRA BUFFER): 29,965 SF

# BUFFER AVERAGING EXHIBIT WILLOWBROOK PLACE APARTMENTS CONCEPTUAL PLAN

NO.	DESCRIPTION	INITIAL	DATE



**PRELIMINARY**  
 NOT FOR CONSTRUCTION

**WILLOWBROOK PLACE**  
 BUFFER AVERAGING EXHIBIT  
 RICHLAND, WASHINGTON

DESIGNED BY:	LTD/CD
DRAFTED BY:	SMA
DATE:	
JOB NO.:	LCE 18-023

C 2





**CRITICAL AREA REPORT  
AND  
BUFFER AVERAGING PLAN  
FOR  
WILLOWBROOK  
Richland, WA**

*Wetland Resources, Inc. Project #16235*

Prepared By  
Wetland Resources, Inc.  
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Everett, WA 98208  
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Prepared For  
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Mukilteo, WA 98275

*Original:*  
February 26, 2018

*Revision 3:*  
December 17, 2019

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## **APPENDICES**

APPENDIX A: WASHINGTON DEPT. OF ECOLOGY WETLAND RATING FORM

APPENDIX B: U.S. ARMY CORPS OF ENGINEERS WETLAND DETERMINATION DATA FORMS

APPENDIX C: CRITICAL AREA REPORT AND BUFFER AVERAGING PLAN MAP

## **Executive Summary**

**Project Name:** Willowbrook

**Location:** East of Piper Street and the intersection of Center Boulevard and Eastwood Avenue, in the City of Richland WA. The site is comprised of Benton County Parcel #s 136983050008001, 136983050007002, and 136983050012000. Access to the site is from the terminus of Piper Street and just east of the intersection of Center Boulevard and Eastwood Avenue.

**Client:**

Alpine Resources  
Attn: Duane Smith  
8914 56<sup>th</sup> Place W  
Mukilteo, WA 98275

**Wetland Resources Staff:** Scott Brainard, PWS (Principal Ecologist); John Laufenberg, PWS (Principal Ecologist); Scott Walters, PWS (Senior Wildlife Biologist and Senior Ecologist).

**Critical Areas Determination:** One Wetland (Amon Wasteway Wetland) was observed roughly paralleling the eastern portion of the subject property. This wetland was delineated, surveyed and categorized. The Amon Wasteway Wetland is a combination of riverine and depressional and is therefore given a depressional HGM. It is a Category II wetland with a moderate habitat score, and is typically designated a 150-foot buffer adjacent to high intensity land use.

**Proposed Project:** The applicant proposes to construct a multi-family residential development paralleling the Amon Wasteway Wetland buffer on its western side. Buffer averaging is proposed as part of this development activity. The proposed project is consistent with adjacent land uses and adheres to critical area protections in the City of Richland, WA.

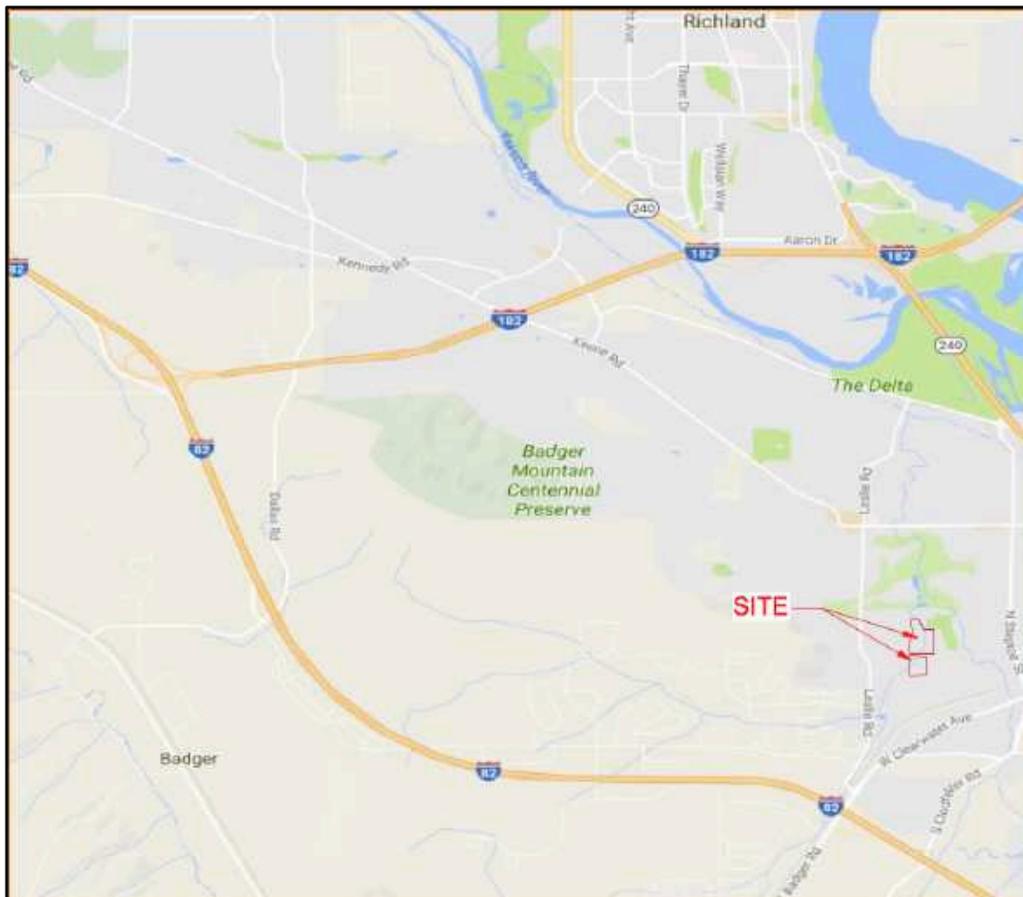
**Critical Areas Impacts and Mitigation:**

No impacts are proposed to the Amon Wasteway Wetland.

## 1.0 INTRODUCTION

### 1.1 PROJECT LOCATION

The proposed project is located east of the intersection of Center Boulevard and Eastwood Avenue, in the City of Richland WA. Access to the site is either from the terminus of Piper Street or just east of the intersection of Center Boulevard and Eastwood Avenue. The site is further located as a portion of Section 36, Township 9N, Range 28E, WM.



**Figure 1:** Vicinity Map of project location.

*Site is located between Leslie Road and N Steptoe St and North of West Clearwater Ave.*

*Section 36, Township 9N, Range 28E, W.M. Latitude: 46.211599 N Longitude: -119.257380 W.*

### 1.2 LANDSCAPE SETTING

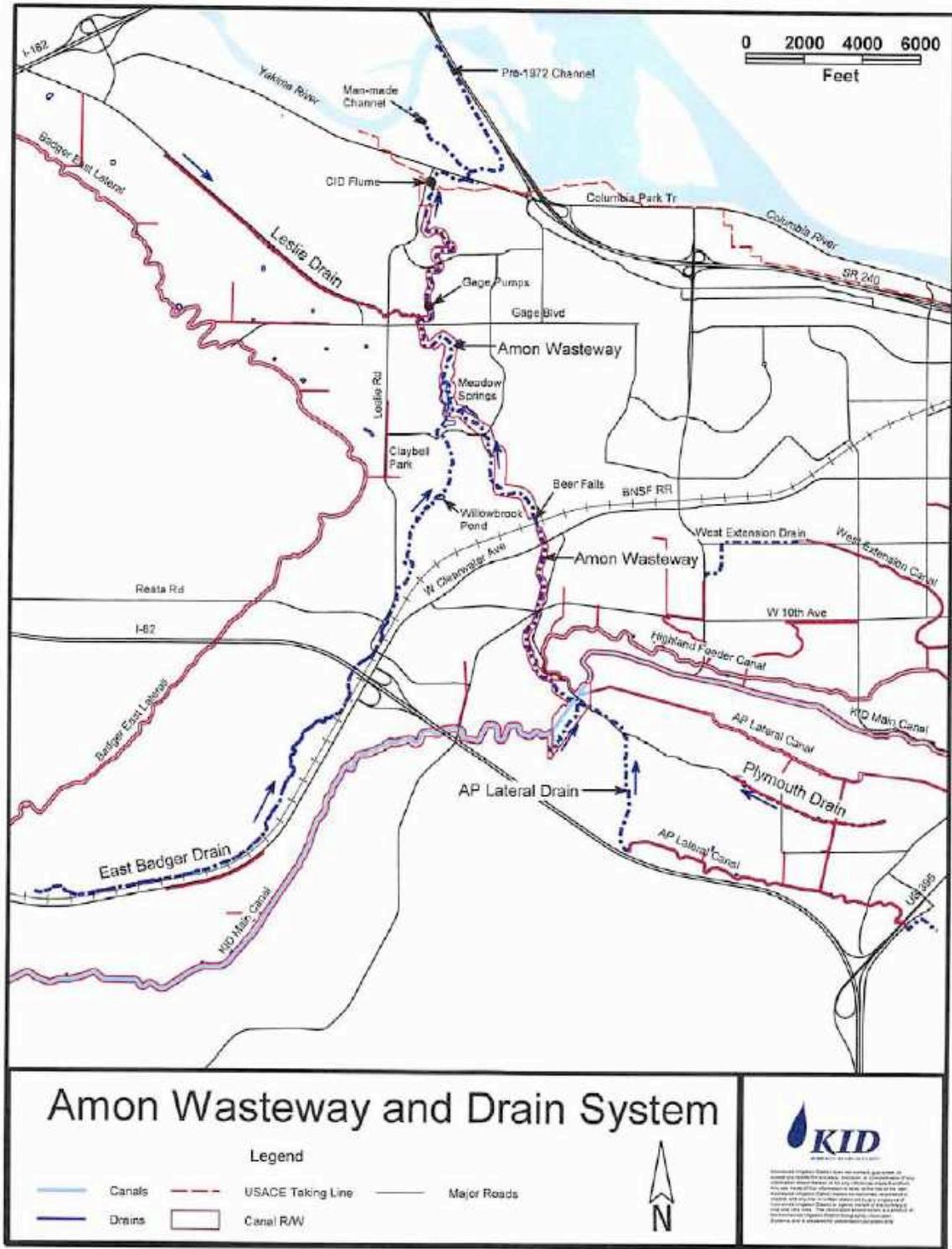
**Basin:** Lower Yakima

**Sub-Basin:** Water Resource Inventory Area (WRIA) 37

**Watershed:** Columbia River

The subject property is located along the bottom of the East Badger Drain, in Richland, WA. Land use in the surrounding area consists of single-family/multi-family residential development, community park areas and a golf course. Topography within the study area slopes moderately to the east, and trends slightly to the north with hills to the east and west. No development currently exists within the boundary of the subject property; however, a network of utility roads is present. The climate of Richland is semi-arid desert.

The East Badger Drain is located on the eastern portion of the property and flows from south to north. Adjacent to the drain is a riparian area consisting of wetland conditions that receives the entirety of its hydrology from wastewater associated with the Kennewick Division of the Yakima project. The Kennewick Irrigation District (KID) main canal and Badger East lateral canal lie upland and parallel to the major portion of the East Badger Drain (see Figure 3, KID map - Amon Wasteway and Drain system). Both canals are unlined, and based on KID data, lose a combined total of approximately 2,800 acre-feet of water each irrigation season.



**Figure 2:** KID Map – Amon Wasteway and Drain System

On-site vegetation is a combination of the typical shrub-steppe community found in much of the non-developed upland surrounding the site and the riparian community located along the Amon Wasteway. Vegetation within the shrub steppe portion of the site has been impacted by surrounding land uses and generally consists of, but is not limited to: big sagebrush, rabbit brush,

Russian thistle and cheatgrass. Within the riparian corridor along the Amon Wastway, vegetation generally consists of: Russian olive, coyote willow and Russian knapweed along the exterior and reed canarygrass, common cattail, and hard-stem bulrush in the interior.

### **1.3 PROJECT DESCRIPTION**

Alpine Resources, hereafter referred to as the applicant, proposes to construct a multi-family residential development east of Piper Street and the intersection of Center Blvd and Eastwood Avenue, paralleling the Amon Wasteway Wetland buffer on its western side. The wetland buffer will be averaged to allow for the proposed development activity, and the buffer averaging design will compensate for buffer width reductions at an approximate 2:1 ratio. A total of 16,160 square feet of buffer will be reduced through buffer averaging in four separate areas. As compensation, a total of 29,965 square feet will be provided as additional buffer in three separate areas adjacent and among those being reduced. The buffer averaging design will result in a net increase of buffer totaling 13,805 square feet. Areas being provided as additional buffer have the same structural and functional characteristics as those being removed.

### **1.0 STATEMENT OF QUALIFICATIONS**

The work for this Report was conducted by and Scott Brainard and Scott Walters.

Scott Brainard holds a Bachelor's degree in Environmental Studies. He is a Professional Wetland Scientist and principal at *Wetland Resources, Inc.*, where he has been employed for over 20 years. Scott provides professional consultation on a wide range of environmental issues throughout the Puget Sound region and Eastern Washington. Scott has extensive knowledge and experience regarding wetland determinations as well as mitigation design and implementation.

Scott Walters holds a Bachelor of Science degree in Wildlife Conservation Biology and Applied Vertebrate Ecology. He is a Professional Wetland Scientist and is a senior wildlife biologist at *Wetland Resources, Inc.* Additional training includes an advanced certificate in Aquarium and Aquatic Sciences, and a post-Baccalaureate certificate in Wetland Science and Management from the University of Washington. Scott has worked as an ecologist on projects across the country for over 12 years, including scientific study of wetlands and streams, environmental restoration monitoring, endangered species monitoring, and shorebird population research.

### **1.1 CRITICAL AREAS COMPLIANCE**

WRI was contracted by the applicant to delineate and categorize wetlands on the subject property and also to evaluate wetlands within 300 feet of the project area. The on-site portion of one wetland unit was delineated as part of this field investigation. The wetland area, flags and data sites are shown in the attached critical area study maps. Depicted wetland boundaries were surveyed based on delineation flagging hung in the field.

Given the proximity of the Amon Creek Natural Preserve (ACNP), a designated fish and wildlife habitat conservation area (HCA), the subject site was assessed for potential habitat meeting HCA designation criteria in the City of Richland. The assessment found that no development activity will occur within an HCA and, therefore, a Habitat Conservation Report is not required for this project. Site investigations were conducted on September 18 and 19, 2016.

The proposed buffer averaging design complies with the stipulations in RMC 22.10.115(A), providing a net increase in buffer area resulting in functional lifts. Details of buffer averaging compliance are provided in *section 5.0*. Similarly, the overall project was designed through the application of mitigation sequencing criteria, per RMC 22.10.220, the detail of which are in *section 4.0*.

## **2.0 REGULATORY SETTING**

### **2.1 CRITICAL AREAS**

#### **2.1.1 Reporting Requirements**

The Amon Wasteway Wetland and its associated buffer are located within the boundary of the subject property. RMC 22.10.370 requires that, prior to issuance of a SEPA determination, applicants submit a wetland determination, wetland delineation report, habitat conservation report or geologic hazard report if critical areas are located within the subject property. In addition, this report must meet the minimum requirements for critical area reports as defined in RMC 22.10.370(B)(3) and (4).

#### **2.1.2 Mitigation**

As previously stated, no impacts to the on-site wetland, the Amon Wasteway, or associated buffers will occur and therefore no mitigation will be provided.

### **2.2 THREATENED & ENDANGERED SPECIES**

Based on review of publicly available resources, there are no state or federally listed endangered species located on-site or within 300 feet of the subject property. On-site observations did not detect any conditions or species that contradict this.

## **3.0 CRITICAL AREAS DETERMINATION**

### **3.1 LIMIT OF STUDY**

The proposed project is within Benton County Tax Parcels 136983050008001, 136983050007002, and 136983050012000. In addition, adjacent parcels within 300 feet of the subject site were observed from existing available resources and the investigation boundary.

### **3.2 CRITICAL AREAS CLASSIFICATION METHODOLOGY**

Wetlands were classified in accordance with the standards set forth in RMC 22.10.100, which requires the use of the Washington State Department of Ecology's *Wetland Rating System for Eastern Washington, Publication No. 14-06-030*. Standard Wetland buffer widths were determined based on RMC 22.10.110. This report accurately classifies the wetland unit that is partially contained within the subject property. Critical areas in the vicinity, but located outside of the subject property are beyond the scope of this report. If, however, they are located within 300 feet of the subject properties, they are briefly discussed.

Areas within 300 feet of the site that meet HCA definitions per RMC 20.10.185 are discussed in brief and on-site characteristics are evaluated to determine their potential to function as related habitat areas extending from the HCA.

### **3.2.1 Wetland Determination and Delineation**

Wetland boundaries were verified using the routine determination approach described in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (U.S. Army Corps of Engineers 2008), as required by RMC 22.10. Under the routine methodology, the process for making a wetland determination is based on three steps:

- 1) Examination of the site for hydrophytic vegetation (species present and percent cover);
- 2) Examination of the site for hydric soils;
- 3) Determining the presence of wetland hydrology

The following criteria must be met in order to make a positive wetland determination:

#### *Vegetation Criteria*

The Corps Manual and 2008 Regional Supplement define hydrophytic vegetation as “*the assemblage of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence.*” Field indicators are used to determine whether the hydrophytic vegetation criteria have been met. Examples of these indicators include, but are not limited to, the rapid test for hydrophytic vegetation, a dominance test result of greater than 50%, and/or a prevalence index score less than or equal to 3.0.

#### *Soils Criteria*

The 2008 Regional Supplement (per the National Technical Committee for Hydric Soils) defines hydric soils as soils “*that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.*” Field indicators are used to determine whether a given soil meets the definition for hydric soils. Indicators are numerous and include, but are not limited to, presence of a histosol or histic epipedon, a sandy gleyed matrix, depleted matrix, and redoximorphic depressions.

#### *Hydrology Criteria*

Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface for a sufficient duration during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on the characteristics of vegetation and soils due to anaerobic and chemically reducing conditions, respectively. The strongest indicators include the presence of surface water, a high water table, and/or soil saturation within at least 12 inches of the soil surface.

### **3.2.2 Wetland Rating**

Wetland Ratings were prepared in accordance with RMC 22.10.100(A) - *Category I, II, III, and IV are set forth in the Washington State Department of Ecology’s Wetland Rating System for Eastern Washington*, Publication No. 14-06-030 or as amended. (Rating System). The entire wetland unit was evaluated with the Rating System as required by the City of Richland. The wetland has a total score of 20 and a habitat score of 7. This equates to a Category II designation with a 150-foot protective buffer adjacent to high intensity land uses (expected).

### **3.2.3 Habitat Assessment**

The habitat assessment was performed in accordance with RMC 22.10 Article IV, Fish and Wildlife Habitat Conservation Areas. Environmental characteristics were evaluated in view of their opportunity and potential to provide high-value habitat functions at the site as well as part of the broader landscape. More specifically, the site was evaluated to determine if any HCAs are

present within the subject site. Observations made during the site investigation were considered in conjunction with publicly available information about habitat use on and near the site.

### **3.3 REVIEW OF EXISTING INFORMATION**

Prior to conducting the on-site investigations, public resources information was reviewed to gather background information on the project study area and surrounding areas in regards to wetlands, streams, and other critical areas.

#### **3.3.1 USFWS National Wetlands Inventory**

The NWI map tool depicts a wetland roughly in the same location as the Amon Wasteway wetland unit. No other wetlands are depicted by the NWI in the vicinity of the project area.

#### **3.3.2 Benton County Soils**

The Natural Resources Conservation Service (NRCS) web soil survey was used to identify soil types in the project area. The subject property consists of Finley stony fine sandy loam 0 to 30 percent slopes, Warden very fine sandy loam 8 to 15 percent slopes and Hezel loamy fine sand, 2 to 15 percent slopes.

#### **3.3.3 Fish Presence**

The Washington Department of Fish and Wildlife (WDFW), Pacific States Marine Fisheries Commission (PSMFC), and the Washington Dept. of Natural Resources (WADNR) are the primary agencies that provide publicly available information used for making fish presence determinations consistent with the water typing rules set forth in WAC 222-16-030. The following information represents the findings from each source.

##### *WDFW SalmonScape Map Tool*

SalmonScape is an online GIS database that contains publicly available resource information for fish population studies and general species distribution (both documented and modeled presence). SalmonScape shows Spring Chinook and Coho both as presumed within the Amon Wasteway.

##### *PSMFC StreamNet Map Tool*

StreamNet is a fish distribution database maintained by the PSMFC as a regional clearinghouse for fish data. StreamNet identifies Coho within the Amon Wasteway.

#### **3.3.4 WADNR Forest Practices Activity Mapping Tool (FPAMT)**

FPAMT is an online GIS database that aids the process of submitting a Forest Practices permit application. The tool is useful for the purposes of this study, because WADNR models fish presence. FPAMT shows an unclassified stream flowing through the subject property.

#### **3.3.5 Benton County GIS**

Benton County GIS Web Mapping does not depict information on wetlands and streams.

#### **3.3.6 WDFW PHS Map (Hard Copy)**

The previous version of this report referred to the online version of the PHS data, which often does not include specific locations of certain priority habitats and species. This revision makes use of the hard copy for the area in which the project site is located. The more accurate hard copy has revealed less use by protected species than previously indicated by the more generalized polygons available on the public online version.

The only mapped priority area recorded in the vicinity by WDFW is Burrowing Owl (*Athene cunicularia*) a foraging area, although no nests are recorded on or adjacent to the site. South of the site, shrub-step areas are mapped as present that may provide quality habitat for black-tailed jackrabbits (*Lepus californicus*), American badgers (*Taxidea taxus*), and side-blotched lizards (*Uta* spp.). Given the disturbed nature on-site habitat and the dominance of cheatgrass (*Bromus tectorum*) in the grass layer, which is non-native and annual, the on-site area does not meet the definition of priority shrub-step habitat. The site may potentially get some use by jackrabbits. Jackrabbits and Burrowing Owls are state candidate species, which do not constitute an HCA designation. No native scrub-steppe habitat, black-tailed jackrabbits, burrowing owls, Townsend's ground squirrels or other priority species were observed at the time of investigation

Amon Creek is a fish-bearing stream and a water of the state flowing through a portion of the site, within the Amon wasteway wetland. However, this area is protected and no development activity is proposed within this HCA. The nearby Amon Creek Natural Preserve HCA does not extend onto the subject site. No other potential habitats species occur in the project area that meet HCA designation.

Discussions of the presence and/or absence of mapped habitats and species were field verified at the time of the September 2016 site investigations.

### 3.4 CRITICAL AREAS DETERMINATION FINDINGS

#### 3.4.1 Amon Wasteway Wetland

**Jurisdiction:** City of Richland

**HGM Class:** Riverine/Depressional - rated as Depressional

**Cowardin Classification:** Palustrine Forested and Palustrine Scrub-shrub components

**Ecology Score for Functions:** 20/7 (total score/habitat score)

**Ecology Rating:** Category II (for functions)

**City of Richland Buffer Requirement:** 150 feet



**Figure 3:** Wetland



**Figure 4:** Wetland with flowing wasteway

The wetland unit is estimated as a 23.5-acre depressional wetland. The delineated wetland boundary was limited to the subject property; however, the entire unit was evaluated from the intersection of Clearwater Avenue and Leslie Road to Broadmoor Street. The portions of the unit

located outside of the delineated boundary were approximated and determined based on visual observation of standing water and the distinct prevalence of facultative (FAC) or wetter vegetation. No formal soils, vegetation, or hydrology data was taken for off-site areas.

Vegetation within the on-site portion of the wetland generally consists of: Pacific willow (*Salix lucida*; FAC), coyote willow (*Salix exigua*; FACW), reed canarygrass (*Phalaris arundinacea*; FACW), common cattail (*Typha latifolia*; OBL), hardstem bulrush (*Schoenoplectus acutus*; OBL), and Watson's willowherb (*Epilobium ciliatum*; FACW).

Soils were sampled within the boundary of the on-site portion of the wetland. Excavated soils were dark grayish brown (10YR 4/2) loamy sand from 0 to 18 inches below the soil surface. Redoximorphic concentrations of dark yellowish brown (10YR 4/6) were present from throughout the profile.

The source of hydrology for the on-site wetland is wastewater from the Kennewick Irrigation District (KID). Aerial photo analysis and groundwater monitoring indicated that the summer months present the highest shallow groundwater levels within the Amon Basin. These findings are consistent with the fact that the source of hydrology to the on-site wetland is from wastewater return from the Kennewick Division of the Yakima project.

This wetland received an overall score of 20 points on the 2014 Washington State Wetland Rating System for Eastern Washington, with a habitat functions score of 7 points. Wetlands with scores between 20 and 22 are classified as Category II wetlands. Adjacent to high intensity land uses, the Amon Wasteway wetland is designated a 150-foot protective buffer.



**Figure 5:** Non-wetland looking south



**Figure 6:** Sewer line buffer mitigation area

Non-wetland areas located within the boundary of the subject property are consistent with an altered shrub-steppe ecosystem. Topography slopes to the east from an adjacent residential subdivision to the clearly demarcated wetland boundary. Existing roads and sewer lines cut through a portion of the non-wetland area. A recent buffer enhancement area associated with a sewer project was noted within the investigation area.

Vegetation within the on-site portion of the non-wetland area generally consists of: Russian olive (*Elaeagnus angustifolia*; FAC) along the outer edge of the riparian area and big sagebrush (*Artemisia*

*tridentata*), common rabbitbrush (*Chrysothamnus nauseosa*) Russian thistle (*Salsola tragus*; FACU) and cheatgrass (*Bromus tectorum*).

Soils were sampled within the boundary of the on-site portion of the wetland. Excavated soils were olive brown (2.5Y 4/3) to olive (5Y 4/3) loamy sand from 0 to 18 inches below the soil surface. No redoximorphic features were noted anywhere within the soil profile.

Soils throughout the non-wetland area were dry at the time of investigation and consistent with a non-irrigated arid shrub-steppe environment. No primary or secondary indicators of hydrology were observed in any of the on-site non-wetland areas.

### **3.4.2 Fish and Wildlife Habitat Conservation Area (summary)**

On-site observations confirm habitat designations established by WDFW (see *section 3.3.6*). The shrub-steppe environment may provide habitat suitable for Burrowing Owls and black-tailed jackrabbits, which are not threatened or endangered at either the state nor the federal level. The habitat is relatively consistent throughout the site, with the exception of where an existing east-west road bisects the area, creating some edge effects within the buffer habitat. Vegetation for the entire site, including wetland and non-wetland areas is discussed above in *section 3.4.1*.

Per RMC 22.10.185(A)(5), The Amon Creek Natural Preserve (ACNP) is considered a Fish and Wildlife Habitat Conservation area (HCA). While the site is hydrologically connected and contiguous with the ACNP, it is private property and not part of the ACNP. As such, the ACNP HCA does not extend into the proposed project area.

The overall habitat on the site provides moderate functions to common wildlife species in the area, but does not constitute an HCA.

## **4.0 COMPLIANCE WITH RMC 20.10.220(A) [MITIGATION SEQUENCING]**

In the City of Richland, proposed projects shall be designed to properly avoid or mitigate any potential adverse environmental effects to critical areas or their associated buffers through the application of mitigation sequencing per RMC 20.10.220(A). Language from this part of the code is presented below in *italics* with responses in normal text.

*A. Adverse impacts to habitat functions and values shall be mitigated to the extent feasible and reasonable. Mitigation actions by an applicant or property owner shall occur in the following preferred sequence:*

*1. Avoiding the impact altogether by not taking a certain action or parts of actions;*

Given the sinuosity of the wasteway, the resulting buffer is projected in a manner incongruous with the relatively north-south orientation of the neighboring residential developments to the west. As a consequence, the subject site exists within an envelope highly encumbered by buffer in certain areas. In order to construct a residential development on the subject property with the least impact on the neighboring properties, it is necessary to slightly modify the buffer edge. Without the proposed averaging, the project would have a greater density and the height of the buildings would increase from 2 stories to 3 stories, thus have more impact on the adjacent neighborhood. Therefore, the impacts have been deemed unavoidable in order to create a balance between a minor buffer intrusion and potential impacts to the adjacent neighborhood.

*2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology and engineering, or by taking affirmative steps to avoid or reduce adverse impacts;*

The proposed residential development has been designed to minimize impacts to the wetland and its associated buffer. Buffer width averaging is consistent with RMC 20.10.115(A).

*3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;*

Areas proposed for buffer width reduction through averaging are necessary for the construction of residential area, and will be inherently permanent. Thus, rectification of the averaging reduction areas is not feasible.

*4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;*

Areas proposed for buffer width reduction through averaging are necessary for the construction of residential area, and will be inherently permanent. Thus, reduction/elimination of impacts over time is not feasible.

*5. Compensating for the impact by replacing, enhancing, or providing similar substitute resources or environments. Preference shall be given to measures that replace the impacted functions on site or in the immediate vicinity of the impact;*

All reduced buffer averaging areas will be compensated through replacement with additional buffer at an approximately 2:1 ratio, which is double what is required by code. A significant net gain of buffer area will result, with buffer width increased adjacent to critical areas (see *section 5.0*).

*6. Monitoring the impact over time and taking corrective measures to minimize additional impacts.*

The higher priority mitigation strategies of minimization and compensation shall be used.

## **5.0 COMPLIANCE WITH RMC 20.10.115(A) [BUFFER AVERAGING]**

In the City of Richland, buffer averaging is allowed when stipulated conditions are met to ensure a net improvement to wetland protection. The proposed project has been designed to meet these requirements. Buffer averaging criteria, listed in RMC 20.10.115(A), are presented below in *italics* with responses in normal text.

*A. Buffer averaging to improve wetland protection may be permitted when all of the following conditions are met:*

*1. The wetland has significant differences in characteristics that affect its habitat functions, such as a wetland with a forested component adjacent to a degraded emergent component or a “dual-rated” wetland with a Category I area adjacent to a lower rated area.*

Vegetated landscapes typically experience reduced habitat functionality at edge environments and adjacent to human land use activity. An existing roadway passes through the wasteway wetland and its associated buffer near the southern portion of the proposed project. Wetland connectivity is maintained through a culvert under the roadway. The presence of these engineered features has created edge conditions to the north and south of the roadway and increases the opportunity for

human disturbance through traffic activity over time. In contrast, areas further north and south of the road have more continuous vegetative connectivity, and are thus less sensitive to disturbance.

*2. The buffer is increased adjacent to the higher functioning area of habitat or more sensitive portion of the wetland and decreased adjacent to the lower functioning or less sensitive portion as demonstrated by a critical areas report from a qualified wetland professional.*

Additional buffer shall be provided north and south of the existing roadway cutting through the wetland area. As a result, the expanded buffer will increase wetland protection and alleviate disturbance from nearby residential activity in this sensitive portion of the buffer.

*3. The total area of the buffer after averaging is equal to the area required without averaging.*

After the proposed averaging, the total buffer area has been increased by 13,805 square feet.

*4. The buffer at its narrowest point is never less than either three-quarters of the required width or 75 feet for Categories I and II, 50 feet for Category III, and 25 feet for Category IV, whichever is greater.*

The buffer will be 112.5 feet wide at its narrowest point, which is 75-percent of the standard required width (150 feet).

## 6.0 USE OF THIS REPORT

This Critical Area Report is supplied to Alpine Resources as a means of determining critical area conditions, as required by the City of Richland. This report is based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

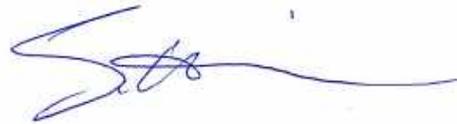
The laws applicable to wetlands are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the applicant's attempt to comply with the laws now in effect.

The work for this report has conformed to the standard of care employed by wetland ecologists. No other representation or warranty is made concerning the work or this report and any implied representation or warranty is disclaimed.

*Wetland Resources, Inc.*



Scott Walters, PWS  
*Senior Wildlife Biologist*



Scott Brainard, PWS  
*Principal Ecologist*

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**APPENDIX A:**  
WASHINGTON DEPT. OF ECOLOGY WETLAND RATING FORM

Wetland name or number \_\_\_\_\_

## RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): Arrow Wasteway Date of site visit: \_\_\_\_\_

Rated by SO Trained by Ecology?  Yes \_\_\_ No Date of training 6/15

HGM Class used for rating Depressional Wetland has multiple HGM classes?  Y \_\_\_ N

**NOTE: Form is not complete without the figures requested (figures can be combined).**

Source of base aerial photo/map \_\_\_\_\_

**OVERALL WETLAND CATEGORY** \_\_\_\_\_ (based on functions \_\_\_ or special characteristics \_\_\_)

### 1. Category of wetland based on FUNCTIONS

- Category I – Total score = 22-27
- Category II – Total score = 19-21
- Category III – Total score = 16-18
- Category IV – Total score = 9-15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
<i>Circle the appropriate ratings</i>				
Site Potential	H <input checked="" type="radio"/> M L	H M <input checked="" type="radio"/> L	<input checked="" type="radio"/> H M L	
Landscape Potential	<input checked="" type="radio"/> H M L	<input checked="" type="radio"/> H M L	H M <input checked="" type="radio"/> L	
Value	<input checked="" type="radio"/> H M L	H M <input checked="" type="radio"/> L	<input checked="" type="radio"/> H M L	<b>TOTAL</b>
Score Based on Ratings	<b>8</b>	<b>5</b>	<b>7</b>	<b>20</b>

**Score for each function based on three ratings (order of ratings is not important)**

- 9 = H,H,H
- 8 = H,H,M
- 7 = H,H,L
- 7 = H,M,M
- 6 = H,M,L
- 6 = M,M,M
- 5 = H,L,L
- 5 = M,M,L
- 4 = M,L,L
- 3 = L,L,L

### 2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY	
	<i>Circle the appropriate category</i>	
Vernal Pools	<b>II</b>	<b>III</b>
Alkali	<b>I</b>	
Wetland of High Conservation Value	<b>I</b>	
Bog and Calcareous Fens	<b>I</b>	
Old Growth or Mature Forest – slow growing	<b>I</b>	
Aspen Forest	<b>I</b>	
Old Growth or Mature Forest – fast growing	<b>II</b>	
Floodplain forest	<b>II</b>	
None of the above		

Wetland name or number \_\_\_\_\_

## Maps and figures required to answer questions correctly for Eastern Washington Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	D 1.3, H 1.1, H 1.5	A1
Hydroperiods (including area of open water for H 1.3)	D 1.4, H 1.2, H 1.3	A1
Location of outlet ( <i>can be added to map of hydroperiods</i> )	D 1.1, D 4.1	A1
Boundary of area within 150 ft of the wetland ( <i>can be added to another figure</i> )	D 2.2, D 5.2	A1
Map of the contributing basin	D 5.3	N/A
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	A2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	A3
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	D 3.3	A4

## Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	
Hydroperiods	H 1.2, H 1.3	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland ( <i>can be added to another figure</i> )	R 2.4	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of wetland vs. width of stream ( <i>can be added to another figure</i> )	R 4.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	R 3.2, R 3.3	

## Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	L 1.1, L 4.1, H 1.1, H 1.5	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland ( <i>can be added to another figure</i> )	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	L 3.3	

## Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	
Hydroperiods	H 1.2, H 1.3	
Plant cover of dense trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of dense, rigid trees, shrubs, and herbaceous plants ( <i>can be added to figure above</i> )	S 4.1	
Boundary of area within 150 ft of the wetland ( <i>can be added to another figure</i> )	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	S 3.3	

## HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?

The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size  
 At least 30% of the open water area is deeper than 10 ft (3 m)

NO - go to 2

YES - The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?

The wetland is on a slope (*slope can be very gradual*),  
 The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;  
 The water leaves the wetland **without being impounded**.

NO - go to 3

YES - The wetland class is **Slope**

**NOTE:** Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?

The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;  
 The overbank flooding occurs at least once every 10 years.

NO - go to 4

YES - The wetland class is **Riverine**

**NOTE:** The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

NO - go to 5

YES - The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

Wetland name or number \_\_\_\_\_

**NOTE:** Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM Class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine (the riverine portion is within the boundary of depression)	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number \_\_\_\_\_

### DEPRESSIONAL WETLANDS

**Water Quality Functions** - Indicators that the site functions to improve water quality

Points  
(only 1  
score per  
box)

<b>D 1.0. Does the site have the potential to improve water quality?</b>			
<b>D 1.1. Characteristics of surface water outflows from the wetland:</b>			
Wetland has no surface water outlet	points = 5		1
Wetland has an intermittently flowing outlet	points = 3		
Wetland has a highly constricted permanently flowing outlet	points = 3		
Wetland has a permanently flowing, unconfined, surface outlet	points = 1		
<b>D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (use NRCS definitions of soils)</b>			
	YES = 3 NO = 0		0
<b>D 1.3. Characteristics of persistent vegetation (Emergent, Scrub-shrub, and/or Forested Cowardin classes)</b>			
Wetland has persistent, ungrazed, vegetation for > 2/3 of area	points = 5		5
Wetland has persistent, ungrazed, vegetation from 1/3 to 2/3 of area	points = 3		
Wetland has persistent, ungrazed vegetation from 1/10 to < 1/3 of area	points = 1		
Wetland has persistent, ungrazed vegetation < 1/10 of area	points = 0		
<b>D 1.4. Characteristics of seasonal ponding or inundation:</b>			
<i>This is the area of ponding that fluctuates every year. Do not count the area that is permanently ponded.</i>			
Area seasonally ponded is > 1/2 total area of wetland	points = 3		1
Area seasonally ponded is 1/4 - 1/2 total area of wetland	points = 1		
Area seasonally ponded is < 1/4 total area of wetland	points = 0		
<b>Total for D 1</b>	<b>Add the points in the boxes above</b>		<b>7</b>

**Rating of Site Potential** If score is: 12-16 = H X 6-11 = M 0-5 = L Record the rating on the first page

<b>D 2.0. Does the landscape have the potential to support the water quality function of the site?</b>			
<b>D 2.1. Does the wetland receive stormwater discharges?</b>			
	Yes = 1 No = 0		1
<b>D 2.2. Is &gt; 10% of the area within 150 ft of the wetland in land uses that generate pollutants?</b>			
	Yes = 1 No = 0		1
<b>D 2.3. Are there septic systems within 250 ft of the wetland?</b>			
	Yes = 1 No = 0		0
<b>D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1- D 2.3? Source <u>Pet waste</u></b>			
	Yes = 1 No = 0		1
<b>Total for D 2</b>	<b>Add the points in the boxes above</b>		<b>3</b>

**Rating of Landscape Potential** If score is: X 3 or 4 = H 1 or 2 = M 0 = L Record the rating on the first page

<b>D 3.0. Is the water quality improvement provided by the site valuable to society?</b>			
<b>D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, or lake that is on the 303(d) list?</b>			
	Yes = 1 No = 0		0
<b>D 3.2. Is the wetland in a basin or sub-basin where water quality is an issue in some aquatic resource [303(d) list, eutrophic lakes, problems with nuisance and toxic algae]?</b>			
	Yes = 1 No = 0		1
<b>D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (answer YES if there is a TMDL for the drainage or basin in which the wetland is found)?</b>			
	Yes = 2 No = 0		2
<b>Total for D 3</b>	<b>Add the points in the boxes above</b>		<b>3</b>

**Rating of Value** If score is: X 2-4 = H 1 = M 0 = L Record the rating on the first page

Wetland name or number \_\_\_\_\_

**DEPRESSIONAL WETLANDS**

Points  
(only 1 score  
per box)

**Hydrologic Functions** - Indicators that the site functions to reduce flooding and erosion.

D 4.0. Does the site have the potential to reduce flooding and erosion?		
D 4.1. Characteristics of surface water outflows from the wetland:		
Wetland has no surface water outlet	points = 8	0
Wetland has an intermittently flowing outlet	points = 4	
Wetland has a highly constricted permanently flowing outlet	points = 4	
Wetland has a permanently flowing unconfined surface outlet	points = 0	
<i>(If outlet is a ditch and not permanently flowing treat wetland as "intermittently flowing")</i>		
D 4.2. Depth of storage during wet periods: Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or deepest part (if dry).		
Seasonal ponding: > 3 ft above the lowest point in wetland or the surface of permanent ponding	points = 8	4
Seasonal ponding: 2 ft - < 3 ft above the lowest point in wetland or the surface of permanent ponding	points = 6	
The wetland is a headwater wetland	points = 4	
Seasonal ponding: 1 ft - < 2 ft	points = 4	
Seasonal ponding: 6 in - < 1 ft	points = 2	
Seasonal ponding: < 6 in or wetland has only saturated soils	points = 0	
Total for D 4	Add the points in the boxes above	

**Rating of Site Potential** If score is: 12-16 = H 6-11 = M X 0-5 = L Record the rating on the first page

D 5.0. Does the landscape have the potential to support the hydrologic functions of the site?		
D 5.1. Does the wetland receive stormwater discharges?	Yes = 1 No = 0	1
D 5.2. Is > 10% of the area within 150 ft of the wetland in a land use that generates runoff?	Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses?	Yes = 1 No = 0	1
Total for D 5	Add the points in the boxes above	3

**Rating of Landscape Potential** If score is: X 3 = H 1 or 2 = M 0 = L Record the rating on the first page

D 6.0. Are the hydrologic functions provided by the site valuable to society?		
D 6.1. The wetland is in a landscape that has flooding problems.		
Choose the description that best matches conditions around the wetland being rated. Do not add points. Choose the highest score if more than one condition is met.		
The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds), AND		
Flooding occurs in sub-basin that is immediately down-gradient of wetland	points = 2	0
Surface flooding problems are in a sub-basin farther down-gradient	points = 1	
The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood.		
Explain why <u>floodflows ARE SEGREGATED DOWNSTREAM</u>		
There are no problems with flooding downstream of the wetland		
D 6.2. Has the site has been identified as important for flood storage or flood conveyance in a regional flood control plan?		
	Yes = 2 No = 0	0
Total for D 6	Add the points in the boxes above	0

**Rating of Value** If score is: 2-4 = H 1 = M X 0 = L Record the rating on the first page

Wetland name or number \_\_\_\_\_

<b>RIVERINE WETLANDS</b>		Points (only 1 score per box)
<b>Water Quality Functions – Indicators that the site functions to improve water quality</b>		
<b>R 1.0. Does the site have the potential to improve water quality?</b>		
<b>R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event:</b> Depressions cover > 1/3 area of wetland <span style="float: right;">points = 6</span> Depressions cover > 1/10 area of wetland <span style="float: right;">points = 3</span> Depressions present but cover < 1/10 area of wetland <span style="float: right;">points = 1</span> No depressions present <span style="float: right;">points = 0</span>		
<b>R 1.2. Structure of plants in the wetland (areas with &gt;90% cover at person height; not Cowardin classes):</b> Forest or shrub > 2/3 the area of the wetland <span style="float: right;">points = 10</span> Forest or shrub 1/3 – 2/3 area of the wetland <span style="float: right;">points = 5</span> Ungrazed, herbaceous plants > 2/3 area of wetland <span style="float: right;">points = 5</span> Ungrazed herbaceous plants 1/3 – 2/3 area of wetland <span style="float: right;">points = 2</span> Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland <span style="float: right;">points = 0</span>		
<b>Total for R 1</b>		Add the points in the boxes above

**Rating of Site Potential** If score is: 12-16 = H 6-11 = M 0-5 = L *Record the rating on the first page*

<b>R 2.0. Does the landscape have the potential to support the water quality function of the site?</b>		
R 2.1. Is the wetland within an incorporated city or within its UGA?	Yes = 2 No = 0	
R 2.2. Does the contributing basin include a UGA or incorporated area?	Yes = 1 No = 0	
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years?	Yes = 1 No = 0	
R 2.4. Is > 10% of the area within 150 ft of wetland in land uses that generate pollutants	Yes = 1 No = 0	
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4? Source _____	Yes = 1 No = 0	
<b>Total for R 2</b>	Add the points in the boxes above	

**Rating of Landscape Potential** If score is: 3-6 = H 1 or 2 = M 0 = L *Record the rating on the first page*

<b>R 3.0. Is the water quality improvement provided by the site valuable to society?</b>		
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi?	Yes = 1 No = 0	
R 3.2. Does the river or stream have TMDL limits for nutrients, toxics, or pathogens?	Yes = 1 No = 0	
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? Answer YES if there is a TMDL for the drainage in which wetland is found.	Yes = 2 No = 0	
<b>Total for R 3</b>	Add the points in the boxes above	

**Rating of Value** If score is: 2-4 = H 1 = M 0 = L *Record the rating on the first page*

Wetland name or number \_\_\_\_\_

### RIVERINE WETLANDS

Points  
(only 1 score  
per box)

#### Hydrologic Functions - Indicators that site functions to reduce flooding and stream erosion

**R 4.0. Does the site have the potential to reduce flooding and erosion?**

**R 4.1. Characteristics of the overbank storage the wetland provides:**

*Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).*

- If the ratio is more than 2 points = 10
- If the ratio is 1-2 points = 8
- If the ratio is 1/2-<1 points = 4
- If the ratio is 1/4-<1/2 points = 2
- If the ratio is < 1/4 points = 1

**R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have > 90% cover at person height. These are NOT Cowardin classes).***

- Forest or shrub for more than 2/3 the area of the wetland points = 6
- Forest or shrub for > 1/3 area OR emergent plants > 2/3 area points = 4
- Forest or shrub for > 1/10 area OR emergent plants > 1/3 area points = 2
- Plants do not meet above criteria points = 0

Total for R 4

Add the points in the boxes above

**Rating of Site Potential** If score is: 12-16 = H 6-11 = M 0-5 = L

Record the rating on the first page

**R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?**

**R 5.1. Is the stream or river adjacent to the wetland downcut?** Yes = 0 No = 1

**R 5.2. Does the up-gradient watershed include a UGA or incorporated area?** Yes = 1 No = 0

**R 5.3. Is the up-gradient stream or river controlled by dams?** Yes = 0 No = 1

Total for R 5

Add the points in the boxes above

**Rating of Landscape Potential** If score is: 3 = H 1 or 2 = M 0 = L

Record the rating on the first page

**R 6.0. Are the hydrologic functions provided by the site valuable to society?**

**R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.***

- The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources points = 2
- Surface flooding problems are in a basin farther down-gradient points = 1
- No flooding problems anywhere downstream points = 0

**R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan?** Yes = 2 No = 0

Total for R 6

Add the points in the boxes above

**Rating of Value** If score is: 2-4 = H 1 = M 0 = L

Record the rating on the first page

Wetland name or number \_\_\_\_\_

**LAKE FRINGE WETLANDS**

Points  
Total  
(Total  
Score per  
Box)

**Water Quality Functions** - Indicators that the site functions to improve water quality

**L 1.0. Does the site have the potential to improve water quality?**

**L 1.1. Average width of plants along the lakeshore (use polygons of Cowardin classes):**

- Plants are more than 33 ft (10 m) wide points = 6
- Plants are more than 16 ft (5 m) and < 33 ft (10 m) wide points = 3
- Plants are more than 6 ft (2 m) and < 16 ft (5 m) wide points = 1
- Plants are less than 6 ft wide points = 0

**L 1.2. Characteristics of the plants in the wetland: Choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. These are not Cowardin classes. Area of cover is total cover in the wetland, but it can be in patches. Herbaceous does not include aquatic bed.**

- Cover of herbaceous plants is > 90% of the vegetated area points = 6
- Cover of herbaceous plants is > 2/3 of the vegetated area points = 4
- Cover of herbaceous plants is > 1/3 of the vegetated area points = 3
- Other plants that are not aquatic bed > 2/3 wetland points = 3
- Other plants that are not aquatic bed in > 1/3 vegetated area points = 1
- Aquatic bed plants and open water cover > 2/3 of the wetland points = 0

**Total for L 1** Add the points in the boxes above

**Rating of Site Potential** If score is: 8-12 = H 4-7 = M 0-3 = L Record the rating on the first page

**L 2.0. Does the landscape have the potential to support the water quality function of the site?**

**L 2.1. Is the lake used by power boats?** Yes = 1 No = 0

**L 2.2. Is > 10% of the area within 150 ft of wetland on the upland side in land uses that generate pollutants?** Yes = 1 No = 0

**L 2.3. Does the lake have problems with algal blooms or excessive plants such as milfoil?** Yes = 1 No = 0

**Total for L 2** Add the points in the boxes above

**Rating of Landscape Potential** If score is: 2 or 3 = H 1 = M 0 = L Record the rating on the first page

**L 3.0. Is the water quality improvement provided by the site valuable to society?**

**L 3.1. Is the lake on the 303(d) list of degraded aquatic resources?** Yes = 1 No = 0

**L 3.2. Is the lake in a sub-basin where water quality is an issue (at least one aquatic resource in the basin is on the 303(d) list)?** Yes = 1 No = 0

**L 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? Answer YES if there is a TMDL for the lake or basin in which wetland is found.** Yes = 2 No = 0

**Total for L 3** Add the points in the boxes above

**Rating of Value** If score is: 2-4 = H 1 = M 0 = L Record the rating on the first page

Wetland name or number \_\_\_\_\_

<b>LAKE FRINGE WETLANDS</b>		Points (only scored 2015)
<b>Hydrologic Functions</b> - Indicators that the wetland unit functions to reduce shoreline erosion		
<b>L 4.0. Does the site have the potential to reduce shoreline erosion?</b>		
<b>L 4.1. Distance along shore and average width of Cowardin classes along the lakeshore (do not include Aquatic Bed):</b> <i>Choose the highest scoring description that matches conditions in the wetland.</i>		
> ¼ of distance is Scrub-shrub or Forested at least 33 ft (10 m) wide	points = 6	
> ¼ of distance is Scrub-shrub or Forested at least 6 ft (2 m) wide	points = 4	
> ¼ distance is Scrub-shrub or Forested at least 33 ft (10 m) wide	points = 4	
Plants are at least 6 ft (2 m) wide (do not include Aquatic Bed)	points = 2	
Plants are less than 6 ft (2 m) wide (do not include Aquatic Bed)	points = 0	

**Rating of Site Potential** If score is:     6 = M     0-5 = L

*Record the rating on the first page*

<b>L 5.0. Does the landscape have the potential to support hydrologic functions of the site?</b>		
L 5.1. Is the lake used by power boats with more than 10 hp?	Yes = 1 No = 0	
L 5.2. Is the fetch on the lake side of the wetland at least 1 mile in distance?	Yes = 1 No = 0	
<b>Total for L 5</b>	<b>Add the points in the boxes above</b>	

**Rating of Landscape Potential** If score is:     2 = H     1 = M     0 = L

*Record the rating on the first page*

<b>L 6.0. Are the hydrologic functions provided by the site valuable to society?</b>		
<b>L 6.1. Are there resources, both human and natural, along the shore that can be impacted by erosion?</b> <i>If more than one resource is present, choose the one with the highest score.</i>		
There are human structures or old growth/mature forests within 25 ft of OHWM of the shore in the wetland	points = 2	
There are nature trails or other paths and recreational activities within 25 ft of OHWM	points = 1	
Other resources that could be impacted by erosion	points = 1	
There are no resources that can be impacted by erosion along the shores of the wetland	points = 0	

**Rating of Value** If score is:     2 = H     1 = M     0 = L

*Record the rating on the first page*

**NOTES and FIELD OBSERVATIONS:**

Wetland name or number \_\_\_\_\_

### SLOPE WETLANDS

Water Quality Functions Indicators that the site functions to improve water quality	Points (only 1 score per box)
<b>S 1.0. Does the site have the potential to improve water quality?</b>	
<b>S 1.1. Characteristics of average slope of wetland: (a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance)</b>	
Slope is 1% or less	points = 3
Slope is > 1% - 2%	points = 2
Slope is > 2% - 5%	points = 1
Slope is greater than 5%	points = 0
<b>S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (use NRCS definitions): Yes = 3 No = 0</b>	
<b>S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants:</b>	
Choose the points appropriate for the description that best fits the plants in the wetland. <i>Dense means you have trouble seeing the soil surface (&gt;75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.</i>	
Dense, uncut, herbaceous plants > 90% of the wetland area	points = 6
Dense, uncut, herbaceous plants > ½ of area	points = 3
Dense, woody, plants > ½ of area	points = 2
Dense, uncut, herbaceous plants > ¼ of area	points = 1
Does not meet any of the criteria above for plants	points = 0
<b>Total for S 1</b>	<b>Add the points in the boxes above</b>

**Rating of Site Potential** If score is:    12 = H    6-11 = M    0-5 = L

*Record the rating on the first page*

<b>S 2.0. Does the landscape have the potential to support the water quality function at the site?</b>	
<b>S 2.1. Is &gt; 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants?</b>	
Yes = 1 No = 0	
<b>S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1?</b>	
Other sources _____	
Yes = 1 No = 0	
<b>Total for S 2</b>	<b>Add the points in the boxes above</b>

**Rating of Landscape Potential** If score is:    1-2 = M    0 = L

*Record the rating on the first page*

<b>S 3.0. Is the water quality improvement provided by the site valuable to society?</b>	
<b>S 3.1. Does the wetland discharge directly to a stream, river, or lake that is on the 303(d) list (within 1 mi)?</b>	
Yes = 1 No = 0	
<b>S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? At least one aquatic resource in the basin is on the 303(d) list.</b>	
Yes = 1 No = 0	
<b>S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (answer YES if there is a TMDL for the drainage or basin in which wetland is found)?</b>	
Yes = 2 No = 0	
<b>Total for S 3</b>	<b>Add the points in the boxes above</b>

**Rating of Value** If score is:    2-4 = H    1 = M    0 = L

*Record the rating on the first page*

Wetland name or number \_\_\_\_\_

**SLOPE WETLANDS**

**Hydrologic Functions** Indicators that the site functions to reduce flooding and erosion

Points  
(only 1  
score per  
box)

S 4.0. Does the site have the potential to reduce flooding and erosion?

S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > 1/8 in), or dense enough, to remain erect during surface flows.*

Dense, uncut, **rigid** plants cover > 90% of the area of the wetland

points = 1

All other conditions

points = 0

**Rating of Site Potential** If score is:    1 = M    0 = L

Record the rating on the first page

S 5.0. Does the landscape have the potential to support the hydrologic functions of the site?

S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses that generate excess surface runoff?

Yes = 1 No = 0

**Rating of Landscape Potential** If score is:    1 = M    0 = L

Record the rating on the first page

S 6.0. Are the hydrologic functions provided by the site valuable to society?

S 6.1. Distance to the nearest areas downstream that have flooding problems:

The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds)

points = 2

Surface flooding problems are in a sub-basin farther down-gradient

points = 1

No flooding problems anywhere downstream

points = 0

S 6.2. Has the site been identified as important for flood storage and flood conveyance in a regional flood control plan?

Yes = 2 No = 0

Total for S 6

Add the points in the boxes above

**Rating of Value** If score is:    2-4 = H    1 = M    0 = L

Record the rating on the first page

NOTES and FIELD OBSERVATIONS:

Wetland name or number \_\_\_\_\_

<b>H 1.6. Special habitat features</b> <i>Check the habitat features that are present in the wetland. The number of checks is the number of points.</i>		
<input type="checkbox"/> Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream. <input checked="" type="checkbox"/> Cattails or bulrushes are present within the wetland. <input checked="" type="checkbox"/> Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge. <input checked="" type="checkbox"/> Emergent or shrub vegetation in areas that are permanently inundated/ponded. <input checked="" type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity <input type="checkbox"/> Invasive species cover less than 20% in each stratum of vegetation (canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)		5
Total for H 1	Add the points in the boxes above	17
<b>Rating of Site Potential</b> If score is: <input checked="" type="checkbox"/> 15-18 = H <input type="checkbox"/> 7-14 = M <input type="checkbox"/> 0-6 = L    Record the rating on the first page		

<b>H 2.0. Does the landscape have the potential to support habitat functions of the site?</b>		
<b>H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is:</b> <i>Calculate: % undisturbed habitat</i> <u>1</u> + [(% moderate and low intensity land uses)/2] <u>8.3</u> = <u>4.65%</u> > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1km Polygon points = 2 10-19% of 1km Polygon points = 1 <10% of 1km Polygon points = 0		0
<b>H 2.2. Undisturbed habitat in 1 km Polygon around wetland.</b> <i>Calculate: % undisturbed habitat</i> <u>3.3</u> + [(% moderate and low intensity land uses)/2] <u>9.8</u> = <u>6.65%</u> Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches points = 2 Undisturbed habitat 10 - 50% and > 3 patches points = 1 Undisturbed habitat < 10% of Polygon points = 0		0
<b>H 2.3. Land use intensity in 1 km Polygon:</b> > 50% of Polygon is high intensity land use <span style="float: right;">1/ points = (- 2)</span> Does not meet criterion above <u>58%</u> <span style="float: right;">points = 0</span>		-2
<b>H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs</b> <span style="float: right;">Yes = 3 No = 0</span>		
Total for H 2	Add the points in the boxes above	-2
<b>Rating of Landscape Potential</b> If score is: <input type="checkbox"/> 4-9 = H <input type="checkbox"/> 1-3 = M <input checked="" type="checkbox"/> < 1 = L    Record the rating on the first page		

CHECK

<b>H 3.0. Is the habitat provided by the site valuable to society?</b>		
<b>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? Choose the highest score that applies to the wetland being rated</b> Site meets ANY of the following criteria: <span style="float: right;">(points = 2)</span> <input checked="" type="checkbox"/> It has 3 or more priority habitats within 100 m (see Appendix B) <input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists) <input type="checkbox"/> It is mapped as a location for an individual WDFW species <input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources <input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats within 100 m (see Appendix B) <span style="float: right;">points = 1</span> Site does not meet any of the criteria above <span style="float: right;">points = 0</span>		2
<b>Rating of Value</b> If score is: <input checked="" type="checkbox"/> 2 = H <input type="checkbox"/> 1 = M <input type="checkbox"/> 0 = L    Record the rating on the first page		



**CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS**

Please determine if the wetland meets the attributes described below and circle the appropriate category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All wetlands should also be characterized based on their functions.

Wetland Type <i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	Category
<p><b>SC 1.0. Vernal pools</b></p> <p>Is the wetland less than 4000 ft<sup>2</sup>, and does it meet at least <b>two</b> of the following criteria?</p> <ul style="list-style-type: none"> <li>— Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input.</li> <li>— Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. <i>If you find perennial, obligate, wetland plants, the wetland is probably NOT a vernal pool.</i></li> <li>— The soil in the wetland is shallow [<math>&lt; 1</math> ft (30 cm) deep] and is underlain by an impermeable layer such as basalt or clay.</li> <li>— Surface water is present for less than 120 days during the wet season.</li> </ul> <p style="text-align: right;">Yes – Go to SC 1.1 No = Not a vernal pool</p> <p>SC 1.1. Is the vernal pool relatively undisturbed in February and March? Yes – Go to SC 1.2 No = Not a vernal pool with special characteristics</p>	
<p>SC 1.2. Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 mi (other wetlands, rivers, lakes etc.)? Yes = Category II No = Category III</p>	<p>Cat. II Cat. III</p>
<p><b>SC 2.0. Alkali wetlands</b></p> <p>Does the wetland meet one of the following criteria?</p> <ul style="list-style-type: none"> <li>— The wetland has a conductivity <math>&gt; 3.0</math> mS/cm.</li> <li>— The wetland has a conductivity between 2.0 and 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as “alkali” species (see Table 4 for list of plants found in alkali systems).</li> <li>— If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt.</li> </ul> <p><b>OR</b> does the wetland unit meet two of the following three sub-criteria?</p> <ul style="list-style-type: none"> <li>— Salt encrustations around more than 75% of the edge of the wetland</li> <li>— More than <math>\frac{1}{4}</math> of the plant cover consists of species listed on Table 4</li> <li>— A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands.</li> </ul> <p style="text-align: right;">Yes = Category I No = Not an alkali wetland</p>	<p>Cat. I</p>
<p><b>SC 3.0. Wetlands of High Conservation Value (WHCV)</b></p> <p>SC 3.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to SC 3.2 No – Go to SC 3.3</p> <p>SC 3.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = Category I No = Not a WHCV</p> <p>SC 3.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? <a href="http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf">http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf</a> Yes – Contact WNHP/WDNR and go to SC 3.4 No = Not a WHCV</p> <p>SC 3.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and it is listed on their website? Yes = Category I No = Not a WHCV</p>	<p>Cat. I</p>

<p><b>SC 4.0 Bogs and Calcareous Fens</b> Does the wetland (or any part of the wetland unit) meet both the criteria for soils and vegetation in bogs or calcareous fens? <i>Use the key below to identify if the wetland is a bog or calcareous fen. If you answer yes you will still need to rate the wetland based on its functions.</i></p> <p>SC 4.1. Does an area within the wetland have organic soil horizons (i.e., layers of organic soil), either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? <i>See Appendix C for a field key to identify organic soils.</i> Yes – Go to SC 4.3 No – Go to SC 4.2</p> <p>SC 4.2. Does an area within the wetland have organic soils, either peats or mucks, that are less than 16 in deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to SC 4.3 No = <b>Is not a bog for rating</b></p> <p>SC 4.3. Does an area within the wetland have more than 70% cover of mosses at ground level AND at least 30% of the total plant cover consists of species in Table 5? Yes = <b>Category I bog</b> No – Go to SC 4.4 <b>NOTE:</b> If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 5 are present, the wetland is a bog.</p> <p>SC 4.4. Is an area with peats or mucks forested (&gt; 30% cover) with subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 5 provide more than 30% of the cover under the canopy? Yes = <b>Category I bog</b> No – Go to SC 4.5</p> <p>SC 4.5. Do the species listed in Table 6 comprise at least 20% of the total plant cover within an area of peats and mucks? Yes = <b>Is a Calcareous Fen for purpose of rating</b> No – Go to SC 4.6</p> <p>SC 4.6. Do the species listed in Table 6 comprise at least 10% of the total plant cover in an area of peats and mucks, AND one of the two following conditions is met: — Marl deposits [calcium carbonate (CaCO<sub>3</sub>) precipitate] occur on the soil surface or plant stems — The pH of free water is ≥ 6.8 AND electrical conductivity is ≥ 200 µS/cm at multiple locations within the wetland Yes = <b>Is a Category I calcareous fen</b> No = <b>Is not a calcareous fen</b></p>	<p>Cat. I</p> <p>Cat. I</p>
<p><b>SC 5.0. Forested Wetlands</b> Does the wetland have an area of forest rooted within its boundary that meets at least one of the following three criteria? (<i>Continue only if you have identified that a forested class is present in question H 1.1</i>)</p> <ul style="list-style-type: none"> <li>— The wetland is within the 100 year floodplain of a river or stream</li> <li>— Aspen (<i>Populus tremuloides</i>) represents at least 20% of the total cover of woody species</li> <li>— There is at least ¼ ac of trees (even in wetlands smaller than 2.5 ac) that are “mature” or “old-growth” according to the definitions for these priority habitats developed by WDFW (<i>see definitions in question H3.1</i>)</li> </ul> <p>Yes – Go to SC 5.1 No = <b>Not a forested wetland with special characteristics</b></p> <p>SC 5.1. Does the wetland have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees (<i>see Table 7</i>)? Yes = <b>Category I</b> No – Go to SC 5.2</p> <p>SC 5.2. Does the wetland have areas where aspen (<i>Populus tremuloides</i>) represents at least 20% of the total cover of woody species? Yes = <b>Category I</b> No – Go to SC 5.3</p> <p>SC 5.3. Does the wetland have at least ¼ acre with a forest canopy where more than 50% of the tree species (by cover) are fast growing species (<i>see Table 7</i>)? Yes = <b>Category II</b> No – Go to SC 5.4</p> <p>SC 5.4. Is the forested component of the wetland within the 100 year floodplain of a river or stream? Yes = <b>Category II</b> No = <b>Not a forested wetland with special characteristics</b></p>	<p>Cat. I</p> <p>Cat. I</p> <p>Cat. II</p> <p>Cat. II</p>
<p><b>Category of wetland based on Special Characteristics</b> <i>Choose the highest rating if wetland falls into several categories</i> If you answered No for all types, enter “Not Applicable” on Summary Form</p>	

# Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/llst/>)

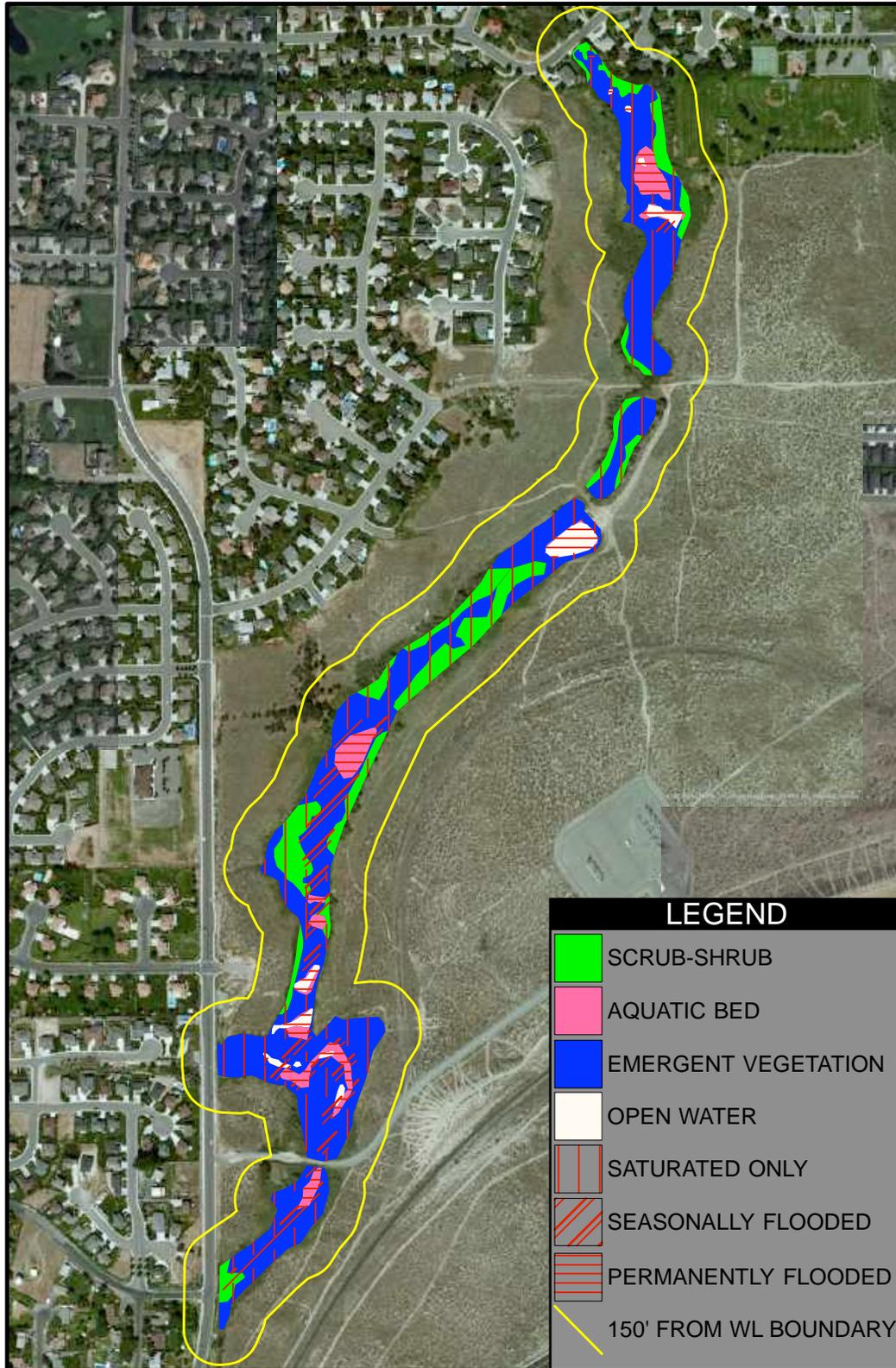
Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: **NOTE: This question is independent of the land use between the wetland and the priority habitat.**

- **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- **Old-growth/Mature forests:** **Old-growth east of Cascade crest** – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. **Mature forests** – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.
- **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm) in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.
- **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).
- **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).
- **Juniper Savannah:** All juniper woodlands.

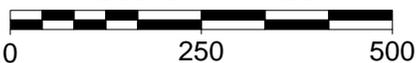
**Note:** All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

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WILLOWBROOK  
WETLAND RATING FIGURE A1 - WETLAND A



Scale 1" = 250'



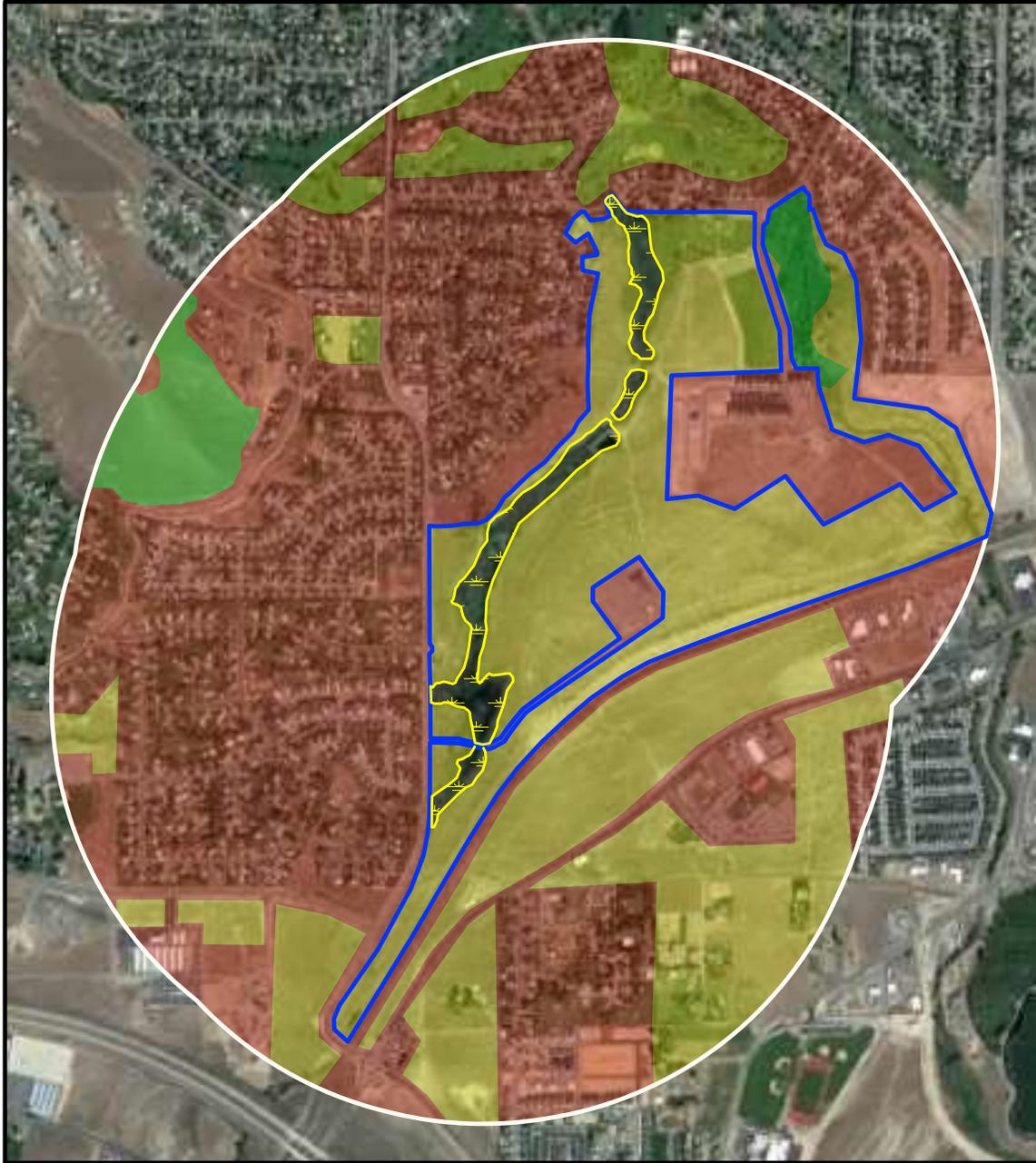
*Wetland Resources, Inc.*  
Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance  
 9505 19th Avenue S.E. Suite 106 Everett, Washington 98208  
 Phone: (425) 337-3174  
 Fax: (425) 337-3045  
 Email: mailbox@wetlandresources.com

**WETLAND RATING**  
**Wetland A**

Alpine Resources  
 Attn: Duane Smith  
 8914 56th Place W  
 Mukilteo, WA 98275

Figure A1  
 WRI Job # 16235  
 Drawn by: SB

WILLOWBROOK  
WETLAND RATING FIGURE A2 - WETLAND A



**LEGEND**

- RELATIVELY UNDISTURBED
- LOW/MOD. INTENSITY
- HIGH INTENSITY
- ACCESSIBLE HABITAT
- WETLAND
- 1 KM FROM WETLAND
- CONTRIBUTING BASIN



Scale 1" = 1,500'



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 9505 19th Avenue S.E. Suite 106 Everett, Washington 98208  
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 Email: mailbox@wetlandresources.com

**WETLAND RATING  
Wetland A**

Alpine Resources  
 Attn: Duane Smith  
 8914 56th Place W  
 Mukilteo, WA 98275

Figure A2  
 WRI Job # 16235  
 Drawn by: SB

WILLOWBROOK  
 WETLAND RATING FIGURE A3 - WETLAND A



**LEGEND**

-  WETLAND
-  AQUATIC RESOURCES ON THE 303(d) LIST

*Wetland Resources, Inc.*  
 Delineation / Mitigation / Restoration / Habitat Creation / Permit Assistance  
 9505 19th Avenue S.E. Suite 106 Everett, Washington 98208  
 Phone: (425) 337-3174  
 Fax: (425) 337-3045  
 Email: mailbox@wetlandresources.com

**WETLAND RATING**  
**Wetland A**

Alpine Resources  
 Attn: Duane Smith  
 8914 56th Place W  
 Mukilteo, WA 98275

Figure A3  
 WRI Job # 16235  
 Drawn by: SB

WILLOWBROOK  
WETLAND RATING FIGURE A4 - WETLAND A

**WRIA 37: Lower Yakima**

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

**Yakima River basin project index:**



[www.ecy.wa.gov/programs/wq/tmdl/yakima\\_wq/index.html](http://www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/index.html)

**Counties**

- [Benton](#)
- [Klickitat](#)
- [Yakima](#)

Waterbody Name	Pollutant(s)	Status**	TMDL Lead
<a href="#">Granger Drain</a>	Fecal Coliform	EPA approved Has an implementation plan	<a href="#">Greg Bohn</a> 509-454-4174
Griffin Lake	Total Phosphorus	Under development	<a href="#">Terry Wittmeier</a> 509-574-3991
Yakima River, Mid Basin Tributaries	<a href="#">Fecal Coliform</a>  Moxie Drain Wide Hollow Cowiche Creek	Under development	<a href="#">Greg Bohn</a> 509-454-4174
	<a href="#">Temperature</a>  Moxie Drain Wide Hollow	Under development	<a href="#">Laine Young</a> 509-575-2642
<a href="#">Yakima River</a>	Toxics	Under development	<a href="#">Jane Creech</a> 509-454-7860
<a href="#">Yakima River, Lower</a>	DDT Turbidity	EPA approved	<a href="#">Jane Creech</a> 509-454-7860

\*\* **Status** will be listed as one of the following: *Approved by EPA, Under Development or Implementation. No status means project work has not yet started.*

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**WETLAND RATING  
Wetland A**

Alpine Resources  
Attn: Duane Smith  
8914 56th Place W  
Mukilteo, WA 98275

Figure A4  
WRI Job # 16235  
Drawn by: SB

**APPENDIX B:**  
U.S. ARMY CORPS OF ENGINEERS  
WETLAND DETERMINATION DATA FORMS

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Smith Multifamily City/County: Richland/Benton Sampling Date: 9/19/16  
 Applicant/Owner: Alpine Resources - Duane Smith State: WA Sampling Point: S1  
 Investigator(s): Sb/JL Section, Township, Range: S36, Twp 28N, Rge 8E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): <1%  
 Subregion (LRR): LRRB Lat: 46.211599 Long: -119.257380 Datum: \_\_\_\_\_  
 Soil Map Unit Name: Finley stony fine sandy loam, 0 to 30 percent slopes NWI classification: Palustrine emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: _____ _____ _____	

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: _____)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
Herb Stratum (Plot size: <u>3m</u> )				
1. <u>Phalaris arundinacea</u>	40	Y	FacW	
2. <u>Acroptilon repens</u>	30	Y	Not listed	
3. <u>Scirpus acutus</u>	20	Y	Obl	
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
90 = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____				
2. _____				
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks: _____ _____ _____				

**Dominance Test worksheet:**  
 Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)  
 Total Number of Dominant Species Across All Strata: 3 (B)  
 Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

**Prevalence Index worksheet:**  
 Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species \_\_\_\_\_ x 1 = \_\_\_\_\_  
 FACW species \_\_\_\_\_ x 2 = \_\_\_\_\_  
 FAC species \_\_\_\_\_ x 3 = \_\_\_\_\_  
 FACU species \_\_\_\_\_ x 4 = \_\_\_\_\_  
 UPL species \_\_\_\_\_ x 5 = \_\_\_\_\_  
 Column Totals: \_\_\_\_\_ (A) \_\_\_\_\_ (B)  
 Prevalence Index = B/A = \_\_\_\_\_

**Hydrophytic Vegetation Indicators:**  
 Dominance Test is >50%  
 Prevalence Index is ≤3.0<sup>1</sup>  
 Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)  
 Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes  No

**SOIL**

Sampling Point: \_\_\_\_\_

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18+"	2.5Y 4/2	90	10YR 4/6	2%	C	M	ls	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- |  |  |
|--|--|
| <input type="checkbox"/> Histosol (A1)                     | <input checked="" type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Stripped Matrix (S6)        |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Loamy Mucky Mineral (F1)    |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Gleyed Matrix (F2)    |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C)    | <input type="checkbox"/> Depleted Matrix (F3)        |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D)            | <input type="checkbox"/> Redox Dark Surface (F6)     |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7)  |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Redox Depressions (F8)      |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Vernal Pools (F9)           |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          |  |

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: \_\_\_\_\_  
Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes  No

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- |  |  |
|--|--|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Salt Crust (B11)                              |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Biotic Crust (B12)                            |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                   |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine)            | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                    |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)      | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine)         | <input type="checkbox"/> Presence of Reduced Iron (C4)                 |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)    |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7)                        |
| <input type="checkbox"/> Water-Stained Leaves (B9)                 | <input type="checkbox"/> Other (Explain in Remarks)                    |

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes  No  Depth (inches): \_\_\_\_\_  
 Water Table Present? Yes  No  Depth (inches): \_\_\_\_\_  
 Saturation Present? (includes capillary fringe) Yes  No  Depth (inches): \_\_\_\_\_

Wetland Hydrology Present? Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**WETLAND DETERMINATION DATA FORM – Arid West Region**

Project/Site: Smith Multifamily City/County: Richland/Benton Sampling Date: 9/19/16  
 Applicant/Owner: Alpine Resources - Duane Smith State: WA Sampling Point: S2  
 Investigator(s): Sb/JL Section, Township, Range: S36, Twp 9N, Rge 28E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ~5%  
 Subregion (LRR): LRRB Lat: 46.211599 Long: -119.257380 Datum: \_\_\_\_\_  
 Soil Map Unit Name: Finley stony fine sandy loam, 0 to 30 percent slopes NWI classification: Palustrine emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: _____ _____ _____	

**VEGETATION – Use scientific names of plants.**

Tree Stratum (Plot size: <u>10m</u> )	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Elaeagnus angustifolia</u>	<u>20</u>	<u>Y</u>	<u>Fac</u>	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
2. <u>Populus balsamifera</u>	<u>20</u>	<u>Y</u>	<u>Fac</u>	
3. <u>Betula Paperifera</u>	<u>10</u>	<u>Y</u>	<u>Fac</u>	
4. _____	_____	_____	_____	
		<u>50</u> = Total Cover		<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: <u>10m</u>)</b>				
1. <u>Rosa gymnocarpa</u>	<u>10</u>	<u>Y</u>	<u>FacU</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
		<u>10</u> = Total Cover		
<b>Herb Stratum (Plot size: _____)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
		_____ = Total Cover		
<b>Woody Vine Stratum (Plot size: _____)</b>				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
		_____ = Total Cover		
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				

**Hydrophytic Vegetation Indicators:**  
 Dominance Test is >50%  
 Prevalence Index is ≤3.0<sup>1</sup>  
 Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)  
 Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes  No

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
**Distinct vegetation transition.**

**SOIL**

Sampling Point: S2

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18+"	2.5Y 4/2	90						No redox

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- |  |   |
|--|---|
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Sandy Redox (S5)           |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Stripped Matrix (S6)       |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Mucky Mineral (F1)   |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C)    | <input type="checkbox"/> Loamy Gleyed Matrix (F2)   |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D)            | <input type="checkbox"/> Depleted Matrix (F3)       |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Redox Dark Surface (F6)    |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Redox Depressions (F8)     |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          | <input type="checkbox"/> Vernal Pools (F9)          |

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: \_\_\_\_\_  
Depth (inches): \_\_\_\_\_

Hydric Soil Present? Yes  No

Remarks:

No redox observed throughout profile,

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- |  |  |
|--|--|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Salt Crust (B11)                              |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Biotic Crust (B12)                            |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                   |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine)            | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                    |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)      | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine)         | <input type="checkbox"/> Presence of Reduced Iron (C4)                 |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)    |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7)                        |
| <input type="checkbox"/> Water-Stained Leaves (B9)                 | <input type="checkbox"/> Other (Explain in Remarks)                    |

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes  No  Depth (inches): \_\_\_\_\_  
 Water Table Present? Yes  No  Depth (inches): \_\_\_\_\_  
 Saturation Present? (includes capillary fringe) Yes  No  Depth (inches): \_\_\_\_\_

Wetland Hydrology Present? Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Smith Multifamily City/County: Richland/Benton Sampling Date: 9/19/16  
 Applicant/Owner: Alpine Resources - Duane Smith State: WA Sampling Point: S3  
 Investigator(s): Sb/JL Section, Township, Range: S36, Twp 9N, Rge 28E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ~5%  
 Subregion (LRR): LRRB Lat: 46.211599 Long: -119.257380 Datum: \_\_\_\_\_  
 Soil Map Unit Name: Finley stony fine sandy loam, 0 to 30 percent slopes NWI classification: Palustrine emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks:	

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: _____)				
1. <u>Phalaris arundinacea</u>	90	Y	FacW	
2. <u>Typha latifolia</u>	10	N	Obl	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
100 = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____		% Cover of Biotic Crust _____		

**Dominance Test worksheet:**  
 Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)  
 Total Number of Dominant Species Across All Strata: 1 (B)  
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**  
 Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species \_\_\_\_\_ x 1 = \_\_\_\_\_  
 FACW species \_\_\_\_\_ x 2 = \_\_\_\_\_  
 FAC species \_\_\_\_\_ x 3 = \_\_\_\_\_  
 FACU species \_\_\_\_\_ x 4 = \_\_\_\_\_  
 UPL species \_\_\_\_\_ x 5 = \_\_\_\_\_  
 Column Totals: \_\_\_\_\_ (A) \_\_\_\_\_ (B)  
 Prevalence Index = B/A = \_\_\_\_\_

**Hydrophytic Vegetation Indicators:**  
 Dominance Test is >50%  
 Prevalence Index is ≤3.0<sup>1</sup>  
 Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)  
 Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes  No

Remarks:

Distinct vegetation transition.

**SOIL**

Sampling Point: S3

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-16"	2.5Y 4/2	90	10YR 4/6	5%	C	M	ls	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- |  |  |
|--|--|
| <input type="checkbox"/> Histosol (A1)                     | <input checked="" type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Stripped Matrix (S6)        |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Loamy Mucky Mineral (F1)    |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Gleyed Matrix (F2)    |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C)    | <input type="checkbox"/> Depleted Matrix (F3)        |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D)            | <input type="checkbox"/> Redox Dark Surface (F6)     |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7)  |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Redox Depressions (F8)      |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Vernal Pools (F9)           |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          |  |

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_

Hydric Soil Present?    Yes     No

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- |  |  |
|--|--|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Salt Crust (B11)                              |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Biotic Crust (B12)                            |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                   |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine)            | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                    |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)      | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine)         | <input type="checkbox"/> Presence of Reduced Iron (C4)                 |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)    |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7)                        |
| <input type="checkbox"/> Water-Stained Leaves (B9)                 | <input type="checkbox"/> Other (Explain in Remarks)                    |

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Water Table Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Saturation Present?    Yes     No     Depth (inches): 10"

Wetland Hydrology Present?    Yes     No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Smith Multifamily City/County: Richland/Benton Sampling Date: 9/19/16  
 Applicant/Owner: Alpine Resources - Duane Smith State: WA Sampling Point: S4  
 Investigator(s): Sb/JL Section, Township, Range: S36, Twp 9N, Rge 28E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ~5%  
 Subregion (LRR): LRRB Lat: 46.211599 Long: -119.257380 Datum: \_\_\_\_\_  
 Soil Map Unit Name: Finley stony fine sandy loam, 0 to 30 percent slopes NWI classification: Palustrine emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks:	

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Elaeagnus angustifolia</u>	80	Y	Fac	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>2</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____				
3. _____				
4. _____				
80 = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B)  Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				
1. _____				
2. _____				
3. _____				
_____ = Total Cover				
<b>Herb Stratum (Plot size: _____)</b>				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Phalaris arundinacea</u>	80	Y	FacW	
2. <u>Acroptiln repens</u>	10	N	not listed	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
90 = Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b>				
1. _____				
2. _____				
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks:				

**SOIL**

Sampling Point: S3

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18+"	5Y 4/3	90					ls	Moistened

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- |  |   |
|--|---|
| <input type="checkbox"/> Histosol (A1)                     | <input type="checkbox"/> Sandy Redox (S5)           |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Stripped Matrix (S6)       |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Loamy Mucky Mineral (F1)   |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Gleyed Matrix (F2)   |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C)    | <input type="checkbox"/> Depleted Matrix (F3)       |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D)            | <input type="checkbox"/> Redox Dark Surface (F6)    |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Redox Depressions (F8)     |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Vernal Pools (F9)          |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          |   |

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: \_\_\_\_\_  
Depth (inches): \_\_\_\_\_

Hydric Soil Present?    Yes     No

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- |  |  |
|--|--|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Salt Crust (B11)                              |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Biotic Crust (B12)                            |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                   |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine)            | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                    |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)      | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine)         | <input type="checkbox"/> Presence of Reduced Iron (C4)                 |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)    |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7)                        |
| <input type="checkbox"/> Water-Stained Leaves (B9)                 | <input type="checkbox"/> Other (Explain in Remarks)                    |

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Water Table Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Saturation Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 (includes capillary fringe)

Wetland Hydrology Present?    Yes     No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil was dry at the time of investigation.

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Smith Multifamily City/County: Richland/Benton Sampling Date: 9/19/16  
 Applicant/Owner: Alpine Resources - Duane Smith State: WA Sampling Point: S5  
 Investigator(s): Sb/JL Section, Township, Range: S36, Twp 9N, Rge 28E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ~5%  
 Subregion (LRR): LRRB Lat: 46.211599 Long: -119.257380 Datum: \_\_\_\_\_  
 Soil Map Unit Name: Finley stony fine sandy loam, 0 to 30 percent slopes NWI classification: Palustrine emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: _____ _____ _____	

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	<b>Dominance Test worksheet:</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Salix exigua</u>	<u>20</u>	<u>Y</u>	<u>FacW</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
_____ = Total Cover				
Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Epilobium ciliatum</u>	<u>90</u>	<u>Y</u>	<u>FacW</u>	
2. <u>Typha latifolia</u>	<u>10</u>	<u>N</u>	<u>Obl</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____		<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
**Distinct vegetation transition.**

**SOIL**

Sampling Point: S5

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18+"	2.5Y 4/2	90	10YR 4/6	3%	C	M	ls	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pools (F9)

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: \_\_\_\_\_  
Depth (inches): \_\_\_\_\_

Hydric Soil Present?    Yes     No

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Water Table Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Saturation Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 (includes capillary fringe)

Wetland Hydrology Present?    Yes     No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soils moist throughout profile

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Smith Multifamily City/County: Richland/Benton Sampling Date: 9/19/16  
 Applicant/Owner: Alpine Resources - Duane Smith State: WA Sampling Point: S6  
 Investigator(s): Sb/JL Section, Township, Range: S36, Twp 9N, Rge 28E  
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): ~5%  
 Subregion (LRR): LRRB Lat: 46.211599 Long: -119.257380 Datum: \_\_\_\_\_  
 Soil Map Unit Name: Finley stony fine sandy loam, 0 to 30 percent slopes NWI classification: Palustrine emergent

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks:	

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Sapling/Shrub Stratum (Plot size: _____)				
1. <u>Salix exigua</u>	10	Y	FacW	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: _____)				
1. <u>Phalaris arundinacea</u>	90	Y	FacW	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
90 = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____		% Cover of Biotic Crust _____		
Remarks:				

**Dominance Test worksheet:**  
 Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)  
 Total Number of Dominant Species Across All Strata: 1 (B)  
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**  
 Total % Cover of: \_\_\_\_\_ Multiply by: \_\_\_\_\_  
 OBL species \_\_\_\_\_ x 1 = \_\_\_\_\_  
 FACW species \_\_\_\_\_ x 2 = \_\_\_\_\_  
 FAC species \_\_\_\_\_ x 3 = \_\_\_\_\_  
 FACU species \_\_\_\_\_ x 4 = \_\_\_\_\_  
 UPL species \_\_\_\_\_ x 5 = \_\_\_\_\_  
 Column Totals: \_\_\_\_\_ (A) \_\_\_\_\_ (B)  
 Prevalence Index = B/A = \_\_\_\_\_

**Hydrophytic Vegetation Indicators:**  
 Dominance Test is >50%  
 Prevalence Index is ≤3.0<sup>1</sup>  
 Morphological Adaptations<sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)  
 Problematic Hydrophytic Vegetation<sup>1</sup> (Explain)

<sup>1</sup>Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes  No

**SOIL**

Sampling Point: S6

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-18+"	5Y 4/3	90					ls	Moistened

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.      <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- |  |   |
|--|---|
| <input type="checkbox"/> Histosol (A1)                     | <input type="checkbox"/> Sandy Redox (S5)           |
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Stripped Matrix (S6)       |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Loamy Mucky Mineral (F1)   |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Gleyed Matrix (F2)   |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C)    | <input type="checkbox"/> Depleted Matrix (F3)       |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D)            | <input type="checkbox"/> Redox Dark Surface (F6)    |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Redox Depressions (F8)     |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Vernal Pools (F9)          |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          |   |

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: \_\_\_\_\_  
Depth (inches): \_\_\_\_\_

Hydric Soil Present?    Yes     No

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- |  |  |
|--|--|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Salt Crust (B11)                              |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Biotic Crust (B12)                            |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                   |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine)            | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                    |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)      | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine)         | <input type="checkbox"/> Presence of Reduced Iron (C4)                 |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)    |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7)                        |
| <input type="checkbox"/> Water-Stained Leaves (B9)                 | <input type="checkbox"/> Other (Explain in Remarks)                    |

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Water Table Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 Saturation Present?    Yes     No     Depth (inches): \_\_\_\_\_  
 (includes capillary fringe)

Wetland Hydrology Present?    Yes     No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil was dry at the time of investigation.

**APPENDIX C:**  
CRITICAL AREA REPORT AND BUFFER AVERAGING PLAN MAP



# **WILDLIFE HABITAT ASSESSMENT REPORT**

**FOR**

***WILLOWBROOK***  
***CITY OF RICHLAND, WA***

*Wetland Resources, Inc. Project #16235*

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April 23, 2020

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## **APPENDICES**

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## 1.0 INTRODUCTION

The site is comprised of two Benton County parcel numbers: 136983050008001 and 136983050007002. These parcels are located east of Piper Street and the intersection of Center Boulevard and Eastwood Avenue, in the City of Richland Washington. Access is from the terminus of Piper Street and just east of the intersection of Center Boulevard and Eastwood Avenue. The site is further located in a portion of Sections 36 in Township 9N, and Range 28E, W.M.

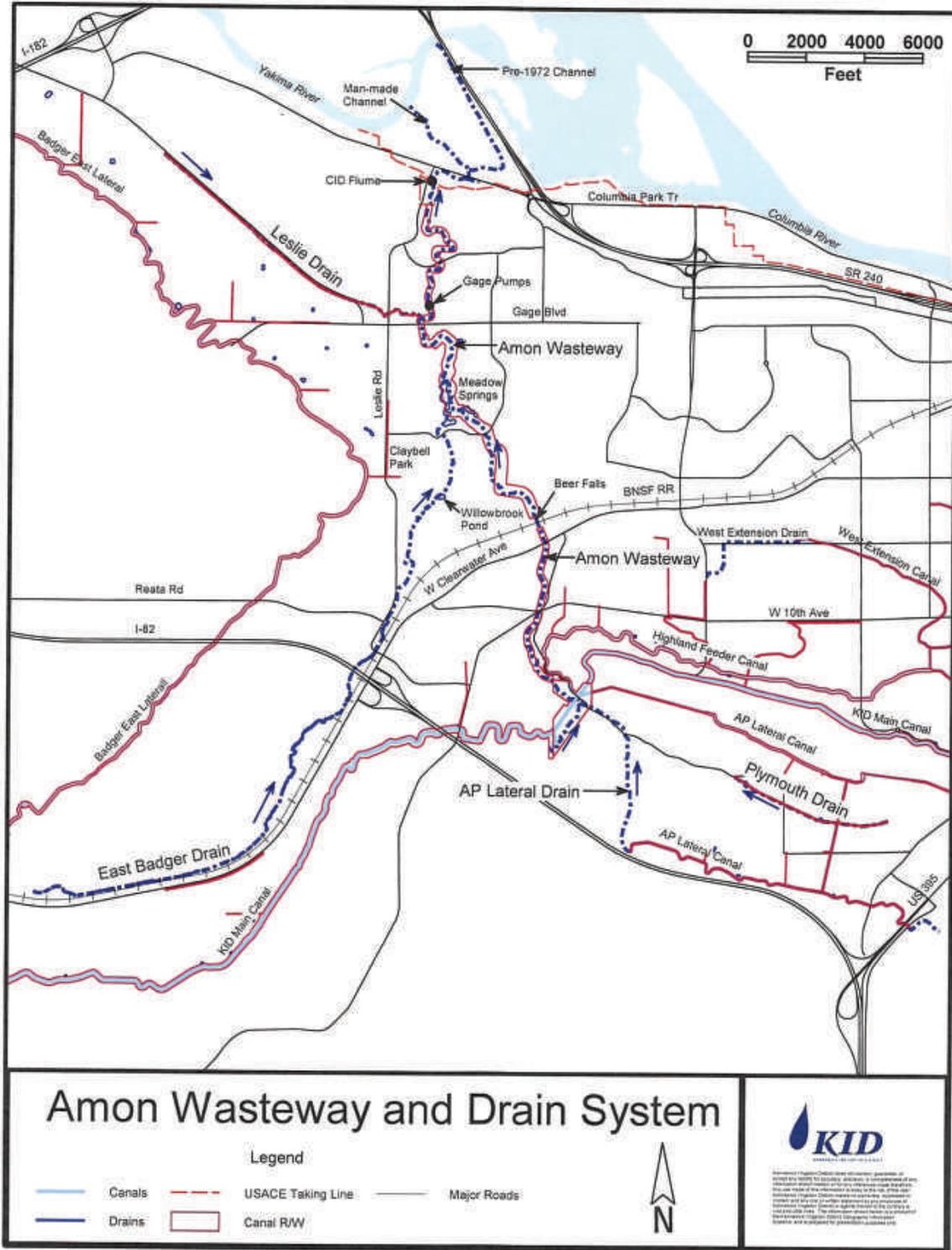
*Wetland Resources, Inc. (WRI)* completed a site investigation on March 19th of 2020 to conduct a wildlife habitat assessment on and in the vicinity of the subject properties in order to determine if any wildlife species or habitats are present that require protection under the City of Richland Municipal Code (RMC). This report presents the findings of the investigation, and provides management recommendations to protect wildlife use and functions associated with the subject site. Conditions and proposals related to wetlands and streams present on the subject site are discussed in a Critical Areas Study and Buffer Averaging Plan prepared by *WRI*. As any potential on-site fish habitat is limited to East Badger Drain/West Fork Amon Creek and its associated tributaries, the determination of fish use and of appropriate protections for these critical areas are also discussed in the aforementioned Critical Areas Study and Buffer Averaging Plan.



**Figure 1** - Aerial View of Subject Property

The subject property is located along the northern portion of the East Badger Drain, in Richland, WA. Land use in the surrounding area consists of single-family/multi-family residential development, community park areas and a golf course. Topography within the study area slopes moderately to the east, and trends slightly to the north with hills to the east and west. No development currently exists within the boundary of the subject property; however, a network of utility roads is present. The climate of Richland is semi-arid desert.

The East Badger Drain/West Fork Amon Creek is located on the eastern portion of the property and flows from south to north. Adjacent to the drain is a riparian area consisting of wetland conditions that receives the entirety of its hydrology from wastewater associated with the Kennewick Division of the Yakima project. The Kennewick Irrigation District (KID) main canal and Badger East lateral canal lie upland and parallel to the major portion of the East Badger Drain (see Figure 3, KID map - Amon Wasteway and Drain system). Both canals are unlined, and based on KID data, lose a combined total of approximately 2,800 acre-feet of water each irrigation season.



**Figure 1 - KID Map – Amon Wasteway and Drain System**

On-site vegetation is a combination of the typical non-native shrub-steppe community found in much of the non-developed upland surrounding the site and the riparian community located along the Amon Wasteway. Outside of the riparian area vegetation has been impacted by surrounding

land uses and generally consists of, but is not limited to: big sagebrush (*Artemisia tridentata*), rabbit brush (*Chrysothamnus nauseosa*), Russian thistle (*Salsola tragus*), and cheatgrass (*Bromus tectorum*). Within the riparian corridor along the Amon Wasteway, vegetation generally consists of: Russian olive (*Elaeagnus angustifolia*), coyote willow (*Salix exigua*), and Russian knapweed (*Acroptilon repens*) along the exterior and reed canarygrass (*Phalaris arundinacea*), common cattail (*Typha latifolia*), and hard-stem bulrush (*Schoenoplectus acutus*) in the interior.

## **1.1 PROJECT DESCRIPTION**

Alpine Resources, hereafter referred to as the applicant, proposes to construct a multi-family residential development east of Piper Street and the intersection of Center Blvd and Eastwood Avenue, paralleling the Amon Wasteway Wetland buffer on its western side. The wetland buffer will be averaged to allow for the proposed development activity, and the buffer averaging design will compensate for buffer width reductions at an approximate 2:1 ratio. The buffer averaging design will result in a net increase of buffer totaling 13,805 square feet. Areas being provided as additional buffer have the same structural and functional characteristics as those being removed.

## **2.0 STATEMENT OF QUALIFICATIONS**

Hailey Starr, conducted the field assessment for this Wildlife Habitat Assessment Report.

Hailey Starr holds a Bachelor of Science degree in Natural Resources (Wildlife Ecology Focus) and a Master's of Environmental Studies (Wildlife Management and Habitat Connectivity Focus). Additional training includes, Wildlife Capture and Immobilization through Washington State University, Emergency Medical Care of Wildlife through Washington State University, and Marbled Murrelet Monitoring through Washington State Department of Transportation. Hailey has worked as an ecologist on projects within the Pacific Northwest for over 12 years, including scientific study of mule deer, white-tailed deer, Columbia Basin pygmy rabbits, captive breeding of endangered species, wildlife-vehicle collisions, wildlife habitat connectivity, highway influences on elk movement, wildlife habitat assessments, wetland and stream determinations, and environmental mitigation monitoring. During these 12 years of experience, Hailey has specialized in the consultation of proposed land use and development permit applications as they pertain to critical areas (wetlands, rivers, streams, lakes, and habitats of protected fish and wildlife species).

## **3.0 WILDLIFE HABITAT ASSESSMENT**

The purpose of this wildlife habitat assessment was to identify any Wildlife Habitat Conservation Areas that are regulated pursuant to the City of Richland Municipal Code (RMC) sections 22.10.180 through 22.10.220. Please note that the purpose of this assessment was related to potential wildlife habitat and is not intended to represent a wildlife survey for particular species. Therefore, this section presents the findings of the investigation, as well as, an analysis of how City of Richland fish and wildlife protections apply to the subject site.

### **3.1 CITY OF RICHLAND WILDLIFE HABITAT PROTECTIONS**

The Richland Municipal Code (RMC) 22.10.185 designates Fish and Wildlife Habitat Conservation Areas (HCAs) as those areas identified in the subsections below.

*A. Fish and wildlife habitat conservation areas include the following:*

*1. Areas where state or federal designated endangered, threatened, and sensitive species have a primary association.*

*a. Federal designated endangered and threatened species are those fish, wildlife and plant species identified by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service that are in danger of extinction or threatened to become endangered. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service should be consulted as necessary for current listing status.*

*b. State designated endangered, threatened and sensitive species are those fish, wildlife and plant species native to the state of Washington identified by the State Department of Fish and Wildlife and/or State of Washington Natural Heritage Program that are in danger of extinction, threatened to become endangered, vulnerable, or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats. The state of Washington's Department of Fish and Wildlife and/or Natural Heritage Program maintains the most current listings and should be consulted as necessary for current state listing status;*

*2. State priority habitats and areas associated with state priority species.*

*a. State of Washington priority habitats and species are considered priorities for conservation and management. The state of Washington's Department of Fish and Wildlife should be consulted for current listing of priority habitats and species;*

*3. Habitats and species of local importance. The city of Richland hereby adopts by reference those priority habitats and species considered priorities for conservation and management identified by the State Department of Fish and Wildlife and State of Washington Natural Heritage Program as now exist or as may be amended;*

*4. In addition to the priority habitats and species recognized by WDFW and/or State of Washington Natural Heritage Program, a process is provided for listing other habitats and species that are important locally to the people of Richland.*

*5. The areas listed as a national wildlife refuge, national park, natural area preserve or any preserve or reserve designated under WAC 332-30-151;*

*6. The Yakima River Delta area, including Lake Wallula wildlife habitat areas currently managed by the U.S. Army Corps of Engineers, the Chamna Natural Preserve, Bateman Island;*

*7. The Hanford Islands in the Columbia River managed by the U.S. Fish and Wildlife Service;*

8. *Amon Creek Natural Preserve;*
9. *Badger Mountain Natural Preserve;*
10. *Category I wetlands as defined in RMC 22.10.100;*
11. *State nature area preserves or natural resource conservation areas and state wildlife areas;*
12. *Documented habitat, other than accidental presence, of threatened or endangered species;*
13. *Documented habitat, other than accidental presence, of regional or national significance for migrating birds;*
14. *Naturally occurring ponds under 20 acres and their submerged aquatic beds that provide fish or wildlife habitat;*
15. *Waters of the state;*
16. *Lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity.*

The HCA regulated species and habitats identified on or within 300 feet of the site includes Amon Creek Natural Preserve (off site), PHS mapped Priority Habitat - wetland (partially on site), and PHS (hard copy) mapped fall chinook located within with West Fork Amon Creek (partially on site).

## **4.0 SITE INVESTIGATION**

### **4.1 REVIEW OF EXISTING INFORMATION DOUBLE CHECK RESOURCES FOR CURRENT ACCURACY**

Prior to conducting the on-site investigation of the subject site, public resource information was reviewed to identify the presence of any priority habitats or species within and near the project area. These sources included:

- WDFW Priority Habitat and Species (PHS) Hard Copy Map: The only mapped priority area recorded in the vicinity by WDFW is Burrowing Owl (*Athene cunicularia*) a regular occurrence area, although no nests are recorded on or adjacent to the site. Southeast of the site, shrub-step areas are mapped as present that may provide quality habitat for black-tailed jackrabbits (*Lepus californicus*), American badgers (*Taxidea taxus*), and side-blotched lizards (*Uta* spp.). Given the disturbed nature on-site habitat and the dominance of cheatgrass (*Bromus tectorum*) in the grass layer, which is non-native and annual, the on-site area does not meet the definition of priority shrub-step habitat.

West Fork Amon Creek is a fish-bearing stream and a water of the state flowing through a portion of the site, within the Amon Wasteway wetland. However, this area is protected and no development activity is proposed within this HCA. The nearby Amon Creek

Natural Preserve HCA does not extend onto the subject site. No other potential habitats species occur in the project area that meet HCA designation.

Discussions of the presence and/or absence of mapped habitats and species were field verified and discussed in detail below.

- USFWS National Wetlands Inventory: The NWI map tool depicts a wetland roughly in the same location as the Amon Wasteway wetland unit. No other wetlands are depicted by the NWI in the vicinity of the project area.
- StreamNet Online Mapping Application: StreamNet is a fish distribution database maintained by the PSMFC as a regional clearinghouse for fish data. StreamNet identifies Coho within the West Fork Amon Creek.
- WDFW SalmonScape Interactive Mapping System: SalmonScape is an online GIS database that contains publicly available resource information for fish population studies and general species distribution (both documented and modeled presence). SalmonScape shows spring chinook and coho both as presumed within the West Fork Amon Creek.
- Washington DNR Natural Heritage and All Features List: No features were found present within the township, range, and section where the site is located.
- Benton County GIS: Benton County GIS Web Mapping does not depict information on wetlands and streams.
- WDNR Forest Practices Activity Mapping Tool (FPAMT): FPAMT is an online GIS database that aids the process of submitting a Forest Practices permit application. The tool is useful for the purposes of this study, because WADNR models fish presence. FPAMT shows an unclassified stream flowing through the subject property.

## **4.2 HABITAT ASSESSMENT**

The subject property was assessed for Fish and Wildlife Habitat Conservation Areas during the March 19, 2020 field visit. Below describes the on-site habitat conditions and wildlife findings. Please see Appendix A (Habitat Unit Map) for the graphical approximation of the described habitat types.

### On-site Habitat Unit A – East Badger Drain Habitat Corridor

#### *Mixed Willow / Reed Canarygrass*

The area along the eastern property line within the West Fork Amon Creek habitat corridor, is primarily comprised of a mixed aged willow and herbaceous species composition. Vegetation within the on-site portion of the wetland generally consists of: Pacific willow (*Salix lucida*), coyote willow (*Salix exigua*), reed canarygrass (*Phalaris arundinacea*), common cattail (*Typha latifolia*), hardstem bulrush (*Schoenoplectus acutus*), Watson's willowherb (*Epilobium ciliatum*), Russian olive (*Elaeagnus angustifolia*), and Black locust (*Robinia pseudoacacia*). For more information about the West Fork

Amon Creek and the associated wetland, please see the Critical Area Report and Buffer Averaging Plan prepared by *WRI*.



**Figure 2** - Site Photos: Wetland and Stream Corridor

The areas of mature and immature willow bordering the stream and wetland corridor create transitional zones considered “edge” habitat space. The on-site forest and shrub system provide patches quality native cover, as well as a wide variety of small to medium sized perches within the forest and along the edge habitat. The larger willows and shrubs within these areas provide perches for a variety of bird species. Large woody debris in the form of snags and downed logs were only found in areas comprised of mature willows. Portions of this habitat unit offer open water features providing habitat for a variety of water dependent species. The wildlife observed within this habitat unit during our March site visit were primarily waterfowl and song birds.



**Figure 3** - Site Photos: Fenced Restoration Areas and Gravel Road Used by Pedestrians

The forest structure is relatively diverse, comprised of pockets of deciduous trees interspersed within immature willow, various native shrub species, and pockets of herbaceous vegetation. This habitat corridor, including West Fork Amon Creek, the associated wetland, and non-wetland area, create a relatively contiguous habitat corridor that extends off-site to the east and south. As this habitat extends eastward (off site) it becomes the Amon Creek Natural Preserve (regulated HCA). This corridor continues south for approximately 2,800 feet. The size and complexity of the different systems present (stream, wetland, and non-wetland) provide a mixed assemblage of habitat for a diversity flora and fauna to thrive in. However, the relatively narrow width of the unit (160 - 400 feet) creates limitation for refuge for larger and sensitive species. This habitat provides moderate-quality hiding and thermal cover, potential nest locations for passerines, and arboreal food resources. Habitat function and wildlife use of this habitat type is in part limited by landscape fragmentation due to public roads and high-density residential development. This level of habitat fragmentation can influence the use of the site by highly sensitive and some highly mobile terrestrial species that necessitate specific habitat requirements. Please see Section 2.3.1 Wildlife Species Detections below for a detailed description of species observed on site.

Overall, this habitat unit appears to have experienced relatively limited disturbance as of recently. However, areas dominated by invasive non-native reed canarygrass does indicate historical disturbance. Portions of this habitat located near the gravel access road used by pedestrians traveling east to access the Amon Creek Natural Preserve are fenced with woven metal wire, protecting the area from human disturbance. These areas appear to be part of a restoration project where non-native species were removed and shrub-steppe vegetation was installed. This habitat unit also borders the Amon Creek Natural Preserve affording connectivity to protected and managed lands. The off-site shrub-steppe ecosystem offered by the Amon Creek Natural Preserve located east of the project site is of higher quality shrub-steppe habitat when compared to what is found on site. It is mostly comprised of native species and structural diversity within the shrub overstory and intermixed with areas of poor herbaceous understory. The connectivity between the protected lands and on-site Habitat Unit A provides a movement corridor for a variety of species. However, there are several hiking trails throughout the nature preserve that present a level of frequent human disturbance that may be intolerable by a variety of species not accustomed to frequent human presence.

#### On-site Habitat Unit B – Moderately Disturbed Shrub-steppe Habitat

##### *Mixed Common Rabbitbrush / Russian Thistle / Tumble Mustard*

A large majority of the site is comprised of this habitat type that borders Habitat Unit A to the west. This area is comprised of common rabbitbrush (*Chrysothamnus nauseosa*), Russian thistle (*Salsola tragus*), Canada thistle (*Cirsium arvense*), desert parsley (*Lomatium leptocarprum*), Indian ricegrass (*Achnatherum hymenoides*), western yarrow (*Achillea millefolium*), cheatgrass (*Bromus tectorum*), and tumble mustard (*Sisymbrium altissimum*). The lack of species and structural diversity offered by this habitat type is likely because of human disturbance. Several unofficial walking trails were found throughout this habitat unit along with signs of recent clearing and grading.



**Figure 4** - Site Photos: Area dominated by rabbitbrush

Despite human disturbance and lack of species and structural diversity, abundant signs of rabbits and coyotes was identified throughout this habitat unit. Large quantities of scat and tracts were found throughout the area. Several species of birds were found perching on large rabbitbrush and finding refuge /cover within the denser portions of the site. The majority of the wildlife trails observed within this habitat were of small mammals mostly used by rabbit species and coyote. Therefore, the primary usage of this habitat type is by small mammals, highly mobile species, and avian species.



**Figure 5** - Site Photos: Abundant Signs of Usage by Rabbits

*Big Sagebrush / Rabbitbrush / Yarrow*

A small portion of the property located within the northwest property corner is comprised of different structural and species diversity than the rest of this Habitat Unit B. This area is primarily comprised of mature big sagebrush (*Artemisia tridentata*), a species indicative of a more native shrub-

steppe habitat than the rest of the unit. More mature individuals of rabbitbrush were found intermixed with western yarrow (*Achillea millefolium*), tumble mustard (*Sisymbrium altissimum*), and cheatgrass (*Bromus tectorum*) within this portion of the habitat unit. The presence of structural diversity and cover offered by the larger shrubs creates perching opportunities for bird species that prefer mature sage such as Sage Sparrow (*Artemisiospiza nevadensis*) and Brewer's Sparrow (*Spizella breweri*) and opportunities for refuge and cover for California Quail (*Callipepla californica*) and a variety of small mammal species. Several of the aforementioned species were visually identified within this habitat patch during our on-site evaluations.



**Figure 6** - Site Photos: Area dominated by big sagebrush

Overall, this habitat unit appears to have abundant use by a variety of species, especially rabbits, coyote, and a variety of bird species. However, the limited quantity of native plant species in both the shrub overstory and herbaceous understory as well as, the limited structural diversity offer by this habitat unit greatly limits wildlife use by a variety of species. A native herbaceous understory is mostly absent from this habitat unit thus inhibiting many ground dwelling species that require a more native shrub-steppe ecosystem.

#### On-site Habitat Unit C – Heavily Disturbed Shrub-steppe Habitat

##### *Mixed Cheatgrass / Tumble Mustard*

A portion of the property located along the western property line is comprised of this habitat type. The dominance of non-native species - cheatgrass (*Bromus tectorum*) as well as, species that occupy disturbed shrub-steppe environments - tumble mustard (*Sisymbrium altissimum*) indicates that this portion of the property has a history of disturbance. Other species found within this portion of the site are typically found within disturbed sites, including Russian thistle (*Salsola tragus*), Canada thistle (*Cirsium arvense*), prickly lettuce (*Lactuca serriola*) western yarrow (*Achillea millefolium*), and bedstraw spp. (*Galium spp.*). The absence of structural diversity offered by a more native shrub-steppe plant community mostly found within the nearby nature preserve, limits the ability for wildlife to seek cover, forage on native herbaceous and shrub plants, and perching opportunities for avian species. Thereby, limiting the use of this portion of the site by a large variety of wildlife.



**Figure 7** - Site Photos: Heavily Disturbed Area on the Right

Wildlife that use this portion of the site are likely transient and don't reside in the area for long due to the lack of high-quality forage and cover options. Therefore, it is presumed that wildlife does not spend a significant amount of time here, but are instead moving through this low-quality habitat to higher quality habitat found in other portions of the site and within the adjacent nature preserve. This is evident by the lack of wildlife signs in this area when compared to other portions of the site.

Overall, the habitat quality offered by this highly disturbed portion of Habitat Unit C is low and extremely limited in comparison to other areas found on site. Given these considerations, the wildlife in this area likely prefer to utilize the nearby nature preserve and Habitat Unit A. As evident by the difference of wildlife usage observed. Please see Section 2.3.1 Wildlife Species Detections below for a detailed description of species observed on site.

### **4.3 WILDLIFE FINDINGS**

One field visit was performed to evaluate habitat conditions and potential wildlife presence. Use of the subject site by at least fourteen (14) avian species and four (4) mammalian species was observed. Other species and groups that may use the site are predicted and described below.

#### **4.3.1 Wildlife Species Detections**

Direct species observations occurred during the site visit conducted in March 2020. Indirect observations included evidence of use by species, such as tracks, scat, and signs of behavioral interactions with habitat features (ex. signs of foraging).

*A Note About Bird Names: This report follows the IOC World Bird List naming convention for birds, where official bird names are capitalized. This convention was adopted because it distinguishes a taxonomic species from a general description of a bird. For instance, several species of flycatcher could be described as "gray flycatchers," but a "Gray Flycatcher" is a specific taxonomic species.*

## **Direct Observations**

### Habitat Unit A

Two Black-tailed jack rabbits (*Lepus californicus*) were found within this habitat type near the gravel road entrance to the off-site nature preserve. Other small mammals visually identified within this habitat unit include eastern cottontail (*Sylvilagus floridanus*) and Douglas Squirrel (*Tamiasciurus douglasii*). Several bird species were observed occupying this habitat unit including Song Sparrow (*Melospiza melodia*), Red-winged Blackbird (*Agelaius phoeniceus*), Mallard (*Anas platyrhynchos*), Northern Flicker (*Colaptes auratus*), Anna's Hummingbird (*Calypte anna*), Killdeer (*Charadrius vociferus*), American Crow (*Corvus brachyrhynchos*), White-crowned sparrow (*Zonotrichia leucophrys*), Sharp-shinned Hawk (*Accipiter striatus*), House Finch (*Haemorphous mexicanus*), and Glaucus-winged Gull (*Larus glaucescens*).

### Habitat Unit B

Several Sage Sparrows (*Artemisiospiza nevadensis*) and Brewer's Sparrows (*Spizella breweri*) were found flying from shrub to shrub within this habitat unit, especially between larger shrubs. California Quail (*Callipepla californica*) were observed seeking cover within larger shrubs. The only small mammal visually observed within this habitat unit was the eastern cottontail (*Sylvilagus floridanus*).

### Habitat Unit C

No direct observations of species were observed in this habitat unit.

## **Indirect Observation**

### Habitat Unit A

Several trails were observed throughout this habitat type. They did not appear to be regularly used by ungulates but instead by small mammals, likely used by either coyote (*Canis latrans*), rabbits (*Sylvilagus* spp. and *Lepus* spp.), raccoons (*Procyon lotor*), and / or skunks (*Mephitis* spp.). Signs of rabbit and coyote scat and prints were abundant within this habitat type. Several old medium sized bird nests were observed within the larger trees found within this habitat unit.

### Habitat Unit B

This habitat unit appears to be used abundantly by rabbits due to the large amount of scat observed. The eastern cottontail and black-tailed jack rabbit are the species likely occupying this area for foraging opportunities and cover. Several signs of coyote were found along the small mammal trails throughout this habitat unit.

### Habitat Unit C

Signs of wildlife within this habitat unit scant. Minor signs of rabbit and coyote were found.

## **4.3.2 General Wildlife Predictions**

Based on the available habitat, other avian species likely to occur on-site include Brown-headed cowbird (*Molothrus ater*), Ring-necked Duck (*Aythya collaris*), American Coot (*Fulica americana*), Yellow-rumped Warbler (*Setophaga coronata*), Cedar Waxwing (*Bombycilla cedrorum*), Say's Phoebe (*Sayornis saya*), and Belted Kingfisher (*Megaceryle alcyon*).

Other possible mammalian species that may utilize this site include species such as: beaver (*Castor canadensis*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), deer mice (*Peromyscus maniculatus*), moles (*Scapanus* spp.), and white-tailed deer (*Odocoileus virginianus*).

Reptilian and amphibian species likely to use this site include American bullfrog (*Rana catesbeiana*) and gopher snake (*Pituophis catenifer*).

### **4.3.3 Use by Special Status Wildlife Species**

While the heterogeneous environments within the project area are clearly used by a variety of wildlife species, only federally or state listed species, WDFW priority species and habitats, and regulated species that have a primary association afford protection by the Richland Municipal Code (Title 22.10).

No terrestrial or avian federal or state listed endangered or threatened species were found on site. WDFW PHS maps a portion of the subject property near the on-site wetland as a regular occurrence area for Burrowing Owls (*Athene cunicularia*), a State Candidate species. However, no signs of Burrowing Owls or habitats of primary association were observed while on-site. Two black-tailed jackrabbits, a State Candidate species, and WDFW priority species were identified on-site along the eastern property line bordering Amon Creek Natural Preserve near the gravel road utilized by pedestrians to access the Amon Creek Natural Preserve. The black-tailed jackrabbits were observed utilizing the east side of the Habitat Unit A likely for cover since this portion of the habitat unit has dense shrub and tree cover. However, habitats of primary association are located off site within the more native shrub-steppe system found within the Amon Creek Natural Preserve. Please see below for a detailed discussion about these species.

WDFW PHS database revealed that a portion of the property near the wetland area, as regular occurrence areas for Burrowing Owls. While on site, no visual observations of the species or its burrows were observed. Burrowing Owls use burrows dug by prairie dogs, ground squirrels, badgers, and marmots. None of the aforementioned species or their burrows were observed on site. Therefore, the property does not currently provide primary habitat for this species to occupy.

As mention above, two black-tailed jackrabbits were observed along the eastern property line. The individuals were seeking refuge within the dense shrub and tree overstory. The on-site disturbed shrub-steppe habitat is of low quality when compared to the more native system located off-site within the nature preserve. While on site, abundant evidence of rabbit scat was observed and is likely a combination of cottontail and black-tailed jackrabbit. The on-site shrub-steppe habitat does provide low quality foraging and cover opportunities for the species. However, the off-site shrub-steppe habitat found within the nature preserve is of higher quality. Therefore, this species is presumed to primarily occupy the nature preserve and occasionally come on-site to forage.

A habitat of primary association typically refers to a critical habitat component that federally or state-listed endangered, threatened, candidate, sensitive, or priority wildlife require, which if altered may reduce the likelihood of that species to persist and reproduce over the long term (Everett 2006). Black-tailed jackrabbits prefer big sagebrush and generally does not prefer grasslands or areas that lack shrub cover (WHCWG 2010). Research has found that this species is positively correlated with shrub density (Thompson and Gese 2007). Size of home range varies from 16 to 300 ha with no seasonal migrations (WHCWG 2010). As mentioned above, the on-site shrub-steppe habitat showed limited availability of big sagebrush and had a large area devoid of shrubs in general. The off-site nature preserve provides the best habitat characteristics preferred by this species. Therefore, this species is presumed to primarily occupy the off-site shrub-steppe area within the nature preserve.

Several public resources map West Fork Amon Creek as supporting fall chinook which is a federally threatened species. Therefore, West Fork Amon Creek is presumed to support this species and should be managed appropriately. This species meets the requirements outlined in RMC 22.10.185 to be protected. The wetland and stream area also meet the requirements outlined in 22.10.185 as WDFW priority habitats. Please see Section 3.0 Proposed Habitat Conservation Area Plan for the proposed HCAs associated with the protection of this species and the West Fork Amon Creek corridor.

## **5.0 PROPOSED HABITAT CONSERVATION AREA PROTECTIONS**

### **5.1 CITY OF RICHLAND FISH AND WILDLIFE HABITAT CONSERVATION AREA PROTECTIONS**

As mentioned above, in Section 3.1 City of Richland Wildlife Habitat Protections, RMC defines Fish and Wildlife Habitat Conservation Areas (HCAs) as areas that show the presence of species proposed or listed by the federal government or the State of Washington as endangered, threatened, sensitive, or priority; or streams and wetlands that provide significant habitat for fish and wildlife. As noted above the only special status species includes the federally threatened chinook mapped utilizing West Fork Amon Creek. Therefore, the only on-site HCAs are associated with West Fork Amon Creek and the associated wetland. The associated protective 150-foot wetland buffer will effectively protect these systems.

### **5.2 HABITAT CONSERVATION AREA PROTECTIONS**

#### **5.2.1 Proposed Development Plan**

RMC Section 22.10.210 details standards for protecting HCAs during site planning and design of development proposals. The applicant has taken these avoidance and minimization measures into consideration when designing the proposed development plan. The applicant, proposes to construct a multi-family residential development east of Piper Street and the intersection of Center Blvd and Eastwood Avenue, paralleling the Amon Wasteway Wetland buffer on its western side. The wetland buffer will be averaged to allow for the proposed development activity, and the buffer averaging design will compensate for buffer width reductions at an approximate 2:1 ratio. A total of 16,160 square feet of buffer will be reduced through buffer averaging in four separate areas. As compensation, a total of 29,965 square feet will be provided as additional buffer in three separate areas adjacent and among those being reduced. The buffer averaging design will result in a net increase of buffer totaling 13,805 square feet. Areas being provided as additional buffer have the same structural and functional characteristics as those being removed. Therefore, the proposed development plan will provide greater protection to on site HCAs by increasing the total on-site buffer area by 13,805 square feet.

#### **5.2.2 Determination of Management Recommendations**

As mentioned above, no proposed development activity will be located within any on-site HCAs. The City of Requires adoption of WDFW management recommendations for HCAs. However, the City of Richland also has specific regulations for protection of these wetland and stream critical area features. Therefore, our management recommendations for these features follow the requirements outlined in the Critical Areas Study and Buffer Averaging Plan prepared by *WRI*, as required by RMC 20.10.220 (Mitigation Sequencing), 20.10.115 (Buffer Averaging), and

22.10.210 (Fish and Wildlife Habitat Conservation Areas – Performance Standards). No other areas were found to be definitively used as active breeding sites by any protected species on the subject property.

### **5.2.3 Habitat Protection (HCA's)**

The Critical Areas Study and Buffer Averaging Plan prepared by *WRI* identifies the approved protection measures for West Fork Amon Creek and the associated wetland complex. The approved protection measures found in this report are summarized below:

Associated Amon Wasteway Wetland Complex (Category II): 150-Foot Buffer

The overriding and final protective wetland buffer will protect the boundary of the HCA as a whole. The proposed buffer averaging plan detailed in the aforementioned report ensure compliance with the City's buffer averaging regulations

Therefore, the proposed protection of the wetland and stream discussed above meets the City of Richland regulations. Please see the Critical Areas Study and Buffer Averaging Plan that specifically outlines proposed protective management plans. RMC 22.10 Article III outlines protection requirements for wetlands, and RMC 22.10 Article IV specifically addresses HCAs, which include streams and wetlands. Any future impacts to these areas will be mitigated for per the standards outlined in RMC Title 18, Chapter 22.10.

## **6.0 CONCLUSION**

A thorough investigation of the subject site revealed regular and intermittent use by a diverse assemblage of wildlife species. However, no species make use of the subject site that are specifically regulated by the City of Richland, except for fall chinook (hatchery planted). Research of publicly available resources depicted regular occurrence areas for Burrowing Owls (mapped on-site by PHS) and that West Fork Amon Creek is mapped as supporting fall chinook (federally threatened species). Field observations by *WRI* determined that the subject site does not appear to be used by Burrowing Owls. Therefore, no HCAs for Burrowing Owls, as defined by the City of Richland are present on-site.

Black-tailed jackrabbits were observed along the eastern property line. However, existing on-site habitat conditions are not preferred by black-tailed jackrabbits. The off-site nature preserve offers a variety of vegetative communities and structural diversity that the species prefers. Therefore, no HCAs for black-tailed jackrabbits are present on-site.

HCA protections only apply to West Fork Amon Creek (fall chinook habitat) and the associated wetland, which are regulated and protected by Chapter 22.10 (Critical Areas) of the City of Richland Municipal Code.

The proposed development plan has been specifically designed in consideration of on-site HCAs, as required by the City of Richland. The proposed development has been placed in the best possible location to avoid impacting on-site HCAs. No impacts to on-site HCAs will occur in association with the proposed development plan.

## 7.0 USE OF THIS REPORT

This Wildlife Habitat Assessment Report is supplied to *Alpine Resources* as a means of determining possible presence of protected wildlife species or habitat and to determine what wildlife species or habitats are present that should be accommodated in the design of the future development proposal, as required by the City of Richland. This report is based largely on readily observable conditions and, to a lesser extent, on readily ascertainable conditions. No attempt has been made to determine hidden or concealed conditions.

The laws applicable to wildlife species and habitats are subject to varying interpretations and may be changed at any time by the courts or legislative bodies. This report is intended to provide information deemed relevant in the applicant's attempt to comply with the laws now in effect.

This report conforms to the standard of care employed by wildlife biologist. No other representation or warranty is made concerning the work or this report, and any implied representation or warranty is disclaimed.

*Wetland Resources, Inc.*



Hailey Starr  
*Associated Ecologist & Wildlife Biologist*



Scott Brainard, PWS  
*Principal Ecologist*

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**Appendix A**

HABITAT UNIT MAP

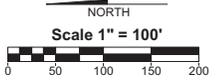
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**HABITAT UNIT MAP (SHEET 1/2)**  
***ALPINE RESOURCES - WILLOWBROOK***  
 PORTION OF SECTION 36, TOWNSHIP 9N, RANGE 28E, W.M.



**LEGEND**

	WETLAND		HABITAT UNIT A
	WETLAND (ESTIMATED)		HABITAT UNIT B
	STANDARD BUFFER		HABITAT UNIT C

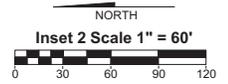
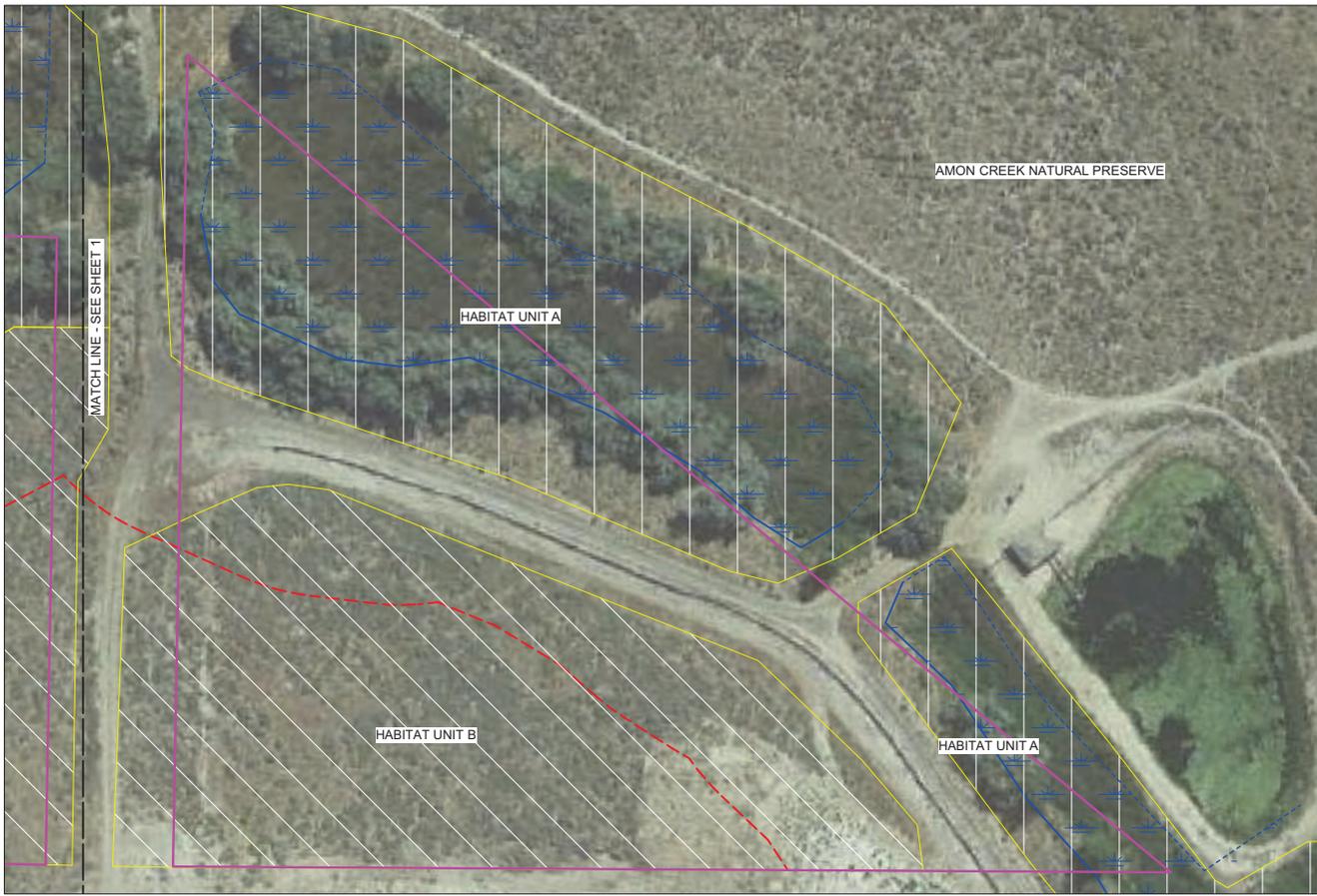


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Habitat Unit Map  
***Alpine Resources - Willowbrook***

Alpine Resources	Sheet 1/2
Attn: Duane Smith	WRI Job#: 16235
9514 56th Place W.	Drawn by: MS
Mukilteo, WA 98275	4/23/2020

**HABITAT UNIT MAP (SHEET 2/2)**  
**ALPINE RESOURCES - WILLOWBROOK**  
 PORTION OF SECTION 36, TOWNSHIP 9N, RANGE 28E, W.M.



LEGEND	
	WETLAND
	WETLAND (ESTIMATED)
	STANDARD BUFFER
	HABITAT UNIT A
	HABITAT UNIT B

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Habitat Unit Map  
**Alpine Resources - Willowbrook**

Alpine Resources	Sheet 2/2
Attn: Duane Smith	WRI Job#: 16235
9214 56th Place W	Drawn by: HJS
Mukilteo, WA 98275	Date: 4/23/2020



Gibson Traffic Consultants  
2813 Rockefeller Avenue  
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425.339.8266

# Willowbrook Place Traffic Impact Analysis

Jurisdiction: City of Richland

November 2019



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## 1. DEVELOPMENT IDENTIFICATION

Gibson Traffic Consultants, Inc. (GTC) has been retained to provide a traffic impact analysis for the proposed Willowbrook Place development to address comments from City of Richland staff. The comments are based on an email from John Deskins on October 4, 2019 in reference to the traffic impact analysis dated August 5, 2019. Brad Lincoln, responsible for this report and traffic analysis, is a licensed professional engineer (Civil) in the State of Washington and member of the Washington State section of ITE.

The Willowbrook Place development is proposed to consist of a total of 96 apartment units on land that is currently vacant. The development site is located east of Leslie Road and south of Broadmoor Street and is adjacent to the Willowbrook #2 development. The development is proposed to have two accesses, one via Center Boulevard east of Piper Street and one to Broadmoor Street. A site vicinity map has been included in Figure 1.

## 2. METHODOLOGY

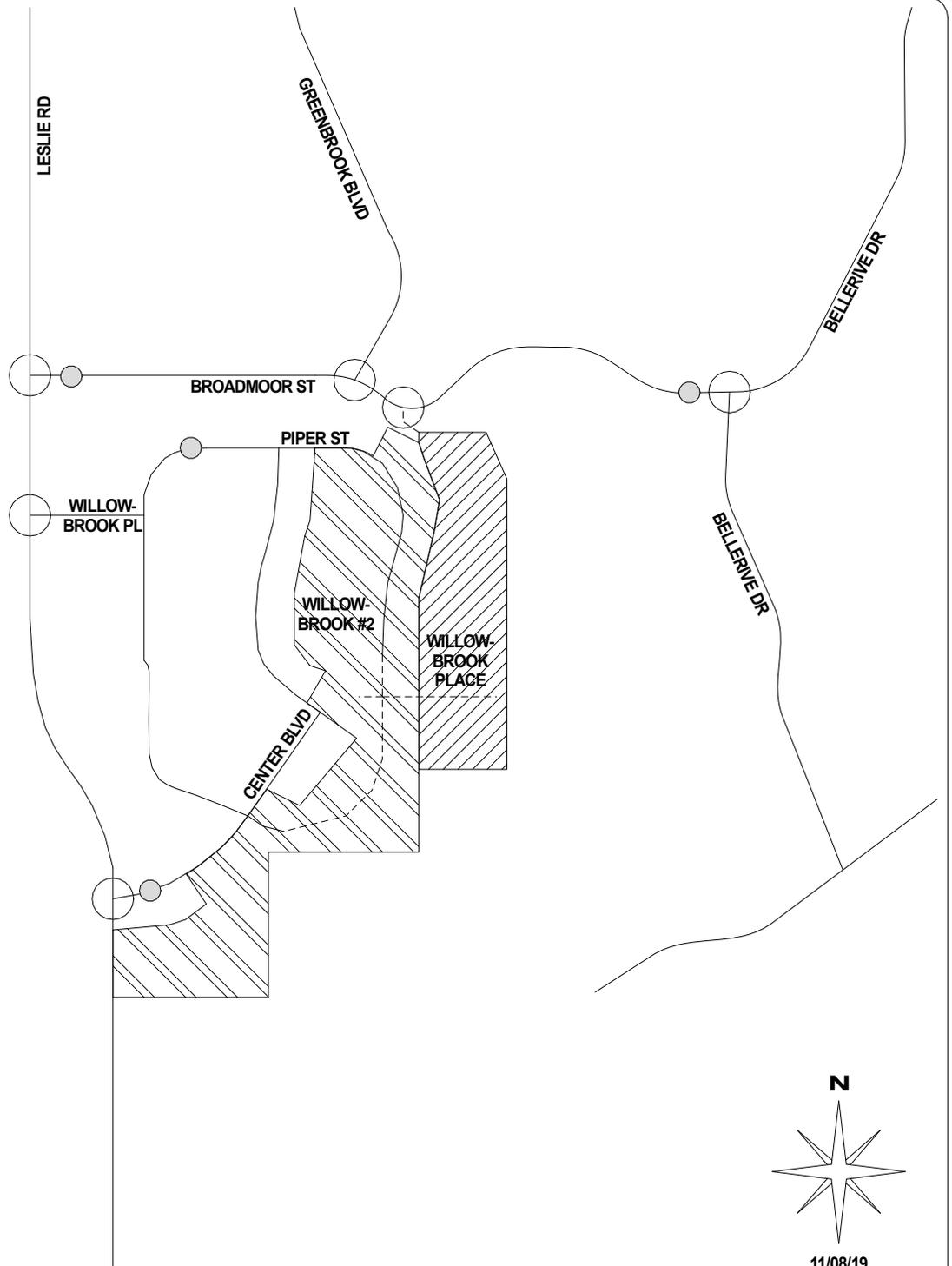
Trip generation calculations for the Willowbrook Place development have been performed utilizing average trip generation data contained in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition (2017)*. The distribution of trips generated by the site is based on the counts at the study intersections, surrounding land uses and comments from City of Richland staff.

The analysis in this report is based on scoping discussions with City of Richland staff and includes an analysis of daily trip volumes, speeds and intersection operations. The daily trips along the following roadways have been compared to typical City of Richland thresholds:

- Broadmoor Street – East of Leslie Road
- Piper Street – Eastwood Avenue vicinity
- Center Boulevard – east of Leslie Road
- Broadmoor Street, west of Bellerive Drive

Broadmoor Street is classified as a Neighborhood Collector and has a typical threshold of approximately 1,500 daily trips. Piper Street is classified as a Local Street and has a typical threshold of approximately 1,000 daily trips. Center Boulevard is classified as a Neighborhood Collector and has a typical threshold of approximately 1,500 daily trips. It is important to note that these thresholds are approximate, especially since Piper Street meets the description of a Neighborhood Collector Street.

Intersection level of service analysis has been performed for the AM peak-hour, the highest four consecutive 15-minute periods between 7:00 AM and 9:00 AM, and the PM peak-hour, the highest four consecutive 15-minute periods between 4:00 PM and 6:00 PM. The intersection level of service analysis has been performed for the following intersections:



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**TRAFFIC IMPACT STUDY  
GTC #18-321**

**WILLOWBROOK PLACE  
96 MULTIFAMILY  
HOUSING UNITS**

**LEGEND**



STUDY INTERSECTION



DAILY TRIP STUDY LOCATION

**FIGURE 1**

**SITE VICINITY  
MAP**

**CITY OF RICHLAND**

1. Leslie Road at Broadmoor Street
2. Leslie Road at Willowbrook Place
3. Leslie Road at Center Boulevard
4. Greenbrook Boulevard at Broadmoor Street
5. Site Access at Broadmoor Street
6. Bellerive Drive at Broadmoor Street

Congestion at intersections is generally measured in terms of level of service (LOS). In accordance with *Highway Capacity Manual: 6<sup>th</sup> Edition (HCM)* by the Transportation Research Board, road facilities and intersections are rated between LOS A and LOS F, with LOS A being free flow and LOS F being forced flow or over-capacity conditions. The level of service at signalized, roundabout and all-way stop-controlled intersections is based on the average delay of all approaches. The level of service for two-way stop-controlled intersections is based on average delays for the stopped approach with the highest delay. Geometric characteristics and conflicting traffic movements are taken into consideration when determining level of service values. A summary of the intersection level of service criteria is included in Table 1.

**Table 1: Level of Service Criteria for Intersections**

Level of <sup>1</sup> Service	Expected Delay	Intersection Control Delay (Seconds per Vehicle)	
		Unsignalized Intersections	Signalized Intersections
A	Little/No Delay	≤10	≤10
B	Short Delays	>10 and ≤15	>10 and ≤20
C	Average Delays	>15 and ≤25	>20 and ≤35
D	Long Delays	>25 and ≤35	>35 and ≤55
E	Very Long Delays	>35 and ≤50	>55 and ≤80
F	Extreme Delays <sup>2</sup>	>50	>80

The City of Richland utilizes an intersection level of service threshold of LOS D.

<sup>1</sup> **Source:** *Highway Capacity Manual: 6<sup>th</sup> Edition*.

LOS A: Free-flow traffic conditions, with minimal delay to stopped vehicles (no vehicle is delayed longer than one cycle at signalized intersection).

LOS B: Generally stable traffic flow conditions.

LOS C: Occasional back-ups may develop, but delay to vehicles is short term and still tolerable.

LOS D: During short periods of the peak hour, delays to approaching vehicles may be substantial but are tolerable during times of less demand (i.e. vehicles delayed one cycle or less at signal).

LOS E: Intersections operate at or near capacity, with long queues developing on all approaches and long delays.

LOS F: Jammed conditions on all approaches with excessively long delays and vehicles unable to move at times.

<sup>2</sup> When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection.

### 3. SURROUNDING AREA

The primary roadway in the site vicinity is Leslie Road; which is a 3-lane arterial roadway with a posted speed limit of 40 mph. Broadmoor Street, Center Boulevard and Willowbrook Place are 2-lane neighborhood collectors with posted speed limits of 25 mph. These roadways have approximately 36 to 40 feet of pavement and include curb, gutter and sidewalk. All of the study intersections are two-way stop-controlled intersections. There is left-turn channelization on Leslie Road at the Willowbrook Place and Center Boulevard intersections.

Speed data was collected at several locations identified by City of Richland staff. The existing 85<sup>th</sup> Percentile speed data is summarized in Table 2.

**Table 2: Speed Data Summary**

Location	Eastbound	Westbound
Broadmoor Street – East of Leslie Road	28.2 mph	28.6 mph
Willowbrook Place – East of Leslie Road	25.7 mph	26.5 mph
Center Boulevard – East of Leslie Road	26.8 mph	29.6 mph
Broadmoor Street – West of Bellerive Drive	28.7 mph	29.0 mph

The speed data shows that the existing speeds at the study locations are within the typical range, based on the posted speed limit.

The surrounding land use is primarily residential. The major commercial areas are west and north of the site. The major highway in the site vicinity is I-82 with the nearest access being south of the development.

### 4. TRIP GENERATION

The trip generation calculations for the Willowbrook Place development are based on the average trip generation rates for Institute of Transportation Engineers ITE Land Use Code 220, Multifamily Housing (Low-Rise). The trip generation of the Willowbrook Place development is summarized in Table 3.

**Table 3: Willowbrook Place Trip Generation Summary**

96 Units of Multifamily (Low-Rise)	Average Daily Trips			AM Peak-Hour Trips			PM Peak-Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Generation Rate	7.32 trips per unit			0.46 trips per unit			0.56 trips per unit		
Splits	50%	50%	100%	23%	77%	100%	63%	37%	100%
Trips	352	351	703	10	34	44	34	20	54

In addition to the Willowbrook Place development, City of Richland staff asked that the Willowbrook #2 development be included as a pipeline development. The Willowbrook #2 development is proposed to consist of 98 total single-family residential units. However, there are currently 34 units that have been constructed, based on available aerial data and field observations. The trip generation of the remaining 64 single-family units of the Willowbrook #2 development are based on ITE Land Use Code 210, Single-Family Detached Housing. The trip generation for the remaining units of the Willowbrook #2 development is summarized in Table 3.

**Table 3: Willowbrook #2 Trip Generation Summary**

64 Single-Family Residential Units	Average Daily Trips			AM Peak-Hour Trips			PM Peak-Hour Trips		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Generation Rate	9.44 trips per unit			0.74 trips per unit			0.99 trips per unit		
Splits	50%	50%	100%	25%	75%	100%	63%	37%	100%
Trips	302	302	604	12	35	47	40	23	63

## 5. TRIP DISTRIBUTION

The trips generated by the Willowbrook Place development and the remaining units of the Willowbrook #2 development have been calculated based on the existing count data, how the internal roadways will be connected and comments from City of Richland staff.

### 5.1 Willowbrook Place

It is anticipated that 70% of the trips generated by the Willowbrook Place will travel to and from the north, forty-five percent along Leslie Road and twenty-five percent along Bellerive Drive. Approximately 25% of the trips generated by the development will travel to and from the south along Leslie Road. The remaining 5% of the trips generated by the development are estimated to travel to and from the south along Bellerive Drive.

It is anticipated that sixty percent of the trips generated by the Willowbrook Place will utilize the access to Broadmoor Street. Approximately thirty percent of the trips generated by the Willowbrook Place will utilize the intersection of Leslie Road at Center Boulevard. The remaining ten percent of the trips are anticipated to utilize the intersection of Leslie Road at Willowbrook Place. The trip assignments for Willowbrook Place development are shown in Figure 2.



---

## 5.2 Willowbrook #2

The trip distribution of the remaining units of the Willowbrook #2 development is based on turning movement counts at the study intersections and surrounding land uses. It is anticipated that 70% of the trips generated by the remaining Willowbrook #2 units will travel to and from the north along Leslie Road. Approximately 25% of the trips generated by the remaining Willowbrook #2 units will travel to and from the south along Leslie Road. The remaining 5% of the trips from the remaining Willowbrook #2 units are estimated to travel to and from the east along Broadmoor Street.

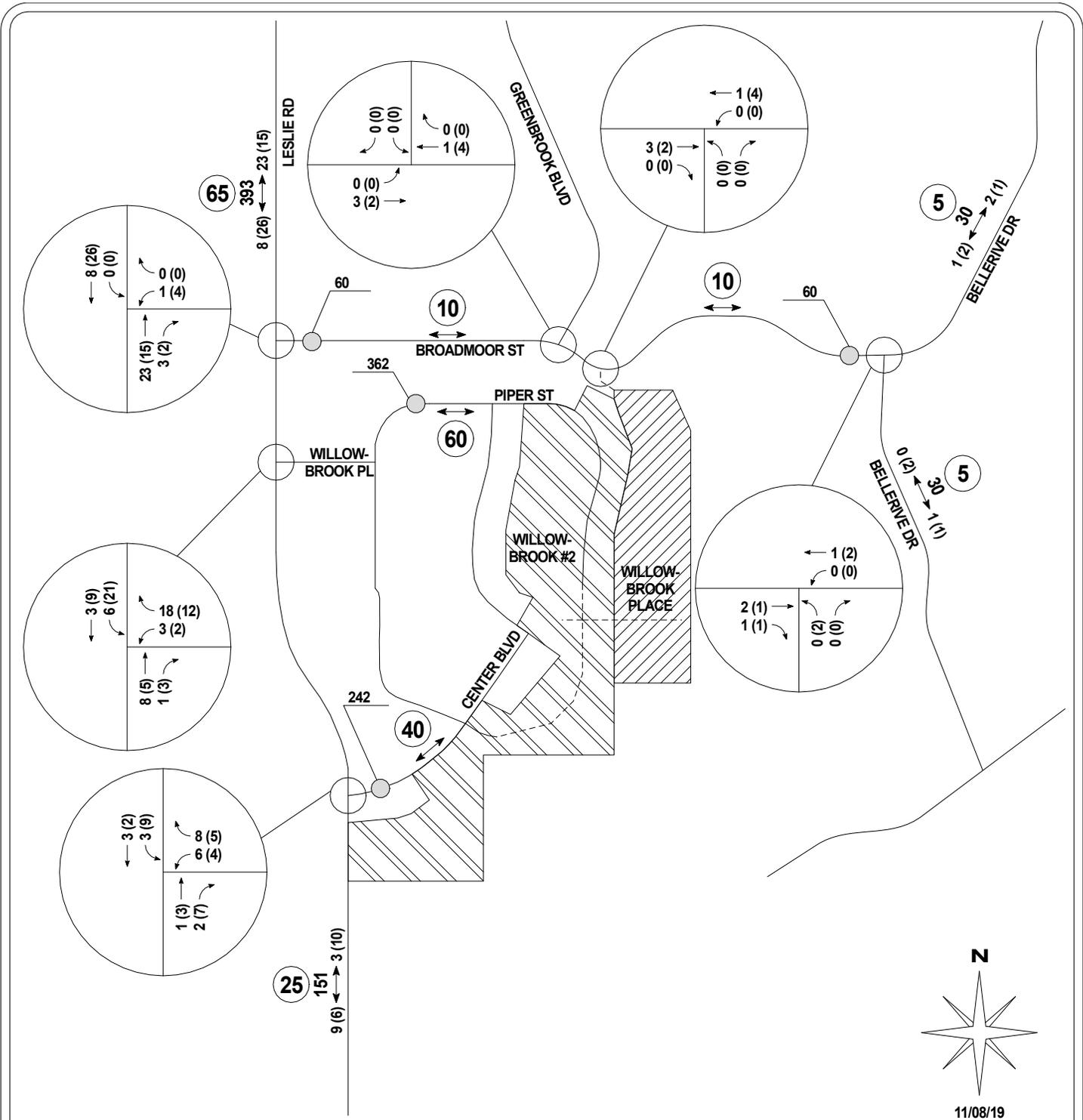
All of the trips generated by the remaining units of the Willowbrook #2 development have been assigned to Leslie Road, sixty percent at the Willowbrook Place intersection and forty percent at the Center Boulevard intersection. The trip assignments for the remaining units of the Willowbrook #2 development are shown in Figure 3.

It is important to note that the analysis in this report does not assume any of the trips generated by the remaining units of Willowbrook #2 will utilize the access through Willowbrook Place to Broadmoor Street. This is based on the access through the Willowbrook Place development being narrower than the surrounding roadways and will likely include speed bumps. A qualitative analysis of the potential for trips to utilize the access to Broadmoor Street is discussed in more detail later in this report.

## 6. DAILY VOLUME ANALYSIS

The City of Richland staff has requested that the daily trips along Broadmoor Street, Piper Street and Center Boulevard be analyzed with the Willowbrook Place and Willowbrook #2 developments. Piper Street is classified as a Local Street and Broadmoor Street and Center Boulevard are classified as Neighborhood Collectors, based on information from City of Richland staff. The typical daily trip thresholds are based on Richland Municipal Code (RMC) 12.02. It is important to note that these typical thresholds are not specific limits. Piper Street, a Local Street, has a typical threshold of 1,000 daily trips and Broadmoor Street and Center Boulevard, Neighborhood Collectors, have a typical threshold of 1,500 daily trips.

The Piper Street daily trip volume has been evaluated for the north section, west of Eastwood Avenue. The existing daily trips are based on the number of units utilizing this section of the roadway, estimated to be 95 units. These units include the 34 existing units of the Willowbrook #2 development. Actual count data was not collected on Piper Street due to the driveways along this section of the roadway and therefore the existing volume is based on the trip generation rate (8.02 daily trips per unit) calculated using the daily count data collected in the study area (see attached calculations). The Broadmoor Street daily volumes are based on daily count data collected east of Leslie Road and west of Bellerive Drive. The Center Boulevard daily trip volume is based on daily count data collected east of Leslie Road.



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CITY OF RICHLAND

**LEGEND**

- ADT
- X (X) ↔ X (X)
- XX
- XXX
- X (X) →
- DAILY TRAFFIC
- AM (PM) PEAK-HOUR TRIPS
- TRIP DISTRIBUTION %
- ROADWAY DAILY TRIPS
- AM (PM) TURNING MOVEMENTS

**FIGURE 3**

**WILLOWBROOK #2  
TRIP ASSIGNMENTS**

The future daily volumes at the study locations have been calculated by applying a 1.0% annually compounding growth rate to the year 2029, a 10-year horizon period. Trips from the Willowbrook Place and Willowbrook #2 developments have also been added based on the local distribution discussed earlier in this report. The daily volumes with the Willowbrook Place and Willowbrook #2 development have been summarized in Table 4.

**Table 4: Daily Trips Volumes**

<b>Volume Source</b>	<b>Broadmoor Street East of Leslie Road</b>	<b>Piper Street West of Eastwood Avenue</b>	<b>Center Boulevard East of Leslie Road</b>	<b>Broadmoor Street West of Bellerive Drive</b>
Existing Volume	1,082	761	533	1,223
Willowbrook Place	211	70	211	211
Willowbrook #2	60	362	242	60
Background Growth	113	88	62	128
Future Volume	1,466	1,281	1,048	1,622

The daily volume analysis shows that the study locations are all anticipated to be approximately 1,500 daily trips or lower, which should be considered to be in the typically acceptable range. It is also important to note that the daily trip volumes are within the typical range of the industry standards from the American Association of State Highway and Transportation Officials (AASHTO). The daily volumes should therefore be considered acceptable.

## 7. INTERSECTION LEVEL OF SERVICE ANALYSIS

The intersections that have been analyzed as part of this report are based on scoping discussions with City of Richland staff. Level of service analysis has been performed for the following intersections for the weekday AM peak-hour (7:00 AM to 9:00 AM) and PM peak-hour (4:00 PM to 6:00 PM):

1. Leslie Road at Broadmoor Street
2. Leslie Road at Willowbrook Place
3. Leslie Road at Center Boulevard
4. Greenbrook Boulevard at Broadmoor Street
5. Site Access at Broadmoor Street
6. Bellerive Drive at Broadmoor Street

The AM peak-hour is the highest consecutive 15-minute periods between 7:00 AM and 9:00 AM. The PM peak-hour is the highest consecutive 15-minute periods between 4:00 PM and 6:00 PM.

## 7.1 Turning Movement Volumes

The existing turning movements at the study intersections were counted by the independent count firm of IDAX. The turning movement counts were collected in November 2018 and March 2019. The 2019 existing turning movements at the study intersections are shown in Figure 4.

The future volumes have been calculated for the year 2029, which represents a 10-year horizon period. The 2029 turning movements have been calculated by applying a 1% annually compounding growth rate to the northbound and southbound trips along Leslie Road to account for development in the area. The 2029 turning movements are shown in Figure 5. The turning movement calculations are included in the attachments.

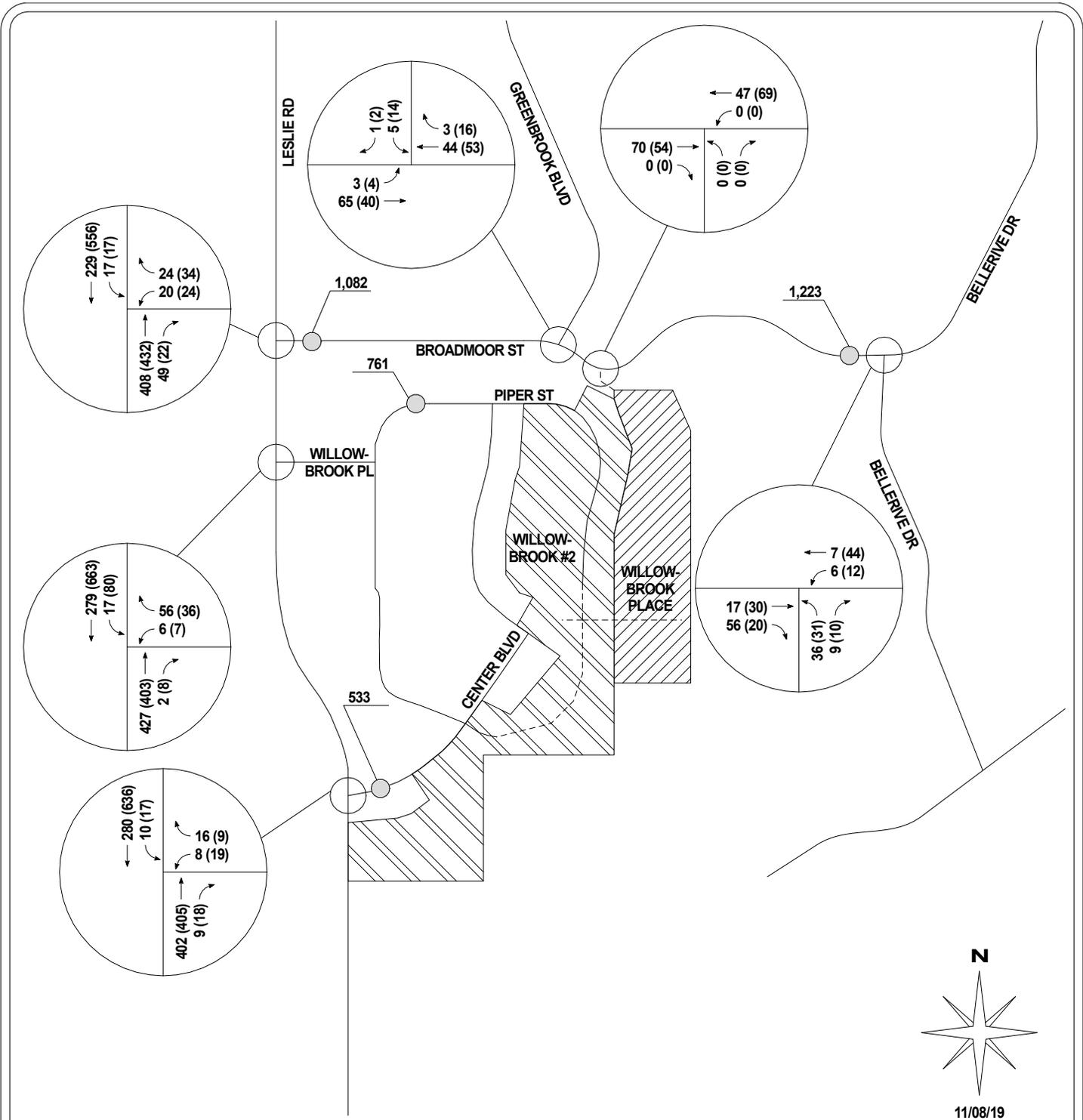
## 7.2 Intersection Level of Service Results

The level of service analysis has been performed utilizing the existing control, channelization, peak-hour factors and heavy-vehicle factors. The level of service for the AM peak-hour are summarized in Table 5.

**Table 5: AM Peak-Hour Intersection Level of Service Summary**

Intersection	2019 Existing Conditions		2029 Future Conditions	
	LOS	Delay	LOS	Delay
1. Leslie Road at Broadmoor Street	B	12.6 sec	B	13.7 sec
2. Leslie Road at Willowbrook Place	B	11.9 sec	B	13.0 sec
3. Leslie Road at Center Boulevard	B	11.8 sec	B	12.7 sec
4. Greenbrook Boulevard at Broadmoor Street	A	9.4 sec	A	9.6 sec
5. Site Access at Broadmoor Street	---	---	A	9.4 sec
6. Bellerive Drive at Broadmoor Street	A	9.4 sec	A	9.7 sec

The level of service results for the PM peak-hour are summarized in Table 6.



**GIBSON TRAFFIC CONSULTANTS**

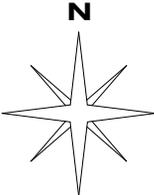
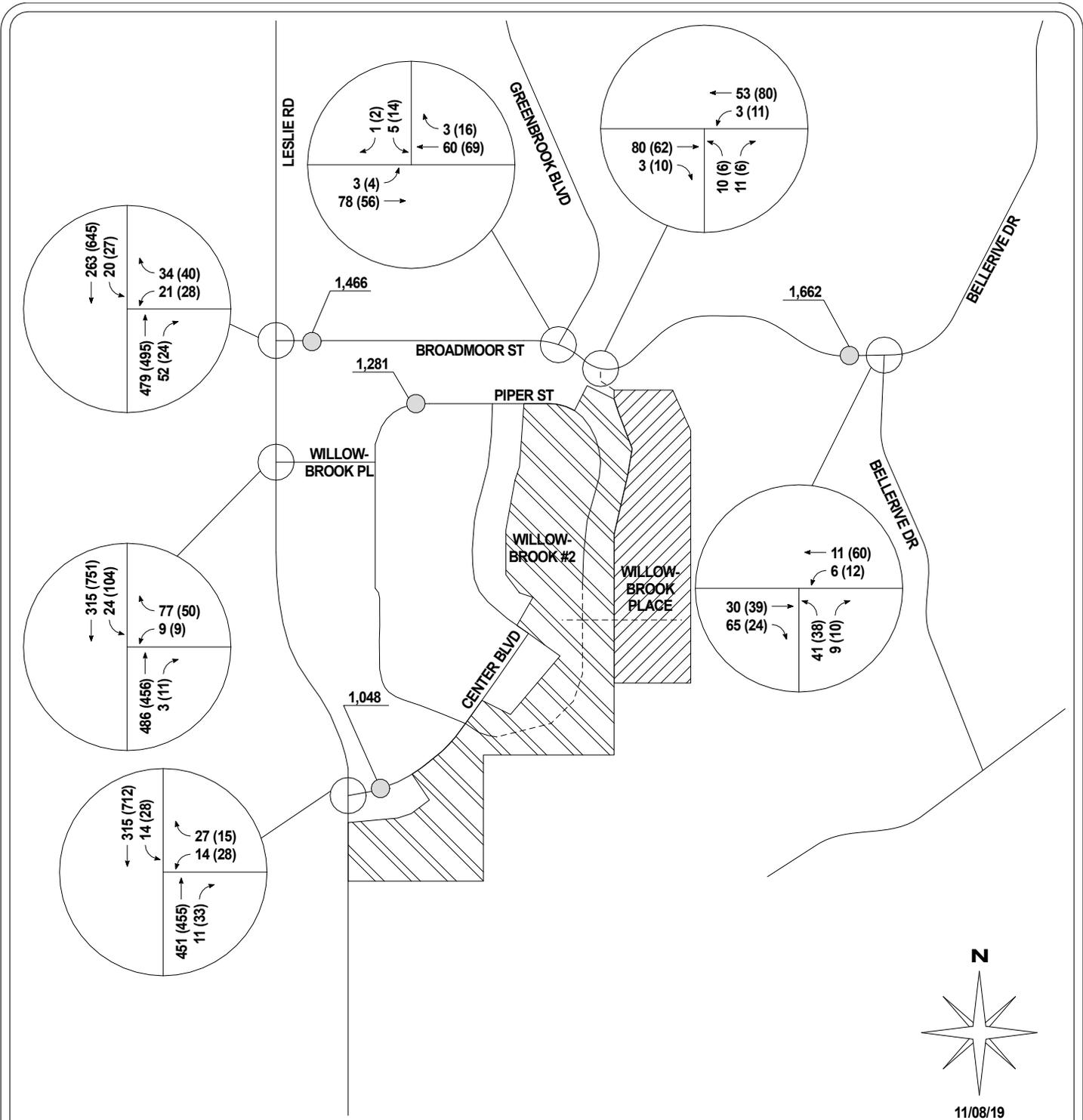
**TRAFFIC IMPACT STUDY  
GTC #18-321**

**WILLOWBROOK PLACE  
96 MULTIFAMILY  
HOUSING UNITS**

**CITY OF RICHLAND**

- LEGEND**
- ADT
  - X (X) ↔ X (X) DAILY TRAFFIC
  - AM (PM) PEAK-HOUR TRIPS
  - XX TRIP DISTRIBUTION %
  - XXX ROADWAY DAILY TRIPS
  - X (X) → AM (PM) TURNING MOVEMENTS

**FIGURE 4  
2019 EXISTING VOLUMES**



11/08/19

**GIBSON TRAFFIC CONSULTANTS**

**TRAFFIC IMPACT STUDY  
GTC #18-321**

**WILLOWBROOK PLACE  
96 MULTIFAMILY  
HOUSING UNITS**

- LEGEND**
- ADT
  - X (X) ↔ X (X) DAILY TRAFFIC
  - AM (PM) PEAK-HOUR TRIPS
  - XX TRIP DISTRIBUTION %
  - XXX ROADWAY DAILY TRIPS
  - X (X) → AM (PM) TURNING MOVEMENTS

**FIGURE 5  
2029 FUTURE VOLUMES**

**CITY OF RICHLAND**

**Table 6: PM Peak-Hour Intersection Level of Service Summary**

Intersection	2019 Existing Conditions		2029 Future Conditions	
	LOS	Delay	LOS	Delay
1. Leslie Road at Broadmoor Street	B	14.4 sec	C	16.5 sec
2. Leslie Road at Willowbrook Place	B	13.0 sec	B	14.7 sec
3. Leslie Road at Center Boulevard	B	14.7 sec	C	16.7 sec
4. Greenbrook Boulevard at Broadmoor Street	A	9.2 sec	A	9.4 sec
5. Site Access at Broadmoor Street	---	---	A	9.2 sec
6. Bellerive Drive at Broadmoor Street	A	9.2 sec	A	9.1 sec

The level of service analysis shows that the study intersections currently operate at LOS B or better during the AM and PM peak-hours and are anticipated to operate at LOS C or better with the Willowbrook Place and remaining units of the Willowbrook #2 development. The level of service calculations are included in the attachments.

### 7.3 Broadmoor Street Access

The intersection analysis discussed above assumes that only trips from the Willowbrook Place development will utilize the access to Broadmoor Street. However, the analysis included in the August 5, 2019 traffic impact analysis for the development assumed that trips from surrounding units would use the access to Broadmoor Street. The difference between the intersection analysis summarized in that report and the intersection analysis summarized in this report is minimal. Trips utilizing the Broadmoor Street from surrounding units are therefore not anticipated to significantly change the operations of the study intersections.

## 8. TRAFFIC MITIGATION FEES

The City of Richland has instituted traffic mitigation fees. The Willowbrook Place development is located in Zone 1, which has a traffic mitigation fee of \$1,991.25 per PM peak-hour trip. The Willowbrook Place development is anticipated to generate 54 PM peak-hour trips. The Willowbrook Place development will result in traffic mitigation fees of \$107,527.50.

## 9. CONCLUSIONS AND RECOMMENDATIONS

The 96 multifamily units of the Willowbrook Place development is anticipated to generate 703 daily trips with 44 AM peak-hour trips and 54 PM peak-hour trips. The remaining units of the Willowbrook #2 development are anticipated to generate 604 daily trips with 47 AM peak-hour trips and 63 PM peak-hour trips. The daily trip analysis shows that the daily trips will remain within the range of the typical thresholds. The study intersections are all anticipated to operate at LOS C or better with the Willowbrook Place development. The traffic mitigation fees for the Willowbrook Place development will be \$107,527.50 for the 54 PM peak-hour trips that are anticipated to be generated.

# **Trip Generation Calculations**

Summary of Count Data (highest data)

Roadway	Daily Trips		AM Peak-Hour Trips			PM Peak-Hour Trips			
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Willowbrook	583	600	1,183	13	85	98	83	46	129
Center	278	255	533	19	24	43	35	28	63
Total	861	855	1,716	32	109	141	118	74	192

Trip Generation Rates - Total Development Area

Units	Daily Trips		AM Peak-Hour Trips			PM Peak-Hour Trips			
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
214	50%	50%	8.02	23%	77%	0.66	61%	39%	0.90

# **Daily Counts, Speed Data and Unit Count Map**



Location: BROADMOOR ST E/O LESLIE RD  
 Date Range: 3/12/2019 - 3/18/2019  
 Site Code: 01

Time	Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Monday		Mid-Week Average	
	EB	Total	EB	Total	EB	Total	EB	Total	EB	Total	EB	Total	EB	Total	EB	Total
12:00 AM	-	-	0	0	-	-	-	-	-	-	-	-	-	-	0	0
1:00 AM	-	-	0	0	-	-	-	-	-	-	-	-	-	-	0	0
2:00 AM	-	-	1	0	1	-	-	-	-	-	-	-	-	-	1	0
3:00 AM	-	-	0	0	0	-	-	-	-	-	-	-	-	-	0	0
4:00 AM	-	-	0	5	5	-	-	-	-	-	-	-	-	-	0	5
5:00 AM	-	-	3	12	15	-	-	-	-	-	-	-	-	-	3	12
6:00 AM	-	-	15	14	29	-	-	-	-	-	-	-	-	-	15	14
7:00 AM	-	-	24	21	45	-	-	-	-	-	-	-	-	-	24	21
8:00 AM	-	-	65	49	114	-	-	-	-	-	-	-	-	-	65	49
9:00 AM	21	18	39	-	-	-	-	-	-	-	-	-	-	-	21	18
10:00 AM	41	34	75	-	-	-	-	-	-	-	-	-	-	-	41	34
11:00 AM	60	60	120	-	-	-	-	-	-	-	-	-	-	-	60	60
12:00 PM	24	22	46	-	-	-	-	-	-	-	-	-	-	-	24	22
1:00 PM	27	34	61	-	-	-	-	-	-	-	-	-	-	-	27	34
2:00 PM	23	39	62	-	-	-	-	-	-	-	-	-	-	-	23	39
3:00 PM	44	62	106	-	-	-	-	-	-	-	-	-	-	-	44	62
4:00 PM	38	45	83	-	-	-	-	-	-	-	-	-	-	-	38	45
5:00 PM	41	57	98	-	-	-	-	-	-	-	-	-	-	-	41	57
6:00 PM	34	39	73	-	-	-	-	-	-	-	-	-	-	-	34	39
7:00 PM	20	29	49	-	-	-	-	-	-	-	-	-	-	-	20	29
8:00 PM	9	17	26	-	-	-	-	-	-	-	-	-	-	-	9	17
9:00 PM	13	15	28	-	-	-	-	-	-	-	-	-	-	-	13	15
10:00 PM	2	2	4	-	-	-	-	-	-	-	-	-	-	-	2	2
11:00 PM	2	1	3	-	-	-	-	-	-	-	-	-	-	-	2	1
<b>Total</b>	<b>399</b>	<b>474</b>	<b>873</b>	<b>108</b>	<b>101</b>	<b>209</b>	-	-	-	-	-	-	-	-	<b>507</b>	<b>575</b>
<b>Percent</b>	<b>46%</b>	<b>54%</b>		<b>52%</b>	<b>48%</b>		-	-	-	-	-	-	-	-	<b>47%</b>	<b>53%</b>

1. Mid-week average includes data between Tuesday and Thursday.

## Vehicle Speed Report Summary

**Location:** BROADMOOR ST E/O LESLIE RD  
**Count Direction:** Eastbound / Westbound  
**Date Range:** 3/12/2019 to 3/13/2019  
**Site Code:** 01

	Speed Range (mph)																	Total Volume
	0 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85	85 +	
<b>Study Total</b>																		
<b>Eastbound</b>	3	11	62	216	182	31	2	0	0	0	0	0	0	0	0	0	0	0
<b>Percent</b>	0.6%	2.2%	12.2%	42.6%	35.9%	6.1%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Westbound</b>	5	18	52	208	242	45	4	1	0	0	0	0	0	0	0	0	0	0
<b>Percent</b>	0.9%	3.1%	9.0%	36.2%	42.1%	7.8%	0.7%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Total</b>	8	29	114	424	424	76	6	1	0	0	0	0	0	0	0	0	0	0
<b>Percent</b>	0.7%	2.7%	10.5%	39.2%	39.2%	7.0%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Total Study Percentile Speed Summary		Total Study Speed Statistics	
<b>Eastbound</b>			
50th Percentile (Median)	24.0 mph	Mean (Average) Speed	24.0 mph
85th Percentile	28.2 mph	10 mph Pace	20.1 - 30.1 mph
95th Percentile	30.5 mph	Percent in Pace	78.5 %
<b>Westbound</b>			
50th Percentile (Median)	24.9 mph	Mean (Average) Speed	24.7 mph
85th Percentile	28.6 mph	10 mph Pace	19.8 - 29.8 mph
95th Percentile	31.2 mph	Percent in Pace	78.4 %



Location: WILLOWBROOK PL E/O LESLIE RD  
 Date Range: 11/6/2018 - 11/12/2018  
 Site Code: 01

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	1	0	1	5	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	4
1:00 AM	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
2:00 AM	0	1	1	0	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	1
3:00 AM	0	1	1	0	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	3
4:00 AM	1	11	12	0	8	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	10	10	
5:00 AM	4	21	25	4	25	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	23	27	
6:00 AM	10	47	57	9	39	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	43	53	
7:00 AM	11	80	91	13	85	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	83	95	
8:00 AM	18	61	79	20	48	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	55	74	
9:00 AM	26	33	59	24	35	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	34	59	
10:00 AM	28	33	61	26	35	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27	34	61	
11:00 AM	36	33	69	26	24	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31	29	60	
12:00 PM	31	28	59	35	29	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	29	62	
1:00 PM	31	27	58	27	29	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29	28	57	
2:00 PM	33	30	63	42	30	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38	30	68	
3:00 PM	64	34	98	57	44	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	61	39	100	
4:00 PM	72	35	107	76	46	122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74	41	115	
5:00 PM	83	46	129	59	35	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71	41	112	
6:00 PM	40	32	72	55	39	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	36	83	
7:00 PM	42	23	65	27	19	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	21	56	
8:00 PM	24	12	36	33	11	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29	12	40	
9:00 PM	17	4	21	14	6	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	5	21	
10:00 PM	7	4	11	10	2	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	3	12	
11:00 PM	4	4	8	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	6	
<b>Total</b>	<b>583</b>	<b>600</b>	<b>1,183</b>	<b>564</b>	<b>596</b>	<b>1,160</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<b>574</b>	<b>598</b>	<b>1,172</b>	
<b>Percent</b>	<b>49%</b>	<b>51%</b>	<b>49%</b>	<b>49%</b>	<b>51%</b>	<b>49%</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<b>49%</b>	<b>51%</b>	<b>49%</b>	

1. Mid-week average includes data between Tuesday and Thursday.

## Vehicle Speed Report Summary

**Location:** WILLOWBROOK PL E/O LESLIE RD  
**Count Direction:** Eastbound / Westbound  
**Date Range:** 11/6/2018 to 11/7/2018  
**Site Code:** 01

	Speed Range (mph)																	Total Volume
	0 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85	85 +	
<b>Study Total</b>																		
<b>Eastbound</b>	5	22	234	641	235	10	0	0	0	0	0	0	0	0	0	0	0	1,147
<b>Percent</b>	0.4%	1.9%	20.4%	55.9%	20.5%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
<b>Westbound</b>	2	23	169	673	293	33	3	0	0	0	0	0	0	0	0	0	0	1,196
<b>Percent</b>	0.2%	1.9%	14.1%	56.3%	24.5%	2.8%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
<b>Total</b>	7	45	403	1,314	528	43	3	0	0	0	0	0	0	0	0	0	0	2,343
<b>Percent</b>	0.3%	1.9%	17.2%	56.1%	22.5%	1.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Total Study Percentile Speed Summary		Total Study Speed Statistics	
<b>Eastbound</b>			
50th Percentile (Median)	22.5 mph	Mean (Average) Speed	22.3 mph
85th Percentile	25.7 mph	10 mph Pace	17.1 - 27.1 mph
95th Percentile	27.9 mph	Percent in Pace	86.9 %
<b>Westbound</b>			
50th Percentile (Median)	23.1 mph	Mean (Average) Speed	23.1 mph
85th Percentile	26.5 mph	10 mph Pace	17.8 - 27.8 mph
95th Percentile	29.0 mph	Percent in Pace	84.8 %



Location: CENTER BLVD E/O LESLIE RD  
 Date Range: 11/6/2018 - 11/12/2018  
 Site Code: 02

Time	Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Monday		Mid-Week Average				
	11/6/2018		11/7/2018		11/8/2018		11/9/2018		11/10/2018		11/11/2018		11/12/2018		11/12/2018				
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	Total		
12:00 AM	1	0	1	0	1	-	-	-	-	-	-	-	-	-	-	-	1	0	1
1:00 AM	1	0	1	0	1	-	-	-	-	-	-	-	-	-	-	-	1	0	1
2:00 AM	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	0	0	0
3:00 AM	0	1	0	1	1	-	-	-	-	-	-	-	-	-	-	-	0	1	1
4:00 AM	0	3	0	2	2	-	-	-	-	-	-	-	-	-	-	-	0	3	3
5:00 AM	4	12	16	3	13	16	-	-	-	-	-	-	-	-	-	-	4	13	16
6:00 AM	5	18	23	9	13	22	-	-	-	-	-	-	-	-	-	-	7	16	23
7:00 AM	11	26	37	10	26	36	-	-	-	-	-	-	-	-	-	-	11	26	37
8:00 AM	18	24	42	9	21	30	-	-	-	-	-	-	-	-	-	-	14	23	36
9:00 AM	13	12	25	8	8	16	-	-	-	-	-	-	-	-	-	-	11	10	21
10:00 AM	12	13	25	13	14	27	-	-	-	-	-	-	-	-	-	-	13	14	26
11:00 AM	14	23	37	15	14	29	-	-	-	-	-	-	-	-	-	-	15	19	33
12:00 PM	14	13	27	13	22	35	-	-	-	-	-	-	-	-	-	-	14	18	31
1:00 PM	14	10	24	19	10	29	-	-	-	-	-	-	-	-	-	-	17	10	27
2:00 PM	9	14	23	26	21	47	-	-	-	-	-	-	-	-	-	-	18	18	35
3:00 PM	29	15	44	23	14	37	-	-	-	-	-	-	-	-	-	-	26	15	41
4:00 PM	28	18	46	35	20	55	-	-	-	-	-	-	-	-	-	-	32	19	51
5:00 PM	32	24	56	40	18	58	-	-	-	-	-	-	-	-	-	-	36	21	57
6:00 PM	19	17	36	13	19	32	-	-	-	-	-	-	-	-	-	-	16	18	34
7:00 PM	24	12	36	16	8	24	-	-	-	-	-	-	-	-	-	-	20	10	30
8:00 PM	12	1	13	15	8	23	-	-	-	-	-	-	-	-	-	-	14	5	18
9:00 PM	2	2	4	5	2	7	-	-	-	-	-	-	-	-	-	-	4	2	6
10:00 PM	2	1	3	3	1	4	-	-	-	-	-	-	-	-	-	-	3	1	4
11:00 PM	1	0	1	1	0	1	-	-	-	-	-	-	-	-	-	-	1	0	1
<b>Total</b>	<b>265</b>	<b>259</b>	<b>524</b>	<b>278</b>	<b>255</b>	<b>533</b>	-	-	-	-	-	-	-	-	-	-	<b>272</b>	<b>257</b>	<b>529</b>
<b>Percent</b>	<b>51%</b>	<b>49%</b>	<b>52%</b>	<b>48%</b>	<b>48%</b>	<b>48%</b>	-	-	-	-	-	-	-	-	-	-	<b>51%</b>	<b>49%</b>	<b>49%</b>

1. Mid-week average includes data between Tuesday and Thursday.

## Vehicle Speed Report Summary

**Location:** CENTER BLVD E/O LESLIE RD  
**Count Direction:** Eastbound / Westbound  
**Date Range:** 11/6/2018 to 11/7/2018  
**Site Code:** 02

	Speed Range (mph)																Total Volume	
	0 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85		85 +
<b>Study Total</b>																		
<b>Eastbound</b>	4	15	83	265	160	15	1	0	0	0	0	0	0	0	0	0	0	543
<b>Percent</b>	0.7%	2.8%	15.3%	48.8%	29.5%	2.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
<b>Westbound</b>	2	17	50	159	223	58	5	0	0	0	0	0	0	0	0	0	0	514
<b>Percent</b>	0.4%	3.3%	9.7%	30.9%	43.4%	11.3%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
<b>Total</b>	6	32	133	424	383	73	6	0	0	0	0	0	0	0	0	0	0	1,057
<b>Percent</b>	0.6%	3.0%	12.6%	40.1%	36.2%	6.9%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Total Study Percentile Speed Summary		Total Study Speed Statistics	
<b>Eastbound</b>			
50th Percentile (Median)	23.5 mph	Mean (Average) Speed	23.1 mph
85th Percentile	26.8 mph	10 mph Pace	18.7 - 28.7 mph
95th Percentile	28.7 mph	Percent in Pace	83.6 %
<b>Westbound</b>			
50th Percentile (Median)	25.6 mph	Mean (Average) Speed	25.0 mph
85th Percentile	29.6 mph	10 mph Pace	20.9 - 30.9 mph
95th Percentile	31.5 mph	Percent in Pace	77.0 %



Location: BROADMOOR ST W/O BELLERIVE DR  
 Date Range: 3/12/2019 - 3/18/2019  
 Site Code: 02

Time	Tuesday 3/12/2019		Wednesday 3/13/2019		Thursday 3/14/2019		Friday 3/15/2019		Saturday 3/16/2019		Sunday 3/17/2019		Monday 3/18/2019		Mid-Week Average			
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	-	-	0	0	0	-	-	-	-	-	-	-	-	-	0	0	0	0
1:00 AM	-	-	0	0	0	-	-	-	-	-	-	-	-	-	0	0	0	0
2:00 AM	-	-	1	0	1	-	-	-	-	-	-	-	-	-	1	0	1	1
3:00 AM	-	-	0	0	0	-	-	-	-	-	-	-	-	-	0	0	0	0
4:00 AM	-	-	1	3	4	-	-	-	-	-	-	-	-	-	1	3	4	4
5:00 AM	-	-	6	6	12	-	-	-	-	-	-	-	-	-	6	6	12	12
6:00 AM	-	-	14	9	23	-	-	-	-	-	-	-	-	-	14	9	23	23
7:00 AM	-	-	33	17	50	-	-	-	-	-	-	-	-	-	33	17	50	50
8:00 AM	-	-	71	45	116	-	-	-	-	-	-	-	-	-	71	45	116	116
9:00 AM	29	15	44	-	-	-	-	-	-	-	-	-	-	-	29	15	44	44
10:00 AM	50	31	81	-	-	-	-	-	-	-	-	-	-	-	50	31	81	81
11:00 AM	59	49	108	-	-	-	-	-	-	-	-	-	-	-	59	49	108	108
12:00 PM	33	33	66	-	-	-	-	-	-	-	-	-	-	-	33	33	66	66
1:00 PM	36	44	80	-	-	-	-	-	-	-	-	-	-	-	36	44	80	80
2:00 PM	29	35	64	-	-	-	-	-	-	-	-	-	-	-	29	35	64	64
3:00 PM	50	69	119	-	-	-	-	-	-	-	-	-	-	-	50	69	119	119
4:00 PM	45	69	114	-	-	-	-	-	-	-	-	-	-	-	45	69	114	114
5:00 PM	43	68	111	-	-	-	-	-	-	-	-	-	-	-	43	68	111	111
6:00 PM	36	53	89	-	-	-	-	-	-	-	-	-	-	-	36	53	89	89
7:00 PM	24	43	67	-	-	-	-	-	-	-	-	-	-	-	24	43	67	67
8:00 PM	6	25	31	-	-	-	-	-	-	-	-	-	-	-	6	25	31	31
9:00 PM	13	20	33	-	-	-	-	-	-	-	-	-	-	-	13	20	33	33
10:00 PM	3	5	8	-	-	-	-	-	-	-	-	-	-	-	3	5	8	8
11:00 PM	1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2
<b>Total</b>	<b>457</b>	<b>560</b>	<b>1,017</b>	<b>126</b>	<b>80</b>	<b>206</b>	-	-	-	-	-	-	-	-	<b>583</b>	<b>640</b>	<b>1,223</b>	<b>1,223</b>
<b>Percent</b>	<b>45%</b>	<b>55%</b>	<b>55%</b>	<b>61%</b>	<b>39%</b>	<b>39%</b>	-	-	-	-	-	-	-	-	<b>48%</b>	<b>52%</b>	<b>52%</b>	<b>52%</b>

1. Mid-week average includes data between Tuesday and Thursday.

## Vehicle Speed Report Summary

**Location:** BROADMOOR ST W/O BELLERIVE DR  
**Count Direction:** Eastbound / Westbound  
**Date Range:** 3/12/2019 to 3/13/2019  
**Site Code:** 02

	Speed Range (mph)																	Total Volume
	0 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85	85 +	
<b>Study Total</b>																		
<b>Eastbound</b>	3	2	49	262	213	48	6	0	0	0	0	0	0	0	0	0	0	583
<b>Percent</b>	0.5%	0.3%	8.4%	44.9%	36.5%	8.2%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
<b>Westbound</b>	0	14	94	284	181	59	7	0	1	0	0	0	0	0	0	0	0	640
<b>Percent</b>	0.0%	2.2%	14.7%	44.4%	28.3%	9.2%	1.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
<b>Total</b>	3	16	143	546	394	107	13	0	1	0	0	0	0	0	0	0	0	1,223
<b>Percent</b>	0.2%	1.3%	11.7%	44.6%	32.2%	8.7%	1.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

Total Study Percentile Speed Summary		Total Study Speed Statistics	
<b>Eastbound</b>			
50th Percentile (Median)	24.5 mph	Mean (Average) Speed	24.8 mph
85th Percentile	28.7 mph	10 mph Pace	19.7 - 29.7 mph
95th Percentile	31.6 mph	Percent in Pace	82.2 %
<b>Westbound</b>			
50th Percentile (Median)	23.4 mph	Mean (Average) Speed	24.0 mph
85th Percentile	29.0 mph	10 mph Pace	18.8 - 28.8 mph
95th Percentile	32.0 mph	Percent in Pace	73.0 %



Daily Trip Calculations

Piper Street – Red Area  
Approximately 95 units

Center Blvd – Blue Area  
Approximately 54 units

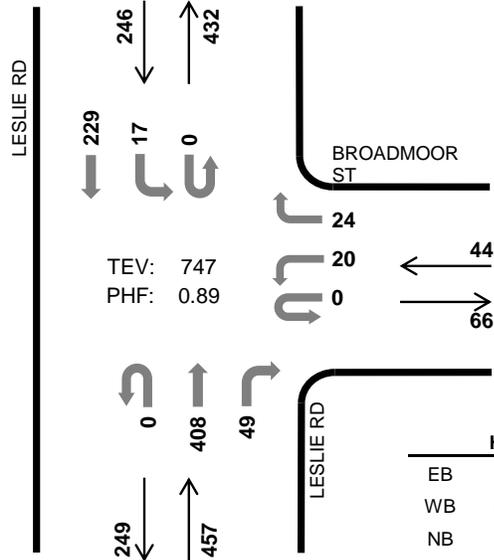
# **AM Peak-Hour Counts and Turning Movement Calculations**

## LESLIE RD BROADMOOR ST

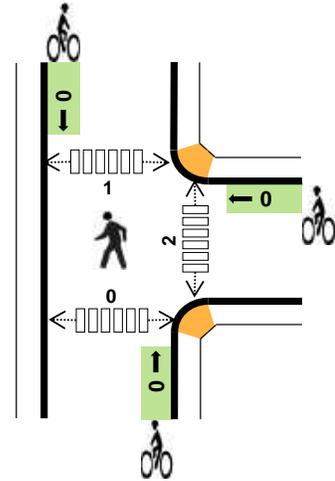


Peak Hour

Date: Wed, Mar 13, 2019  
Count Period: 7:00 AM to 9:00 AM  
Peak Hour: 7:45 AM to 8:45 AM



	HV %:	PHF
EB	-	-
WB	0.0%	0.38
NB	1.3%	0.89
SB	2.8%	0.85
TOTAL	1.7%	0.89



### Two-Hour Count Summaries

Interval Start	0				BROADMOOR ST				LESLIE RD				LESLIE RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	4	0	0	104	2	0	1	46	0	157	0
7:15 AM	0	0	0	0	0	5	0	3	0	0	114	3	0	2	45	0	172	0
7:30 AM	0	0	0	0	0	2	0	1	0	0	131	2	0	4	59	0	199	0
7:45 AM	0	0	0	0	0	2	0	3	0	0	114	5	0	4	56	0	184	712
8:00 AM	0	0	0	0	0	0	0	2	0	0	99	2	0	5	67	0	175	730
8:15 AM	0	0	0	0	0	4	0	4	0	0	81	27	0	5	58	0	179	737
8:30 AM	0	0	0	0	0	14	0	15	0	0	114	15	0	3	48	0	209	747
8:45 AM	0	0	0	0	0	2	0	9	0	0	96	2	0	6	67	0	182	745
Count Total	0	0	0	0	0	29	0	41	0	0	853	58	0	30	446	0	1,457	0
Peak Hour	0	0	0	0	0	20	0	24	0	0	408	49	0	17	229	0	747	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

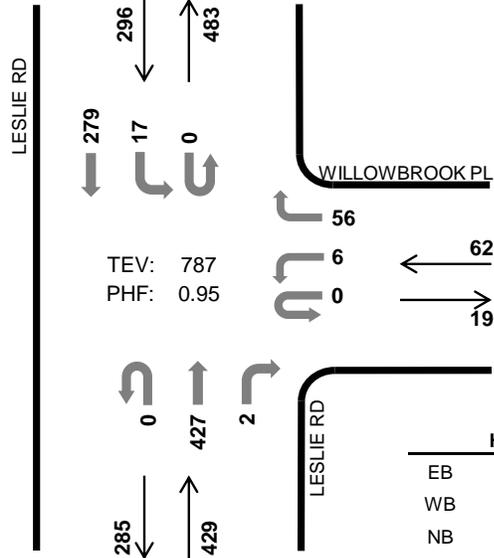
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	3	2	5	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	2	3	5	0	0	0	0	0	2	0	1	0	3
8:15 AM	0	0	2	3	5	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	16	11	27	0	0	0	0	0	2	0	1	0	3
Peak Hr	0	0	6	7	13	0	0	0	0	0	2	0	1	0	3

### LESLIE RD WILLOWBROOK PL

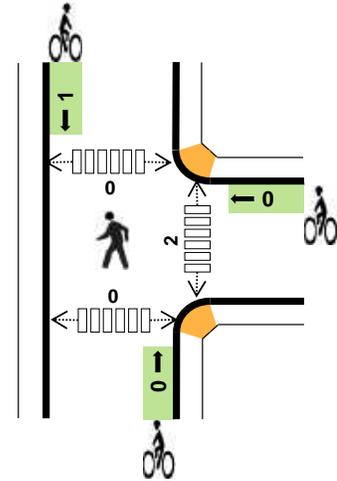


Peak Hour

Date: Tue, Nov 06, 2018  
Count Period: 7:00 AM to 9:00 AM  
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	-	-
WB	1.6%	0.91
NB	3.7%	0.87
SB	5.1%	0.91
TOTAL	4.1%	0.95

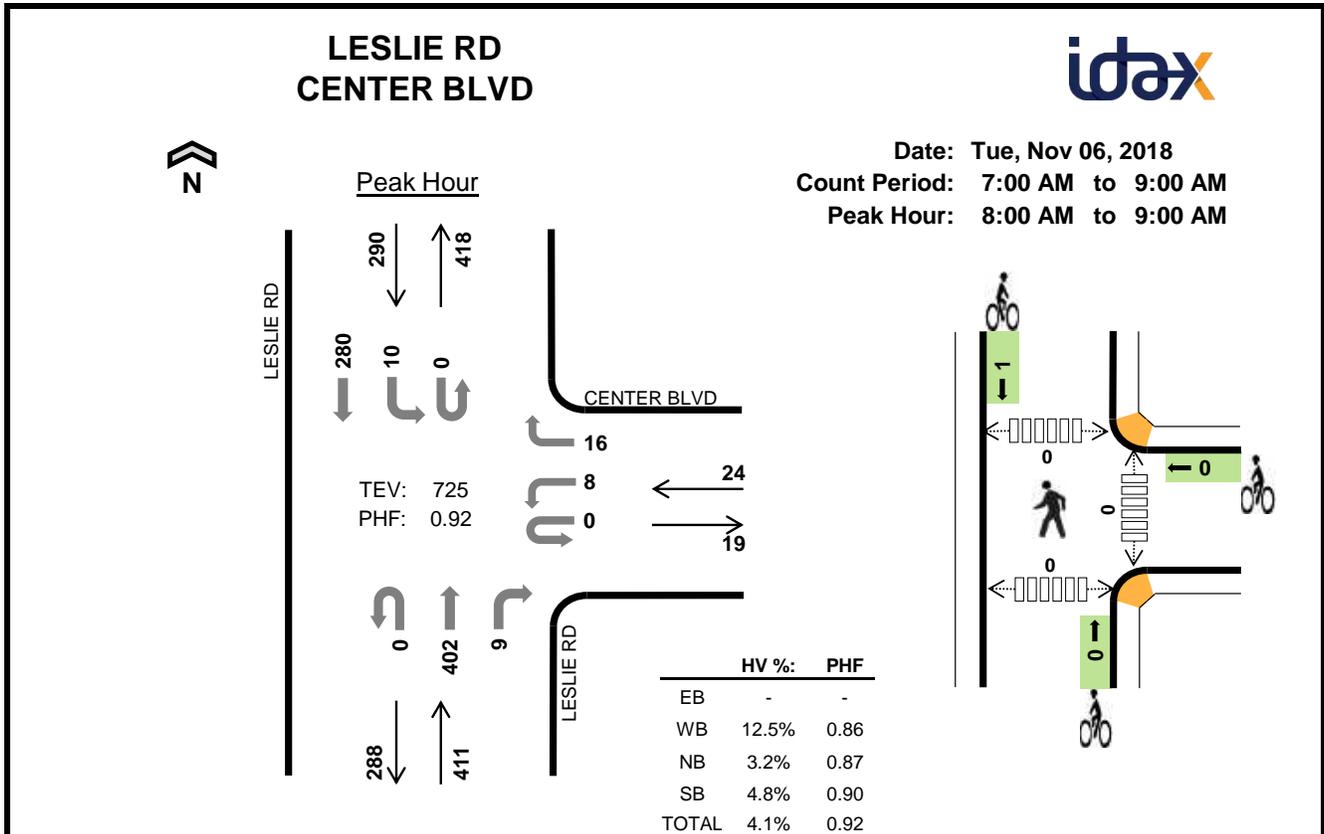


#### Two-Hour Count Summaries

Interval Start	0				WILLOWBROOK PL				LESLIE RD				LESLIE RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	3	0	16	0	0	108	0	0	2	41	0	170	0
7:15 AM	0	0	0	0	0	5	0	16	0	0	106	1	0	2	64	0	194	0
7:30 AM	0	0	0	0	0	3	0	25	0	0	98	1	0	2	67	0	196	0
7:45 AM	0	0	0	0	0	0	0	13	0	0	98	0	0	2	50	0	163	723
8:00 AM	0	0	0	0	0	2	0	15	0	0	84	1	0	8	73	0	183	736
8:15 AM	0	0	0	0	0	3	0	12	0	0	122	1	0	3	66	0	207	749
8:30 AM	0	0	0	0	0	1	0	14	0	0	123	0	0	3	64	0	205	758
8:45 AM	0	0	0	0	0	0	0	15	0	0	98	0	0	3	76	0	192	787
Count Total	0	0	0	0	0	17	0	126	0	0	837	4	0	25	501	0	1,510	0
Peak Hour	0	0	0	0	0	6	0	56	0	0	427	2	0	17	279	0	787	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	2	6	3	11	0	0	1	0	1	0	0	0	0	0
7:15 AM	0	0	3	3	6	0	0	0	0	0	0	1	0	0	1
7:30 AM	0	1	1	5	7	0	0	0	0	0	0	1	0	0	1
7:45 AM	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	4	7	11	0	0	0	0	0	0	1	0	0	1
8:15 AM	0	1	6	3	10	0	0	0	0	0	0	1	0	0	1
8:30 AM	0	0	3	2	5	0	0	0	1	1	2	0	0	0	2
8:45 AM	0	0	3	3	6	0	0	0	0	0	0	1	0	0	1
Count Total	0	4	27	28	59	0	0	1	1	2	2	5	0	0	7
Peak Hr	0	1	16	15	32	0	0	0	1	1	2	3	0	0	5



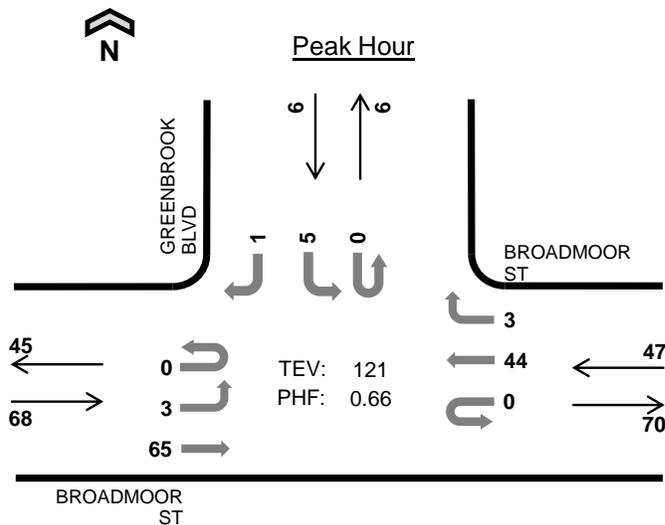
#### Two-Hour Count Summaries

Interval Start	0				CENTER BLVD				LESLIE RD				LESLIE RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	4	0	2	0	0	97	3	0	2	40	0	148	0
7:15 AM	0	0	0	0	0	6	0	2	0	0	99	3	0	2	65	0	177	0
7:30 AM	0	0	0	0	0	4	0	3	0	0	94	1	0	0	69	0	171	0
7:45 AM	0	0	0	0	0	2	0	4	0	0	88	0	0	0	53	0	147	643
8:00 AM	0	0	0	0	0	4	0	3	0	0	85	2	0	4	70	0	168	663
8:15 AM	0	0	0	0	0	2	0	5	0	0	116	2	0	1	70	0	196	682
8:30 AM	0	0	0	0	0	0	0	7	0	0	109	4	0	2	62	0	184	695
8:45 AM	0	0	0	0	0	2	0	1	0	0	92	1	0	3	78	0	177	725
Count Total	0	0	0	0	0	24	0	27	0	0	780	16	0	14	507	0	1,368	0
Peak Hour	0	0	0	0	0	8	0	16	0	0	402	9	0	10	280	0	725	0

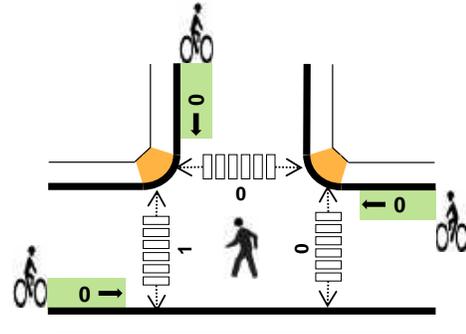
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	6	4	10	0	0	1	0	1	0	0	0	0	0
7:15 AM	0	0	3	3	6	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	4	5	0	0	0	0	0	0	2	0	0	2
7:45 AM	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	1	3	5	9	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	2	4	3	9	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	3	3	6	0	0	0	1	1	0	0	0	0	0
8:45 AM	0	0	3	3	6	0	0	0	0	0	0	0	0	0	0
Count Total	0	3	24	27	54	0	0	1	1	2	0	2	0	0	2
Peak Hr	0	3	13	14	30	0	0	0	1	1	0	0	0	0	0

# GREENBROOK BLVD BROADMOOR ST



Date: Wed, Mar 13, 2019  
Count Period: 7:00 AM to 9:00 AM  
Peak Hour: 8:00 AM to 9:00 AM



	HV %:	PHF
EB	5.9%	0.59
WB	2.1%	0.47
NB	-	-
SB	0.0%	0.75
TOTAL	4.1%	0.66

## Two-Hour Count Summaries

Interval Start	BROADMOOR ST				BROADMOOR ST				0				GREENBROOK BLVD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	1	3	0	0	0	2	3	0	0	0	0	0	2	0	0	11	0
7:15 AM	0	0	4	0	0	0	6	0	0	0	0	0	0	0	0	2	12	0
7:30 AM	0	0	7	0	0	0	2	0	0	0	0	0	0	2	0	1	12	0
7:45 AM	0	0	9	0	0	0	5	0	0	0	0	0	0	1	0	0	15	50
<b>8:00 AM</b>	<b>0</b>	<b>2</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>54</b>
8:15 AM	0	1	28	0	0	0	7	1	0	0	0	0	0	1	0	1	39	81
<b>8:30 AM</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>46</b>	115
8:45 AM	0	0	9	0	0	0	10	0	0	0	0	0	0	2	0	0	21	121
Count Total	0	4	88	0	0	0	59	6	0	0	0	0	0	10	0	4	171	0
<b>Peak Hour</b>	<b>0</b>	<b>3</b>	<b>65</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>44</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>121</b>	<b>0</b>

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

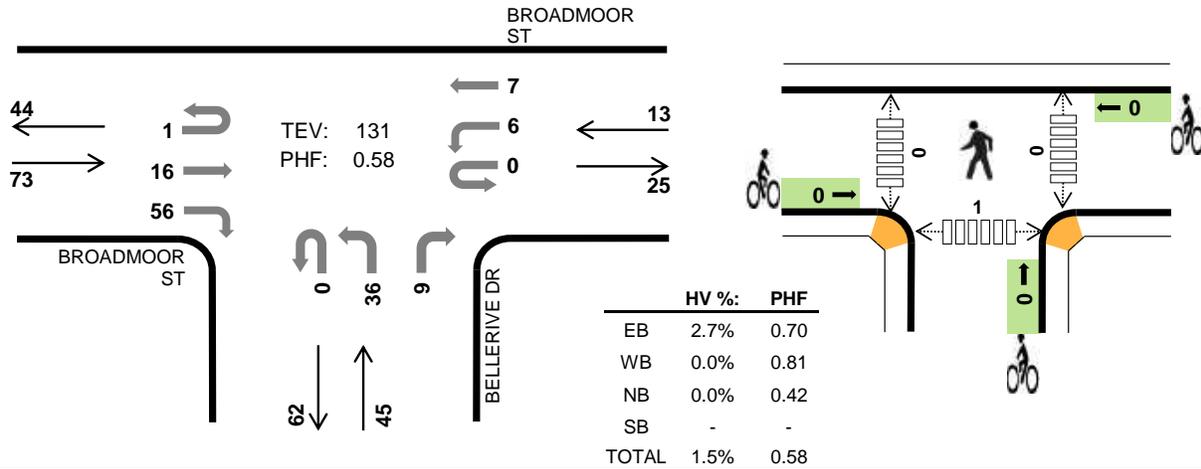
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>8:00 AM</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>
8:15 AM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0
<b>8:30 AM</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	5	1	0	0	6	0	0	0	0	0	0	1	0	1	2
<b>Peak Hr</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>

# BELLERIVE DR BROADMOOR ST



Peak Hour

Date: Wed, Mar 13, 2019  
 Count Period: 7:00 AM to 9:00 AM  
 Peak Hour: 8:00 AM to 9:00 AM



## Two-Hour Count Summaries

Interval Start	BROADMOOR ST				BROADMOOR ST				BELLERIVE DR				0				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	1	3	0	1	1	0	0	2	0	0	0	0	0	0	8	0
7:15 AM	0	0	2	3	0	1	5	0	0	2	0	1	0	0	0	0	14	0
7:30 AM	0	0	6	7	0	0	2	0	0	0	0	2	0	0	0	0	17	0
7:45 AM	0	0	5	6	0	3	2	0	0	3	0	2	0	0	0	0	21	60
8:00 AM	1	0	4	4	0	3	0	0	0	3	0	1	0	0	0	0	16	68
8:15 AM	0	0	3	23	0	1	2	0	0	5	0	1	0	0	0	0	35	89
8:30 AM	0	0	2	23	0	2	2	0	0	22	0	5	0	0	0	0	56	128
8:45 AM	0	0	7	6	0	0	3	0	0	6	0	2	0	0	0	0	24	131
Count Total	1	0	30	75	0	11	17	0	0	43	0	14	0	0	0	0	191	0
Peak Hour	1	0	16	56	0	6	7	0	0	36	0	9	0	0	0	0	131	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1
8:30 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	2	1	0	0	3	0	0	0	0	0	0	0	0	3	3
Peak Hr	2	0	0	0	2	0	0	0	0	0	0	0	0	1	1

**AM Peak-Hour**

**1 Leslie Rd at Broadmoor St**

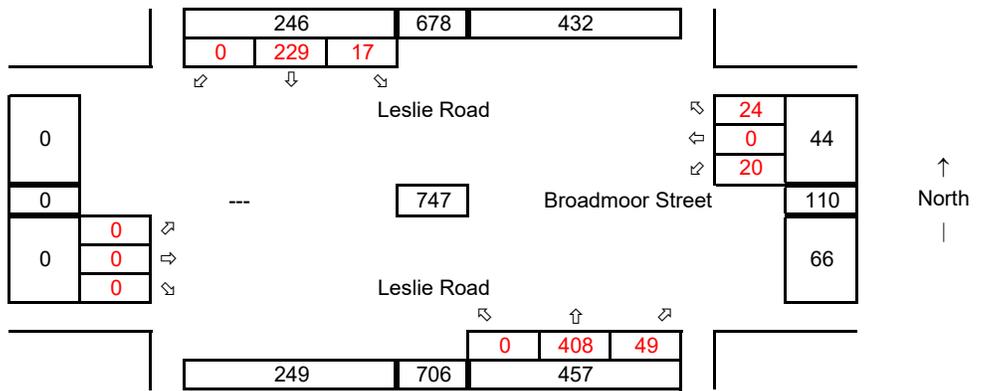
Synchro ID: 1

**Existing**

Average Weekday  
AM Peak-Hour

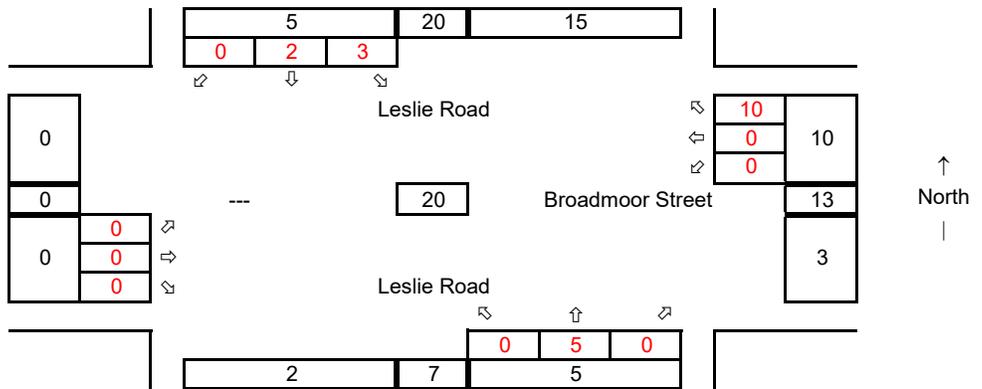
Year: **3/12/2019**

Data Source: **IDAX**



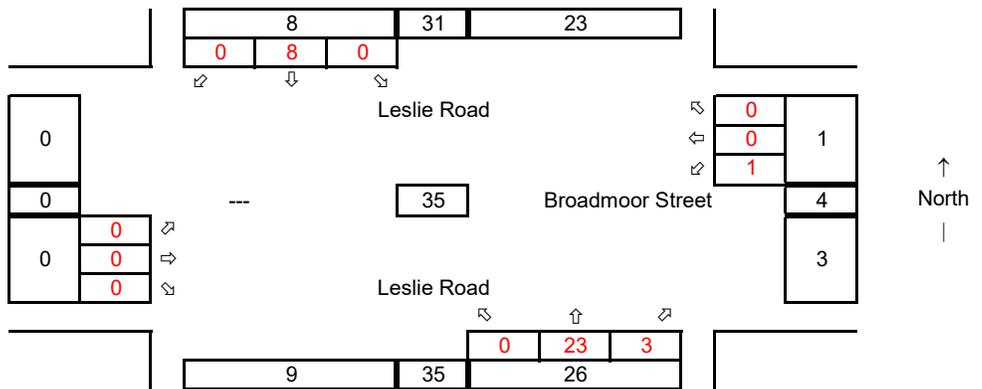
**Willowbrook Place Trips**

Average Weekday  
AM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
AM Peak-Hour



**Future Trips**

Average Weekday  
AM Peak-Hour

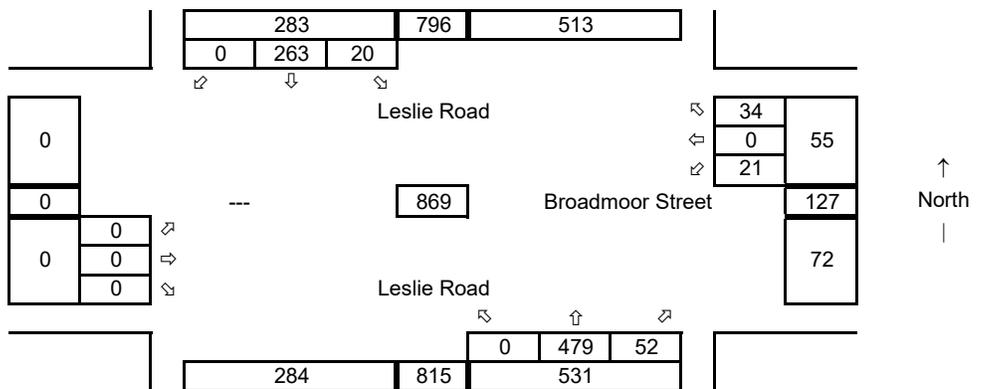
Year: **2029**

Growth Rate = **1.0%**

Years of Growth = 10

Total Growth = 1.1046

Growth was only applied to northbound and southbound through trips





**AM Peak-Hour**

**3 Leslie Rd at Center Blvd**

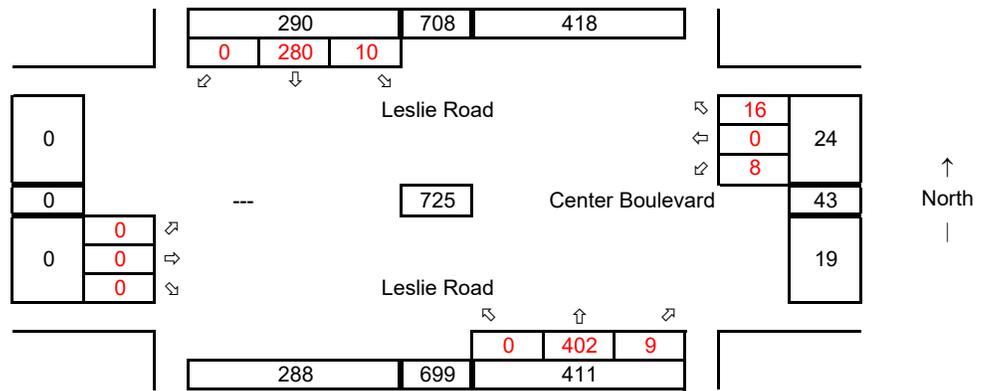
Synchro ID: 3

**Existing**

Average Weekday  
AM Peak-Hour

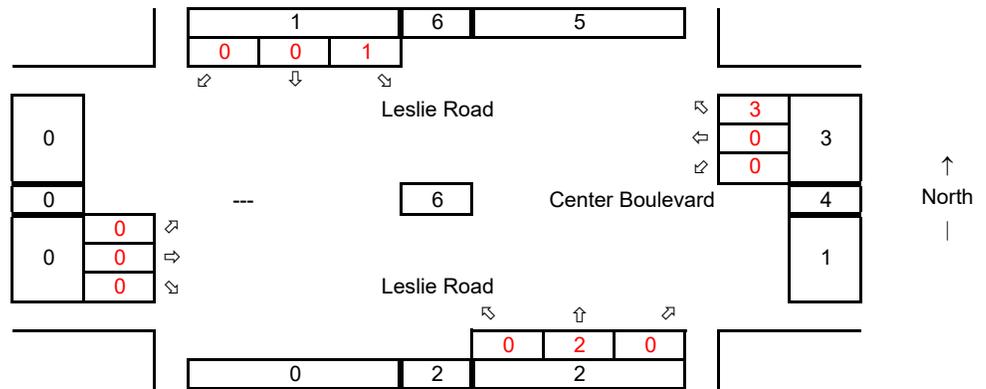
Year: **11/6/2018**

Data Source: **IDAX**



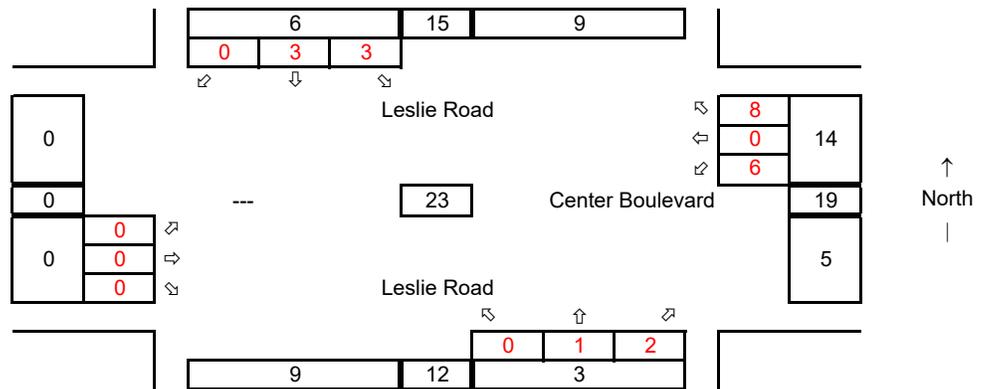
**Willowbrook Place Trips**

Average Weekday  
AM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
AM Peak-Hour



**Future Trips**

Average Weekday  
AM Peak-Hour

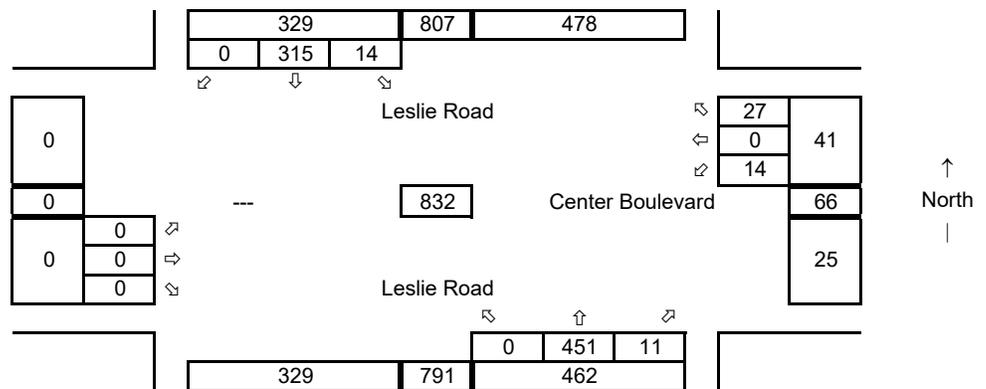
Year: 2029

Growth Rate = 1.0%

Years of Growth = 11

Total Growth = 1.1157

Growth was only applied to  
northbound and southbound  
through trips



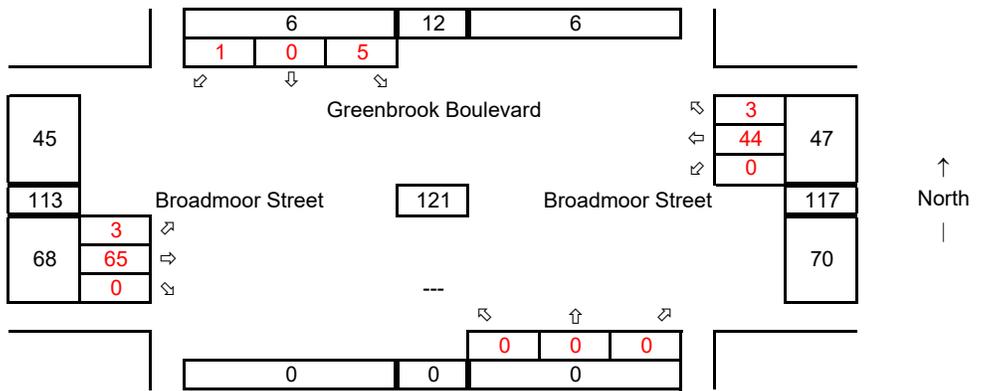
**AM Peak-Hour**

**4 Greenbrook Bd at Broadmoor St**

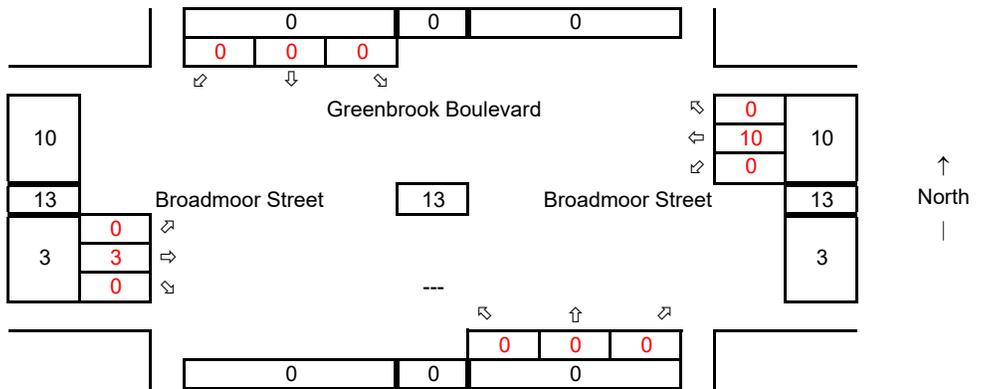
Synchro ID: 4  
**Existing**  
 Average Weekday  
 AM Peak-Hour

Year: **3/12/2019**

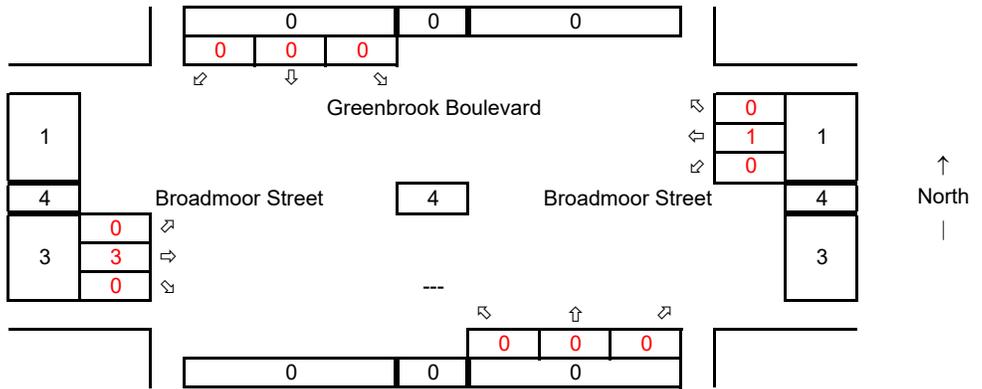
Data Source: **IDAX**



**Willowbrook Place Trips**  
 Average Weekday  
 AM Peak-Hour



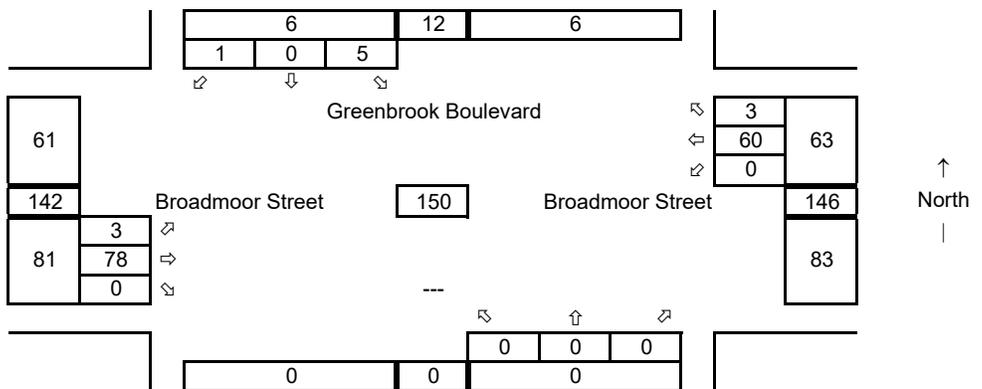
**Willowbrook #2 Trips**  
 Average Weekday  
 AM Peak-Hour



**Future Trips**  
 Average Weekday  
 AM Peak-Hour

Year: 2029  
 Growth Rate = 1.0%  
 Years of Growth = 10  
 Total Growth = 1.1046

Growth was only applied to northbound and southbound through trips



**AM Peak-Hour**

**5 Site Access at Broadmoor St**

Synchro ID: 4

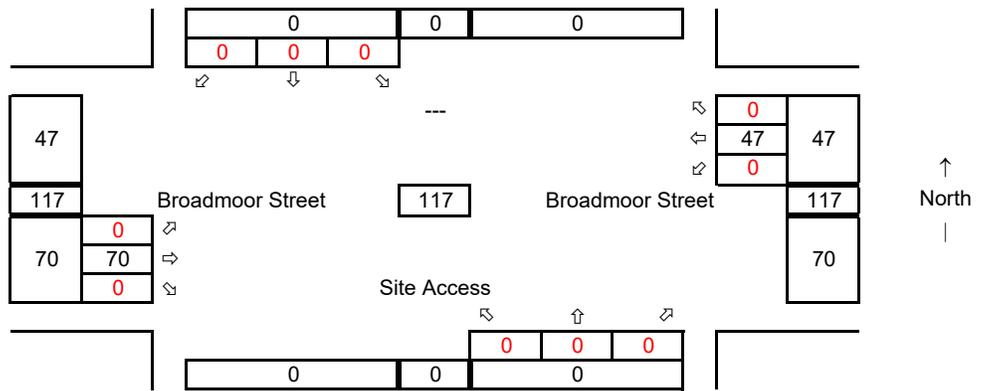
**Existing**

Average Weekday  
AM Peak-Hour

Year: **3/12/2019**

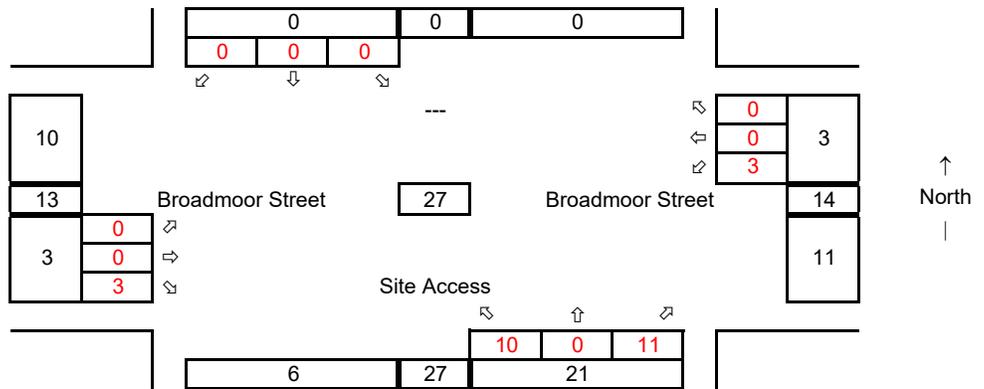
Data Source: **IDAX**

The volumes are based on  
the count for the intersection  
of Greenbrook Boulevard at  
Broadmoor Street



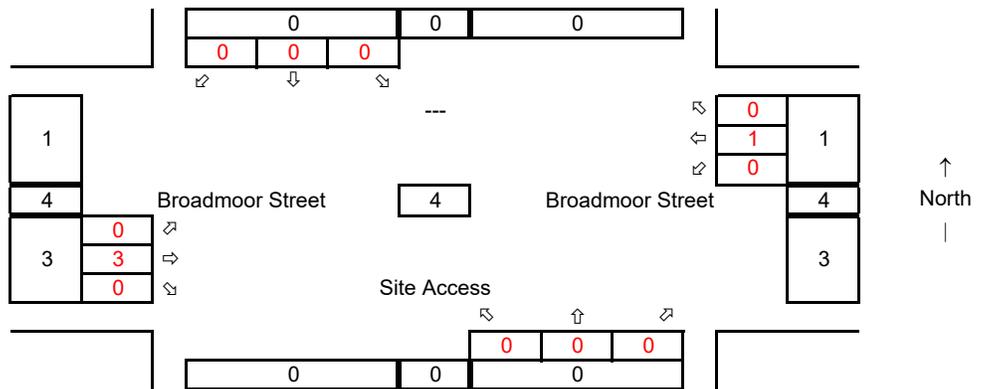
**Willowbrook Place Trips**

Average Weekday  
AM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
AM Peak-Hour



**Future Trips**

Average Weekday  
AM Peak-Hour

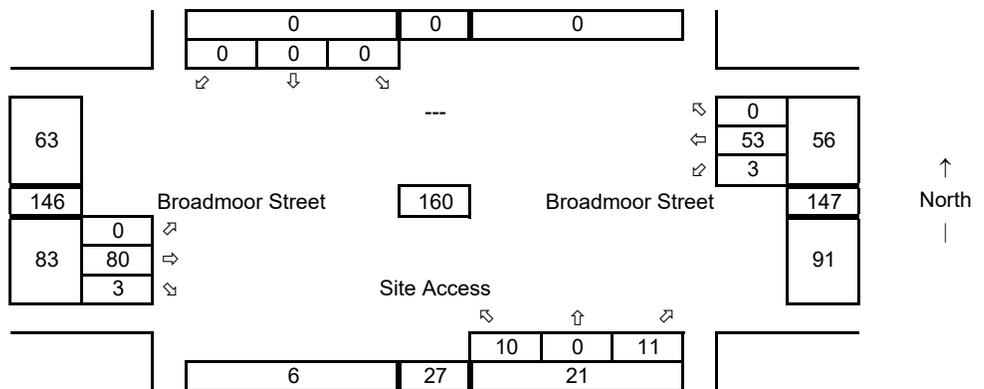
Year: 2029

Growth Rate = 1.0%

Years of Growth = 10

Total Growth = 1.1046

Growth was only applied to  
northbound and southbound  
through trips



**AM Peak-Hour**

**6 Bellerive Dr at Broadmoor St**

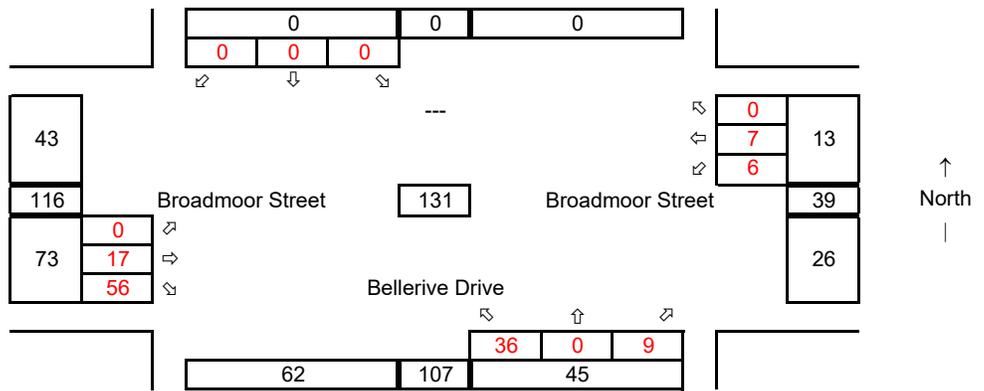
Synchro ID: 6

**Existing**

Average Weekday  
AM Peak-Hour

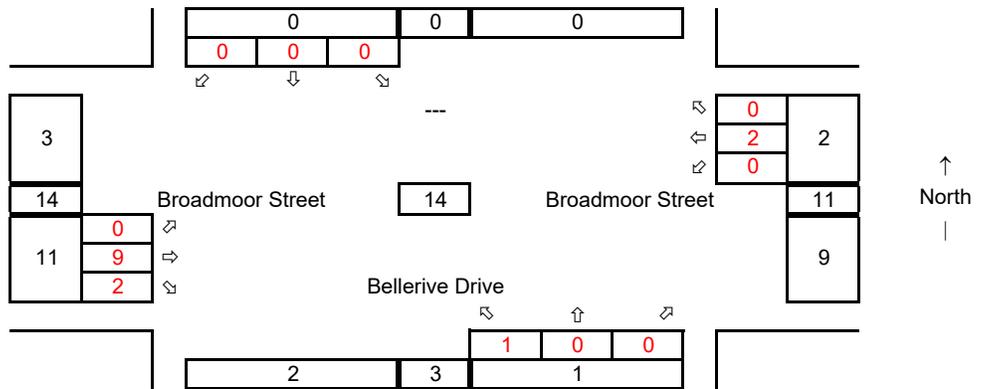
Year: **3/12/2019**

Data Source: **IDAX**



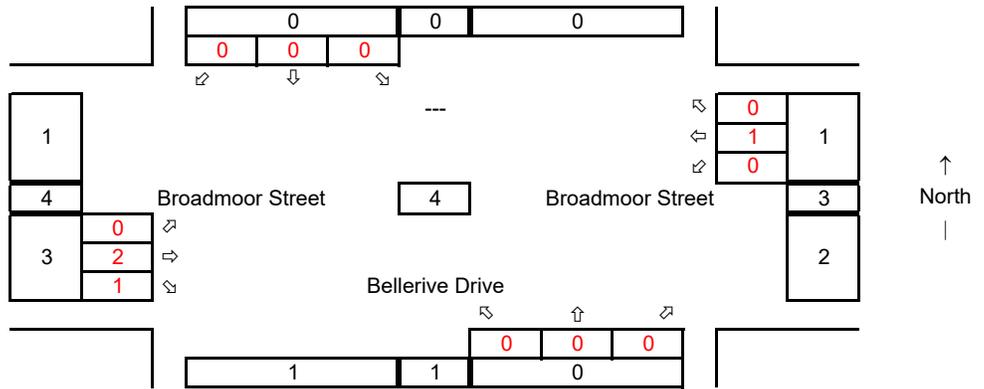
**Willowbrook Place Trips**

Average Weekday  
AM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
AM Peak-Hour



**Future Trips**

Average Weekday  
AM Peak-Hour

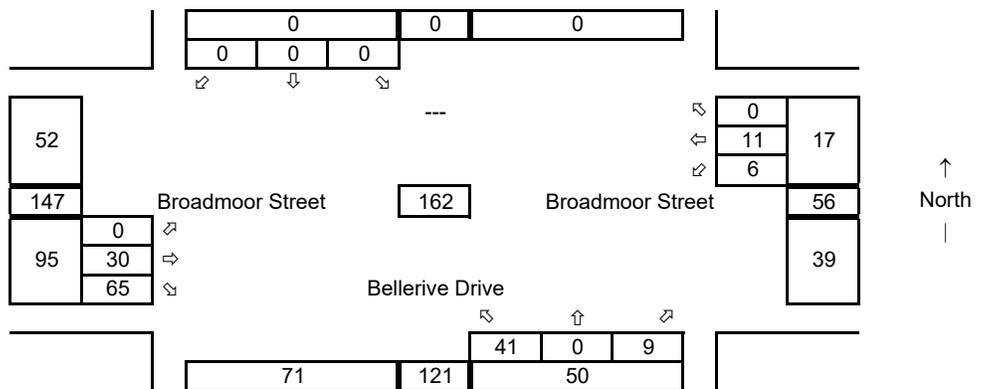
Year: 2029

Growth Rate = 1.0%

Years of Growth = 10

Total Growth = 1.1046

Growth was only applied to northbound and southbound through trips



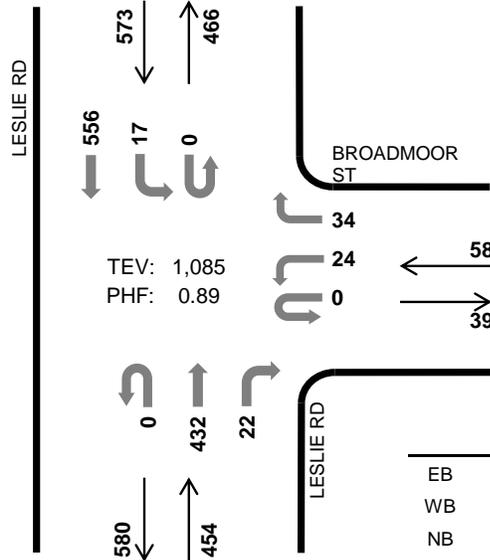
# **PM Peak-Hour Counts and Turning Movement Calculations**

## LESLIE RD BROADMOOR ST

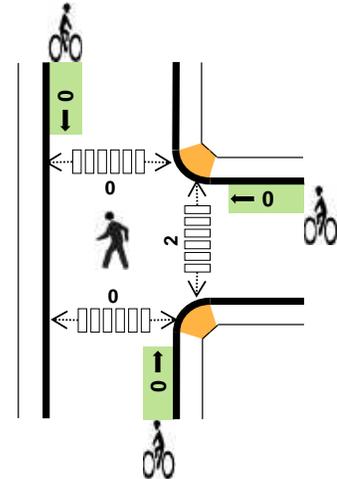


Peak Hour

Date: Tue, Mar 12, 2019  
Count Period: 4:00 PM to 6:00 PM  
Peak Hour: 5:00 PM to 6:00 PM



	HV %:	PHF
EB	-	-
WB	1.7%	0.76
NB	0.9%	0.86
SB	0.2%	0.91
TOTAL	0.6%	0.89



### Two-Hour Count Summaries

Interval Start	0				BROADMOOR ST				LESLIE RD				LESLIE RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	6	0	8	0	0	88	2	0	5	109	0	218	0
4:15 PM	0	0	0	0	0	5	0	7	0	0	98	0	0	6	117	0	233	0
4:30 PM	0	0	0	0	0	2	0	7	0	0	104	4	0	7	138	0	262	0
4:45 PM	0	0	0	0	0	5	0	8	0	0	86	8	0	4	115	0	226	939
5:00 PM	0	0	0	0	0	9	0	10	0	0	101	5	0	6	141	0	272	993
5:15 PM	0	0	0	0	0	6	0	8	0	0	126	6	0	7	151	0	304	1,064
5:30 PM	0	0	0	0	0	4	0	7	0	0	100	5	0	3	134	0	253	1,055
5:45 PM	0	0	0	0	0	5	0	9	0	0	105	6	0	1	130	0	256	1,085
Count Total	0	0	0	0	0	42	0	64	0	0	808	36	0	39	1,035	0	2,024	0
Peak Hour	0	0	0	0	0	24	0	34	0	0	432	22	0	17	556	0	1,085	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

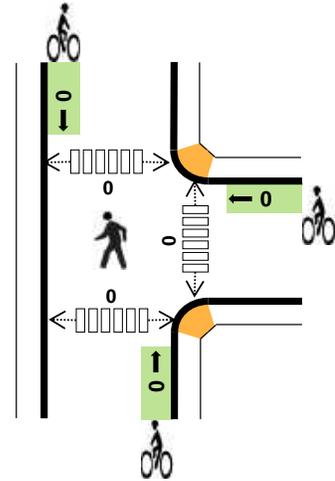
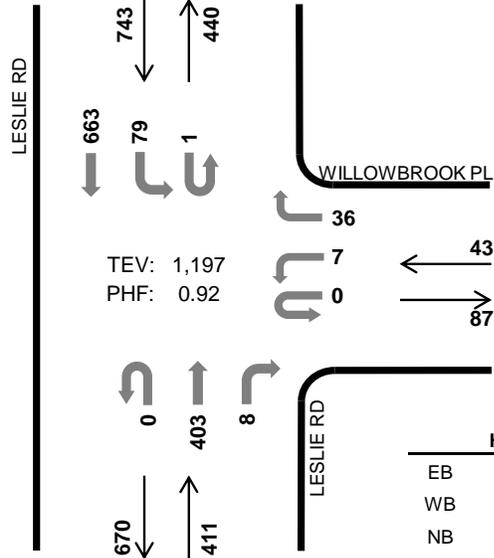
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	2	2	4	0	0	0	0	0	2	0	0	0	2
4:30 PM	0	0	2	0	2	0	0	0	0	0	2	0	0	0	2
4:45 PM	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	2	0	2	0	0	0	0	0	1	0	0	0	1
5:15 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
5:45 PM	0	1	1	1	3	0	0	0	0	0	0	0	0	0	0
Count Total	0	1	12	5	18	0	0	0	0	0	6	0	0	0	6
Peak Hr	0	1	4	1	6	0	0	0	0	0	2	0	0	0	2

## LESLIE RD WILLOWBROOK PL



Peak Hour

Date: Tue, Nov 06, 2018  
 Count Period: 4:00 PM to 6:00 PM  
 Peak Hour: 4:45 PM to 5:45 PM



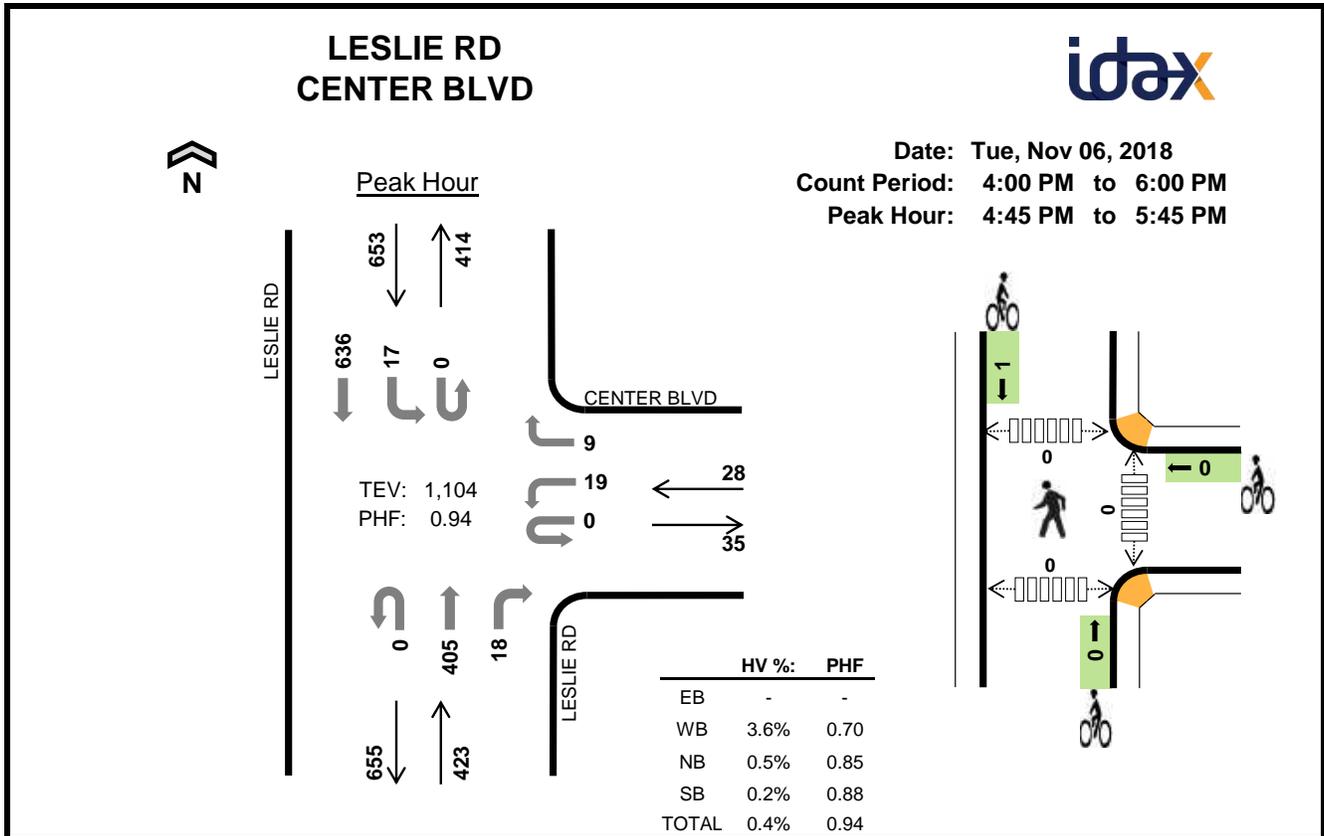
	HV %:	PHF
EB	-	-
WB	0.0%	0.72
NB	0.5%	0.82
SB	0.3%	0.86
TOTAL	0.3%	0.92

### Two-Hour Count Summaries

Interval Start	0				WILLOWBROOK PL				LESLIE RD				LESLIE RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	8	0	0	85	1	0	14	123	0	231	0
4:15 PM	0	0	0	0	0	0	0	5	0	0	78	3	0	16	144	0	246	0
4:30 PM	0	0	0	0	0	1	0	14	0	0	88	0	0	20	145	0	268	0
4:45 PM	0	0	0	0	0	0	0	9	0	0	91	2	0	18	173	0	293	1,038
5:00 PM	0	0	0	0	0	1	0	7	0	0	93	1	1	20	153	0	276	1,083
5:15 PM	0	0	0	0	0	3	0	12	0	0	122	3	0	16	145	0	301	1,138
5:30 PM	0	0	0	0	0	3	0	8	0	0	97	2	0	25	192	0	327	1,197
5:45 PM	0	0	0	0	0	1	0	8	0	0	94	0	0	16	125	0	244	1,148
Count Total	0	0	0	0	0	9	0	71	0	0	748	12	1	145	1,200	0	2,186	0
Peak Hour	0	0	0	0	0	7	0	36	0	0	403	8	1	79	663	0	1,197	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	1	3	1	5	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0
4:45 PM	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	1	1	0	0	0	0	0	0	2	0	0	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
5:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Count Total	0	1	6	5	12	0	0	0	1	1	0	4	0	0	4
Peak Hr	0	0	2	2	4	0	0	0	0	0	0	4	0	0	4



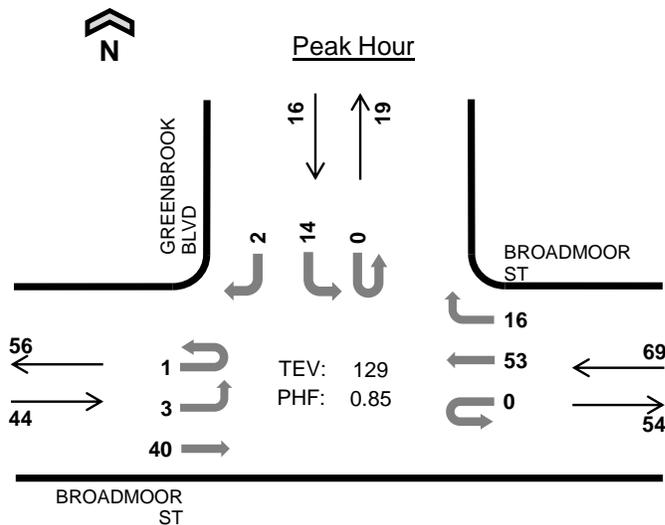
**Two-Hour Count Summaries**

Interval Start	0				CENTER BLVD				LESLIE RD				LESLIE RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	2	0	4	0	0	75	4	0	3	116	0	204	0
4:15 PM	0	0	0	0	0	4	0	0	0	0	84	3	0	1	137	0	229	0
4:30 PM	0	0	0	0	0	1	0	0	0	0	90	3	0	4	138	0	236	0
<b>4:45 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>92</b>	<b>6</b>	<b>0</b>	<b>4</b>	<b>165</b>	<b>0</b>	<b>273</b>	<b>942</b>
<b>5:00 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>94</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>144</b>	<b>0</b>	<b>253</b>	<b>991</b>
5:15 PM	0	0	0	0	0	6	0	4	0	0	121	4	0	5	144	0	284	1,046
<b>5:30 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>98</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>183</b>	<b>0</b>	<b>294</b>	<b>1,104</b>
5:45 PM	0	0	0	0	0	1	0	2	0	0	83	3	0	2	116	0	207	1,038
Count Total	0	0	0	0	0	27	0	15	0	0	737	31	0	27	1,143	0	1,980	0
<b>Peak Hour</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>0</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>405</b>	<b>18</b>	<b>0</b>	<b>17</b>	<b>636</b>	<b>0</b>	<b>1,104</b>	<b>0</b>

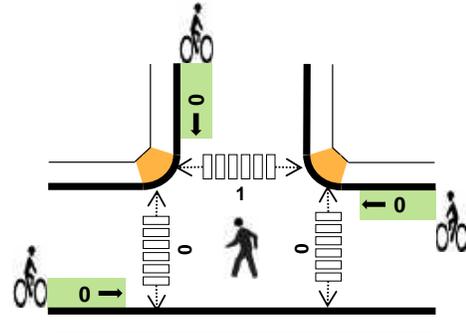
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	1	1	1	3	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0
<b>4:45 PM</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>5:00 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
5:15 PM	0	1	0	0	1	0	0	0	1	1	0	1	0	0	1
<b>5:30 PM</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
5:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Count Total	0	2	4	4	10	0	0	0	2	2	0	2	0	0	2
<b>Peak Hr</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

## GREENBROOK BLVD BROADMOOR ST



Date: Tue, Mar 12, 2019  
 Count Period: 4:00 PM to 6:00 PM  
 Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	2.3%	0.92
WB	0.0%	0.72
NB	-	-
SB	6.3%	0.80
TOTAL	1.6%	0.85

### Two-Hour Count Summaries

Interval Start	BROADMOOR ST				BROADMOOR ST				0				GREENBROOK BLVD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	7	0	0	0	14	4	0	0	0	0	0	0	0	1	26	0
4:15 PM	0	0	4	0	0	0	14	5	0	0	0	0	0	4	0	0	27	0
<b>4:30 PM</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>0</b>
4:45 PM	0	1	11	0	0	0	11	3	0	0	0	0	0	2	0	0	28	111
<b>5:00 PM</b>	<b>0</b>	<b>1</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>38</b>	<b>123</b>
5:15 PM	1	1	9	0	0	0	12	5	0	0	0	0	0	3	0	2	33	129
5:30 PM	0	1	8	0	0	0	12	3	0	0	0	0	0	3	0	0	27	126
5:45 PM	0	1	5	0	0	0	10	2	0	0	0	0	0	3	0	1	22	120
Count Total	1	5	64	0	0	0	103	30	0	0	0	0	0	24	0	4	231	0
<b>Peak Hour</b>	<b>1</b>	<b>3</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>53</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>2</b>	<b>129</b>	<b>0</b>

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

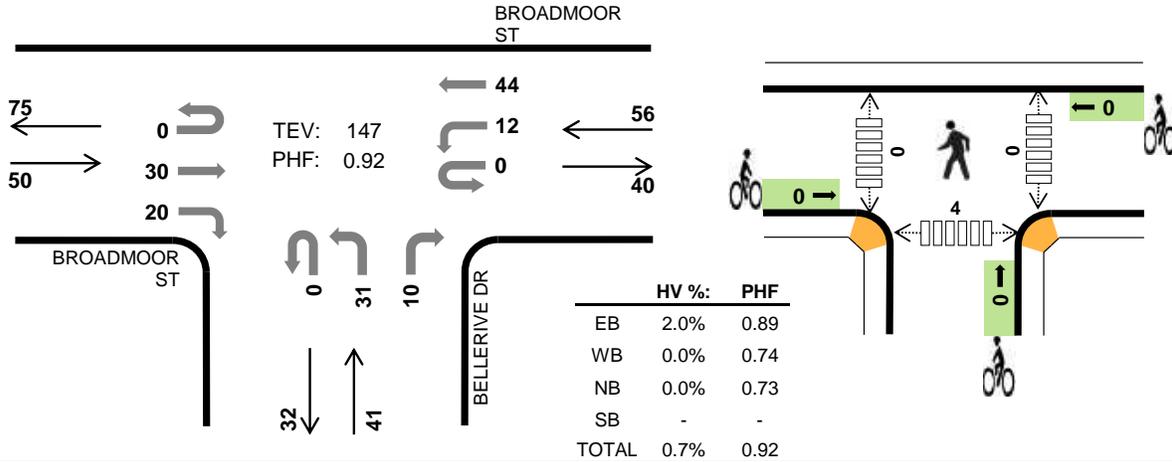
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>4:30 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>5:00 PM</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
5:15 PM	1	0	0	1	2	0	0	0	0	0	0	0	1	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	1	1	2
Count Total	1	0	0	2	3	0	0	0	0	0	0	0	2	2	4
<b>Peak Hr</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>

# BELLERIVE DR BROADMOOR ST



Peak Hour

Date: Tue, Mar 12, 2019  
 Count Period: 4:00 PM to 6:00 PM  
 Peak Hour: 4:45 PM to 5:45 PM



## Two-Hour Count Summaries

Interval Start	BROADMOOR ST				BROADMOOR ST				BELLERIVE DR				0				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	5	2	0	2	9	0	0	11	0	1	0	0	0	0	30	0
4:15 PM	0	0	6	2	0	3	15	0	0	6	0	2	0	0	0	0	34	0
4:30 PM	0	0	10	5	0	4	7	0	0	5	0	1	0	0	0	0	32	0
4:45 PM	0	0	7	7	0	1	12	0	0	5	0	3	0	0	0	0	35	131
5:00 PM	0	0	8	4	0	3	10	0	0	12	0	2	0	0	0	0	39	140
5:15 PM	0	0	9	3	0	5	14	0	0	7	0	2	0	0	0	0	40	146
5:30 PM	0	0	6	6	0	3	8	0	0	7	0	3	0	0	0	0	33	147
5:45 PM	0	0	6	1	0	0	6	0	0	4	0	1	0	0	0	0	18	130
Count Total	0	0	57	30	0	21	81	0	0	57	0	15	0	0	0	0	261	0
Peak Hour	0	0	30	20	0	12	44	0	0	31	0	10	0	0	0	0	147	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	2	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
Count Total	1	0	0	0	1	0	0	0	0	0	0	1	1	9	11
Peak Hr	1	0	0	0	1	0	0	0	0	0	0	0	0	4	4

**PM Peak-Hour**

**1 Leslie Rd at Broadmoor St**

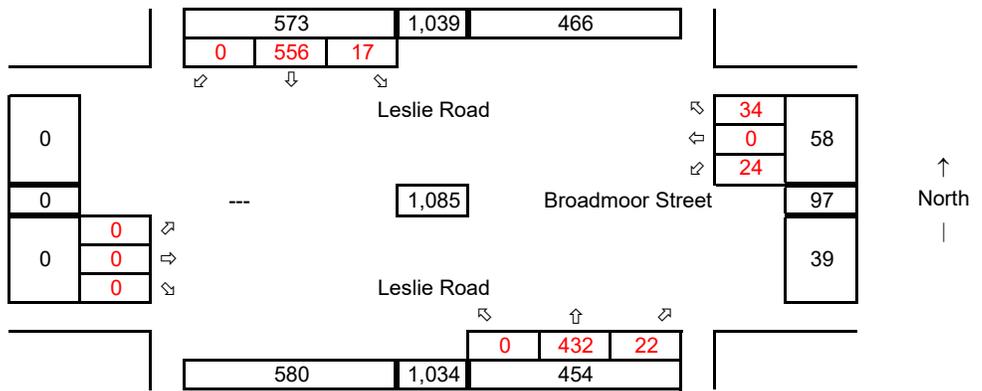
Synchro ID: 1

**Existing**

Average Weekday  
PM Peak-Hour

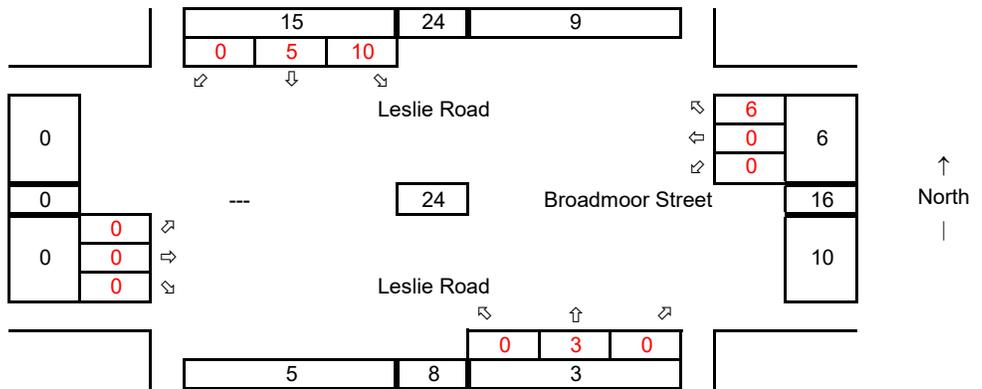
Year: **3/12/2019**

Data Source: **IDAX**



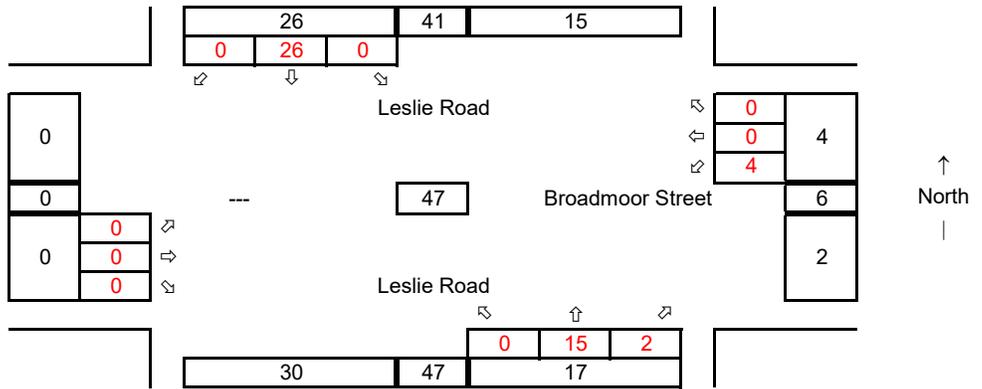
**Willowbrook Place Trips**

Average Weekday  
PM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
PM Peak-Hour



**Future Trips**

Average Weekday  
PM Peak-Hour

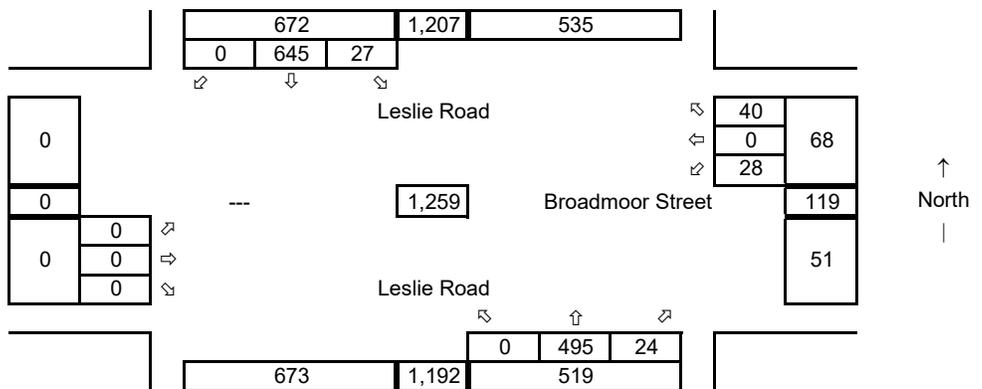
Year: **2029**

Growth Rate = **1.0%**

Years of Growth = 10

Total Growth = 1.1046

Growth was only applied to  
northbound and southbound  
through trips





**PM Peak-Hour**

**3 Leslie Rd at Center Blvd**

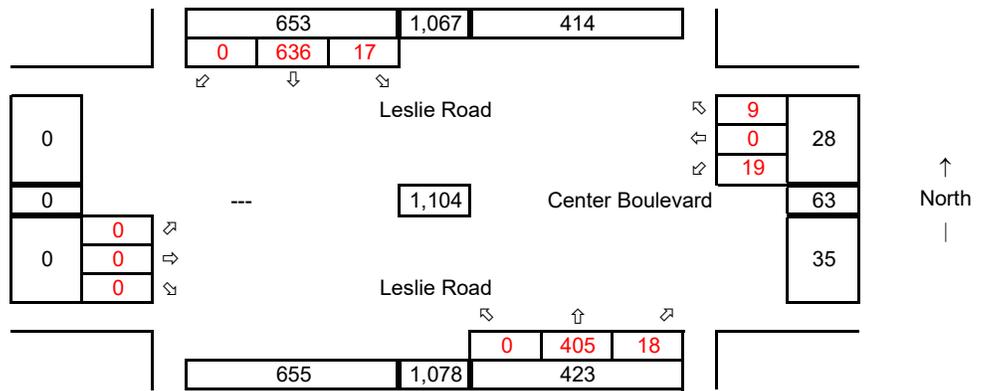
Synchro ID: 3

**Existing**

Average Weekday  
PM Peak-Hour

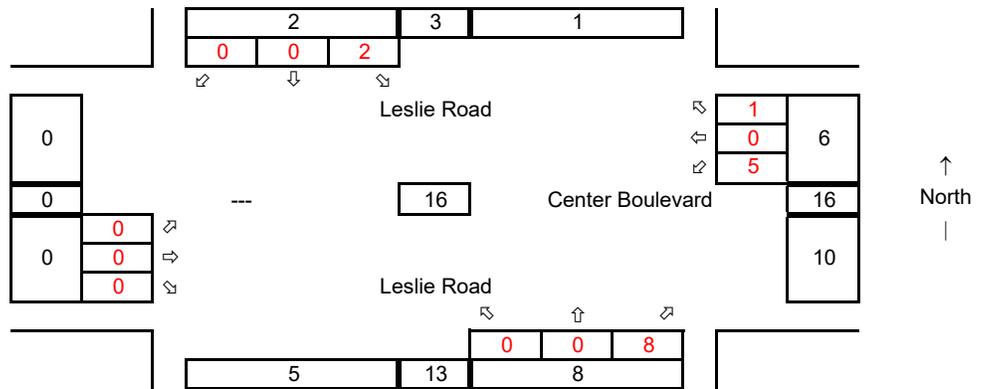
Year: **11/6/2018**

Data Source: **IDAX**



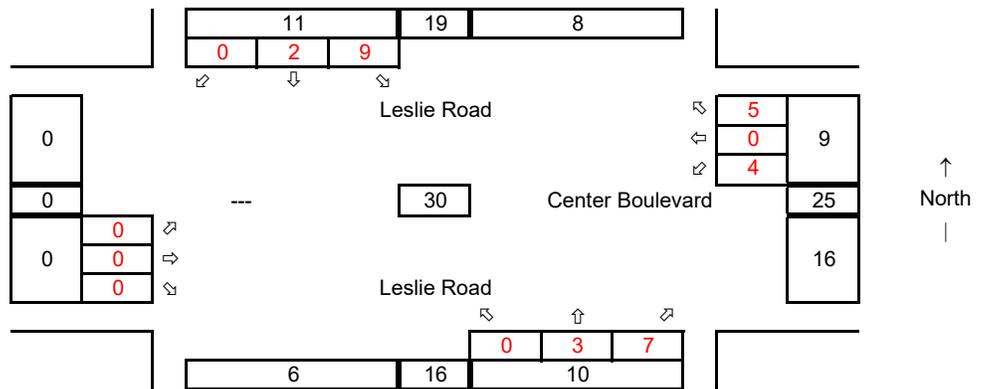
**Willowbrook Place Trips**

Average Weekday  
PM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
PM Peak-Hour



**Future Trips**

Average Weekday  
PM Peak-Hour

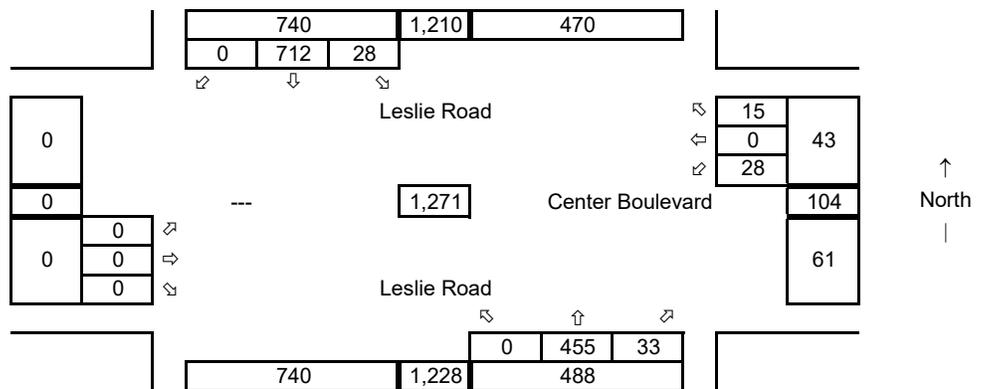
Year: 2029

Growth Rate = 1.0%

Years of Growth = 11

Total Growth = 1.1157

Growth was only applied to  
northbound and southbound  
through trips



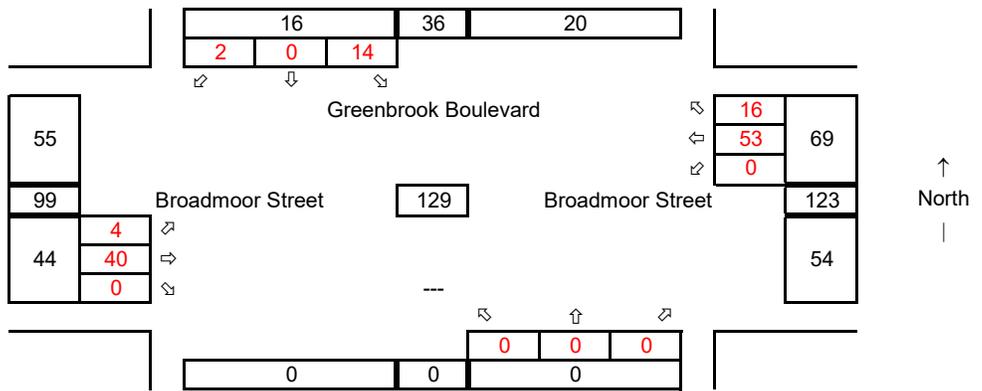
**PM Peak-Hour**

**4 Greenbrook Bd at Broadmoor St**

Synchro ID: 4  
**Existing**  
 Average Weekday  
 PM Peak-Hour

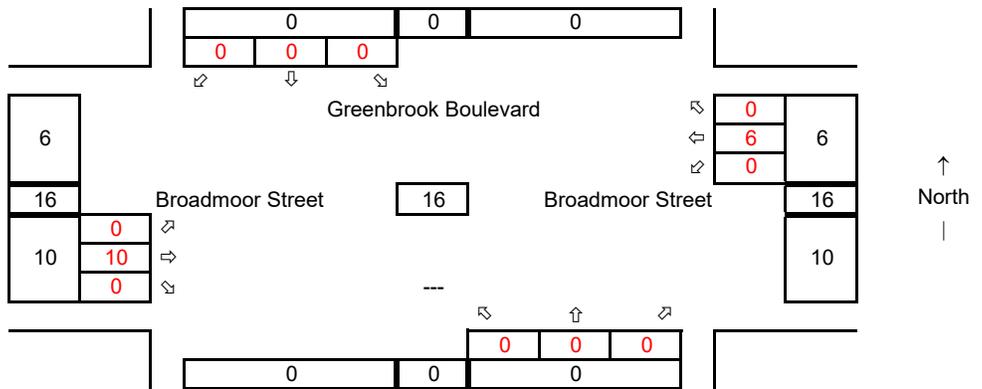
Year: **3/12/2019**

Data Source: **IDAX**



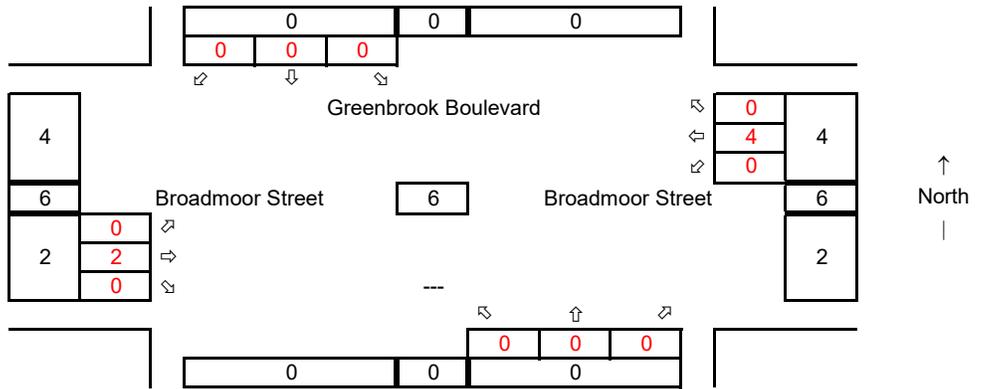
**Willowbrook Place Trips**

Average Weekday  
 PM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
 PM Peak-Hour

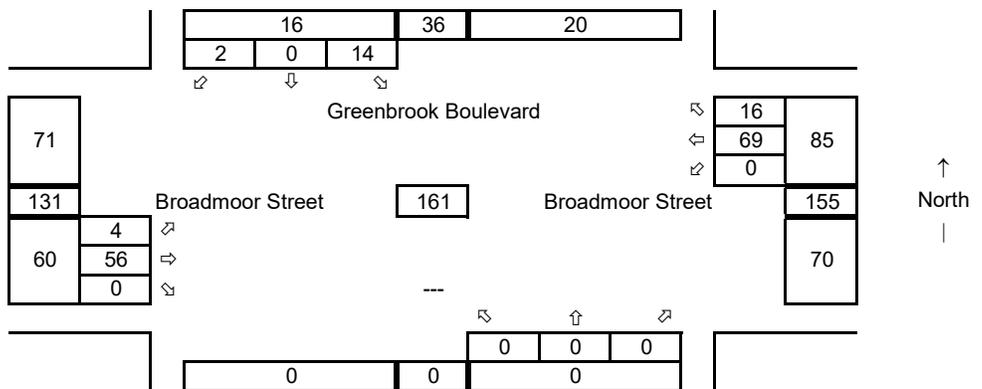


**Future Trips**

Average Weekday  
 PM Peak-Hour

Year: 2029  
 Growth Rate = 1.0%  
 Years of Growth = 10  
 Total Growth = 1.1046

Growth was only applied to northbound and southbound through trips



**PM Peak-Hour**

**5 Site Access at Broadmoor St**

Synchro ID: 4

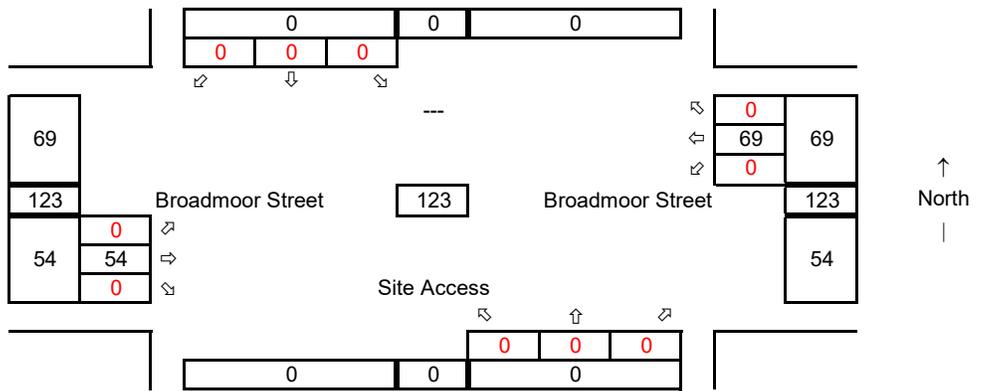
**Existing**

Average Weekday  
PM Peak-Hour

Year: **3/12/2019**

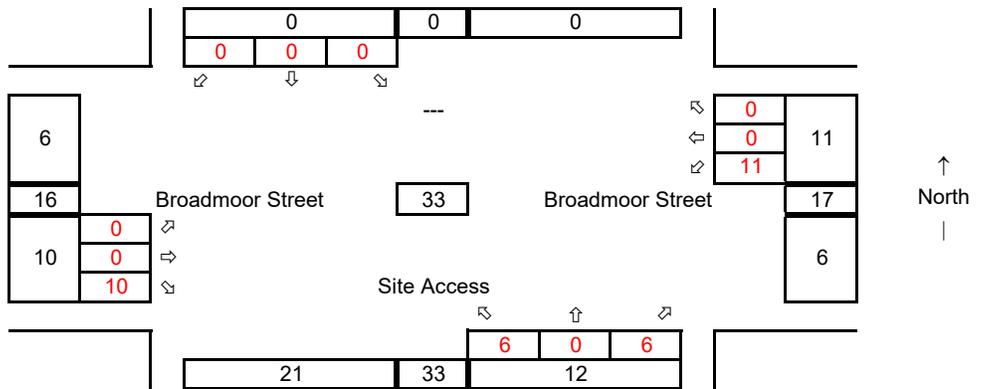
Data Source: **IDAX**

The volumes are based on  
the count for the intersection  
of Greenbrook Boulevard at  
Broadmoor Street



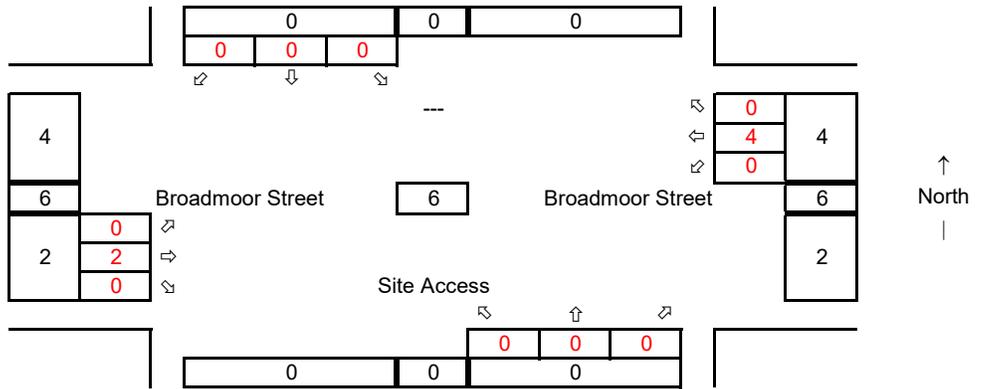
**Willowbrook Place Trips**

Average Weekday  
PM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
PM Peak-Hour



**Future Trips**

Average Weekday  
PM Peak-Hour

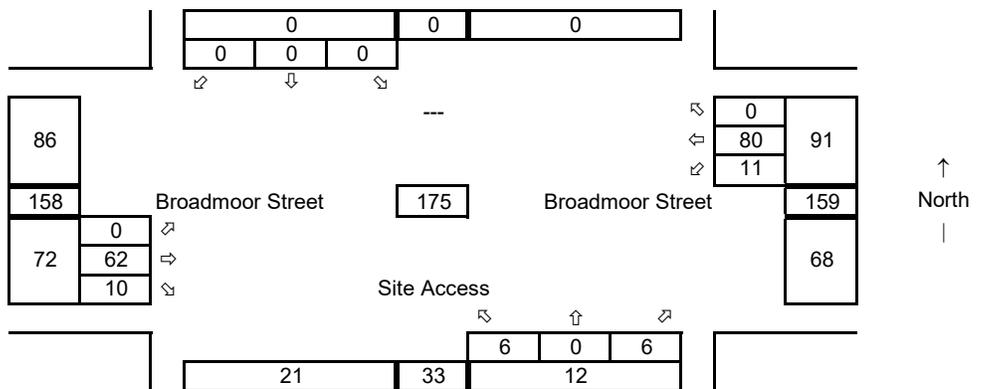
Year: 2029

Growth Rate = 1.0%

Years of Growth = 10

Total Growth = 1.1046

Growth was only applied to  
northbound and southbound  
through trips



**PM Peak-Hour**

**6 Bellerive Dr at Broadmoor St**

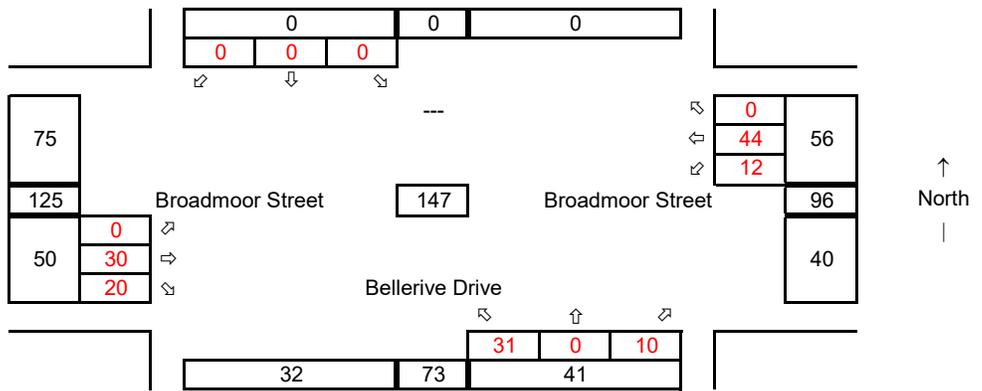
Synchro ID: 6

**Existing**

Average Weekday  
PM Peak-Hour

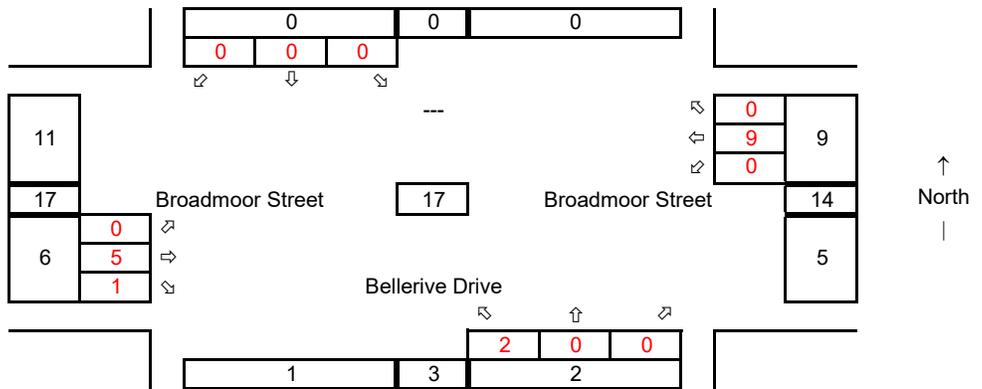
Year: **3/12/2019**

Data Source: **IDAX**



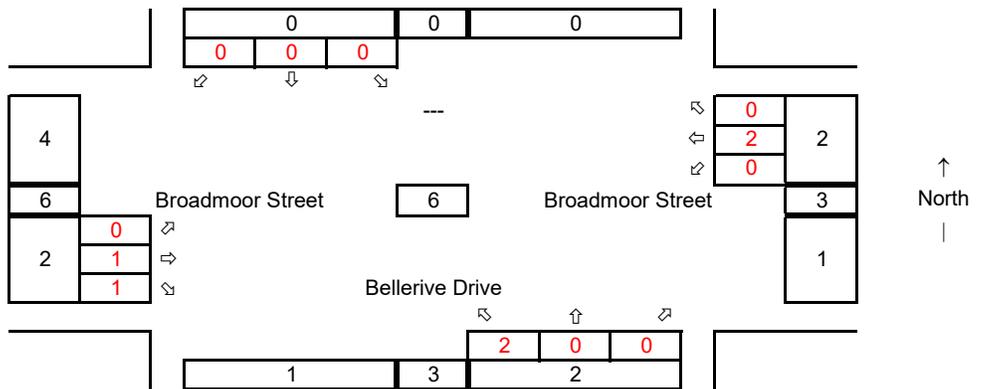
**Willowbrook Place Trips**

Average Weekday  
PM Peak-Hour



**Willowbrook #2 Trips**

Average Weekday  
PM Peak-Hour



**Future Trips**

Average Weekday  
PM Peak-Hour

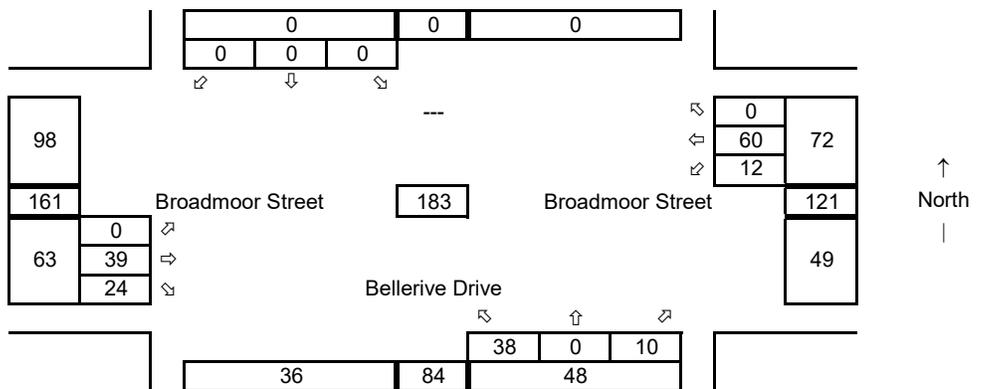
Year: 2029

Growth Rate = 1.0%

Years of Growth = 10

Total Growth = 1.1046

Growth was only applied to  
northbound and southbound  
through trips



# **AM Peak-Hour Level of Service Calculations**

HCM 6th TWSC  
1: Leslie Road & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	24	408	49	17	229
Future Vol, veh/h	20	24	408	49	17	229
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	27	458	55	19	257

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	781	486	0	0	513
Stage 1	486	-	-	-	-
Stage 2	295	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	363	581	-	-	1052
Stage 1	618	-	-	-	-
Stage 2	755	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	355	581	-	-	1052
Mov Cap-2 Maneuver	462	-	-	-	-
Stage 1	605	-	-	-	-
Stage 2	755	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	520	1052
HCM Lane V/C Ratio	-	-	0.095	0.018
HCM Control Delay (s)	-	-	12.6	8.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

HCM 6th TWSC  
2: Leslie Road & Willowbrook Place

Willowbrook Place

Intersection

Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	56	427	2	17	279
Future Vol, veh/h	6	56	427	2	17	279
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	6	59	449	2	18	294

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	780	450	0	0	451
Stage 1	450	-	-	-	-
Stage 2	330	-	-	-	-
Critical Hdwy	6.44	6.24	-	-	4.14
Critical Hdwy Stg 1	5.44	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-
Follow-up Hdwy	3.536	3.336	-	-	2.236
Pot Cap-1 Maneuver	361	605	-	-	1099
Stage 1	638	-	-	-	-
Stage 2	724	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	355	605	-	-	1099
Mov Cap-2 Maneuver	464	-	-	-	-
Stage 1	628	-	-	-	-
Stage 2	724	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	588	1099
HCM Lane V/C Ratio	-	-	0.111	0.016
HCM Control Delay (s)	-	-	11.9	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1

HCM 6th TWSC  
3: Leslie Road & Center Boulevard

Willowbrook Place

Intersection

Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	16	402	9	10	280
Future Vol, veh/h	8	16	402	9	10	280
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	9	17	437	10	11	304

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	768	442	0	0	447
Stage 1	442	-	-	-	-
Stage 2	326	-	-	-	-
Critical Hdwy	6.44	6.24	-	-	4.14
Critical Hdwy Stg 1	5.44	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-
Follow-up Hdwy	3.536	3.336	-	-	2.236
Pot Cap-1 Maneuver	367	611	-	-	1103
Stage 1	644	-	-	-	-
Stage 2	727	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	363	611	-	-	1103
Mov Cap-2 Maneuver	473	-	-	-	-
Stage 1	638	-	-	-	-
Stage 2	727	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.8	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	557	1103
HCM Lane V/C Ratio	-	-	0.047	0.01
HCM Control Delay (s)	-	-	11.8	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 6th TWSC

4: Broadmoor Street & Greenbrook Boulevard

Willowbrook Place

Intersection

Int Delay, s/veh 0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Vol, veh/h	3	65	44	3	5	1
Future Vol, veh/h	3	65	44	3	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	5	98	67	5	8	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	72	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1515	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1515	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1515	-	-	-	831
HCM Lane V/C Ratio	0.003	-	-	-	0.011
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

HCM 6th TWSC  
6: Bellerive Drive & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh 3.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	17	56	6	7	36	9
Future Vol, veh/h	17	56	6	7	36	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	58	58	58	58	58	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	97	10	12	62	16

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	126
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1460
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1460
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.5	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	900	-	-	1460	-
HCM Lane V/C Ratio	0.086	-	-	0.007	-
HCM Control Delay (s)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

HCM 6th TWSC  
1: Leslie Road & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	34	479	52	20	263
Future Vol, veh/h	21	34	479	52	20	263
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	38	538	58	22	296

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	907	567	0	0	596
Stage 1	567	-	-	-	-
Stage 2	340	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	306	523	-	-	980
Stage 1	568	-	-	-	-
Stage 2	721	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	298	523	-	-	980
Mov Cap-2 Maneuver	414	-	-	-	-
Stage 1	553	-	-	-	-
Stage 2	721	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	475	980
HCM Lane V/C Ratio	-	-	0.13	0.023
HCM Control Delay (s)	-	-	13.7	8.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1

HCM 6th TWSC  
2: Leslie Road & Willowbrook Place

Willowbrook Place

Intersection

Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	77	486	3	24	315
Future Vol, veh/h	9	77	486	3	24	315
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	9	81	512	3	25	332

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	896	514	0	0	515
Stage 1	514	-	-	-	-
Stage 2	382	-	-	-	-
Critical Hdwy	6.44	6.24	-	-	4.14
Critical Hdwy Stg 1	5.44	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-
Follow-up Hdwy	3.536	3.336	-	-	2.236
Pot Cap-1 Maneuver	308	557	-	-	1040
Stage 1	596	-	-	-	-
Stage 2	686	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	301	557	-	-	1040
Mov Cap-2 Maneuver	419	-	-	-	-
Stage 1	582	-	-	-	-
Stage 2	686	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	538	1040
HCM Lane V/C Ratio	-	-	0.168	0.024
HCM Control Delay (s)	-	-	13	8.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1

HCM 6th TWSC  
3: Leslie Road & Center Boulevard

Willowbrook Place

Intersection

Int Delay, s/veh	0.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	27	451	11	14	315
Future Vol, veh/h	14	27	451	11	14	315
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	15	29	490	12	15	342

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	868	496	0	0	502
Stage 1	496	-	-	-	-
Stage 2	372	-	-	-	-
Critical Hdwy	6.44	6.24	-	-	4.14
Critical Hdwy Stg 1	5.44	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-
Follow-up Hdwy	3.536	3.336	-	-	2.236
Pot Cap-1 Maneuver	320	570	-	-	1052
Stage 1	608	-	-	-	-
Stage 2	693	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	316	570	-	-	1052
Mov Cap-2 Maneuver	434	-	-	-	-
Stage 1	599	-	-	-	-
Stage 2	693	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	515	1052
HCM Lane V/C Ratio	-	-	0.087	0.014
HCM Control Delay (s)	-	-	12.7	8.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0

HCM 6th TWSC

4: Broadmoor Street & Greenbrook Boulevard

Willowbrook Place

Intersection

Int Delay, s/veh 0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		4	1		4	
Traffic Vol, veh/h	3	78	60	3	5	1
Future Vol, veh/h	3	78	60	3	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	5	118	91	5	8	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	96	0	0
Stage 1	-	-	94
Stage 2	-	-	128
Critical Hdwy	4.14	-	6.44
Critical Hdwy Stg 1	-	-	5.44
Critical Hdwy Stg 2	-	-	5.44
Follow-up Hdwy	2.236	-	3.536
Pot Cap-1 Maneuver	1485	-	762
Stage 1	-	-	925
Stage 2	-	-	893
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1485	-	759
Mov Cap-2 Maneuver	-	-	759
Stage 1	-	-	921
Stage 2	-	-	893

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1485	-	-	-	786
HCM Lane V/C Ratio	0.003	-	-	-	0.012
HCM Control Delay (s)	7.4	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

HCM 6th TWSC  
5: Site Access & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh 1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	80	3	3	53	10	11
Future Vol, veh/h	80	3	3	53	10	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	121	5	5	80	15	17

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	126
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.14
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.236
Pot Cap-1 Maneuver	-	-	1448
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1448
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	841	-	-	1448	-
HCM Lane V/C Ratio	0.038	-	-	0.003	-
HCM Control Delay (s)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 6th TWSC  
6: Bellerive Drive & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh 3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	30	65	6	11	41	9
Future Vol, veh/h	30	65	6	11	41	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	58	58	58	58	58	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	112	10	19	71	16

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	164	0	147
Stage 1	-	-	-	-	108
Stage 2	-	-	-	-	39
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1414	-	845
Stage 1	-	-	-	-	916
Stage 2	-	-	-	-	983
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1414	-	839
Mov Cap-2 Maneuver	-	-	-	-	839
Stage 1	-	-	-	-	910
Stage 2	-	-	-	-	983

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	856	-	-	1414	-
HCM Lane V/C Ratio	0.101	-	-	0.007	-
HCM Control Delay (s)	9.7	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

# **PM Peak-Hour Level of Service Calculations**

HCM 6th TWSC  
1: Leslie Road & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	24	34	432	22	17	556
Future Vol, veh/h	24	34	432	22	17	556
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	27	38	485	25	19	625

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1161	498	0	0	510
Stage 1	498	-	-	-	-
Stage 2	663	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	217	574	-	-	1060
Stage 1	613	-	-	-	-
Stage 2	514	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	211	574	-	-	1060
Mov Cap-2 Maneuver	342	-	-	-	-
Stage 1	596	-	-	-	-
Stage 2	514	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.4	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	448	1060
HCM Lane V/C Ratio	-	-	0.145	0.018
HCM Control Delay (s)	-	-	14.4	8.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1

HCM 6th TWSC  
2: Leslie Road & Willowbrook Place

Willowbrook Place

Intersection

Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	36	403	8	80	663
Future Vol, veh/h	7	36	403	8	80	663
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	8	39	438	9	87	721

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1338	443	0	0	447
Stage 1	443	-	-	-	-
Stage 2	895	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	170	617	-	-	1119
Stage 1	649	-	-	-	-
Stage 2	401	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	157	617	-	-	1119
Mov Cap-2 Maneuver	249	-	-	-	-
Stage 1	598	-	-	-	-
Stage 2	401	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	497	1119
HCM Lane V/C Ratio	-	-	0.094	0.078
HCM Control Delay (s)	-	-	13	8.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.3

HCM 6th TWSC  
 3: Leslie Road & Center Boulevard

Willowbrook Place

Intersection

Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	9	405	18	17	636
Future Vol, veh/h	19	9	405	18	17	636
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	20	10	431	19	18	677

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1154	441	0	0	450
Stage 1	441	-	-	-	-
Stage 2	713	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	219	618	-	-	1116
Stage 1	651	-	-	-	-
Stage 2	488	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	215	618	-	-	1116
Mov Cap-2 Maneuver	342	-	-	-	-
Stage 1	641	-	-	-	-
Stage 2	488	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.7	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	399	1116
HCM Lane V/C Ratio	-	-	0.075	0.016
HCM Control Delay (s)	-	-	14.7	8.3
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

HCM 6th TWSC

4: Broadmoor Street & Greenbrook Boulevard

Willowbrook Place

Intersection

Int Delay, s/veh 1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Vol, veh/h	4	40	53	16	14	2
Future Vol, veh/h	4	40	53	16	14	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	47	62	19	16	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	81	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1517	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1517	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1517	-	-	-	876
HCM Lane V/C Ratio	0.003	-	-	-	0.021
HCM Control Delay (s)	7.4	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th TWSC  
6: Bellerive Drive & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh 3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	30	20	12	44	31	10
Future Vol, veh/h	30	20	12	44	31	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	33	22	13	48	34	11

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	55	0	118
Stage 1	-	-	-	-	44
Stage 2	-	-	-	-	74
Critical Hdwy	-	-	4.11	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	-	-	2.209	-	3.509
Pot Cap-1 Maneuver	-	-	1556	-	880
Stage 1	-	-	-	-	981
Stage 2	-	-	-	-	951
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1556	-	872
Mov Cap-2 Maneuver	-	-	-	-	872
Stage 1	-	-	-	-	972
Stage 2	-	-	-	-	951

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	906	-	-	1556	-
HCM Lane V/C Ratio	0.049	-	-	0.008	-
HCM Control Delay (s)	9.2	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

HCM 6th TWSC  
1: Leslie Road & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	495	24	27	645
Future Vol, veh/h	28	40	495	24	27	645
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	31	45	556	27	30	725

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1355	570	0	0	583
Stage 1	570	-	-	-	-
Stage 2	785	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	166	523	-	-	996
Stage 1	568	-	-	-	-
Stage 2	451	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	158	523	-	-	996
Mov Cap-2 Maneuver	286	-	-	-	-
Stage 1	540	-	-	-	-
Stage 2	451	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.5	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	390	996
HCM Lane V/C Ratio	-	-	0.196	0.03
HCM Control Delay (s)	-	-	16.5	8.7
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1

HCM 6th TWSC  
2: Leslie Road & Willowbrook Place

Willowbrook Place

Intersection

Int Delay, s/veh	1.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	50	456	11	104	751
Future Vol, veh/h	9	50	456	11	104	751
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	10	54	496	12	113	816

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1544	502	0	0	508
Stage 1	502	-	-	-	-
Stage 2	1042	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	127	571	-	-	1062
Stage 1	610	-	-	-	-
Stage 2	341	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	114	571	-	-	1062
Mov Cap-2 Maneuver	186	-	-	-	-
Stage 1	545	-	-	-	-
Stage 2	341	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.7	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	434	1062
HCM Lane V/C Ratio	-	-	0.148	0.106
HCM Control Delay (s)	-	-	14.7	8.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.5	0.4

HCM 6th TWSC  
3: Leslie Road & Center Boulevard

Willowbrook Place

Intersection

Int Delay, s/veh	0.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	15	455	33	28	712
Future Vol, veh/h	28	15	455	33	28	712
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	30	16	484	35	30	757

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1319	502	0	0	519
Stage 1	502	-	-	-	-
Stage 2	817	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	174	571	-	-	1052
Stage 1	610	-	-	-	-
Stage 2	436	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	169	571	-	-	1052
Mov Cap-2 Maneuver	293	-	-	-	-
Stage 1	592	-	-	-	-
Stage 2	436	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.7	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	353	1052
HCM Lane V/C Ratio	-	-	0.13	0.028
HCM Control Delay (s)	-	-	16.7	8.5
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1

# HCM 6th TWSC

## 4: Broadmoor Street & Greenbrook Boulevard

Willowbrook Place

### Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations		4	4		4	
Traffic Vol, veh/h	4	56	69	16	14	2
Future Vol, veh/h	4	56	69	16	14	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	66	81	19	16	2

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	100	0	0	167	91
Stage 1	-	-	-	91	-
Stage 2	-	-	-	76	-
Critical Hdwy	4.12	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	1493	-	-	823	967
Stage 1	-	-	-	933	-
Stage 2	-	-	-	947	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1493	-	-	821	967
Mov Cap-2 Maneuver	-	-	-	821	-
Stage 1	-	-	-	930	-
Stage 2	-	-	-	947	-

Approach	EB	WB	SB
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HCM Control Delay, s	0.5	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
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Capacity (veh/h)	1493	-	-	-	837
HCM Lane V/C Ratio	0.003	-	-	-	0.022
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th TWSC  
 5: Site Access & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh 1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	62	10	11	80	6	6
Future Vol, veh/h	62	10	11	80	6	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	12	13	94	7	7

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	85
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1512
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1512
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	871	-	-	1512	-
HCM Lane V/C Ratio	0.016	-	-	0.009	-
HCM Control Delay (s)	9.2	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

HCM 6th TWSC  
6: Bellerive Drive & Broadmoor Street

Willowbrook Place

Intersection

Int Delay, s/veh 4.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	39	24	12	0	38	10
Future Vol, veh/h	39	24	12	0	38	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	42	26	13	0	41	11

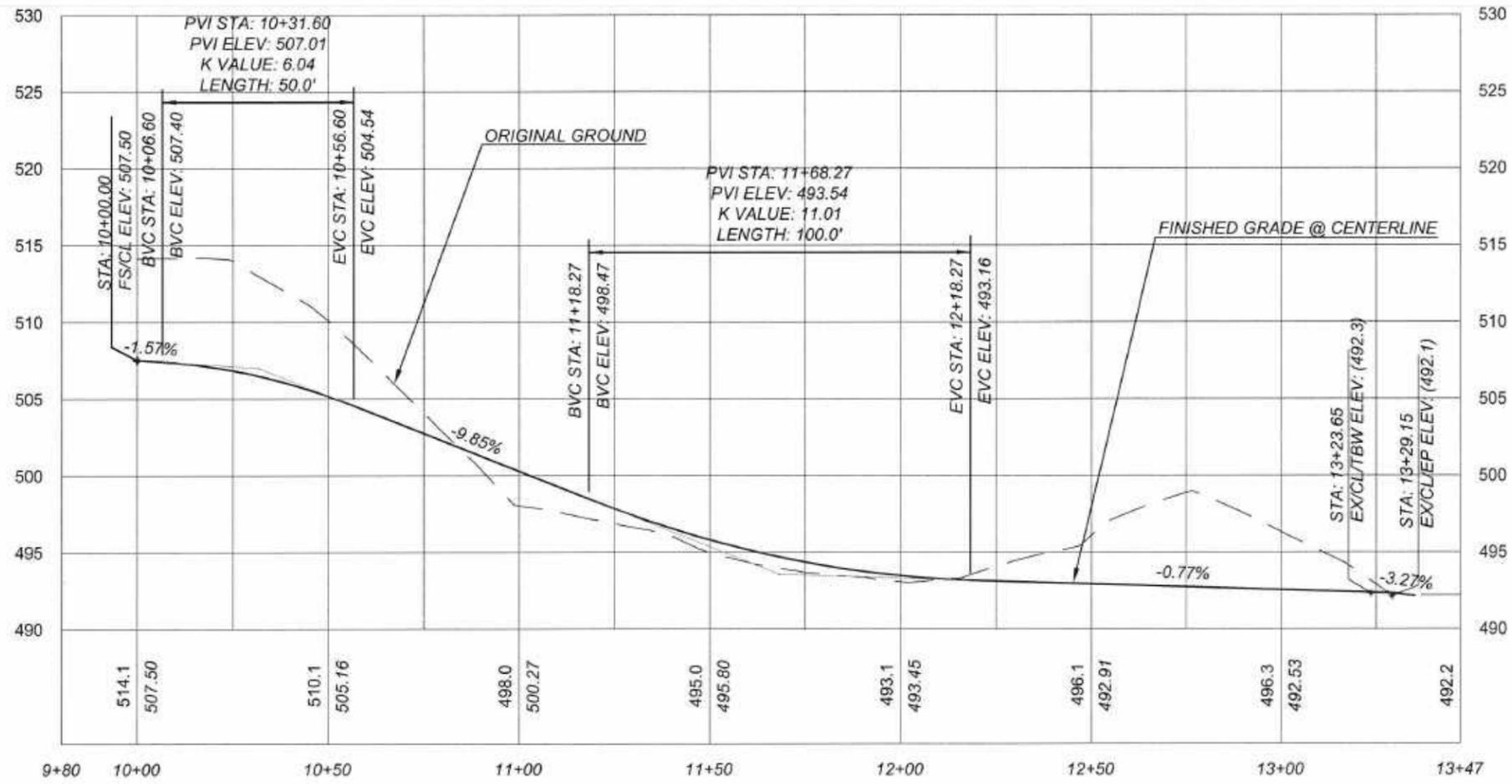
Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	68
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.11
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.209
Pot Cap-1 Maneuver	-	-	1540
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1540
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	936	-	-	1540	-
HCM Lane V/C Ratio	0.056	-	-	0.008	-
HCM Control Delay (s)	9.1	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-



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**PROFILE SCALES**  
 HORIZONTAL SCALE 1" = 40'  
 VERTICAL SCALE 1" = 10'



**PRELIMINARY**  
 NOT FOR CONSTRUCTION

WILLOWBROOK

SECONDARY ACCESS PROFILE  
 RICHLAND, WASHINGTON

DESIGNED BY:	DCD
DRAFTED BY:	SMA
DATE:	02/2020
JOB NO:	LCE 18-023
SCALE:	1" = 40'

0 20 40 80

