# Appendix A
## Field Explorations

# Appendix A: Field Explorations

## A1 GENERAL

PBS explored subsurface conditions at the project site by excavating 30 test pits up to approximately 10 feet bgs between April 30 and May 2, 2019. The approximate locations of the explorations are shown on Figure 2, Site Plan. The procedures used to advance the test pits, collect samples, and other field techniques are described in detail in the following paragraphs. Unless otherwise noted, all soil sampling and classification procedures followed engineering practices in general accordance with relevant ASTM procedures. "General accordance" means that certain local drilling/excavation and descriptive practices and methodologies have been followed.

## A2 TEST PITS

### A2.1 Excavation

Test pits were excavated using a CAT 304C equipped with a 24-inch-wide bucket by Braden and Nelson Construction of Walla Walla, Washington. The test pits were observed by a member of the PBS geotechnical staff, who maintained a detailed log of the subsurface conditions and materials encountered during the course of the work.

### A2.2 Sampling

Representative disturbed samples were taken at selected depths in the test pits. The disturbed soil samples were examined by a member of the PBS geotechnical staff and sealed in plastic bags for further examination.

### A2.3 Test Pit Logs

The test pit logs show the various types of materials that were encountered in the excavations and the depths where the materials and/or characteristics of these materials changed, although the changes may be gradual. Where material types and descriptions changed between samples, the contacts were interpreted. The types of samples taken during excavation, along with their sample identification number, are shown to the right of the classification of materials. The natural water (moisture) contents are shown farther to the right. Measured seepage levels, if observed, are noted in the column to the right.

## A3 MATERIAL DESCRIPTION

Initially, samples were classified visually in the field. Consistency, color, relative moisture, degree of plasticity, and other distinguishing characteristics of the soil samples were noted. Afterward, the samples were reexamined in the PBS laboratory, various standard classification tests were conducted, and the field classifications were modified where necessary. The terminology used in the soil classifications and other modifiers are defined in Table A-1, Terminology Used to Describe Soil.

## Soil Descriptions

Soils exist in mixtures with varying proportions of components. The predominant soil, i.e., greater than 50 percent based on total dry weight, is the primary soil type and is capitalized in our log descriptions (SAND, GRAVEL, SILT, or CLAY). Smaller percentages of other constituents in the soil mixture are indicated by use of modifier words in general accordance with the ASTM D2488-06 Visual-Manual Procedure. "General Accordance" means that certain local and common descriptive practices may have been followed. In accordance with ASTM D2488-06, group symbols (such as GP or CH) are applied on the portion of soil passing the 3-inch (75mm) sieve based on visual examination. The following describes the use of soil names and modifying terms used to describe fine- and coarse-grained soils.

**Fine-Grained Soils (50% or greater fines passing 0.075 mm, No. 200 sieve)**
The primary soil type, i.e., SILT or CLAY is designated through visual-manual procedures to evaluate soil toughness, dilatency, dry strength, and plasticity. The following outlines the terminology used to describe fine-grained soils, and varies from ASTM D2488 terminology in the use of some common terms.

| Primary soil NAME, Symbols, and Adjectives | | | Plasticity Description | Plasticity Index (PI) |
|---|---|---|---|---|
| **SILT (ML & MH)** | **CLAY (CL & CH)** | **ORGANIC SOIL (OL & OH)** | | |
| SILT | | Organic SILT | Non-plastic | 0 – 3 |
| SILT | | Organic SILT | Low plasticity | 4 – 10 |
| SILT/Elastic SILT | Lean CLAY | Organic SILT/ Organic CLAY | Medium Plasticity | 10 – 20 |
| Elastic SILT | Lean/Fat CLAY | Organic CLAY | High Plasticity | 20 – 40 |
| Elastic SILT | Fat CLAY | Organic CLAY | Very Plastic | >40 |

Modifying terms describing secondary constituents, estimated to 5 percent increments, are applied as follows:

| Description | % Composition | |
|---|---|---|
| **With Sand** | % Sand ≥ % Gravel | 15% to 25% plus No. 200 |
| **With Gravel** | % Sand < % Gravel | |
| **Sandy** | % Sand ≥ % Gravel | ≤30% to 50% plus No. 200 |
| **Gravelly** | % Sand < % Gravel | |

**Borderline Symbols**, for example CH/MH, are used when soils are not distinctly in one category or when variable soil units contain more than one soil type. **Dual Symbols,** for example CL-ML, are used when two symbols are required in accordance with ASTM D2488.

**Soil Consistency** terms are applied to fine-grained, plastic soils (i.e., PI ≥ 7). Descriptive terms are based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586-84, as follows. SILT soils with low to non-plastic behavior (i.e., PI < 7) may be classified using relative density.

| Consistency Term | SPT N-value | Unconfined Compressive Strength tsf | kPa |
|---|---|---|---|
| **Very soft** | Less than 2 | Less than 0.25 | Less than 24 |
| **Soft** | 2 – 4 | 0.25 – 0.5 | 24 – 48 |
| **Medium stiff** | 5 – 8 | 0.5 – 1.0 | 48 – 96 |
| **Stiff** | 9 – 15 | 1.0 – 2.0 | 96 – 192 |
| **Very stiff** | 16 – 30 | 2.0 – 4.0 | 192 – 383 |
| **Hard** | Over 30 | Over 4.0 | Over 383 |

## Soil Descriptions

**Coarse - Grained Soils (less than 50% fines)**

Coarse-grained soil descriptions, i.e., SAND or GRAVEL, are based on the portion of materials passing a 3-inch (75mm) sieve. Coarse-grained soil group symbols are applied in accordance with ASTM D2488-06 based on the degree of grading, or distribution of grain sizes of the soil. For example, well-graded sand containing a wide range of grain sizes is designated SW; poorly graded gravel, GP, contains high percentages of only certain grain sizes. Terms applied to grain sizes follow.

| Material NAME | Particle Diameter | |
|---|---|---|
| | Inches | Millimeters |
| **SAND (SW or SP)** | 0.003 – 0.19 | 0.075 – 4.8 |
| **GRAVEL (GW or GP)** | 0.19 – 3 | 4.8 – 75 |
| **Additional Constituents:** | | |
| **Cobble** | 3 – 12 | 75 – 300 |
| **Boulder** | 12 – 120 | 300 – 3050 |

The primary soil type is capitalized, and the fines content in the soil are described as indicated by the following examples. Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 percent. Other soil mixtures will have similar descriptive names.

**Example: Coarse-Grained Soil Descriptions with Fines**

| >5% to < 15% fines (Dual Symbols) | ≥15% to < 50% fines |
|---|---|
| Well graded GRAVEL with silt: GW-GM | Silty GRAVEL: GM |
| Poorly graded SAND with clay: SP-SC | Silty SAND: SM |

Additional descriptive terminology applied to coarse-grained soils follow.

**Example: Coarse-Grained Soil Descriptions with Other Coarse-Grained Constituents**

| Coarse-Grained Soil Containing Secondary Constituents | |
|---|---|
| **With sand or with gravel** | ≥ 15% sand or gravel |
| **With cobbles; with boulders** | Any amount of cobbles or boulders. |

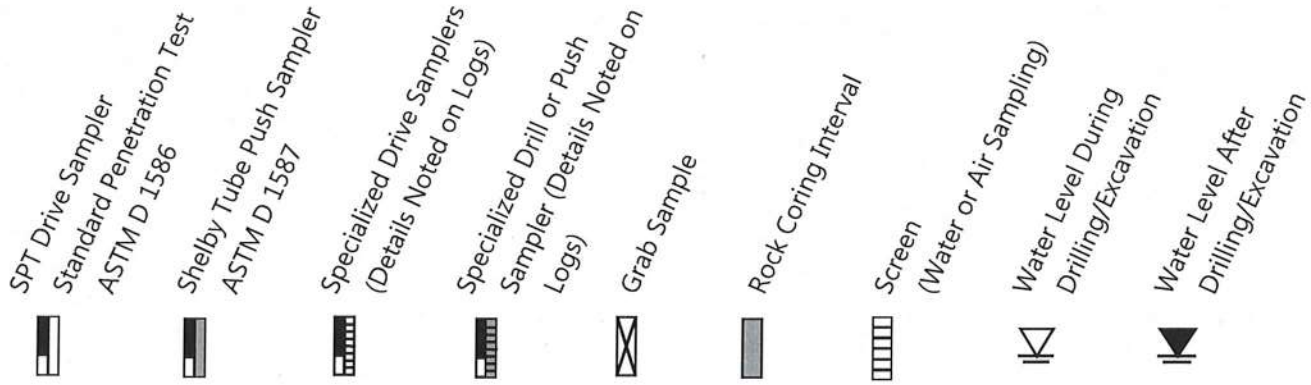
Cobble and boulder deposits may include a description of the matrix soils, as defined above.

**Relative Density** terms are applied to granular, non-plastic soils based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586-84.

| Relative Density Term | SPT N-value |
|---|---|
| **Very loose** | 0 – 4 |
| **Loose** | 5 – 10 |
| **Medium dense** | 11 – 30 |
| **Dense** | 31 – 50 |
| **Very dense** | > 50 |

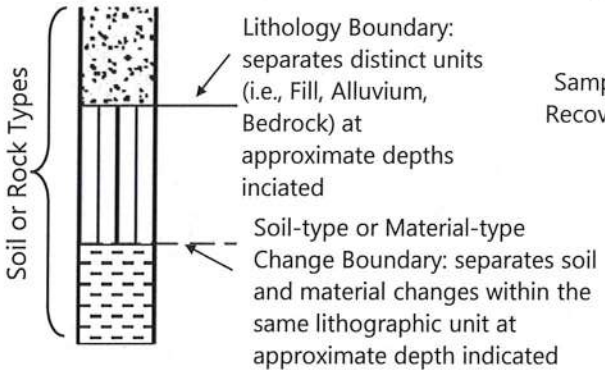
# Table A-2
# Key To Test Pit and Boring Log Symbols

## SAMPLING DESCRIPTIONS

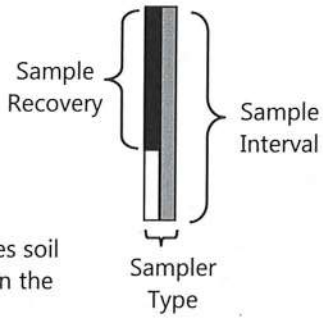



## LOG GRAPHICS

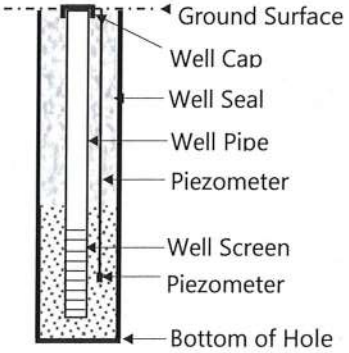
### Soil and Rock




### Sampling Symbols




### Instrumentation Detail




## Geotechnical Testing Acronym Explanations

| | | | |
|---|---|---|---|
| PP | Pocket Penetrometer | HYD | Hydrometer Gradation |
| TOR | Torvane | SIEV | Sieve Gradation |
| DCP | Dynamic Cone Penetrometer | DS | Direct Shear |
| ATT | Atterberg Limits | DD | Dry Density |
| PL | Plasticity Limit | CBR | California Bearing Ratio |
| LL | Liquid Limit | RES | Resilient Modulus |
| PI | Plasticity Index | VS | Vane Shear |
| P200 | Percent Passing US Standard No. 200 Sieve | bgs | Below ground surface |
| OC | Organic Content | MSL | Mean Sea Level |
| CON | Consolidation | HCL | Hydrochloric Acid |
| UC | Unconfined Compressive Strength | | |

Details of soil and rock classification systems are available on request.

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-1** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-1 LOCATION:<br>(See Site Plan)<br>Lat: 46.21768 Long: -119.306136 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine to medium sand; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | mild HCl reaction | | | S-2 | | |
| 6.0 | | Brown, poorly graded SAND (SP) with gravel and cobbles; fine to medium sand; fine, subrounded to subangular gravel; dry | 5.5 | | S-3 | | |
| 8.0 | | Brown, poorly graded SAND (SP-SM) with silt, gravel, and cobbles; fine to medium sand; fine to coarse, subrounded to subangular gravel; mild HCl reaction; dry | 8.0 | | | | |
| | | | | | S-4 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 4/30/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A1



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-2** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-2 LOCATION:<br>(See Site Plan)<br>Lat: 46.217659 Long: -119.30423 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, silty SAND (SM) with roots; non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | | S-2 | | |
| | | | | P200 | S-3 | ● | Infiltration testing completed at 5 feet bgs<br>P200 = 48% |
| 6.0 | | with calcite stringers; fine to medium sand | | | | | |
| | | | | | S-4 | | |
| 8.0 | | Final depth 8.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 8.0 | | | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A2



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-3** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-3 LOCATION:<br>(See Site Plan)<br>Lat: 46.217637 Long: -119.302325 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; moderate HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | mild HCL reaction; fine to medium sand | | | S-2 | | |
| 6.0 | | | | | | | |
| | | fine to coarse sand | | | | | |
| 8.0 | | | | | | | |
| | | strong HCL reaction | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A3



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-4** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-4 LOCATION:<br>(See Site Plan)<br>Lat: 46.217616 Long: -119.300419 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| | | | | | S-1 | | |
| 2.0 | | | | | | | |
| | | | | | S-2 | | |
| 4.0 | | with calcite stringers; moderate HCL reaction | | | | | |
| 6.0 | | | | | | | |
| | | fine to coarse sand; trace fine to coarse, subrounded to subangular gravel | | | | | |
| 8.0 | | | | | | | |
| | | strong HCL reaction | | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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EXCAVATION METHOD: CAT 304 C

FIGURE A4



TEST PIT LOG - 1 PER PAGE 66150.000_TP1-30_20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19 RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-5** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-5 LOCATION:<br>(See Site Plan)<br>Lat: 46.217595 Long: -119.298513 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| | | with fine to medium sand | | | | | |
| | | | | | S-2 | | |
| 4.0 | | | | | | | Infiltration testing completed at 4.5 feet bgs |
| | | | | P200 | S-3 | ● | P200 = 86% |
| 6.0 | | | | | | | |
| | | Brown, well-graded SAND (SW-SM) with silt, gravel, cobbles, and boulders; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; moderate HCL reaction; dry | 7.0 | | | | |
| 8.0 | | | | | | | |
| | | | | | S-4 | | |
| | | Final depth 9.5 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 9.5 | | | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A5



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-6** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-6 LOCATION:<br>(See Site Plan)<br>Lat: 46.217573 Long: -119.296608 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ✧ DYNAMIC CONE PENETROMETER<br>STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with roots; non-plastic; fine sand; moderate HCL reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | with calcite stringers; fine to medium sand; without roots | | | S-2 | | |
| 6.0 | | with trace fine to coarse, subrounded gravel; cobbles | | | | | |
| 8.0 | | | | | | | |
| 10.0 | | fine to coarse sand<br>Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | S-3 | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A6



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-7** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-7 LOCATION:<br>(See Site Plan)<br>Lat: 46.217552 Long: -119.294702 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with roots; non-plastic; fine sand; no HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | without roots | | | S-2 | | |
| | | | | P200 | S-3 | ● | Infiltration testing completed at 5 feet bgs<br>P200 = 90% |
| 6.0 | | | | | | | |
| 8.0 | | | | | | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | S-4 | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 5/01/19

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EXCAVATION METHOD: CAT 304 C

FIGURE A7



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-8** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-8 LOCATION:<br>(See Site Plan)<br>Lat: 46.218531 Long: -119.306116 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown silty SAND (SM); non-plastic; fine to medium sand; no HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | P200 | S-2 | ● | P200 = 33% |
| 6.0 | | | | | S-3 | | |
| 8.0 | | Brown, well-graded SAND (SW) with gravel, cobbles, and calcite stringers; fine to coarse sand; fine to coarse, subrounded to subangular gravel; dry | 8.0 | | | | |
| | | | | | S-4 | | |
| 10.0 | | Final depth 9.5 feet bgs due to refusal in cobbles; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 9.5 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 4/30/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A8



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-9** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-9 LOCATION:<br>(See Site Plan)<br>Lat: 46.21851 Long: -119.30421 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with roots; non-plastic; fine sand; moderate HCL reaction; dry | 0.0 | | | | |
| | | | | | S-1 | | |
| 2.0 | | | | | | | |
| | | | | | S-2 | | |
| 4.0 | | with calcite stringers; basalt cobbles; without roots | | | | | |
| 6.0 | | mild HCl reaction | | | | | |
| 8.0 | | strong HCl reaction; strong cementation | | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 4/30/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A9



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-10** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-10 LOCATION:<br>(See Site Plan)<br>Lat: 46.218488 Long: -119.302305 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with roots; non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| | | | | P200 | S-1 | ● | P200 = 73% |
| 2.0 | | | | | | | |
| | | | | | S-2 | | |
| 4.0 | | fine to medium sand; without roots | | | | | |
| 6.0 | | | | | | | |
| | | fine to coarse sand | | | | | |
| 8.0 | | | | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A10



TEST PIT LOG - 1 PER PAGE 66150.000_TP1-30_20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-11** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-11 LOCATION:<br>(See Site Plan)<br>Lat: 46.218467 Long: -119.300399 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; mild HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | | S-2 | | |
| 6.0 | | | | | | | |
| 8.0 | | Brown and gray, well-graded SAND (SW-SM) with silt and calcite stringers; non-plastic; fine to coarse sand; dry<br><br>trace fine, subrounded to subangular gravel | 8.0 | | | | |
| | | | | P200 | S-3 | ● | P200 = 66% |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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EXCAVATION METHOD: CAT 304 C

FIGURE A11



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-12** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-12 LOCATION:<br>(See Site Plan)<br>Lat: 46.218445 Long: -119.298493 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; mild HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | with gray silt nodules; moderate HCl reaction; without roots | | | | | |
| 6.0 | | | | | S-2 | | |
| | | trace gravel and cobbles | | | | | |
| 8.0 | | | | | | | |
| | | fine to coarse sand; mild HCl reaction | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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EXCAVATION METHOD: CAT 304 C

FIGURE A12



TEST PIT LOG - 1 PER PAGE 66150.000_TP1-30_20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-13** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-13 LOCATION:<br>(See Site Plan)<br>Lat: 46.218424 Long: -119.296588 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>▣ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with roots; non-plastic; fine to medium sand; mild HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| | | | | P200 | S-2 | ● | P200 = 66% |
| 4.0 | | strong HCl reaction; without roots | | | | | |
| 6.0 | | | | | | | |
| | | Brown, silty SAND (SM) with gravel and cobbles; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; strong HCl reaction; dry | 7.0 | | | | |
| 8.0 | | | | | S-3 | | |
| | | | | | S-4 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A13



TEST PIT LOG - 1 PER PAGE 66150.000_TP1-30_20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-14** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-14 LOCATION:<br>(See Site Plan)<br>Lat: 46.218403 Long: -119.294682 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | mild HCl reaction | | | S-2 | | |
| | | with calcite stringers | | | | | |
| 6.0 | | | | | | | |
| 8.0 | | | | | | | |
| | | fine to medium sand; trace fine to coarse, subrounded gravel; no HCl reaction | | | S-3 | | |
| | | Final depth 9.5 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 9.5 | | | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A14



TEST PIT LOG - 1 PER PAGE 66150.000_TP1-30_20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-15** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-15 LOCATION:<br>(See Site Plan)<br>Lat: 46.219382 Long: -119.306096 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, silty SAND (SM) with roots; non-plastic; fine to medium sand; no HCI reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | strong HCI reaction | | | S-2 | | |
| 6.0 | | | | | S-3 | | |
| | | Brown, silty SAND (SM) with gravel and cobbles; non-plastic; fine to medium sand; fine to coarse, subrounded to subangular gravel; strong HCI reaction; dry | 7.0 | | | | |
| 8.0 | | Brown, well-graded SAND (SW) with gravel and cobbles; fine to coarse sand; fine to coarse, subangular gravel; dry | 8.0 | | S-4 | | |
| 10.0 | | | | | S-5 | | |
| | | Final depth 10.5 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.5 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A15



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-16** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-16 LOCATION:<br>(See Site Plan)<br>Lat: 46.21936 Long: -119.30419 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ✧ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with calcite stringers; non-plastic; fine sand; dry | 0.0 | | | | |
| | | | | P200 | S-1 | | P200 = 86% |
| 2.0 | | strong HCl reaction | | | | | |
| | | | | | S-2 | | |
| 4.0 | | | | | | | |
| | | deceased silt | | | | | |
| 6.0 | | | | | | | |
| 8.0 | | Light brown, silty SAND (SM) with few cobbles; non-plastic; fine to medium sand; strong HCl reaction; dry | 8.0 | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | S-4 | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 4/30/19

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FIGURE A16



TEST PIT LOG - 1 PER PAGE 66150.000_TP1-30_20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-17** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-17 LOCATION:<br>(See Site Plan)<br>Lat: 46.219339 Long: -119.302285 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | | S-2 | | |
| | | without roots | | | | | |
| 6.0 | | | | | | | |
| | | fine to coarse sand; trace fine to coarse, subrounded to subangular gravel; cobbles | | | | | |
| 8.0 | | | | | | | |
| | | | | | S-3 | | |
| | | Final depth 9.5 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 9.5 | | | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

| | | |
|---|---|---|
| LOGGED BY: C. Grant<br>COMPLETED: 5/02/19 | EXCAVATED BY: Braden and Nelson, Inc.<br>EXCAVATION METHOD: CAT 304 C | FIGURE A17<br>Page 1 of 1 |

TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-18** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-18 LOCATION:<br>(See Site Plan)<br>Lat: 46.219318 Long: -119.300379 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine to medium sand; moderate HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | | S-2 | | |
| 6.0 | | | | | | | |
| 8.0 | | Brown, well-graded SAND (SW-SM) with silt, gravel, and cobbles; non-plastic; fine to coarse sand; fine to coarse, subrounded gravel; moderate HCl reaction; dry | 8.0 | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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FIGURE A18



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-19** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-19 LOCATION:<br>(See Site Plan)<br>Lat: 46.219296 Long: -119.298473 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, ssandy SILT (ML); non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | S-1 | | |
| 2.0 | | | | | | | |
| | | Brown, sandy SILT (ML) with gravel, cobbles; and boulders; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; mild HCl reaction; dry | 3.0 | | S-2 | | |
| 4.0 | | | | | | | |
| 6.0 | | fine to medium sand; with calcite stringers; deceased gravel, cobbles, and boulders | | | | | |
| 8.0 | | | | | | | |
| | | Final depth 9.5 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 9.5 | | S-3 | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 5/01/19

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EXCAVATION METHOD: CAT 304 C

FIGURE A19



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-20** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-20 LOCATION:<br>(See Site Plan)<br>Lat: 46.219275 Long: -119.296568 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>■ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine to medium sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | with calcite stringers | | | S-2 | | |
| 6.0 | | | | | | | |
| 8.0 | | | | | | | |
| | | fine to coarse sand; with trace fine, subrounded to subangular gravel; cobbles | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 5/02/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A20



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-21** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-21 LOCATION:<br>(See Site Plan)<br>Lat: 46.219253 Long: -119.294662 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Weeds |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; moderate HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | | S-2 | | |
| 6.0 | | | | | | | |
| 8.0 | | | | | | | |
| | | fine to medium sand | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A21



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-22** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-22 LOCATION:<br>(See Site Plan)<br>Lat: 46.218936 Long: -119.292777 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Weeds |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; dry | 0.0 | | | | |
| | | | | | S-1 | | Possible fill material stockpile |
| 2.0 | | | | | | | |
| | | fine to coarse sand | | | | | |
| | | | | | S-2 | | |
| 4.0 | | | | | | | |
| 6.0 | | | | | | | |
| 8.0 | | | | | | | |
| | | | | P200 | S-3 | ● | P200 = 73% |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 5/01/19

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EXCAVATION METHOD: CAT 304 C

FIGURE A22



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-23** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-23 LOCATION:<br>(See Site Plan)<br>Lat: 46.220233 Long: -119.306076 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ✧ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, silty SAND (SM) with roots; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | | S-2 | | |
| 6.0 | | without roots | | | | | |
| 8.0 | | Brown, silty SAND (SM) with gravel and cobbles; non-plastic; fine to medium sand; fine, subrounded gravel; dry | 8.0 | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

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COMPLETED: 4/30/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A23



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-24** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-24 LOCATION:<br>(See Site Plan)<br>Lat: 46.220211 Long: -119.30417 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with roots; non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | with calcite stringers; without roots | | | S-2 | | |
| 6.0 | | fine to medium sand | | | | | |
| 8.0 | | Brown, silty SAND (SM) with gravel and cobbles; fine to coarse sand; fine to coarse, subangular gravel; dry | 8.5 | | S-3 | | |
| | | | | | S-4 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 4/30/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A24



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-25** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-25 LOCATION:<br>(See Site Plan)<br>Lat: 46.22019 Long: -119.302265 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown sandy SILT (ML) with roots; non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | with calcite stringers; without roots | | | S-2 | | |
| 6.0 | | | | | | | |
| | | Brown, silty SAND (SM) with gravel; and cobbles; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; moderate HCl reaction; dry | 7.0 | | | | |
| 8.0 | | | | | | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | S-3 | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 5/02/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A25



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-26** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-26 LOCATION:<br>(See Site Plan)<br>Lat: 46.220168 Long: -119.300359 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; moderate HCl reaction; dry | 0.0 | | | | |
| | | | | P200 | S-1 | ● | P200 = 66% |
| 2.0 | | | | | | | |
| | | | | | S-2 | | |
| 4.0 | | | | | | | |
| 6.0 | | | | | | | |
| 8.0 | | Brown, well-graded SAND (SW-SM) with silt and gravel; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; mild HCl reaction; dry | 8.0 | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 5/02/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A26



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-27** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-27 LOCATION:<br>(See Site Plan)<br>Lat: 46.220147 Long: -119.298453 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML) with calcite stringers; non-plastic; fine to medium sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| | | without calcite stringers | | | | | |
| 4.0 | | | | | S-2 | | |
| | | | 5.5 | | | | |
| 6.0 | | Brown, well-graded SAND (SW-SM) with silt, gravel; and cobbles; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; dry | | | | | |
| 8.0 | | | 8.0 | | | | |
| | | Brown, silty SAND (SM) with trace gravel; non-plastic; fine to medium sand; fine to coarse, subangular gravel; strong HCl reaction; dry | | | | | |
| | | | | | S-3 | | |
| 10.0 | | Final depth 10.0 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 10.0 | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 5/01/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A27



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-28** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-28 LOCATION:<br>(See Site Plan)<br>Lat: 46.220126 Long: -119.296548 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT %<br>0 50 100 | COMMENTS<br>Surface Conditions: Orchard Field |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); non-plastic; fine sand; strong HCl reaction; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| | | | | | S-2 | | |
| 4.0 | | Final depth 4.0 feet bgs due to possible water line; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 4.0 | | | | |
| 6.0 | | | | | | | |
| 8.0 | | | | | | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 5/01/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A28



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-29** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-29 LOCATION:<br>(See Site Plan)<br>Lat: 46.220104 Long: -119.294642 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Weeds |
|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, sandy SILT (ML); fine to medium sand; dry | 0.0 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | mild HCl reaction | | P200 | S-2 | ● | P200 = 85% |
| 6.0 | | Brown, silty SAND (SM) with gravel, cobbles, and boulders; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; dry | 6.0 | | | | |
| 8.0 | | | | | S-3 | | |
| | | Final depth 8.5 feet bgs due to refusal in gravel and cobbles/boulders; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 8.5 | | | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 5/01/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 C

FIGURE A29



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 6/7/19:RPG

| PBS | SIENNA HILLS<br>RICHLAND, WASHINGTON | **TEST PIT TP-30** |
|---|---|---|
| | PBS PROJECT NUMBER:<br>66150.000 | APPROX. TEST PIT TP-30 LOCATION:<br>(See Site Plan)<br>Lat: 46.22101 Long: -119.295257 |

| DEPTH FEET | GRAPHIC LOG | MATERIAL DESCRIPTION<br>Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition. | DEPTH | TESTING | SAMPLE TYPE SAMPLE ID | ◇ DYNAMIC CONE PENETROMETER<br>⊠ STATIC PENETROMETER<br>● MOISTURE CONTENT % (0 – 50 – 100) | COMMENTS<br>Surface Conditions: Weeds |
|---|---|---|---|---|---|---|---|
| 0.0 | | FILL | 0.0 | | | | |
| | | Brown, sandy SILT (ML); non-plastic; fine sand; moderate HCl reaction; dry | 0.5 | | | | |
| 2.0 | | | | | S-1 | | |
| 4.0 | | | | | S-2 | | |
| 6.0 | | Brown, well-graded SAND (SW-SM) with silt, gravel, and cobbles; non-plastic; fine to coarse sand; fine to coarse, subrounded to subangular gravel; dry | 6.0 | | | | |
| 8.0 | | | | | S-3 | | |
| | | Final depth 9.5 feet bgs; test pit backfilled with excavated material to existing ground surface. Groundwater not encountered at time of exploration. | 9.5 | | | | |
| 10.0 | | | | | | | |
| 12.0 | | | | | | | |
| 14.0 | | | | | | | |

LOGGED BY: C. Grant
COMPLETED: 5/01/19

EXCAVATED BY: Braden and Nelson, Inc.
EXCAVATION METHOD: CAT 304 Mini Excavator

FIGURE A30



TEST PIT LOG - 1 PER PAGE 66150.000 TP1-30 20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 6/7/19:RPG

# Appendix B
## Laboratory Testing

# Appendix B: Laboratory Testing

## B1 GENERAL

Samples obtained during the field explorations were examined in the PBS laboratory. The physical characteristics of the samples were noted and field classifications were modified where necessary. During the course of examination, representative samples were selected for further testing. The testing program for the soil samples included standard classification tests, which yield certain index properties of the soils important to an evaluation of soil behavior. The testing procedures are described in the following paragraphs. Unless noted otherwise, all test procedures are in general accordance with applicable ASTM standards. "General accordance" means that certain local and common descriptive practices and methodologies have been followed.

## B2 CLASSIFICATION TESTS

### B2.1 Visual Classification

The soils were classified in accordance with the Unified Soil Classification System with certain other terminology, such as the relative density or consistency of the soil deposits, in general accordance with engineering practice. In determining the soil type (that is, gravel, sand, silt, or clay) the term that best described the major portion of the sample is used. Modifying terminology to further describe the samples is defined in Table A-1, Terminology Used to Describe Soil, in Appendix A.

### B2.2 Moisture (Water) Contents

Natural moisture content determinations were made on samples of the fine-grained soils (that is, silts, clays, and silty sands). The natural moisture content is defined as the ratio of the weight of water to dry weight of soil, expressed as a percentage. The results of the moisture content determinations are presented on the exploration logs in Appendix A and on Figure B2, Summary of Laboratory Data, in Appendix B.

### B2.3 Grain-Size Analyses (P200 Wash)

Washed sieve analyses (P200) were completed on samples to determine the portion of soil samples passing the No. 200 Sieve (i.e., silt and clay). The results of the P200 test results are presented on the exploration logs in Appendix A and on Figure B2, Summary of Laboratory Data, in Appendix B.

# SUMMARY OF LABORATORY DATA

SIENNA HILLS
RICHLAND, WASHINGTON

PBS PROJECT NUMBER:
66150.000

| SAMPLE INFORMATION | | | | MOISTURE CONTENT (PERCENT) | DRY DENSITY (PCF) | SIEVE | | | ATTERBERG LIMITS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EXPLORATION NUMBER | SAMPLE NUMBER | SAMPLE DEPTH (FEET) | ELEVATION (FEET) | | | GRAVEL (PERCENT) | SAND (PERCENT) | P200 (PERCENT) | LIQUID LIMIT (PERCENT) | PLASTIC LIMIT (PERCENT) | PLASTICITY INDEX (PERCENT) |
| TP-2 | S-3 | 5 | | 21.7 | | | | 48 | | | |
| TP-5 | S-3 | 4.5 | | 30.6 | | | | 86 | | | |
| TP-7 | S-3 | 5 | | 37.3 | | | | 90 | | | |
| TP-8 | S-2 | 3.5 | | 11.5 | | | | 33 | | | |
| TP-10 | S-1 | 1.5 | | 13.8 | | | | 73 | | | |
| TP-11 | S-3 | 9.5 | | 14.7 | | | | 66 | | | |
| TP-13 | S-2 | 3.5 | | 16.6 | | | | 66 | | | |
| TP-16 | S-1 | 1.5 | | 17.3 | | | | 86 | | | |
| TP-22 | S-3 | 9 | | 10.7 | | | | 73 | | | |
| TP-26 | S-1 | 1.5 | | 12.6 | | | | 66 | | | |
| TP-29 | S-2 | 3.5 | | 12.4 | | | | 85 | | | |



LAB SUMMARY 66150.000_TP1-30_20190513.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 5/30/19:RPG

Organochlorine, Lead, Arsenic Soil Sampling Report

February 4, 2019

Greg Johnson
Siena Hills Development, LLC
PO Box 344
Meridian, Idaho 83642

Via email: greg@westparkco.com

Regarding: Limited Soil Investigation Results
Richland Orchard Parcels
Benton County Tax Lot 134983000001005
South Bermuda Road
Kennewick, Washington 99336
PBS Project No. 66150.000

Dear Mr. Johnson:

PBS Engineering and Environmental Inc. (PBS) is pleased to submit this letter report that provides the findings of limited soil sampling and laboratory analysis completed for the above-referenced property. This work was done as part of site redevelopment plans.

**PROJECT BACKGROUND**

The subject property is a 98-acre tax lot in Benton County, Washington. It is currently active as an orchard, except for the easternmost portion of the subject property, which appears not to be in use. There are no permanent structures on the subject property. Aerial photographs indicate that the majority of the property was used as an orchard from the late 1970s or early 1980s until the present. Based on the aerial photography, the eastern side of the property across Bermuda Road was not used as an orchard until the mid-1980s or early 1990s, and this portion of the property was out of use as an orchard sometime between 2013 and 2017.

The use of regulated agricultural chemicals such as pesticides, herbicides, and fertilizers is considered an acceptable practice. However, spillage, mixing, or handling of these chemicals in bulk quantities or intense usage can result in hazardous soil conditions requiring remedial action in accordance with state or federal agencies. PBS did not encounter information indicating that these conditions existed on the subject property; however, based on the timeframe of active orchard use at the site, and the proposed development of the site for residential use, the former agricultural use posed a high concern for the presence of pesticide residues.

**General Background on Pesticides**

Organochlorines contain carbon, hydrogen, and chlorine. They were developed in the mid-1940s through the 1950s and tend to persist in the environment for decades. Key organochlorines include Dichloro-Diphenyl-Trichloroethane (DDT), chlordanes, toxaphene, aldrin, dieldrin, and endrin, all of which were banned for sale in the United States by the late 1980s.

Historically, orchard pesticides contained heavy metals such as arsenic and lead, as well as DDT. Lead arsenate (LA) was the most extensively used of the arsenical insecticides and its use was effectively terminated in 1948 when DDT became widely available to the public (Benson et al., 1968). All insecticidal uses of lead arsenate in the United

States were officially banned on August 1, 1988 (USEPA, 1988). Organochlorine pesticides have been found to persist in soil at levels that may present health risks, despite subsequent redevelopment of the property.

**SITE INVESTIGATION**

PBS' scope, as presented in the Proposal for Limited Soil Investigation (dated November 28, 2018) was to perform limited soil sampling to provide a screening-level assessment for the presence of residual organochlorine pesticides, lead and arsenic in shallow soil within the active orchard. This scope consisted of collecting samples on an approximate grid, set using a handheld GPS in the field, within the orchard area. PBS planned to collect samples at any visible indication of soil discoloration, but no staining or other indications were observed.

PBS conducted the sampling at the site on December 12 and 13, 2018. At the time of the field work the majority of the site was in use as an orchard. The eastern portion of the site was undeveloped and covered with sparse vegetation. Twenty samples were collected in an approximate grid pattern and sample locations were recorded by a handheld GPS unit. The sample locations are shown on Figure 2.

The soil samples were collected using hand tools from the surface to a depth of 6-inches. Soil throughout the area of sampling consisted of a dry light brown silt. Each sample was individually labeled and placed into laboratory-provided containers by PBS field personnel wearing new disposable nitrile gloves at each location. Hand tools were decontaminated between sampling sites.

The samples were placed on ice in a cooler until transported to the lab under chain of custody documentation. Samples were submitted to a Washington-accredited laboratory and analyzed for Pesticides by EPA Method 8081 and Total Lead and Arsenic by EPA Method 6010C.

**REGULATORY CRITERIA**

The Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC, sets forth the requirements and procedures for establishing cleanup levels that are protective of human health and the environment. To determine the appropriate screening criteria for concentrations of hazardous substances in soil under MTCA, the site use and pathways of potential concern should consider the potential for direct contact; exposure to wildlife and plants; and potential for leaching of contaminants into the groundwater.

Given that the project site is planned for development and the existing surface soils will be removed or capped during redevelopment, the direct contact is the likely pathway of concern.

1. Under the MTCA regulation the direct contact pathway is evaluated using MTCA Method A or B screening levels. The MTCA Method A soil cleanup standards (Table 740-1) are protective of human health and the environment and can be used for unrestricted land use application. Subsequent hazardous substances not included in the Method A list can be found in the CLARC Table for Method B and C screening criteria. Based on proposed site development, the Method A soil criteria is appropriate for this project.

2. Under the MTCA regulation, a terrestrial ecological evaluation (TEE) may be necessary if hazardous substances are released into the soils at a Site (WAC 173-340-7490 through 7494). The purpose of a TEE is to protect land-based plants and animals from exposure to contaminated soil. If necessary, the soil screening levels unrestricted land use for a TEE evaluation would be compared to concentrations presented in MTCA Table 749-2. Because this Site is planned for redevelopment, the site will have very little habitat or little opportunity for plants and animals to be exposed to the contamination and would be exempt from conducting further evaluation.

3. Under the MTCA regulation, when selecting a cleanup level for a chemical contaminate in soil, one criterion is to consider the potential for the contaminant to leach from soil into groundwater. Specifically, the concentrations of a hazardous substance in soil should not cause contamination of groundwater that exceeds cleanup levels established under WAC 173-340-720. This pathway is considered in addition to the direct-contact criterion that is based on ingestion of soil (and dermal absorption for modified Method B and C evaluations).

The results of the soil analyses were compared to the MTCA Method A soil cleanup levels for unrestricted land use (Table 740-1). The MTCA Method A cleanup levels are presented in Washington Administrative Code (WAC) 173-340, which includes common contaminants of concern. The only organochlorine pesticide listed in MTCA Method A is DDT. The soil sample data and relevant MTCA Method A cleanup levels for lead, arsenic, and DDT are presented in Table 1 in the attachments.

**FINDINGS**

No organochloride pesticides were detected above the laboratory reporting limits any of the twenty samples. Arsenic was detected above the lab reporting limit in three samples, but concentrations in these samples are consistent with local background levels. Lead was detected above the laboratory reporting limit in each sample, but concentrations are consistent with local background levels (Table 1).

Of the detected compounds, the concentrations are below the MTCA Method A cleanup levels of 20 mg/kg for arsenic and 250 mg/kg for lead. The analytical results are presented in Table 1. Laboratory analytical results are included as an attachment.

**CONCLUSIONS**

The site observations and laboratory results indicate that no organochloride pesticides were detected in the soil above laboratory detection limits. Arsenic and lead levels in soil are present at concentrations consistent with natural background levels and are below MTCA Method A cleanup levels.

**RECOMMENDATIONS**

PBS has the following recommendations:

- There is no indication of soil impacts at this Site that would prohibit unrestricted land use.
- PBS recommends that if soil staining or other evidence of contamination is uncovered during redevelopment activities, sampling and analysis of this suspect material should be completed prior to further construction activities.
- PBS recommends that Siena Hills Development keep this report as a permanent record of the site investigation that took place at the site

**LIMITATIONS OF SCOPE**

PBS has prepared this report for use by Siena Hills Development and is not intended for use by others without the written consent of PBS. The site as a whole may have other contamination that was not characterized by this study. The findings and conclusions of this work are not scientific certainties, but probabilities based on professional judgment concerning the significance of the data gathered during the course of this investigation.

PBS is not able to represent that the site or adjoining land contains no hazardous waste, oil, or other latent conditions beyond that detected or observed by PBS.

Please feel free to contact me at 509.942.1600 or angela.mcguire@pbsusa.com with any questions or comments.

Sincerely,

Digitally signed by Angela McGuire
Date: 2019.02.04 16:05:07 -08'00'

Angela McGuire, LG
Project Geologist

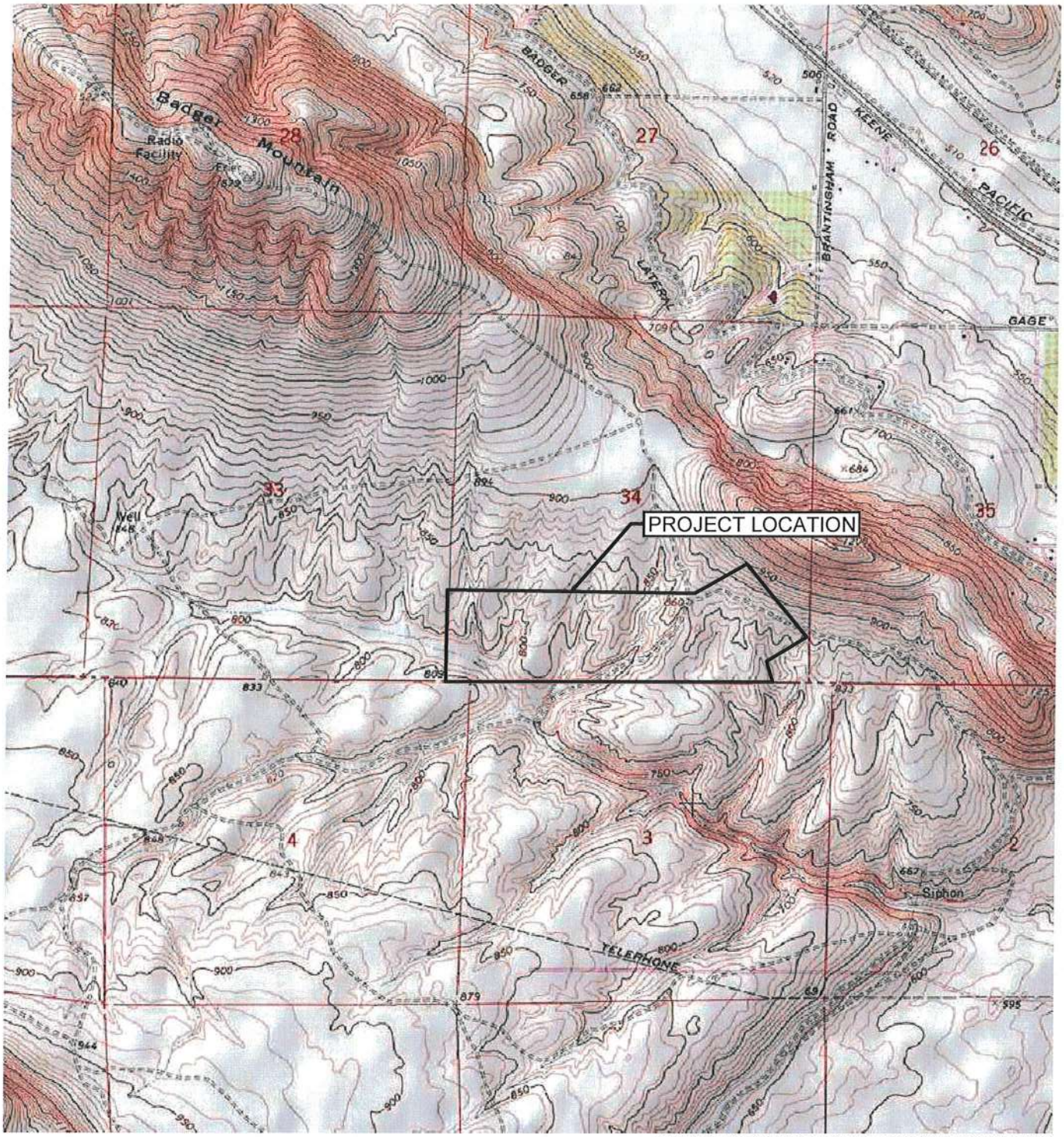
Digitally signed by Thomas Mergy
Date: 2019.02.06 12:08:51 -08'00'

Thomas Mergy, LHG
PBS Senior Hydrogeologist

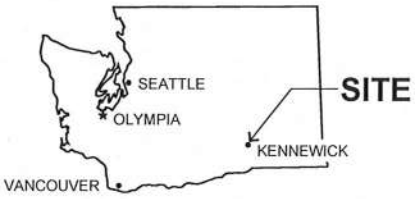
Attachments: Figure 1. Vicinity Map
Figure 2. Site and Soil Sample Location Map

Table 1. Summary of Soil Analytical Results

Historical Aerial Photographs
Pace Laboratory Analytical Report




SOURCE: USGS BADGER MOUNTAIN, WA QUADRANGLE 1970, PHOTO REVISED 1978.




**WASHINGTON**

SCALE 1" = 2000'

0' 1,000' 2,000' 4,000'

PREPARED FOR: SIENA HILLS DEVELOPMENT, LLC

PBS

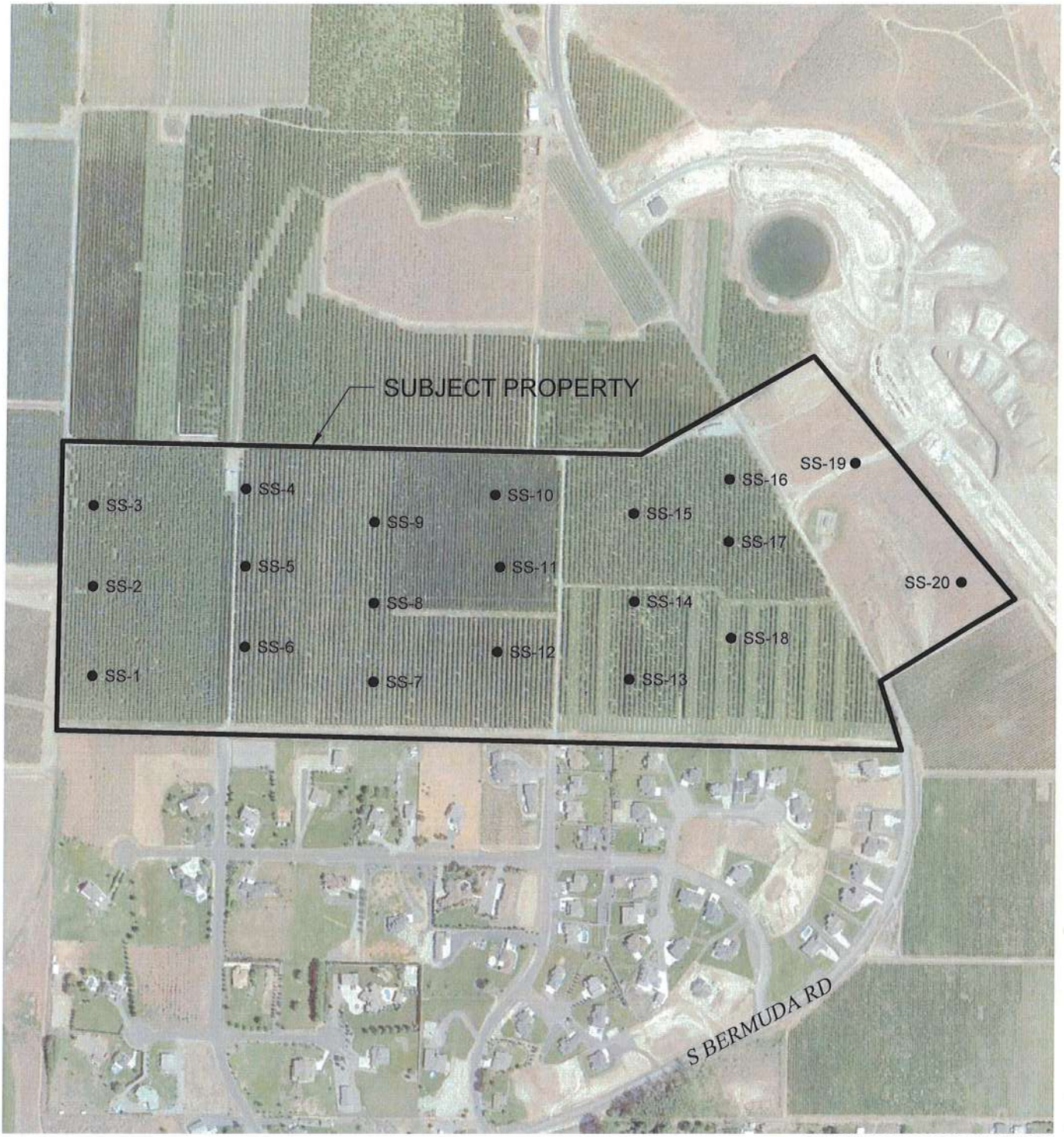
# VICINITY MAP

BENTON COUNTY ORCHARD PARCELS
SOUTH BERMUDA ROAD
KENNEWICK, WASHINGTON

JAN 2019
66150.000

FIGURE
1

Filename: L:\Projects\66000\66150\66150-000\Environmental\DWG\Soil Assessment\66150.000_FIG-1-2.dwg Layout Tab: VICINITY MAP User: Rebecca Snellings CAD Plot Date/Time: 1/30/2019 3:31:30 PM




SOURCE: © 2018 GOOGLE EARTH PRO

**LEGEND**

● SS-1 SOIL SAMPLE NUMBER AND LOCATION

SCALE 1" = 600'

0' 300' 600' 1,200'

PREPARED FOR: SIENA HILLS DEVELOPMENT, LLC

PBS

# SOIL ASSESSMENT SITE PLAN

BENTON COUNTY ORCHARD PARCELS
SOUTH BERMUDA ROAD
KENNEWICK, WASHINGTON

JAN 2019
66150.000

FIGURE
2

Filename: L:\Projects\66000\66150\66150-000\Environmental\DWG\Soil Assessment\66150.000_FIG-1-2.dwg Layout Tab: SITE PLAN User: Rebecca Snellings CAD Plot Date/Time: 1/30/2019 3:33:34 PM

Summary of Soil Analytical Results
Benton County Tax Lot 134983000001005
Kennewick, Washington

| Sample ID | Sample Date | Metals | | Pesticides[A] (mg/kg) |
|---|---|---|---|---|
| | | Arsenic (mg/kg) | Lead (mg/kg) | |
| SS-1-6 | 12/12/2018 | ND | 7.77 | ND |
| SS-2-6 | 12/12/2018 | 2.98 | 8.92 | ND |
| SS-3-6 | 12/12/2018 | ND | 7.85 | ND |
| SS-4-6 | 12/12/2018 | ND | 9.29 | ND |
| SS-5-6 | 12/12/2018 | ND | 9.16 | ND |
| SS-6-6 | 12/12/2018 | 2.75 | 11.2 | ND |
| SS-7-6 | 12/12/2018 | 3.40 | 9.52 | ND |
| SS-8-6 | 12/12/2018 | ND | 9.86 | ND |
| SS-9-6 | 12/12/2018 | ND | 9.04 | ND |
| SS-10-6 | 12/12/2018 | ND | 9.21 | ND |
| SS-11-6 | 12/12/2018 | ND | 9.24 | ND |
| SS-12-6 | 12/12/2018 | 2.85 | 9.13 | ND |
| SS-13-6 | 12/12/2018 | ND | 10.8 | ND |
| SS-14-6 | 12/12/2018 | ND | 9.91 | ND |
| SS-15-6 | 12/12/2018 | ND | 9.72 | ND |
| SS-16-6 | 12/12/2018 | ND | 9.41 | ND |
| SS-17-6 | 12/12/2018 | ND | 9.45 | ND |
| SS-18-6 | 12/12/2018 | ND | 9.49 | ND |
| SS-19-6 | 12/13/2018 | ND | 9.88 | ND |
| SS-20-6 | 12/13/2018 | ND | 8.41 | ND |
| MTCA Method A Soil Cleanup Levels | | 20 | 250 | 3[B] |
| Regional Median Background Metals Concentrations[C] | | 2.95 | 7.82 | NA |

Samples taken in a grid pattern at depths of 0-6 in.
ND = Compound not detected above laboratory reporting limit.
NA = Not applicable.
[A]See laboratory report for full list of pesticides.
[B]Method A Cleanup Level for DDT only.
[C]Washington Department of Ecology, Natural Background Soil Metals Concentrations in Washington State, Eastern Washington, October 1994.

**Richland Orchards**

South Bermuda Road

Kennewick, WA 99338

Inquiry Number: 5489381.1

November 21, 2018

# The EDR Aerial Photo Decade Package

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Shelton, CT 06484
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# EDR Aerial Photo Decade Package

11/21/18

**Site Name:**

Richland Orchards
South Bermuda Road
Kennewick, WA 99338
EDR Inquiry # 5489381.1

**Client Name:**

PBS Engineering & Env.
400 Bradley Boulevard , Suite 300
Richland, WA 99352
Contact: Angela Mcguire

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***Search Results:***

| Year | Scale | Details | Source |
|---|---|---|---|
| 2017 | 1"=625' | Flight Year: 2017 | USDA/NAIP |
| 2013 | 1"=625' | Flight Year: 2013 | USDA/NAIP |
| 2009 | 1"=625' | Flight Year: 2009 | USDA/NAIP |
| 2006 | 1"=625' | Flight Year: 2006 | USDA/NAIP |
| 1996 | 1"=625' | Acquisition Date: July 08, 1996 | USGS/DOQQ |
| 1991 | 1"=625' | Flight Date: July 02, 1991 | USGS |
| 1982 | 1"=625' | Flight Date: August 01, 1982 | USDA |
| 1976 | 1"=625' | Flight Date: July 01, 1976 | USGS |
| 1963 | 1"=625' | Flight Date: September 09, 1963 | USGS |
| 1952 | 1"=625' | Flight Date: October 17, 1952 | USGS |
| 1948 | 1"=625' | Flight Date: June 02, 1948 | USGS |

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INQUIRY #: 5489381.1
YEAR: 2017
= 625'
N
EDR

INQUIRY #: 5489381.1
YEAR: 2013
= 625'
N
EDR

INQUIRY #: 5489381.1
YEAR: 2009
= 625'
N
EDR

INQUIRY #: 5489381.1
YEAR: 2006
= 625'
N
EDR

INQUIRY #: 5489381.1
YEAR: 1996
= 625'
N
EDR
Subject boundary not shown because it exceeds image extent or image is not georeferenced.

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YEAR: 1991
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EDR

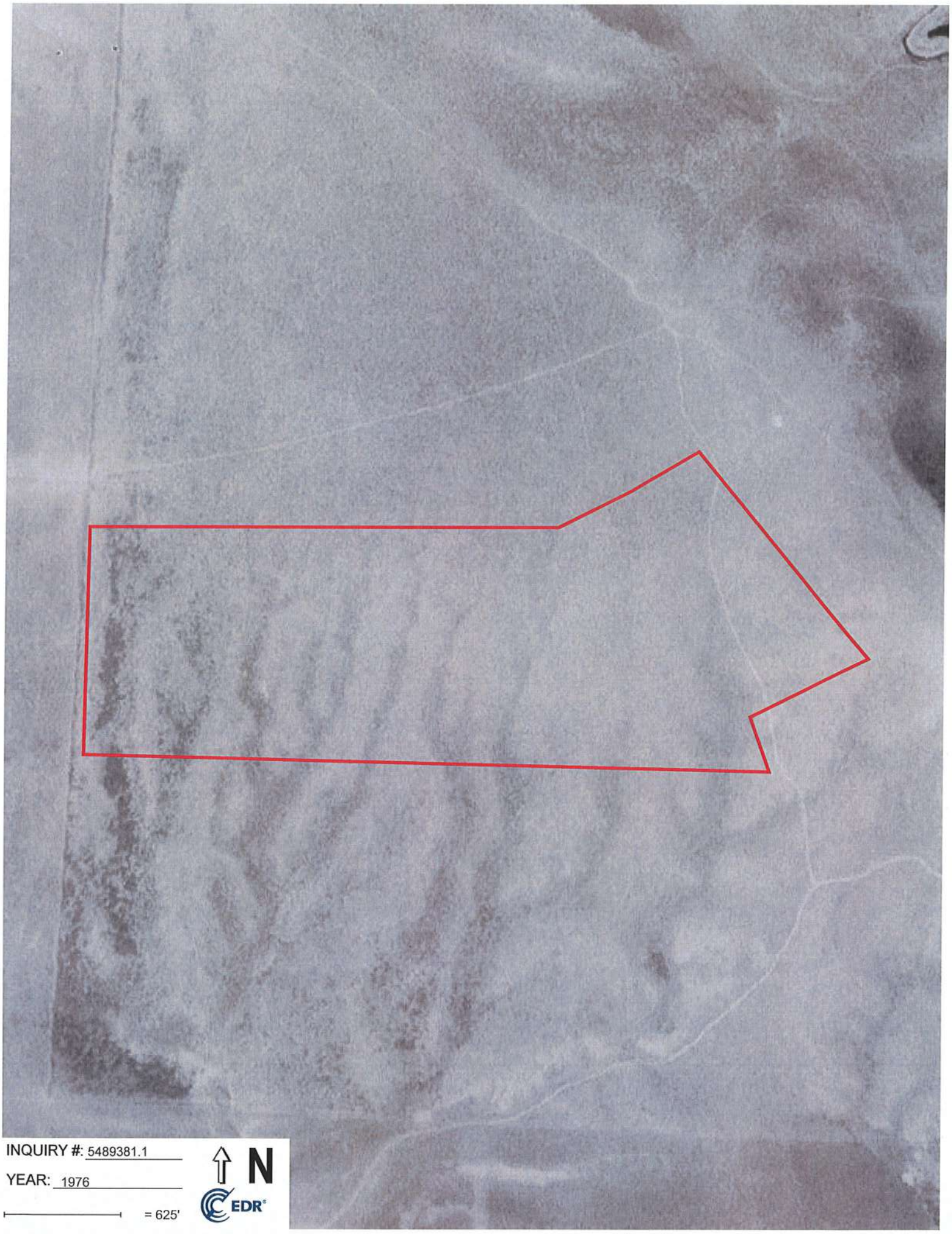
INQUIRY #: 5489381.1

YEAR: 1982

= 625'

N

EDR



INQUIRY #: 5489381.1

YEAR: 1976

= 625'

N

EDR

INQUIRY #: 5489381.1

YEAR: 1963

= 625'

N

EDR

INQUIRY #: 5489381.1

YEAR: 1952

= 625'

N

EDR

INQUIRY #: 5489381.1
YEAR: 1948
= 625'
N
EDR

Pace Analytical®
National Center for Testing & Innovation

# ANALYTICAL REPORT

December 24, 2018

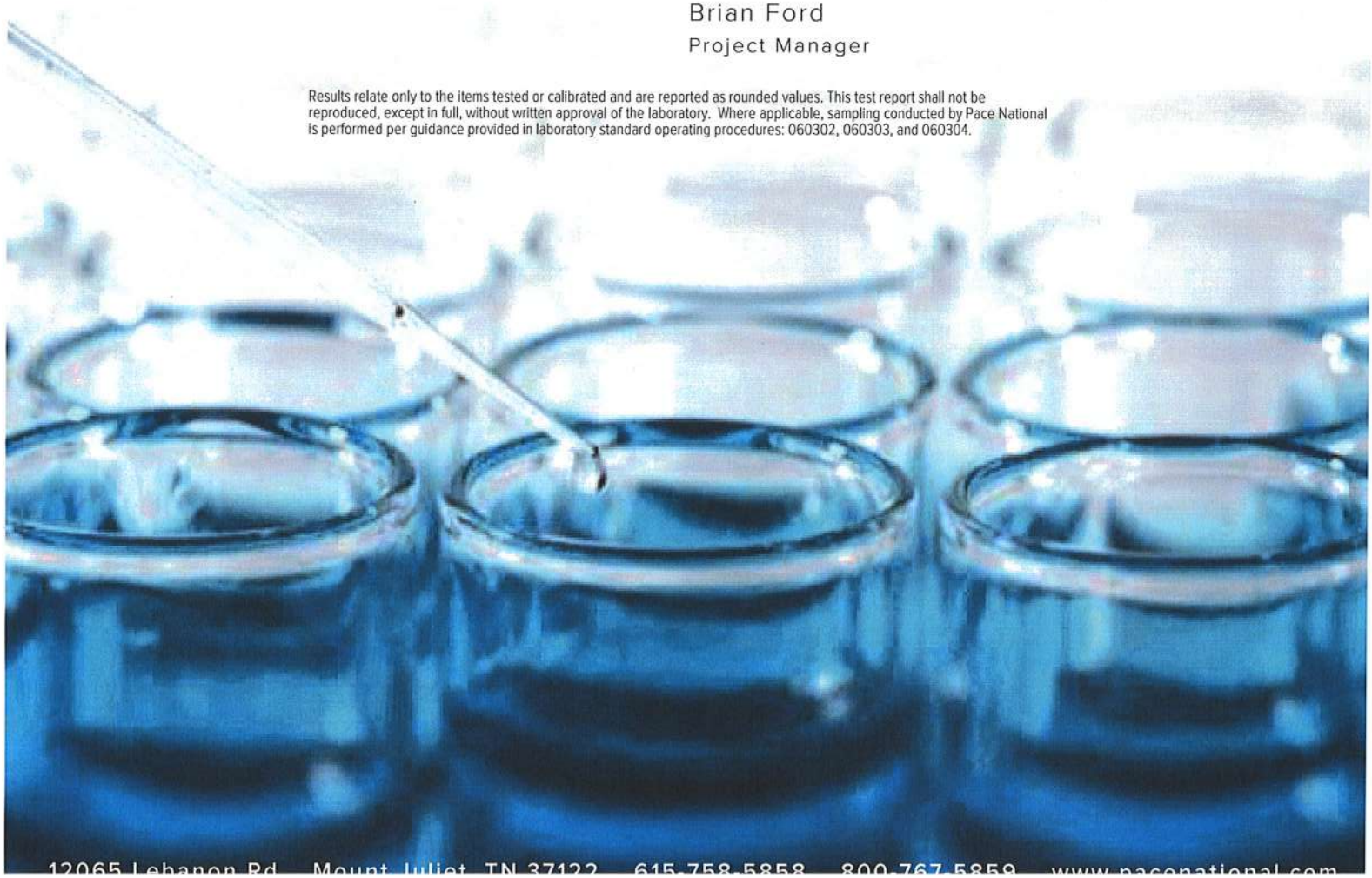
## PBS Engineering & Env.- WA

| | |
|---|---|
| Sample Delivery Group: | L1053387 |
| Samples Received: | 12/14/2018 |
| Project Number: | 66150 |
| Description: | Richland Orchards |
| Report To: | Angela McGuire<br>400 Bradley Blvd<br>Suite 106<br>Richland, WA 99352 |

Entire Report Reviewed By: Brian Ford

Brian Ford
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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9 Sc

## SS-1-6 L1053387-01 Solid

Collected by: Angela McGuire | Collected date/time: 12/12/18 10:11 | Received date/time: 12/14/18 08:30

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211423 | 1 | 12/17/18 13:55 | 12/17/18 14:04 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:09 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 18:38 | VKS |

## SS-2-6 L1053387-02 Solid

Collected by: Angela McGuire | Collected date/time: 12/12/18 10:44 | Received date/time: 12/14/18 08:30

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211423 | 1 | 12/17/18 13:55 | 12/17/18 14:04 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:12 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 18:53 | VKS |

## SS-3-6 L1053387-03 Solid

Collected by: Angela McGuire | Collected date/time: 12/12/18 11:10 | Received date/time: 12/14/18 08:30

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211423 | 1 | 12/17/18 13:55 | 12/17/18 14:04 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:19 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 19:08 | VKS |

## SS-4-6 L1053387-04 Solid

Collected by: Angela McGuire | Collected date/time: 12/12/18 11:25 | Received date/time: 12/14/18 08:30

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211423 | 1 | 12/17/18 13:55 | 12/17/18 14:04 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:22 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 19:23 | VKS |

## SS-5-6 L1053387-05 Solid

Collected by: Angela McGuire | Collected date/time: 12/12/18 11:37 | Received date/time: 12/14/18 08:30

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:24 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 19:37 | VKS |

## SS-6-6 L1053387-06 Solid

Collected by: Angela McGuire | Collected date/time: 12/12/18 11:48 | Received date/time: 12/14/18 08:30

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:27 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 19:52 | VKS |

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

## SS-7-6 L1053387-07 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 12:43 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:29 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 20:07 | VKS |

## SS-8-6 L1053387-08 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 12:51 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:32 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 20:51 | VKS |

## SS-9-6 L1053387-09 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 13:03 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:34 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 21:06 | VKS |

## SS-10-6 L1053387-10 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 13:17 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:37 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 21:21 | VKS |

## SS-11-6 L1053387-11 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 13:27 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 16:57 | ST |
| Pesticides (GC) by Method 8081B | WG1211736 | 1 | 12/17/18 09:05 | 12/17/18 21:35 | VKS |

## SS-12-6 L1053387-12 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 13:38 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:39 | ST |
| Pesticides (GC) by Method 8081B | WG1213431 | 1 | 12/20/18 06:58 | 12/21/18 00:15 | TD |

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

## SS-13-6 L1053387-13 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 14:18 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:42 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 12:44 | RP |

## SS-14-6 L1053387-14 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 14:28 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211424 | 1 | 12/17/18 13:44 | 12/17/18 13:52 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:50 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 12:56 | RP |

## SS-15-6 L1053387-15 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 14:38 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211857 | 1 | 12/17/18 10:21 | 12/17/18 10:31 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:52 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 13:09 | RP |

## SS-16-6 L1053387-16 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 14:50 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211857 | 1 | 12/17/18 10:21 | 12/17/18 10:31 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:55 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 13:21 | RP |

## SS-17-6 L1053387-17 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 15:01 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211857 | 1 | 12/17/18 10:21 | 12/17/18 10:31 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 17:57 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 13:34 | RP |

## SS-18-6 L1053387-18 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/12/18 15:08 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211857 | 1 | 12/17/18 10:21 | 12/17/18 10:31 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 18:00 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 14:11 | RP |

## SS-19-6 L1053387-19 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/13/18 10:23 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211857 | 1 | 12/17/18 10:21 | 12/17/18 10:31 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 18:02 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 14:24 | RP |

## SS-20-6 L1053387-20 Solid

| Collected by | Collected date/time | Received date/time |
|---|---|---|
| Angela McGuire | 12/13/18 10:46 | 12/14/18 08:30 |

| Method | Batch | Dilution | Preparation date/time | Analysis date/time | Analyst |
|---|---|---|---|---|---|
| Total Solids by Method 2540 G-2011 | WG1211907 | 1 | 12/17/18 12:43 | 12/17/18 12:55 | JD |
| Metals (ICP) by Method 6010D | WG1211653 | 1 | 12/16/18 08:01 | 12/17/18 18:05 | ST |
| Pesticides (GC) by Method 8081B | WG1212395 | 1 | 12/18/18 09:39 | 12/19/18 14:36 | RP |

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Brian Ford

Brian Ford
Project Manager

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 73.7 | | 1 | 12/17/2018 14:04 | WG1211423 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.72 | 1 | 12/17/2018 17:09 | WG1211653 |
| Lead | 7.77 | | 0.679 | 1 | 12/17/2018 17:09 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Alpha BHC | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Beta BHC | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Delta BHC | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Gamma BHC | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Chlordane | ND | | 0.272 | 1 | 12/17/2018 18:38 | WG1211736 |
| 4,4-DDD | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| 4,4-DDE | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| 4,4-DDT | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Dieldrin | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Endosulfan I | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Endosulfan II | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Endrin | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Endrin aldehyde | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Endrin ketone | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Heptachlor | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Methoxychlor | ND | | 0.0272 | 1 | 12/17/2018 18:38 | WG1211736 |
| Toxaphene | ND | | 0.543 | 1 | 12/17/2018 18:38 | WG1211736 |
| *(S) Decachlorobiphenyl* | *107* | | *10.0-135* | | *12/17/2018 18:38* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *103* | | *10.0-139* | | *12/17/2018 18:38* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 84.4 | | 1 | 12/17/2018 14:04 | WG1211423 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | 2.98 | | 2.37 | 1 | 12/17/2018 17:12 | WG1211653 |
| Lead | 8.92 | | 0.593 | 1 | 12/17/2018 17:12 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Alpha BHC | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Beta BHC | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Delta BHC | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Gamma BHC | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Chlordane | ND | | 0.237 | 1 | 12/17/2018 18:53 | WG1211736 |
| 4,4-DDD | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| 4,4-DDE | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| 4,4-DDT | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Dieldrin | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Endosulfan I | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Endosulfan II | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Endrin | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Endrin aldehyde | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Endrin ketone | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Heptachlor | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Methoxychlor | ND | | 0.0237 | 1 | 12/17/2018 18:53 | WG1211736 |
| Toxaphene | ND | | 0.474 | 1 | 12/17/2018 18:53 | WG1211736 |
| *(S) Decachlorobiphenyl* | *79.5* | | *10.0-135* | | *12/17/2018 18:53* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *77.4* | | *10.0-139* | | *12/17/2018 18:53* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 82.9 | | 1 | 12/17/2018 14:04 | WG1211423 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.41 | 1 | 12/17/2018 17:19 | WG1211653 |
| Lead | 7.85 | | 0.603 | 1 | 12/17/2018 17:19 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Alpha BHC | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Beta BHC | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Delta BHC | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Gamma BHC | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Chlordane | ND | | 0.241 | 1 | 12/17/2018 19:08 | WG1211736 |
| 4,4-DDD | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| 4,4-DDE | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| 4,4-DDT | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Dieldrin | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Endosulfan I | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Endosulfan II | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Endrin | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Endrin aldehyde | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Endrin ketone | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Heptachlor | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Methoxychlor | ND | | 0.0241 | 1 | 12/17/2018 19:08 | WG1211736 |
| Toxaphene | ND | | 0.483 | 1 | 12/17/2018 19:08 | WG1211736 |
| *(S) Decachlorobiphenyl* | *85.7* | | *10.0-135* | | *12/17/2018 19:08* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *80.7* | | *10.0-139* | | *12/17/2018 19:08* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 82.5 | | 1 | 12/17/2018 14:04 | WG1211423 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.42 | 1 | 12/17/2018 17:22 | WG1211653 |
| Lead | 9.29 | | 0.606 | 1 | 12/17/2018 17:22 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Alpha BHC | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Beta BHC | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Delta BHC | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Gamma BHC | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Chlordane | ND | | 0.242 | 1 | 12/17/2018 19:23 | WG1211736 |
| 4,4-DDD | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| 4,4-DDE | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| 4,4-DDT | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Dieldrin | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Endosulfan I | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Endosulfan II | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Endrin | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Endrin aldehyde | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Endrin ketone | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Heptachlor | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Methoxychlor | ND | | 0.0242 | 1 | 12/17/2018 19:23 | WG1211736 |
| Toxaphene | ND | | 0.485 | 1 | 12/17/2018 19:23 | WG1211736 |
| *(S) Decachlorobiphenyl* | *91.4* | | *10.0-135* | | *12/17/2018 19:23* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *91.9* | | *10.0-139* | | *12/17/2018 19:23* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 77.9 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.57 | 1 | 12/17/2018 17:24 | WG1211653 |
| Lead | 9.16 | | 0.642 | 1 | 12/17/2018 17:24 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Alpha BHC | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Beta BHC | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Delta BHC | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Gamma BHC | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Chlordane | ND | | 0.257 | 1 | 12/17/2018 19:37 | WG1211736 |
| 4,4-DDD | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| 4,4-DDE | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| 4,4-DDT | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Dieldrin | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Endosulfan I | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Endosulfan II | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Endrin | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Endrin aldehyde | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Endrin ketone | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Heptachlor | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Methoxychlor | ND | | 0.0257 | 1 | 12/17/2018 19:37 | WG1211736 |
| Toxaphene | ND | | 0.514 | 1 | 12/17/2018 19:37 | WG1211736 |
| *(S) Decachlorobiphenyl* | *98.5* | | *10.0-135* | | *12/17/2018 19:37* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *92.7* | | *10.0-139* | | *12/17/2018 19:37* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 79.7 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | 2.75 | | 2.51 | 1 | 12/17/2018 17:27 | WG1211653 |
| Lead | 11.2 | | 0.627 | 1 | 12/17/2018 17:27 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Alpha BHC | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Beta BHC | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Delta BHC | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Gamma BHC | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Chlordane | ND | | 0.251 | 1 | 12/17/2018 19:52 | WG1211736 |
| 4,4-DDD | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| 4,4-DDE | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| 4,4-DDT | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Dieldrin | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Endosulfan I | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Endosulfan II | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Endrin | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Endrin aldehyde | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Endrin ketone | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Heptachlor | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Methoxychlor | ND | | 0.0251 | 1 | 12/17/2018 19:52 | WG1211736 |
| Toxaphene | ND | | 0.502 | 1 | 12/17/2018 19:52 | WG1211736 |
| *(S) Decachlorobiphenyl* | *93.9* | | *10.0-135* | | *12/17/2018 19:52* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *89.9* | | *10.0-139* | | *12/17/2018 19:52* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 85.0 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | 3.40 | | 2.35 | 1 | 12/17/2018 17:29 | WG1211653 |
| Lead | 9.52 | | 0.588 | 1 | 12/17/2018 17:29 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Alpha BHC | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Beta BHC | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Delta BHC | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Gamma BHC | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Chlordane | ND | | 0.235 | 1 | 12/17/2018 20:07 | WG1211736 |
| 4,4-DDD | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| 4,4-DDE | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| 4,4-DDT | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Dieldrin | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Endosulfan I | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Endosulfan II | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Endrin | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Endrin aldehyde | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Endrin ketone | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Heptachlor | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Methoxychlor | ND | | 0.0235 | 1 | 12/17/2018 20:07 | WG1211736 |
| Toxaphene | ND | | 0.470 | 1 | 12/17/2018 20:07 | WG1211736 |
| *(S) Decachlorobiphenyl* | *81.7* | | *10.0-135* | | *12/17/2018 20:07* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *78.7* | | *10.0-139* | | *12/17/2018 20:07* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 77.7 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.57 | 1 | 12/17/2018 17:32 | WG1211653 |
| Lead | 9.86 | | 0.644 | 1 | 12/17/2018 17:32 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Alpha BHC | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Beta BHC | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Delta BHC | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Gamma BHC | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Chlordane | ND | | 0.257 | 1 | 12/17/2018 20:51 | WG1211736 |
| 4,4-DDD | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| 4,4-DDE | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| 4,4-DDT | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Dieldrin | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Endosulfan I | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Endosulfan II | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Endrin | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Endrin aldehyde | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Endrin ketone | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Heptachlor | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Methoxychlor | ND | | 0.0257 | 1 | 12/17/2018 20:51 | WG1211736 |
| Toxaphene | ND | | 0.515 | 1 | 12/17/2018 20:51 | WG1211736 |
| *(S) Decachlorobiphenyl* | *121* | | *10.0-135* | | *12/17/2018 20:51* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *109* | | *10.0-139* | | *12/17/2018 20:51* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 78.8 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.54 | 1 | 12/17/2018 17:34 | WG1211653 |
| Lead | 9.04 | | 0.634 | 1 | 12/17/2018 17:34 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Alpha BHC | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Beta BHC | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Delta BHC | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Gamma BHC | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Chlordane | ND | | 0.254 | 1 | 12/17/2018 21:06 | WG1211736 |
| 4,4-DDD | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| 4,4-DDE | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| 4,4-DDT | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Dieldrin | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Endosulfan I | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Endosulfan II | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Endrin | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Endrin aldehyde | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Endrin ketone | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Heptachlor | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Methoxychlor | ND | | 0.0254 | 1 | 12/17/2018 21:06 | WG1211736 |
| Toxaphene | ND | | 0.508 | 1 | 12/17/2018 21:06 | WG1211736 |
| *(S) Decachlorobiphenyl* | *89.8* | | *10.0-135* | | *12/17/2018 21:06* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *81.1* | | *10.0-139* | | *12/17/2018 21:06* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 83.3 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.40 | 1 | 12/17/2018 17:37 | WG1211653 |
| Lead | 9.21 | | 0.600 | 1 | 12/17/2018 17:37 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Alpha BHC | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Beta BHC | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Delta BHC | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Gamma BHC | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Chlordane | ND | | 0.240 | 1 | 12/17/2018 21:21 | WG1211736 |
| 4,4-DDD | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| 4,4-DDE | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| 4,4-DDT | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Dieldrin | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Endosulfan I | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Endosulfan II | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Endrin | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Endrin aldehyde | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Endrin ketone | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Heptachlor | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Methoxychlor | ND | | 0.0240 | 1 | 12/17/2018 21:21 | WG1211736 |
| Toxaphene | ND | | 0.480 | 1 | 12/17/2018 21:21 | WG1211736 |
| *(S) Decachlorobiphenyl* | *118* | | *10.0-135* | | *12/17/2018 21:21* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *103* | | *10.0-139* | | *12/17/2018 21:21* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 81.7 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.45 | 1 | 12/17/2018 16:57 | WG1211653 |
| Lead | 9.24 | | 0.612 | 1 | 12/17/2018 16:57 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Alpha BHC | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Beta BHC | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Delta BHC | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Gamma BHC | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Chlordane | ND | | 0.245 | 1 | 12/17/2018 21:35 | WG1211736 |
| 4,4-DDD | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| 4,4-DDE | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| 4,4-DDT | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Dieldrin | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Endosulfan I | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Endosulfan II | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Endosulfan sulfate | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Endrin | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Endrin aldehyde | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Endrin ketone | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Hexachlorobenzene | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Heptachlor | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Heptachlor epoxide | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Methoxychlor | ND | | 0.0245 | 1 | 12/17/2018 21:35 | WG1211736 |
| Toxaphene | ND | | 0.490 | 1 | 12/17/2018 21:35 | WG1211736 |
| *(S) Decachlorobiphenyl* | *118* | | *10.0-135* | | *12/17/2018 21:35* | WG1211736 |
| *(S) Tetrachloro-m-xylene* | *106* | | *10.0-139* | | *12/17/2018 21:35* | WG1211736 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 80.4 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | 2.85 | | 2.49 | 1 | 12/17/2018 17:39 | WG1211653 |
| Lead | 9.13 | | 0.622 | 1 | 12/17/2018 17:39 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Alpha BHC | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Beta BHC | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Delta BHC | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Gamma BHC | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Chlordane | ND | | 0.249 | 1 | 12/21/2018 00:15 | WG1213431 |
| 4,4-DDD | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| 4,4-DDE | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| 4,4-DDT | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Dieldrin | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Endosulfan I | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Endosulfan II | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Endosulfan sulfate | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Endrin | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Endrin aldehyde | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Endrin ketone | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Hexachlorobenzene | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Heptachlor | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Heptachlor epoxide | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Methoxychlor | ND | | 0.0249 | 1 | 12/21/2018 00:15 | WG1213431 |
| Toxaphene | ND | | 0.498 | 1 | 12/21/2018 00:15 | WG1213431 |
| *(S) Decachlorobiphenyl* | *69.8* | | *10.0-135* | | *12/21/2018 00:15* | WG1213431 |
| *(S) Tetrachloro-m-xylene* | *74.0* | | *10.0-139* | | *12/21/2018 00:15* | WG1213431 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 75.7 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.64 | 1 | 12/17/2018 17:42 | WG1211653 |
| Lead | 10.8 | | 0.661 | 1 | 12/17/2018 17:42 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Alpha BHC | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Beta BHC | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Delta BHC | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Gamma BHC | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Chlordane | ND | | 0.264 | 1 | 12/19/2018 12:44 | WG1212395 |
| 4,4-DDD | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| 4,4-DDE | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| 4,4-DDT | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Dieldrin | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Endosulfan I | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Endosulfan II | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Endrin | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Endrin aldehyde | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Endrin ketone | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Heptachlor | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Methoxychlor | ND | | 0.0264 | 1 | 12/19/2018 12:44 | WG1212395 |
| Toxaphene | ND | | 0.529 | 1 | 12/19/2018 12:44 | WG1212395 |
| *(S) Decachlorobiphenyl* | *60.8* | | *10.0-135* | | *12/19/2018 12:44* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *68.6* | | *10.0-139* | | *12/19/2018 12:44* | WG1212395 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 82.8 | | 1 | 12/17/2018 13:52 | WG1211424 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.41 | 1 | 12/17/2018 17:50 | WG1211653 |
| Lead | 9.91 | | 0.604 | 1 | 12/17/2018 17:50 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Alpha BHC | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Beta BHC | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Delta BHC | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Gamma BHC | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Chlordane | ND | | 0.241 | 1 | 12/19/2018 12:56 | WG1212395 |
| 4,4-DDD | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| 4,4-DDE | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| 4,4-DDT | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Dieldrin | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Endosulfan I | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Endosulfan II | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Endrin | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Endrin aldehyde | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Endrin ketone | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Heptachlor | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Methoxychlor | ND | | 0.0241 | 1 | 12/19/2018 12:56 | WG1212395 |
| Toxaphene | ND | | 0.483 | 1 | 12/19/2018 12:56 | WG1212395 |
| *(S) Decachlorobiphenyl* | *58.6* | | *10.0-135* | | *12/19/2018 12:56* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *72.4* | | *10.0-139* | | *12/19/2018 12:56* | WG1212395 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 81.9 | | 1 | 12/17/2018 10:31 | WG1211857 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.44 | 1 | 12/17/2018 17:52 | WG1211653 |
| Lead | 9.72 | | 0.610 | 1 | 12/17/2018 17:52 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Alpha BHC | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Beta BHC | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Delta BHC | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Gamma BHC | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Chlordane | ND | | 0.244 | 1 | 12/19/2018 13:09 | WG1212395 |
| 4,4-DDD | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| 4,4-DDE | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| 4,4-DDT | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Dieldrin | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Endosulfan I | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Endosulfan II | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Endrin | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Endrin aldehyde | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Endrin ketone | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Heptachlor | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Methoxychlor | ND | | 0.0244 | 1 | 12/19/2018 13:09 | WG1212395 |
| Toxaphene | ND | | 0.488 | 1 | 12/19/2018 13:09 | WG1212395 |
| *(S) Decachlorobiphenyl* | *66.4* | | *10.0-135* | | *12/19/2018 13:09* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *75.0* | | *10.0-139* | | *12/19/2018 13:09* | WG1212395 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 84.3 | | 1 | 12/17/2018 10:31 | WG1211857 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.37 | 1 | 12/17/2018 17:55 | WG1211653 |
| Lead | 9.41 | | 0.593 | 1 | 12/17/2018 17:55 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Alpha BHC | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Beta BHC | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Delta BHC | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Gamma BHC | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Chlordane | ND | | 0.237 | 1 | 12/19/2018 13:21 | WG1212395 |
| 4,4-DDD | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| 4,4-DDE | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| 4,4-DDT | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Dieldrin | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Endosulfan I | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Endosulfan II | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Endrin | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Endrin aldehyde | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Endrin ketone | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Heptachlor | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Methoxychlor | ND | | 0.0237 | 1 | 12/19/2018 13:21 | WG1212395 |
| Toxaphene | ND | | 0.475 | 1 | 12/19/2018 13:21 | WG1212395 |
| *(S) Decachlorobiphenyl* | *61.3* | | *10.0-135* | | *12/19/2018 13:21* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *70.1* | | *10.0-139* | | *12/19/2018 13:21* | WG1212395 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 85.2 | | 1 | 12/17/2018 10:31 | WG1211857 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.35 | 1 | 12/17/2018 17:57 | WG1211653 |
| Lead | 9.45 | | 0.587 | 1 | 12/17/2018 17:57 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Alpha BHC | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Beta BHC | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Delta BHC | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Gamma BHC | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Chlordane | ND | | 0.235 | 1 | 12/19/2018 13:34 | WG1212395 |
| 4,4-DDD | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| 4,4-DDE | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| 4,4-DDT | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Dieldrin | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Endosulfan I | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Endosulfan II | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Endrin | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Endrin aldehyde | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Endrin ketone | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Heptachlor | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Methoxychlor | ND | | 0.0235 | 1 | 12/19/2018 13:34 | WG1212395 |
| Toxaphene | ND | | 0.469 | 1 | 12/19/2018 13:34 | WG1212395 |
| *(S) Decachlorobiphenyl* | *61.5* | | *10.0-135* | | *12/19/2018 13:34* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *71.1* | | *10.0-139* | | *12/19/2018 13:34* | WG1212395 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 81.4 | | 1 | 12/17/2018 10:31 | WG1211857 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.46 | 1 | 12/17/2018 18:00 | WG1211653 |
| Lead | 9.49 | | 0.614 | 1 | 12/17/2018 18:00 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Alpha BHC | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Beta BHC | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Delta BHC | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Gamma BHC | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Chlordane | ND | | 0.246 | 1 | 12/19/2018 14:11 | WG1212395 |
| 4,4-DDD | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| 4,4-DDE | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| 4,4-DDT | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Dieldrin | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Endosulfan I | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Endosulfan II | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Endrin | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Endrin aldehyde | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Endrin ketone | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Heptachlor | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Methoxychlor | ND | | 0.0246 | 1 | 12/19/2018 14:11 | WG1212395 |
| Toxaphene | ND | | 0.491 | 1 | 12/19/2018 14:11 | WG1212395 |
| *(S) Decachlorobiphenyl* | *65.5* | | *10.0-135* | | *12/19/2018 14:11* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *73.5* | | *10.0-139* | | *12/19/2018 14:11* | WG1212395 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 84.4 | | 1 | 12/17/2018 10:31 | WG1211857 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.37 | 1 | 12/17/2018 18:02 | WG1211653 |
| Lead | 9.88 | | 0.592 | 1 | 12/17/2018 18:02 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Alpha BHC | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Beta BHC | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Delta BHC | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Gamma BHC | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Chlordane | ND | | 0.237 | 1 | 12/19/2018 14:24 | WG1212395 |
| 4,4-DDD | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| 4,4-DDE | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| 4,4-DDT | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Dieldrin | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Endosulfan I | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Endosulfan II | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Endrin | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Endrin aldehyde | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Endrin ketone | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Heptachlor | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Methoxychlor | ND | | 0.0237 | 1 | 12/19/2018 14:24 | WG1212395 |
| Toxaphene | ND | | 0.474 | 1 | 12/19/2018 14:24 | WG1212395 |
| *(S) Decachlorobiphenyl* | *64.4* | | *10.0-135* | | *12/19/2018 14:24* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *71.4* | | *10.0-139* | | *12/19/2018 14:24* | WG1212395 |

## Total Solids by Method 2540 G-2011

| Analyte | Result % | Qualifier | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|
| Total Solids | 86.2 | | 1 | 12/17/2018 12:55 | WG1211907 |

## Metals (ICP) by Method 6010D

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.32 | 1 | 12/17/2018 18:05 | WG1211653 |
| Lead | 8.41 | | 0.580 | 1 | 12/17/2018 18:05 | WG1211653 |

## Pesticides (GC) by Method 8081B

| Analyte | Result (dry) mg/kg | Qualifier | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch |
|---|---|---|---|---|---|---|
| Aldrin | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Alpha BHC | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Beta BHC | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Delta BHC | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Gamma BHC | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Chlordane | ND | | 0.232 | 1 | 12/19/2018 14:36 | WG1212395 |
| 4,4-DDD | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| 4,4-DDE | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| 4,4-DDT | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Dieldrin | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Endosulfan I | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Endosulfan II | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Endosulfan sulfate | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Endrin | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Endrin aldehyde | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Endrin ketone | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Hexachlorobenzene | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Heptachlor | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Heptachlor epoxide | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Methoxychlor | ND | | 0.0232 | 1 | 12/19/2018 14:36 | WG1212395 |
| Toxaphene | ND | | 0.464 | 1 | 12/19/2018 14:36 | WG1212395 |
| *(S) Decachlorobiphenyl* | *65.6* | | *10.0-135* | | *12/19/2018 14:36* | WG1212395 |
| *(S) Tetrachloro-m-xylene* | *72.8* | | *10.0-139* | | *12/19/2018 14:36* | WG1212395 |

# QUALITY CONTROL SUMMARY

L1053387-01,02,03,04



## Method Blank (MB)

(MB) R3369039-1 12/17/18 14:04

| Analyte | MB Result % | MB Qualifier | MB MDL % | MB RDL % |
|---|---|---|---|---|
| Total Solids | 0.00100 | | | |

## L1053373-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1053373-01 12/17/18 14:04 • (DUP) R3369039-3 12/17/18 14:04

| Analyte | Original Result % | DUP Result % | Dilution | DUP RPD % | DUP Qualifier | DUP RPD Limits % |
|---|---|---|---|---|---|---|
| Total Solids | 75.0 | 74.5 | 1 | 0.691 | | 10 |

## Laboratory Control Sample (LCS)

(LCS) R3369039-2 12/17/18 14:04

| Analyte | Spike Amount % | LCS Result % | LCS Rec. % | Rec. Limits % | LCS Qualifier |
|---|---|---|---|---|---|
| Total Solids | 50.0 | 50.0 | 100 | 85.0-115 | |

# QUALITY CONTROL SUMMARY

L1053387-05,06,07,08,09,10,11,12,13,14



## Method Blank (MB)

(MB) R3369037-1 12/17/18 13:52

| Analyte | MB Result % | MB Qualifier | MB MDL % | MB RDL % |
|---|---|---|---|---|
| Total Solids | 0.00100 | | | |

## L1053387-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1053387-11 12/17/18 13:52 • (DUP) R3369037-3 12/17/18 13:52

| Analyte | Original Result % | DUP Result % | Dilution | DUP RPD % | DUP Qualifier | DUP RPD Limits % |
|---|---|---|---|---|---|---|
| Total Solids | 81.7 | 81.7 | 1 | 0.00122 | | 10 |

## Laboratory Control Sample (LCS)

(LCS) R3369037-2 12/17/18 13:52

| Analyte | Spike Amount % | LCS Result % | LCS Rec. % | Rec. Limits % | LCS Qualifier |
|---|---|---|---|---|---|
| Total Solids | 50.0 | 50.0 | 100 | 85.0-115 | |

# QUALITY CONTROL SUMMARY

L1053387-15,16,17,18,19



## Method Blank (MB)

(MB) R3369026-1 12/17/18 10:31

| Analyte | MB Result % | MB Qualifier | MB MDL % | MB RDL % |
|---|---|---|---|---|
| Total Solids | 0.00100 | | | |

## L1053594-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1053594-02 12/17/18 10:31 • (DUP) R3369026-3 12/17/18 10:31

| Analyte | Original Result % | DUP Result % | Dilution | DUP RPD % | DUP Qualifier | DUP RPD Limits % |
|---|---|---|---|---|---|---|
| Total Solids | 83.5 | 83.6 | 1 | 0.0917 | | 10 |

## Laboratory Control Sample (LCS)

(LCS) R3369026-2 12/17/18 10:31

| Analyte | Spike Amount % | LCS Result % | LCS Rec. % | Rec. Limits % | LCS Qualifier |
|---|---|---|---|---|---|
| Total Solids | 50.0 | 50.0 | 100 | 85.0-115 | |

# QUALITY CONTROL SUMMARY

L1053387-20



## Method Blank (MB)

(MB) R3369031-1 12/17/18 12:55

| Analyte | MB Result % | MB Qualifier | MB MDL % | MB RDL % |
|---|---|---|---|---|
| Total Solids | 0.00100 | | | |

## L1053388-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1053388-01 12/17/18 12:55 • (DUP) R3369031-3 12/17/18 12:55

| Analyte | Original Result % | DUP Result % | Dilution | DUP RPD % | DUP Qualifier | DUP RPD Limits % |
|---|---|---|---|---|---|---|
| Total Solids | 78.3 | 77.9 | 1 | 0.454 | | 10 |

## Laboratory Control Sample (LCS)

(LCS) R3369031-2 12/17/18 12:55

| Analyte | Spike Amount % | LCS Result % | LCS Rec. % | Rec. Limits % | LCS Qualifier |
|---|---|---|---|---|---|
| Total Solids | 50.0 | 50.0 | 100 | 85.0-115 | |

# QUALITY CONTROL SUMMARY

L1053387-01,02,03,04,05,06,07,08,09,10,11,12,13,14,15,16,17,18,19,20



## Method Blank (MB)

(MB) R3368991-1 12/17/18 16:50

| Analyte | MB Result mg/kg | MB Qualifier | MB MDL mg/kg | MB RDL mg/kg |
|---|---|---|---|---|
| Arsenic | U | | 0.460 | 2.00 |
| Lead | 0.233 | J | 0.190 | 0.500 |

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3368991-2 12/17/18 16:52 • (LCSD) R3368991-3 12/17/18 16:54

| Analyte | Spike Amount mg/kg | LCS Result mg/kg | LCSD Result mg/kg | LCS Rec. % | LCSD Rec. % | Rec. Limits % | LCS Qualifier | LCSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 100 | 107 | 105 | 107 | 105 | 80.0-120 | | | 2.48 | 20 |
| Lead | 100 | 108 | 105 | 108 | 105 | 80.0-120 | | | 2.86 | 20 |

## L1053387-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1053387-11 12/17/18 16:57 • (MS) R3368991-6 12/17/18 17:04 • (MSD) R3368991-7 12/17/18 17:07

| Analyte | Spike Amount (dry) mg/kg | Original Result (dry) mg/kg | MS Result (dry) mg/kg | MSD Result (dry) mg/kg | MS Rec. % | MSD Rec. % | Dilution | Rec. Limits % | MS Qualifier | MSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 122 | ND | 117 | 116 | 94.7 | 93.9 | 1 | 75.0-125 | | | 0.832 | 20 |
| Lead | 122 | 9.24 | 130 | 129 | 98.7 | 97.4 | 1 | 75.0-125 | | | 1.24 | 20 |

# QUALITY CONTROL SUMMARY

L1053387-01,02,03,04,05,06,07,08,09,10,11





## Method Blank (MB)

(MB) R3369232-3 12/17/18 16:11

| Analyte | MB Result mg/kg | MB Qualifier | MB MDL mg/kg | MB RDL mg/kg |
|---|---|---|---|---|
| Aldrin | U | | 0.00135 | 0.0200 |
| Alpha BHC | U | | 0.00136 | 0.0200 |
| Beta BHC | U | | 0.00160 | 0.0200 |
| Delta BHC | U | | 0.00143 | 0.0200 |
| Gamma BHC | U | | 0.00145 | 0.0200 |
| 4,4-DDD | U | | 0.00156 | 0.0200 |
| 4,4-DDE | U | | 0.00154 | 0.0200 |
| 4,4-DDT | U | | 0.00200 | 0.0200 |
| Dieldrin | U | | 0.00152 | 0.0200 |
| Endosulfan I | U | | 0.00149 | 0.0200 |
| Endosulfan II | U | | 0.00160 | 0.0200 |
| Endosulfan sulfate | U | | 0.00151 | 0.0200 |
| Endrin | U | | 0.00157 | 0.0200 |
| Endrin aldehyde | U | | 0.00129 | 0.0200 |
| Endrin ketone | U | | 0.00165 | 0.0200 |
| Heptachlor | U | | 0.00154 | 0.0200 |
| Heptachlor epoxide | U | | 0.00161 | 0.0200 |
| Hexachlorobenzene | U | | 0.00124 | 0.0200 |
| Methoxychlor | U | | 0.00178 | 0.0200 |
| Chlordane | U | | 0.0390 | 0.200 |
| Toxaphene | U | | 0.0360 | 0.400 |
| *(S) Decachlorobiphenyl* | *100* | | | *10.0-135* |
| *(S) Tetrachloro-m-xylene* | *92.5* | | | *10.0-139* |

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3369232-1 12/17/18 15:41 • (LCSD) R3369232-2 12/17/18 15:56

| Analyte | Spike Amount mg/kg | LCS Result mg/kg | LCSD Result mg/kg | LCS Rec. % | LCSD Rec. % | Rec. Limits % | LCS Qualifier | LCSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 0.0666 | 0.0651 | 0.0568 | 97.7 | 85.3 | 34.0-136 | | | 13.6 | 38 |
| Alpha BHC | 0.0666 | 0.0672 | 0.0587 | 101 | 88.1 | 34.0-139 | | | 13.5 | 38 |
| Beta BHC | 0.0666 | 0.0621 | 0.0547 | 93.2 | 82.1 | 34.0-133 | | | 12.7 | 37 |
| Delta BHC | 0.0666 | 0.0660 | 0.0580 | 99.1 | 87.1 | 34.0-135 | | | 12.9 | 38 |
| Gamma BHC | 0.0666 | 0.0651 | 0.0570 | 97.7 | 85.6 | 34.0-136 | | | 13.3 | 38 |
| 4,4-DDD | 0.0666 | 0.0654 | 0.0570 | 98.2 | 85.6 | 33.0-141 | | | 13.7 | 39 |
| 4,4-DDE | 0.0666 | 0.0655 | 0.0571 | 98.3 | 85.7 | 34.0-134 | | | 13.7 | 38 |
| 4,4-DDT | 0.0666 | 0.0572 | 0.0495 | 85.9 | 74.3 | 30.0-143 | | | 14.4 | 40 |
| Dieldrin | 0.0666 | 0.0655 | 0.0573 | 98.3 | 86.0 | 35.0-137 | | | 13.4 | 37 |
| Endosulfan I | 0.0666 | 0.0633 | 0.0554 | 95.0 | 83.2 | 34.0-134 | | | 13.3 | 37 |

# QUALITY CONTROL SUMMARY

L1053387-01,02,03,04,05,06,07,08,09,10,11



## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3369232-1 12/17/18 15:41 • (LCSD) R3369232-2 12/17/18 15:56

| Analyte | Spike Amount mg/kg | LCS Result mg/kg | LCSD Result mg/kg | LCS Rec. % | LCSD Rec. % | Rec. Limits % | LCS Qualifier | LCSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|
| Endosulfan II | 0.0666 | 0.0599 | 0.0523 | 89.9 | 78.5 | 35.0-132 | | | 13.5 | 38 |
| Endosulfan sulfate | 0.0666 | 0.0656 | 0.0581 | 98.5 | 87.2 | 35.0-132 | | | 12.1 | 37 |
| Endrin | 0.0666 | 0.0611 | 0.0532 | 91.7 | 79.9 | 34.0-137 | | | 13.8 | 37 |
| Endrin aldehyde | 0.0666 | 0.0534 | 0.0484 | 80.2 | 72.7 | 23.0-121 | | | 9.82 | 39 |
| Endrin ketone | 0.0666 | 0.0628 | 0.0554 | 94.3 | 83.2 | 35.0-144 | | | 12.5 | 37 |
| Heptachlor | 0.0666 | 0.0609 | 0.0535 | 91.4 | 80.3 | 36.0-141 | | | 12.9 | 37 |
| Heptachlor epoxide | 0.0666 | 0.0644 | 0.0566 | 96.7 | 85.0 | 36.0-134 | | | 12.9 | 37 |
| Hexachlorobenzene | 0.0666 | 0.0607 | 0.0534 | 91.1 | 80.2 | 33.0-129 | | | 12.8 | 37 |
| Methoxychlor | 0.0666 | 0.0594 | 0.0520 | 89.2 | 78.1 | 28.0-150 | | | 13.3 | 38 |
| *(S) Decachlorobiphenyl* | | | | *97.3* | *89.9* | *10.0-135* | | | | |
| *(S) Tetrachloro-m-xylene* | | | | *90.5* | *82.7* | *10.0-139* | | | | |

## L1053387-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1053387-07 12/17/18 20:07 • (MS) R3369232-4 12/17/18 20:22 • (MSD) R3369232-5 12/17/18 20:36

| Analyte | Spike Amount (dry) mg/kg | Original Result (dry) mg/kg | MS Result (dry) mg/kg | MSD Result (dry) mg/kg | MS Rec. % | MSD Rec. % | Dilution | Rec. Limits % | MS Qualifier | MSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 0.0783 | ND | 0.0702 | 0.0821 | 89.6 | 105 | 1 | 20.0-135 | | | 15.6 | 37 |
| Alpha BHC | 0.0783 | ND | 0.0860 | 0.100 | 110 | 128 | 1 | 27.0-140 | | | 15.1 | 35 |
| Beta BHC | 0.0783 | ND | 0.0797 | 0.0928 | 102 | 118 | 1 | 23.0-141 | | | 15.1 | 37 |
| Delta BHC | 0.0783 | ND | 0.0845 | 0.0991 | 108 | 127 | 1 | 21.0-138 | | | 15.9 | 35 |
| Gamma BHC | 0.0783 | ND | 0.0831 | 0.0972 | 106 | 124 | 1 | 27.0-137 | | | 15.6 | 36 |
| 4,4-DDD | 0.0783 | ND | 0.0795 | 0.0927 | 102 | 118 | 1 | 15.0-152 | | | 15.3 | 39 |
| 4,4-DDE | 0.0783 | ND | 0.0702 | 0.0828 | 89.6 | 106 | 1 | 10.0-152 | | | 16.4 | 40 |
| 4,4-DDT | 0.0783 | ND | 0.0561 | 0.0686 | 71.6 | 87.5 | 1 | 10.0-151 | | | 20.0 | 40 |
| Dieldrin | 0.0783 | ND | 0.0794 | 0.0929 | 101 | 119 | 1 | 17.0-145 | | | 15.7 | 37 |
| Endosulfan I | 0.0783 | ND | 0.0764 | 0.0889 | 97.6 | 114 | 1 | 20.0-137 | | | 15.1 | 36 |
| Endosulfan II | 0.0783 | ND | 0.0738 | 0.0861 | 94.3 | 110 | 1 | 15.0-141 | | | 15.3 | 37 |
| Endosulfan sulfate | 0.0783 | ND | 0.0814 | 0.0947 | 104 | 121 | 1 | 15.0-143 | | | 15.1 | 38 |
| Endrin | 0.0783 | ND | 0.0862 | 0.107 | 110 | 136 | 1 | 19.0-143 | | | 21.1 | 37 |
| Endrin aldehyde | 0.0783 | ND | 0.0664 | 0.0780 | 84.8 | 99.5 | 1 | 10.0-139 | | | 16.0 | 40 |
| Endrin ketone | 0.0783 | ND | 0.0758 | 0.0895 | 96.8 | 114 | 1 | 17.0-149 | | | 16.5 | 38 |
| Heptachlor | 0.0783 | ND | 0.0697 | 0.0847 | 89.0 | 108 | 1 | 22.0-138 | | | 19.3 | 37 |
| Heptachlor epoxide | 0.0783 | ND | 0.0788 | 0.0922 | 101 | 118 | 1 | 22.0-138 | | | 15.7 | 36 |
| Hexachlorobenzene | 0.0783 | ND | 0.0767 | 0.0908 | 97.9 | 116 | 1 | 25.0-126 | | | 16.9 | 35 |
| Methoxychlor | 0.0783 | ND | 0.0683 | 0.0825 | 87.2 | 105 | 1 | 10.0-159 | | | 18.9 | 40 |
| *(S) Decachlorobiphenyl* | | | | | *92.6* | *105* | | *10.0-135* | | | | |
| *(S) Tetrachloro-m-xylene* | | | | | *94.6* | *110* | | *10.0-139* | | | | |

# QUALITY CONTROL SUMMARY

L1053387-13,14,15,16,17,18,19,20





## Method Blank (MB)

(MB) R3369588-3 12/19/18 10:51

| Analyte | MB Result mg/kg | MB Qualifier | MB MDL mg/kg | MB RDL mg/kg |
|---|---|---|---|---|
| Aldrin | U | | 0.00135 | 0.0200 |
| Alpha BHC | U | | 0.00136 | 0.0200 |
| Beta BHC | U | | 0.00160 | 0.0200 |
| Delta BHC | U | | 0.00143 | 0.0200 |
| Gamma BHC | U | | 0.00145 | 0.0200 |
| 4,4-DDD | U | | 0.00156 | 0.0200 |
| 4,4-DDE | U | | 0.00154 | 0.0200 |
| 4,4-DDT | U | | 0.00200 | 0.0200 |
| Dieldrin | U | | 0.00152 | 0.0200 |
| Endosulfan I | U | | 0.00149 | 0.0200 |
| Endosulfan II | U | | 0.00160 | 0.0200 |
| Endosulfan sulfate | U | | 0.00151 | 0.0200 |
| Endrin | U | | 0.00157 | 0.0200 |
| Endrin aldehyde | U | | 0.00129 | 0.0200 |
| Endrin ketone | U | | 0.00165 | 0.0200 |
| Heptachlor | U | | 0.00154 | 0.0200 |
| Heptachlor epoxide | U | | 0.00161 | 0.0200 |
| Hexachlorobenzene | U | | 0.00124 | 0.0200 |
| Methoxychlor | U | | 0.00178 | 0.0200 |
| Chlordane | U | | 0.0390 | 0.200 |
| Toxaphene | U | | 0.0360 | 0.400 |
| *(S) Decachlorobiphenyl* | *70.1* | | | *10.0-135* |
| *(S) Tetrachloro-m-xylene* | *74.0* | | | *10.0-139* |

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3369588-1 12/19/18 10:26 • (LCSD) R3369588-2 12/19/18 10:39

| Analyte | Spike Amount mg/kg | LCS Result mg/kg | LCSD Result mg/kg | LCS Rec. % | LCSD Rec. % | Rec. Limits % | LCS Qualifier | LCSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 0.0666 | 0.0570 | 0.0613 | 85.6 | 92.0 | 34.0-136 | | | 7.27 | 38 |
| Alpha BHC | 0.0666 | 0.0514 | 0.0562 | 77.2 | 84.4 | 34.0-139 | | | 8.92 | 38 |
| Beta BHC | 0.0666 | 0.0562 | 0.0617 | 84.4 | 92.6 | 34.0-133 | | | 9.33 | 37 |
| Delta BHC | 0.0666 | 0.0497 | 0.0547 | 74.6 | 82.1 | 34.0-135 | | | 9.58 | 38 |
| Gamma BHC | 0.0666 | 0.0491 | 0.0540 | 73.7 | 81.1 | 34.0-136 | | | 9.51 | 38 |
| 4,4-DDD | 0.0666 | 0.0544 | 0.0586 | 81.7 | 88.0 | 33.0-141 | | | 7.43 | 39 |
| 4,4-DDE | 0.0666 | 0.0481 | 0.0518 | 72.2 | 77.8 | 34.0-134 | | | 7.41 | 38 |
| 4,4-DDT | 0.0666 | 0.0493 | 0.0535 | 74.0 | 80.3 | 30.0-143 | | | 8.17 | 40 |
| Dieldrin | 0.0666 | 0.0589 | 0.0632 | 88.4 | 94.9 | 35.0-137 | | | 7.04 | 37 |
| Endosulfan I | 0.0666 | 0.0569 | 0.0609 | 85.4 | 91.4 | 34.0-134 | | | 6.79 | 37 |

# QUALITY CONTROL SUMMARY

L1053387-13,14,15,16,17,18,19,20





## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3369588-1 12/19/18 10:26 • (LCSD) R3369588-2 12/19/18 10:39

| Analyte | Spike Amount mg/kg | LCS Result mg/kg | LCSD Result mg/kg | LCS Rec. % | LCSD Rec. % | Rec. Limits % | LCS Qualifier | LCSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|
| Endosulfan II | 0.0666 | 0.0522 | 0.0564 | 78.4 | 84.7 | 35.0-132 | | | 7.73 | 38 |
| Endosulfan sulfate | 0.0666 | 0.0574 | 0.0623 | 86.2 | 93.5 | 35.0-132 | | | 8.19 | 37 |
| Endrin | 0.0666 | 0.0582 | 0.0624 | 87.4 | 93.7 | 34.0-137 | | | 6.97 | 37 |
| Endrin aldehyde | 0.0666 | 0.0503 | 0.0548 | 75.5 | 82.3 | 23.0-121 | | | 8.56 | 39 |
| Endrin ketone | 0.0666 | 0.0574 | 0.0613 | 86.2 | 92.0 | 35.0-144 | | | 6.57 | 37 |
| Heptachlor | 0.0666 | 0.0552 | 0.0606 | 82.9 | 91.0 | 36.0-141 | | | 9.33 | 37 |
| Heptachlor epoxide | 0.0666 | 0.0588 | 0.0632 | 88.3 | 94.9 | 36.0-134 | | | 7.21 | 37 |
| Hexachlorobenzene | 0.0666 | 0.0500 | 0.0543 | 75.1 | 81.5 | 33.0-129 | | | 8.25 | 37 |
| Methoxychlor | 0.0666 | 0.0544 | 0.0608 | 81.7 | 91.3 | 28.0-150 | | | 11.1 | 38 |
| *(S) Decachlorobiphenyl* | | | | *76.9* | *78.8* | *10.0-135* | | | | |
| *(S) Tetrachloro-m-xylene* | | | | *76.9* | *80.8* | *10.0-139* | | | | |

## L1053387-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1053387-17 12/19/18 13:34 • (MS) R3369588-4 12/19/18 13:46 • (MSD) R3369588-5 12/19/18 13:59

| Analyte | Spike Amount (dry) mg/kg | Original Result (dry) mg/kg | MS Result (dry) mg/kg | MSD Result (dry) mg/kg | MS Rec. % | MSD Rec. % | Dilution | Rec. Limits % | MS Qualifier | MSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 0.0782 | ND | 0.0625 | 0.0629 | 80.0 | 80.5 | 1 | 20.0-135 | | | 0.561 | 37 |
| Alpha BHC | 0.0782 | ND | 0.0604 | 0.0611 | 77.3 | 78.2 | 1 | 27.0-140 | | | 1.16 | 35 |
| Beta BHC | 0.0782 | ND | 0.0663 | 0.0668 | 84.8 | 85.4 | 1 | 23.0-141 | | | 0.705 | 37 |
| Delta BHC | 0.0782 | ND | 0.0554 | 0.0562 | 70.9 | 71.9 | 1 | 21.0-138 | | | 1.47 | 35 |
| Gamma BHC | 0.0782 | ND | 0.0573 | 0.0581 | 73.3 | 74.3 | 1 | 27.0-137 | | | 1.42 | 36 |
| 4,4-DDD | 0.0782 | ND | 0.0637 | 0.0641 | 81.5 | 82.0 | 1 | 15.0-152 | | | 0.551 | 39 |
| 4,4-DDE | 0.0782 | ND | 0.0536 | 0.0536 | 68.6 | 68.6 | 1 | 10.0-152 | | | 0.000 | 40 |
| 4,4-DDT | 0.0782 | ND | 0.0447 | 0.0444 | 57.2 | 56.8 | 1 | 10.0-151 | | | 0.791 | 40 |
| Dieldrin | 0.0782 | ND | 0.0660 | 0.0661 | 84.4 | 84.5 | 1 | 17.0-145 | | | 0.178 | 37 |
| Endosulfan I | 0.0782 | ND | 0.0629 | 0.0635 | 80.5 | 81.2 | 1 | 20.0-137 | | | 0.929 | 36 |
| Endosulfan II | 0.0782 | ND | 0.0581 | 0.0586 | 74.3 | 74.9 | 1 | 15.0-141 | | | 0.805 | 37 |
| Endosulfan sulfate | 0.0782 | ND | 0.0662 | 0.0671 | 84.7 | 85.9 | 1 | 15.0-143 | | | 1.41 | 38 |
| Endrin | 0.0782 | ND | 0.0647 | 0.0654 | 82.7 | 83.6 | 1 | 19.0-143 | | | 1.08 | 37 |
| Endrin aldehyde | 0.0782 | ND | 0.0601 | 0.0602 | 76.9 | 77.0 | 1 | 10.0-139 | | | 0.195 | 40 |
| Endrin ketone | 0.0782 | ND | 0.0608 | 0.0617 | 77.8 | 79.0 | 1 | 17.0-149 | | | 1.53 | 38 |
| Heptachlor | 0.0782 | ND | 0.0609 | 0.0610 | 77.9 | 78.1 | 1 | 22.0-138 | | | 0.192 | 37 |
| Heptachlor epoxide | 0.0782 | ND | 0.0660 | 0.0662 | 84.4 | 84.7 | 1 | 22.0-138 | | | 0.355 | 36 |
| Hexachlorobenzene | 0.0782 | ND | 0.0567 | 0.0572 | 72.5 | 73.1 | 1 | 25.0-126 | | | 0.825 | 35 |
| Methoxychlor | 0.0782 | ND | 0.0555 | 0.0555 | 71.0 | 71.0 | 1 | 10.0-159 | | | 0.000 | 40 |
| *(S) Decachlorobiphenyl* | | | | | *65.6* | *67.6* | | *10.0-135* | | | | |
| *(S) Tetrachloro-m-xylene* | | | | | *72.4* | *73.4* | | *10.0-139* | | | | |

## Method Blank (MB)

(MB) R3370599-3 12/21/18 00:00

| Analyte | MB Result mg/kg | MB Qualifier | MB MDL mg/kg | MB RDL mg/kg |
|---|---|---|---|---|
| Aldrin | U | | 0.00135 | 0.0200 |
| Alpha BHC | U | | 0.00136 | 0.0200 |
| Beta BHC | U | | 0.00160 | 0.0200 |
| Delta BHC | U | | 0.00143 | 0.0200 |
| Gamma BHC | U | | 0.00145 | 0.0200 |
| 4,4-DDD | U | | 0.00156 | 0.0200 |
| 4,4-DDE | U | | 0.00154 | 0.0200 |
| 4,4-DDT | U | | 0.00200 | 0.0200 |
| Dieldrin | U | | 0.00152 | 0.0200 |
| Endosulfan I | U | | 0.00149 | 0.0200 |
| Endosulfan II | U | | 0.00160 | 0.0200 |
| Endosulfan sulfate | U | | 0.00151 | 0.0200 |
| Endrin | U | | 0.00157 | 0.0200 |
| Endrin aldehyde | U | | 0.00129 | 0.0200 |
| Endrin ketone | U | | 0.00165 | 0.0200 |
| Heptachlor | U | | 0.00154 | 0.0200 |
| Heptachlor epoxide | U | | 0.00161 | 0.0200 |
| Hexachlorobenzene | U | | 0.00124 | 0.0200 |
| Methoxychlor | U | | 0.00178 | 0.0200 |
| Chlordane | U | | 0.0390 | 0.200 |
| Toxaphene | U | | 0.0360 | 0.400 |
| *(S) Decachlorobiphenyl* | *63.2* | | | *10.0-135* |
| *(S) Tetrachloro-m-xylene* | *64.7* | | | *10.0-139* |

## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3370599-1 12/20/18 23:30 • (LCSD) R3370599-2 12/20/18 23:45

| Analyte | Spike Amount mg/kg | LCS Result mg/kg | LCSD Result mg/kg | LCS Rec. % | LCSD Rec. % | Rec. Limits % | LCS Qualifier | LCSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 0.0666 | 0.0471 | 0.0428 | 70.7 | 64.3 | 34.0-136 | | | 9.57 | 38 |
| Alpha BHC | 0.0666 | 0.0516 | 0.0471 | 77.5 | 70.7 | 34.0-139 | | | 9.12 | 38 |
| Beta BHC | 0.0666 | 0.0470 | 0.0437 | 70.6 | 65.6 | 34.0-133 | | | 7.28 | 37 |
| Delta BHC | 0.0666 | 0.0489 | 0.0445 | 73.4 | 66.8 | 34.0-135 | | | 9.42 | 38 |
| Gamma BHC | 0.0666 | 0.0507 | 0.0465 | 76.1 | 69.8 | 34.0-136 | | | 8.64 | 38 |
| 4,4-DDD | 0.0666 | 0.0458 | 0.0415 | 68.8 | 62.3 | 33.0-141 | | | 9.85 | 39 |
| 4,4-DDE | 0.0666 | 0.0461 | 0.0421 | 69.2 | 63.2 | 34.0-134 | | | 9.07 | 38 |
| 4,4-DDT | 0.0666 | 0.0501 | 0.0454 | 75.2 | 68.2 | 30.0-143 | | | 9.84 | 40 |
| Dieldrin | 0.0666 | 0.0473 | 0.0430 | 71.0 | 64.6 | 35.0-137 | | | 9.52 | 37 |
| Endosulfan I | 0.0666 | 0.0444 | 0.0409 | 66.7 | 61.4 | 34.0-134 | | | 8.21 | 37 |

# QUALITY CONTROL SUMMARY

L1053387-12





## Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3370599-1 12/20/18 23:30 • (LCSD) R3370599-2 12/20/18 23:45

| Analyte | Spike Amount mg/kg | LCS Result mg/kg | LCSD Result mg/kg | LCS Rec. % | LCSD Rec. % | Rec. Limits % | LCS Qualifier | LCSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|
| Endosulfan II | 0.0666 | 0.0421 | 0.0383 | 63.2 | 57.5 | 35.0-132 | | | 9.45 | 38 |
| Endosulfan sulfate | 0.0666 | 0.0464 | 0.0423 | 69.7 | 63.5 | 35.0-132 | | | 9.24 | 37 |
| Endrin | 0.0666 | 0.0503 | 0.0455 | 75.5 | 68.3 | 34.0-137 | | | 10.0 | 37 |
| Endrin aldehyde | 0.0666 | 0.0427 | 0.0392 | 64.1 | 58.9 | 23.0-121 | | | 8.55 | 39 |
| Endrin ketone | 0.0666 | 0.0445 | 0.0407 | 66.8 | 61.1 | 35.0-144 | | | 8.92 | 37 |
| Heptachlor | 0.0666 | 0.0532 | 0.0479 | 79.9 | 71.9 | 36.0-141 | | | 10.5 | 37 |
| Heptachlor epoxide | 0.0666 | 0.0464 | 0.0428 | 69.7 | 64.3 | 36.0-134 | | | 8.07 | 37 |
| Hexachlorobenzene | 0.0666 | 0.0480 | 0.0456 | 72.1 | 68.5 | 33.0-129 | | | 5.13 | 37 |
| Methoxychlor | 0.0666 | 0.0484 | 0.0439 | 72.7 | 65.9 | 28.0-150 | | | 9.75 | 38 |
| *(S) Decachlorobiphenyl* | | | | *69.5* | *66.5* | *10.0-135* | | | | |
| *(S) Tetrachloro-m-xylene* | | | | *71.6* | *68.2* | *10.0-139* | | | | |

## L1053387-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1053387-12 12/21/18 00:15 • (MS) R3370599-4 12/21/18 00:30 • (MSD) R3370599-5 12/21/18 00:45

| Analyte | Spike Amount (dry) mg/kg | Original Result (dry) mg/kg | MS Result (dry) mg/kg | MSD Result (dry) mg/kg | MS Rec. % | MSD Rec. % | Dilution | Rec. Limits % | MS Qualifier | MSD Qualifier | RPD % | RPD Limits % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 0.0829 | ND | 0.0572 | 0.0600 | 69.1 | 72.4 | 1 | 20.0-135 | | | 4.67 | 37 |
| Alpha BHC | 0.0829 | ND | 0.0621 | 0.0655 | 74.9 | 79.0 | 1 | 27.0-140 | | | 5.27 | 35 |
| Beta BHC | 0.0829 | ND | 0.0556 | 0.0590 | 67.1 | 71.2 | 1 | 23.0-141 | | | 5.86 | 37 |
| Delta BHC | 0.0829 | ND | 0.0559 | 0.0584 | 67.4 | 70.4 | 1 | 21.0-138 | | | 4.36 | 35 |
| Gamma BHC | 0.0829 | ND | 0.0591 | 0.0633 | 71.3 | 76.4 | 1 | 27.0-137 | | | 6.91 | 36 |
| 4,4-DDD | 0.0829 | ND | 0.0565 | 0.0589 | 68.2 | 71.0 | 1 | 15.0-152 | | | 4.10 | 39 |
| 4,4-DDE | 0.0829 | ND | 0.0563 | 0.0590 | 67.9 | 71.2 | 1 | 10.0-152 | | | 4.75 | 40 |
| 4,4-DDT | 0.0829 | ND | 0.0612 | 0.0632 | 73.9 | 76.3 | 1 | 10.0-151 | | | 3.20 | 40 |
| Dieldrin | 0.0829 | ND | 0.0591 | 0.0614 | 71.3 | 74.0 | 1 | 17.0-145 | | | 3.72 | 37 |
| Endosulfan I | 0.0829 | ND | 0.0548 | 0.0572 | 66.1 | 69.1 | 1 | 20.0-137 | | | 4.44 | 36 |
| Endosulfan II | 0.0829 | ND | 0.0512 | 0.0524 | 61.7 | 63.2 | 1 | 15.0-141 | | | 2.40 | 37 |
| Endosulfan sulfate | 0.0829 | ND | 0.0559 | 0.0566 | 67.4 | 68.3 | 1 | 15.0-143 | | | 1.33 | 38 |
| Endrin | 0.0829 | ND | 0.0635 | 0.0656 | 76.6 | 79.1 | 1 | 19.0-143 | | | 3.28 | 37 |
| Endrin aldehyde | 0.0829 | ND | 0.0509 | 0.0514 | 61.4 | 62.0 | 1 | 10.0-139 | | | 0.973 | 40 |
| Endrin ketone | 0.0829 | ND | 0.0539 | 0.0551 | 65.0 | 66.5 | 1 | 17.0-149 | | | 2.28 | 38 |
| Heptachlor | 0.0829 | ND | 0.0660 | 0.0680 | 79.6 | 82.0 | 1 | 22.0-138 | | | 2.97 | 37 |
| Heptachlor epoxide | 0.0829 | ND | 0.0596 | 0.0621 | 71.9 | 74.9 | 1 | 22.0-138 | | | 4.09 | 36 |
| Hexachlorobenzene | 0.0829 | ND | 0.0584 | 0.0616 | 70.4 | 74.3 | 1 | 25.0-126 | | | 5.39 | 35 |
| Methoxychlor | 0.0829 | ND | 0.0622 | 0.0625 | 75.1 | 75.4 | 1 | 10.0-159 | | | 0.399 | 40 |
| *(S) Decachlorobiphenyl* | | | | | *61.0* | *64.1* | | *10.0-135* | | | | |
| *(S) Tetrachloro-m-xylene* | | | | | *65.6* | *69.1* | | *10.0-139* | | | | |

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

## Abbreviations and Definitions

| | |
|---|---|
| (dry) | Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils]. |
| MDL | Method Detection Limit. |
| ND | Not detected at the Reporting Limit (or MDL where applicable). |
| RDL | Reported Detection Limit. |
| RDL (dry) | Reported Detection Limit. |
| Rec. | Recovery. |
| RPD | Relative Percent Difference. |
| SDG | Sample Delivery Group. |
| (S) | Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media. |
| U | Not detected at the Reporting Limit (or MDL where applicable). |
| Analyte | The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported. |
| Dilution | If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor. |
| Limits | These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges. |
| Original Sample | The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG. |
| Qualifier | This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable. |
| Result | The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte. |
| Uncertainty (Radiochemistry) | Confidence level of 2 sigma. |
| Case Narrative (Cn) | A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report. |
| Quality Control Summary (Qc) | This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material. |
| Sample Chain of Custody (Sc) | This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis. |
| Sample Results (Sr) | This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported. |
| Sample Summary (Ss) | This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis. |

| Qualifier | Description |
|---|---|
| J | The identification of the analyte is acceptable; the reported value is an estimate. |

# ACCREDITATIONS & LOCATIONS

ONE LAB. NATIONWIDE.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.



## State Accreditations

| | | | |
|---|---|---|---|
| Alabama | 40660 | Nebraska | NE-OS-15-05 |
| Alaska | 17-026 | Nevada | TN-03-2002-34 |
| Arizona | AZ0612 | New Hampshire | 2975 |
| Arkansas | 88-0469 | New Jersey–NELAP | TN002 |
| California | 2932 | New Mexico [1] | n/a |
| Colorado | TN00003 | New York | 11742 |
| Connecticut | PH-0197 | North Carolina | Env375 |
| Florida | E87487 | North Carolina [1] | DW21704 |
| Georgia | NELAP | North Carolina [3] | 41 |
| Georgia [1] | 923 | North Dakota | R-140 |
| Idaho | TN00003 | Ohio–VAP | CL0069 |
| Illinois | 200008 | Oklahoma | 9915 |
| Indiana | C-TN-01 | Oregon | TN200002 |
| Iowa | 364 | Pennsylvania | 68-02979 |
| Kansas | E-10277 | Rhode Island | LAO00356 |
| Kentucky [1 6] | 90010 | South Carolina | 84004 |
| Kentucky [2] | 16 | South Dakota | n/a |
| Louisiana | AI30792 | Tennessee [1 4] | 2006 |
| Louisiana [1] | LA180010 | Texas | T 104704245-17-14 |
| Maine | TN0002 | Texas [5] | LAB0152 |
| Maryland | 324 | Utah | TN00003 |
| Massachusetts | M-TN003 | Vermont | VT2006 |
| Michigan | 9958 | Virginia | 460132 |
| Minnesota | 047-999-395 | Washington | C847 |
| Mississippi | TN00003 | West Virginia | 233 |
| Missouri | 340 | Wisconsin | 9980939910 |
| Montana | CERT0086 | Wyoming | A2LA |

## Third Party Federal Accreditations

| | | | |
|---|---|---|---|
| A2LA – ISO 17025 | 1461.01 | AIHA-LAP,LLC EMLAP | 100789 |
| A2LA – ISO 17025 [5] | 1461.02 | DOD | 1461.01 |
| Canada | 1461.01 | USDA | P330-15-00234 |
| EPA–Crypto | TN00003 | | |

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

## Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.

PBS Engineering & Env.- WA

00 Bradley Blvd
uite 106
ichland WA 99352

eport to:
ngela McGuire

Billing Information:
Accounts Payable- Stephanie Price
400 Bradley Blvd., Ste. 300
Richland, WA 99352

Email To: angela.mcguire@pbsusa.com

roject
escription: Richland Orchards

City/State Collected: Richland WA

hone: 509-942-1600
ax:

Client Project # 66150

Lab Project # PBSENGRWA-66150

ollected by (print): Angela McGuire

Site/Facility ID # —

P.O. # —

ollected by (signature):

Quote # —

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*Rush?* (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: Standard

Analysis / Container / Preservative

Pres Chk

Chain of Custody Page ___ of ___

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Fax: 615-758-5859

L# L1053387

Ta D101

Acctnum: PBSENGRWA
Template: T143625
Prelogin: P683272
TSR: 110 - Brian Ford
PB:
Shipped Via:

| Sample ID | Comp/Grab | Matrix * | Depth | Date | Time | No. of Ctrs | As Pb 6010 4ozClr-NoPres | OCPs (SV8081) 4ozClr-NoPres | Remarks | Sample # (lab only) |
|---|---|---|---|---|---|---|---|---|---|---|
| SS-1-6 | Grab | SS | 0.5' | 12/12/18 | 10:11 | 2 | X | X | | |
| SS-2-6 | | SS | | | 10:44 | | X | X | | -01 |
| SS-3-6 | | SS | | | 11:10 | | X | X | | -02 |
| SS-4-6 | | SS | | | 11:25 | | X | X | | -03 |
| SS-5-6 | | SS | | | 11:37 | | X | X | | -04 |
| SS-6-6 | | SS | | | 11:48 | | X | X | | -05 |
| SS-7-6 | | SS | | | 12:43 | | X | X | | -06 |
| SS-8-6 | | SS | | | 12:51 | | X | X | | -07 |
| SS-9-6 | | SS | | | 13:03 | | X | X | | -08 |
| SS-10-6 | | SS | | | 13:17 | | X | X | | -09 |
| | | | | | | | | | | -10 |

Matrix:
S - Soil AIR - Air F - Filter
W - Groundwater B - Bioassay
WW - WasteWater
W - Drinking Water
T - Other ___

Remarks:

pH ___ Temp ___
Flow ___ Other ___

Samples returned via:
__ UPS __ FedEx __ Courier ___

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD SCREEN: <0.5 mR/hr

| Relinquished by: (Signature) | Date: | Time: | Received by: (Signature) | Trip Blank Received: Yes / (No) HCL / MeoH TBR |
|---|---|---|---|---|
| Angela McGuire PBS | 12/13/18 | 15:00 | FedEx 4686 6470 3047 | |
| Relinquished by: (Signature) | Date: | Time: | Received by: (Signature) | Temp: +0.5 °C Bottles Received: 1.41.7 ~ 40 40z |
| Relinquished by: (Signature) | Date: | Time: | Received for lab by: (Signature) | Date: 12/14/18 Time: 0830 |

If preservation required by Login: Date/Time

Hold:

Condition: NCF / (OK)

**BS Engineering & Env.- WA**

00 Bradley Blvd
uite 106
ichland, WA 99352

eport to:
ngela McGuire

Billing Information:
**Accounts Payable- Stephanie Price**
**400 Bradley Blvd., Ste. 300**
**Richland, WA 99352**

Email To: angela.mcguire@pbsusa.com

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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L# L1053387

Table #

Acctnum: PBSENGRWA
Template: T143625
Prelogin: P683272
TSR: 110 - Brian Ford
PB:
Shipped Via:

roject
escription: Richland Orchards

City/State Collected: Richland WA

hone: 509-942-1600
ax:

Client Project # 66150

Lab Project # PBSENGRWA-66150

ollected by (print): Angela McGuire

Site/Facility ID # —

P.O. # —

ollected by (signature):

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*Rush?* (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day Standard

Quote # —

Date Results Needed

| Sample ID | Comp/Grab | Matrix * | Depth | Date | Time | No. of Cntrs | As Pb 6010 4ozClr-NoPres | OCPs (SV8081) 4ozClr-NoPres | Remarks | Sample # (lab only) |
|---|---|---|---|---|---|---|---|---|---|---|
| SS-11-6 | Grab | SS | 0.5' | 12/12/18 | 1327 | 2 | X | X | | -11 |
| SS-12-6 | | SS | | 12/12/18 | 1338 | | X | X | | -12 |
| SS-13-6 | | SS | | 12/12/18 | 1418 | | X | X | | -13 |
| SS-14-6 | | SS | | 12/12/18 | 1428 | | X | X | | -14 |
| SS-15-6 | | SS | | 12/12/18 | 1438 | | X | X | | -15 |
| SS-16-6 | | SS | | 12/12/18 | 1450 | | X | X | | -16 |
| SS-17-6 | | SS | | 12/12/18 | 1501 | | X | X | | -17 |
| SS-18-6 | | SS | | 12/12/18 | 1508 | | X | X | | -18 |
| SS-19-6 | | SS | | 12/13/18 | 1023 | | X | X | | -19 |
| SS-20-6 | | SS | | 12/13/18 | 1046 | | X | X | | -20 |

Matrix:
S - Soil AIR - Air F - Filter
W - Groundwater B - Bioassay
WW - WasteWater
W - Drinking Water
T - Other _____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD SCREEN: <0.5 mR/hr

| Relinquished by : (Signature) | Date: | Time: | Received by: (Signature) | Trip Blank Received: Yes / No HCL / MeoH TBR | If preservation required by Login: Date/Time |
|---|---|---|---|---|---|
| PBS | 12/13/18 | 15:00 | FedEx 4686 6470 3047 | | |
| Relinquished by : (Signature) | Date: | Time: | Received by: (Signature) | Temp: 0.3 °C Bottles Received: 1.4 / 1.7 % 40 4oz | |
| Relinquished by : (Signature) | Date: | Time: | Received for lab by: (Signature) | Date: 12/14/18 Time: 0830 | Hold: Condition: NCF / OK |

Exhibit 6

ORDINANCE NO. 38-19

AN ORDINANCE of the City of Richland, Washington adopting the 2018-2019 Comprehensive Plan Amendments into the existing 2017 Comprehensive Plan and adopting the resulting document.

WHEREAS, through City of Richland Ordinance No. 42-17, the City adopted the Comprehensive Plan of the City of Richland (the Comprehensive Plan); and

WHEREAS, pursuant to RCW 36.70A.470(2), each city and county planning under RCW 36.70A.040 must include in its development regulations a procedure for any interested person, including applicants, citizens, hearing examiners, and staff of other agencies, to suggest plan or development regulation amendments; and

WHEREAS, the suggested amendments shall be docketed and considered on at least an annual basis, consistent with the provisions of RCW 36.70A.130; and

WHEREAS, Chapter 19.90 of the Richland Municipal Code, titled Comprehensive Plan and Development Regulation Amendments, establishes the procedures as required by RCW 36.70.A.470(2); and

WHEREAS, the City of Richland accepted applications suggesting comprehensive plan or development regulation amendments between January 1, 2018 and March 1, 2019; and

WHEREAS, a total of eight (8) proposed amendments were received, consisting of five (5) complete private applications for map amendments, two (2) City-initiated map amendments and one (1) City-initiated text amendment as identified in **Exhibit A**; and

WHEREAS, on April 23, 2019, Richland City Council held a workshop to review the proposed 2018-2019 Comprehensive Plan Policies, Maps and Zoning Code Amendments Docket; and

WHEREAS, on May 21, 2019, Richland City Council passed Resolution No. 66-19 authorizing the 2018-2019 Comprehensive Plan Policies, Maps and Zoning Code Amendments Docket; and

WHEREAS, the City of Richland Planning Commission held a workshop on June 12, 2019 to review the 2018-2019 Comprehensive Plan Policies, Maps and Zoning Code Amendments Docket; and

WHEREAS, the Planning Commission held a duly advertised public hearing on June 26, 2019 to accept testimony from anyone wishing to speak for or against the proposed changes; and

WHEREAS, the Planning Commission continued the public hearing to July 24, 2019 in order to deliberate on the proposed changes prior to making a formal recommendation to Richland City Council; and

WHEREAS, on July 24, 2019, the Richland Planning Commission voted to accept staff's suggested findings, conclusions and recommendations on the proposed amendments as evidenced in the Planning Commission's adopted meeting minutes; and

WHEREAS, on September 17, 2019, Richland City Council held a public hearing to consider the proposed amendments and the recommendation of the Planning Commission. All testimony from anyone wishing to speak for or against the changes was accepted, after which Council deliberated on the proposed changes; and

WHEREAS, the Richland City Council finds it prudent to adopt the updated 2018-2019 Comprehensive Plan of the City of Richland by ordinance.

NOW, THEREFORE, BE IT ORDAINED by the City of Richland as follows:

Section 1. The recitals and findings set forth above are hereby incorporated by reference.

Section 2. Richland City Council acknowledges that the Planning Commission conducted appropriate investigation and study and held a public hearing on the proposed amendments to the Comprehensive Plan. Council hereby approves the eight (8) proposed amendments to the Comprehensive Plan map and text. The Council has read and considered the Commission's findings, and hereby makes the following findings for the record:

1. Chapter 19.90 RMC provides that City Council will consider each comprehensive plan amendment and forward those selected to the Planning Commission for processing. Plan amendment applications may be submitted via private application and/or proposed by staff or Council.

2. The deadline for submittal of private party applications for consideration as part of the 2018-2019 Comprehensive Plan Policies, Maps and Code Amendments Docket was March 1, 2019.

3. Five (5) private party applications were received and deemed complete.

4. Three (3) city-initiated applications were received and deemed complete.

5. City Council held a Council workshop on April 23, 2019 to review the 2018-2019 Comprehensive Plan Policies, Maps and Code Amendments Docket.

6. On May 21, 2019, Richland City Council established the 2018-2019 Comprehensive Plan Policies, Maps and Code Amendments Docket by adoption of Resolution No. 66-19.

7. On June 5, 2019, notice of a public hearing to be held on June 26, 2019 was sent to property owners within 300 feet of each parcel affected by the proposed comprehensive plan map and zoning map changes.

8. On June 5, 2019, pursuant to RCW 36.70A.106, the City of Richland provided to the State of Washington the required sixty (60) day notification of the City's proposed Comprehensive Plan Policies, Maps and Code Amendments Docket and intent to adopt.

9. On June 5, 2019, a Notice of Public Hearing was posted at the City Hall and on the City website.

10. On June 9, 2019, a Notice of Public Hearing was published in the Tri-City Herald, the official newspaper of the City of Richland.

11. Public hearing notice signs were posted on or near each of the five (5) properties associated with the private party applications submitted for consideration. A public hearing notice sign was also posted at the location of the City-initiated application at the intersection of Stevens Drive and Jadwin Avenue.

12. All public notification requirements for the public workshops and public hearings were met.

13. On June 12, 2019, the Planning Commission conducted a workshop to review the 2018-2019 Comprehensive Plan Policies, Maps and Code Amendments Docket.

14. On June 21, 2019, the Richland Development Services Department issued a SEPA Threshold Determination of Non-Significance (DNS) for the actions listed on the proposed 2018-2019 Comprehensive Plan Policies, Maps and Code Amendments Docket. The SEPA Threshold Determination of Non-Significance was issued after utilizing the Optional DNS Method.

15. CPA 2018-102 and Z2018-105 consist of an application to change the land use designation on approximately two (2) acres from undetermined/undesignated to Parks & Public Facilities (Parks & Public Facilities Zoning District) on property located at the intersection of SR-240 and Stevens Drive.

16. CPA2018-103 consists of an application to change the land use designation on approximately 1.99 acres from Developed Open Space to Medium-Density Residential. The property is located at the southwest corner of the intersection of Clubhouse Lane and River Valley Drive in the Horn Rapids Golf Community (northern portion of the existing parking lot for the Horn Rapids Golf Course).

17. CPA2018-104 consists of a request submitted by the City of Richland Fire & Emergency Services Department to amend Capital Facilities Goal 12 (Re-label current Policy 3 to Policy 4 and add a new Policy 3).

18. CPA2019-101 and Z2019-101 consist of an application filed by Bethel Church to change the land use designation on approximately ten (10) acres from Low-Density Residential to High-Density Residential, and to change the zoning district from Low-Density Residential R-1-12 to High-Density Residential R-3. The property is located north of Shockley Road immediately west of the existing Bethel Church.

19. CPA2019-102 and Z2019-102 consist of an application filed by North Stone Richland, LLC to change the land use designation from Low-Density Residential to Medium-Density Residential, and to change the zoning district from Low-Density Residential R-1-10 and Medium-Density Residential R-2 to Medium-Density Residential R-2S on approximately 54.40 acres. The property is located within an undeveloped area of Horn Rapids west of the 4th hole fairway.

20. CPA2019-103 and Z2019-103 consist of an application filed by Tim Bush to change the land use designation on approximately 1.8 acres from Developed Open Space to High-Density Residential, and change the zoning district from Parks & Public Facilities (PPF) to Multiple Family Residential R-3. The property is located north of Dupertail Street immediately east of 412 Thayer Drive.

21. CPA2019-104 and Z2019-104 consist of an application filed by Tim Bush, Lot 4 to change the land use designation on approximately 2 acres from Developed Open Space to Commercial and change the zoning district from Parks & Public Facilities to Retail Business C-2. The property is located south of Lawless Drive immediately west of Fred Meyer.

22. CPA2019-104 & Z2019-105 consist of an application filed by the City of Richland to change land use designations and zoning districts on portions of City-owned properties located at Leslie Grove Park, Howard Amon Park, Amon Preserve and W.E. Johnson Park.

23. Based upon the application materials submitted and presentations by the applicants, the proposed amendments will not adversely impact the City's ability to provide sewer and water, and will not adversely affect adopted levels of service standards for other public facilities and services such as parks, police, fire, emergency medical services and governmental services.

24. Adequate infrastructure, facilities and services are available to serve the proposed or potential development expected as a result of these amendments.

25. The proposed amendments are consistent with the goals, policies and objectives of the Comprehensive Plan of the City of Richland.

26. The proposed comprehensive plan amendments will not result in probable significant adverse impacts to the transportation network, capital facilities, utilities, parks, or environmental features.

27. The subject parcels being re-designated are physically suitable for the allowed land uses in the designations being requested.

28. The proposed amendments are consistent with the Washington State Growth Management Act, the Benton County planning policies and other applicable local and state policies, agreements, and laws.

29. The proposed amendments will not have a cumulative adverse effect on the planning area.

30. The City-initiated comprehensive plan amendments are primarily house-keeping in nature and are consistent with the goals and intent of the Comprehensive Plan of the City of Richland.

31. The State of Washington's Growth Management Act requires that comprehensive plans be effectuated by various development regulations such as subdivision regulations, critical areas and zoning. Proposed Ordinance No. 39-19 will give effect to the comprehensive plan amendments approved by this action.

32. The proposed area-wide rezoning of the properties in question is dependent upon a change in the land-use designation of the Comprehensive Plan of the City of Richland.

33. The Planning Commission recommends approval of an area-wide rezone in order to bring the zoning into compliance with the change of land-use designations authorized by the passage of the five (5) private party applications and the City-initiated actions (i.e., the map amendments).

Section 3. The 2018-2019 amendments to the 2017 Richland Comprehensive Plan as identified in **Exhibit A** and depicted in **Exhibit B** are hereby adopted and incorporated into the Comprehensive Plan of the City of Richland, which is adopted in its entirety by this Ordinance No. 38-19 and set forth in **Exhibit C**.

Section 4. Richland Municipal Code Section 23.01.030, entitled Plan adopted, as first enacted by Ordinance No. 28-05 and last amended by Ordinance No. 42-17, is hereby amended to read as follows:

**23.01.030 Plan adopted.**
There is hereby adopted as a current and flexible guide to coordinate the public and private development of property and other resources of the city of Richland that certain comprehensive plan adopted by the Richland city council on October 6, 1997, ~~and~~ amended on December 14, 1998, December 7, 1999, December 19, 2000, October 16, 2001, December 2, 2002, December 3, 2003, December 7, 2004, December 6, 2005,

December 19, 2006, December 4, 2007, December 2, 2008, November 17, 2009, August 3, 2010, November 16, 2010, November 27, 2012, November 19, 2013, November 18, 2014, December 1, 2015, and November 15, 2016, ~~and~~ updated as required by law on October 3, 2017, and amended on October 1, 2019, which is on file with the city clerk and consists of general goals and policies relating to economic development, land use, transportation, utilities, capital facilities and housing, and also includes a revised urban growth boundary land use plan map.

Section 5. All prior versions and of the Comprehensive Plan of the City of Richland are hereby repealed.

Section 6. Pursuant to RCW 36.70A.106(2), this ordinance shall be transmitted to the Washington State Department of Commerce within ten (10) days of adoption.

Section 7. The provisions of this ordinance are declared separate and severable. If any section, paragraph, subsection, clause or phrase of this ordinance is for any reason held to be unconstitutional or invalid, such decision shall not affect the validity of the remaining portion of this ordinance.

Section 8. This ordinance shall take effect the day following its publication in the official newspaper of the City of Richland.

Section 9. The City Clerk and the codifiers of this ordinance are authorized to make necessary corrections to this ordinance, including but not limited to the correction of scrivener's errors/clerical errors, section numbering, references, or similar mistakes of form.

PASSED by the City Council of the City of Richland, Washington, at a regular meeting on the 1st day of October, 2019.

ROBERT J. THOMPSON
Mayor

ATTEST:

TONI FULTON, Acting Deputy City Clerk

APPROVED AS TO FORM:

HEATHER KINTZLEY, City Attorney

Date Published: October 6, 2019

**EXHIBIT A to Ordinance No. 38-19**

# 2018/2019 DOCKET

**File Number: CPA2018-102 & Z2018-105**
**Applicant: City of Richland Fire Department**

The Richland Fire Department is proposing to amend the Land Use Map from undesignated to Public Facility with a concurrent rezone from undesignated to Parks & Public Facilities for a single parcel of 2.05 acres located at the intersection of Stevens and SR 240 (Parcel Number 134081000029000).

**File Number: CPA 2018-103**
**Applicant: Rew (HJBT Properties, LLC)**

The applicants are proposing to amend the Land Use Map from Developed Open Space (DOS) to Medium Density Residential (MDR) for a portion of property consisting of approximately 1.99 acres located immediately south of the Horn Rapids Golf Course Clubhouse (Parcel Number 128082000001005).

**File Number: CPA2019-101 & Z2019-101**
**Applicant: Bethel Church**

The applicants are proposing to amend the Land Use Map from Low Density Residential (LDR) to High Density Residential (HDR) with a concurrent rezone from Low Density Residential R-1-12 to High Density Residential – R3 for two parcels totaling approximately 10.25 acres located on the north side of Shockley Boulevard and west of the existing Bethel Church (Parcel Numbers 122983000006002 & 122983000006003).

**File Number: CPA2019-102 & Z2019-102**
**Applicant: North Stone Development (Stewart Stone)**

The applicant is proposing to amend the Land Use Map from Low Density Residential (LDR) to Medium Density Residential (MDR) with a concurrent rezone from Low Density Residential R-1-10 and Medium Density Residential R-2 to Medium Density Residential R-2S upon a portion of property totaling approximately 54.40 acres (Parcel Number 120083000009010).

**File Number: CPA2019-103 & Z2019-103**
**Applicant: Tim Bush**

The applicant is proposing to amend the Land Use Map from Developed Open Space (DOS) to High Density Residential (HDR) with a concurrent rezone from Parks & Public Facilities (PPF) to High Density Residential R-3 upon property totaling 1.81 acres located at 1380 Duportail Street (Parcel Number 115981013592002).

**File Number:** **CPA 2019-104 & Z2019-104**
**Applicant:** **Tim Bush**

The applicant is proposing to amend the Land Use Map from Developed Open Space (DOS) to Commercial (C) with a concurrent rezone from Parks & Public Facilities (PPF) to Retail Business (C-2) totaling 2.02 acres located at 1383 Lawless Drive (Parcel Number 115981013592004).

**File Number:** **CPA2019-105 & Z2019-105**
**Applicant:** **City of Richland**

The City of Richland is proposing to perform minor mapping amendments to both the Land Use Map and the Zoning Map as "housekeeping purposes" at the following locations:

1. Leslie Groves Park – Amend Land Use Map by extending the Natural Open Space (NOS) designation north along the riverfront from the existing Natural Open Space (NOS) boundary north to Newcomer Street with a concurrent rezone to Natural Open Space (NOS) (Portion of Parcel Number 111981020624001).
2. Howard Amon Park – Amend Land Use Map from Natural Open Space (NOS) to Developed Open Space (DOS) to match the rest of the developed city park and to be consistent with the existing Parks & Public Facilities (PPF) Zoning (Portion of Parcel Number 013981000000000).
3. Amon Preserve South – Amend the Land Use Map at the south end of the Amon Preserve from Commercial (C) to Natural Open Space (NOS) to be consistent with the existing Natural Open Space (NOS) Zoning (Southern portion of Parcel Number 101882000001003).
4. Amon Preserve East – Amend the Land Use Map upon Parcel Number 101883000002000 from Low Density Residential (LDR) to Natural Open Space (NOS) with a concurrent rezone from Low Density Residential R-1-10 to Natural Open Space (NOS)
5. Amon Preserve North – Amend the Land Use Map from High Density Residential (HDR) to Natural Open Space (NOS) with a concurrent rezone from Multiple Family Residential (R-3) to Natural Open Space (NOS).
6. W.E. Johnson Park – Amend the Land Use Map from Natural Open Space (NOS) to Developed Open Space (DOS) in the area referred to as the "old dump" (Parcel Numbers 104984000013000 & 104984000014000) and change the zoning from Parks & Public Facilities (PPF) to Natural Open Space (NOS) upon land located east and south of the "old dump" to match the existing Land Use Map designation (Parcel Numbers 104984000015000, 109981000004000, 109981000005000, 109981000006000 & 109984000004000).

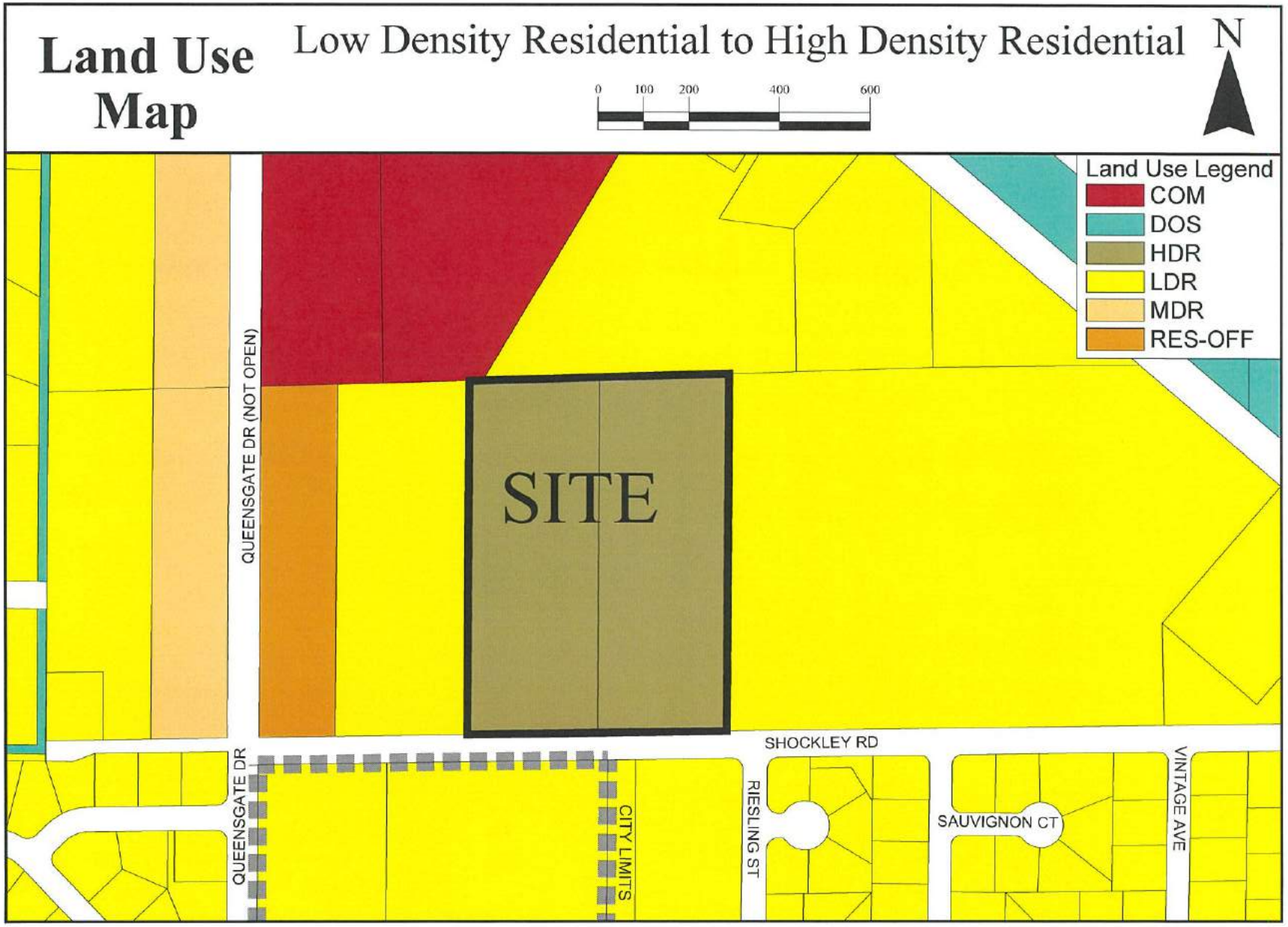
**File Number:** **CPA2018-104**
**Applicant:** **City of Richland Fire Department**

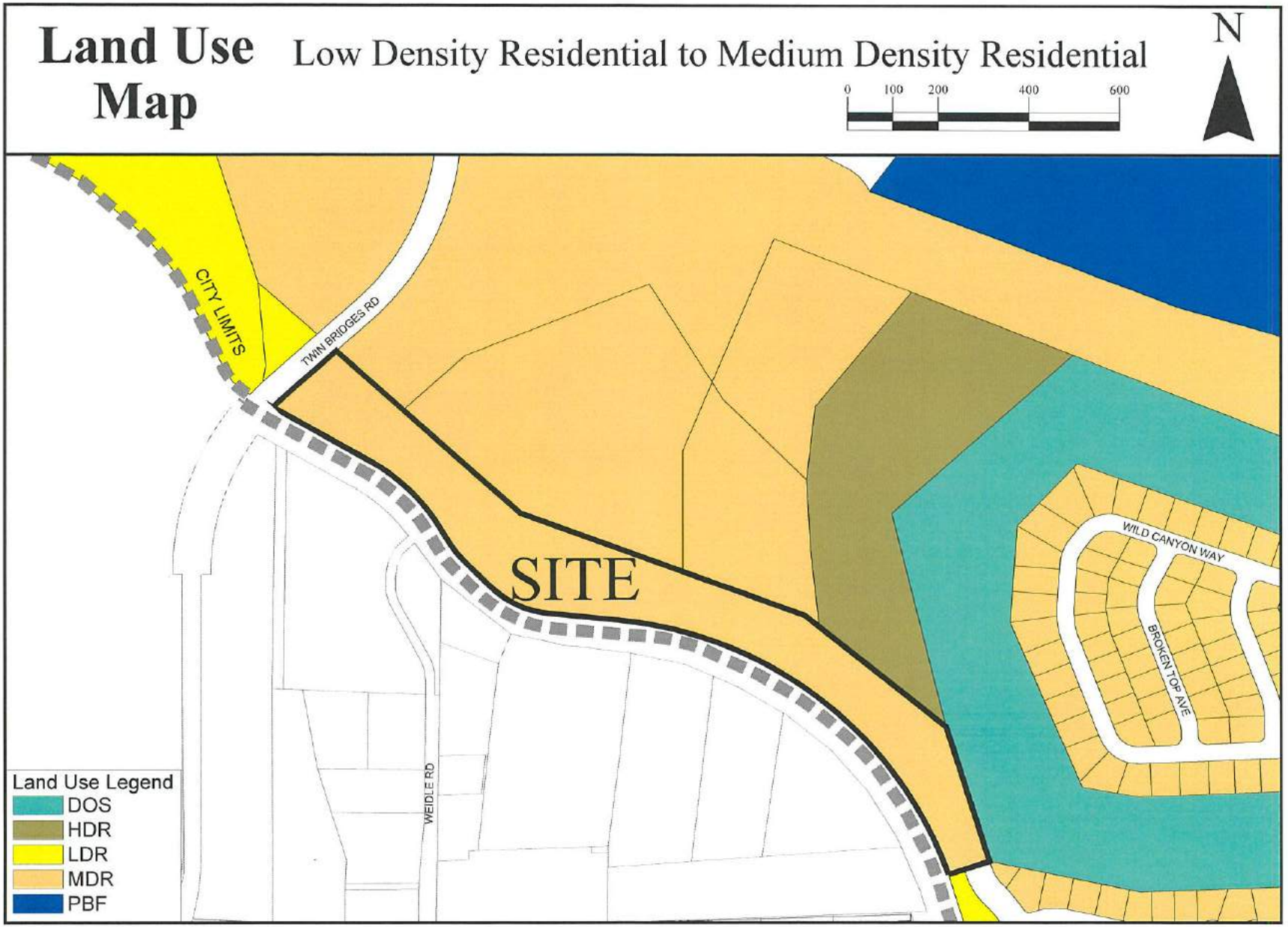
The City of Richland Fire Department is proposing to amend Policy #3 of the Capital Facilities Element and Add a new Policy #4.

Land Use Map
REW
(From DOS to MDR)
N
SR-240
River Park Dr
Kingsgate Way
Clubhouse Ln
SITE
Land Use
Commercial
Developed Open Space
High Density Residential
Medium Density Residential
0 62.5 125 250 375 500 625 Feet

# Land Use Map

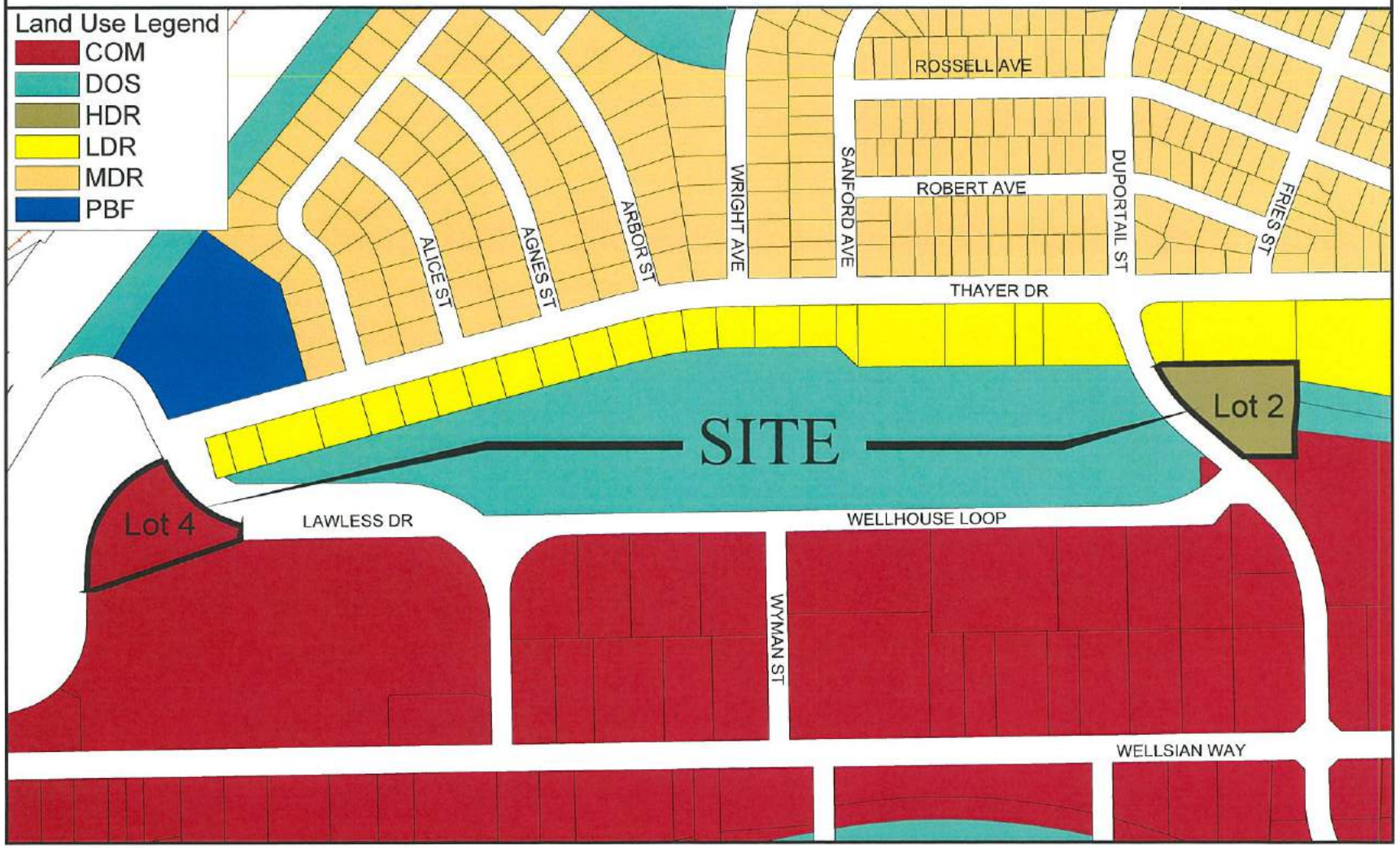
## Low Density Residential to High Density Residential



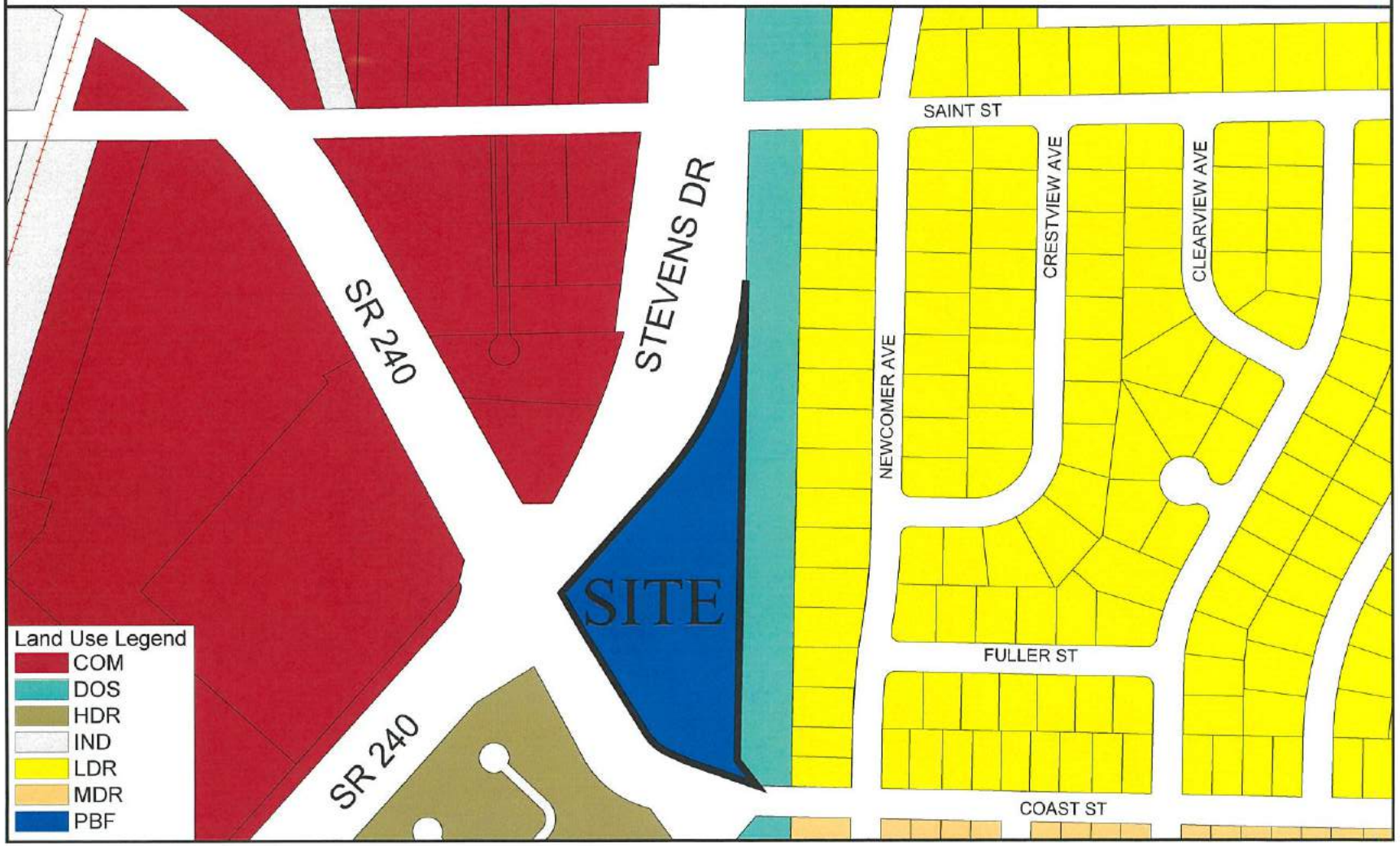

Land Use Map
Low Density Residential to Medium Density Residential
0 100 200 400 600
N
CITY LIMITS
TWIN BRIDGES RD
SITE
WILD CANYON WAY
BROKEN TOP AVE
WEIDLE RD
Land Use Legend
DOS
HDR
LDR
MDR
PBF

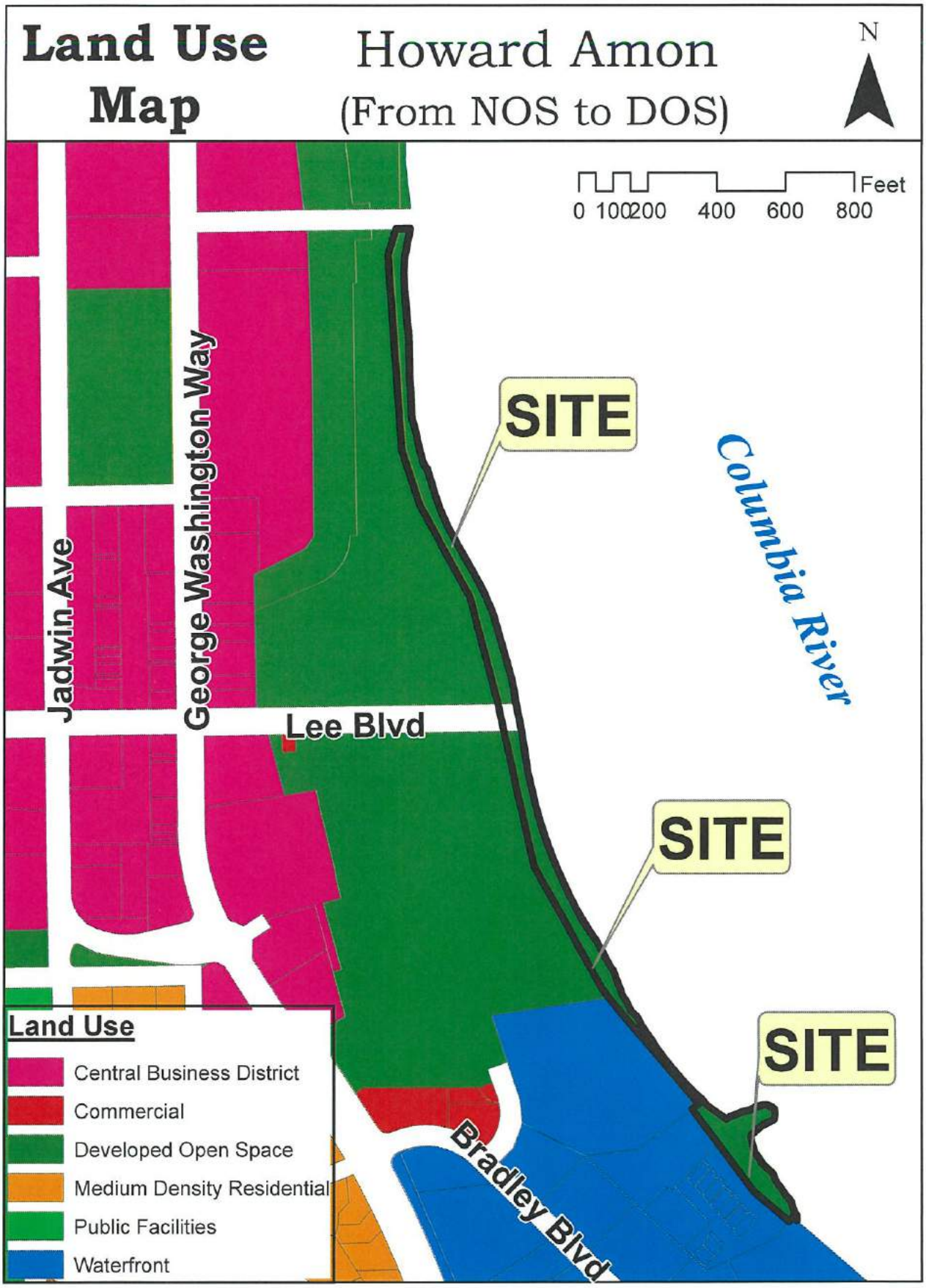
# Land Use Map

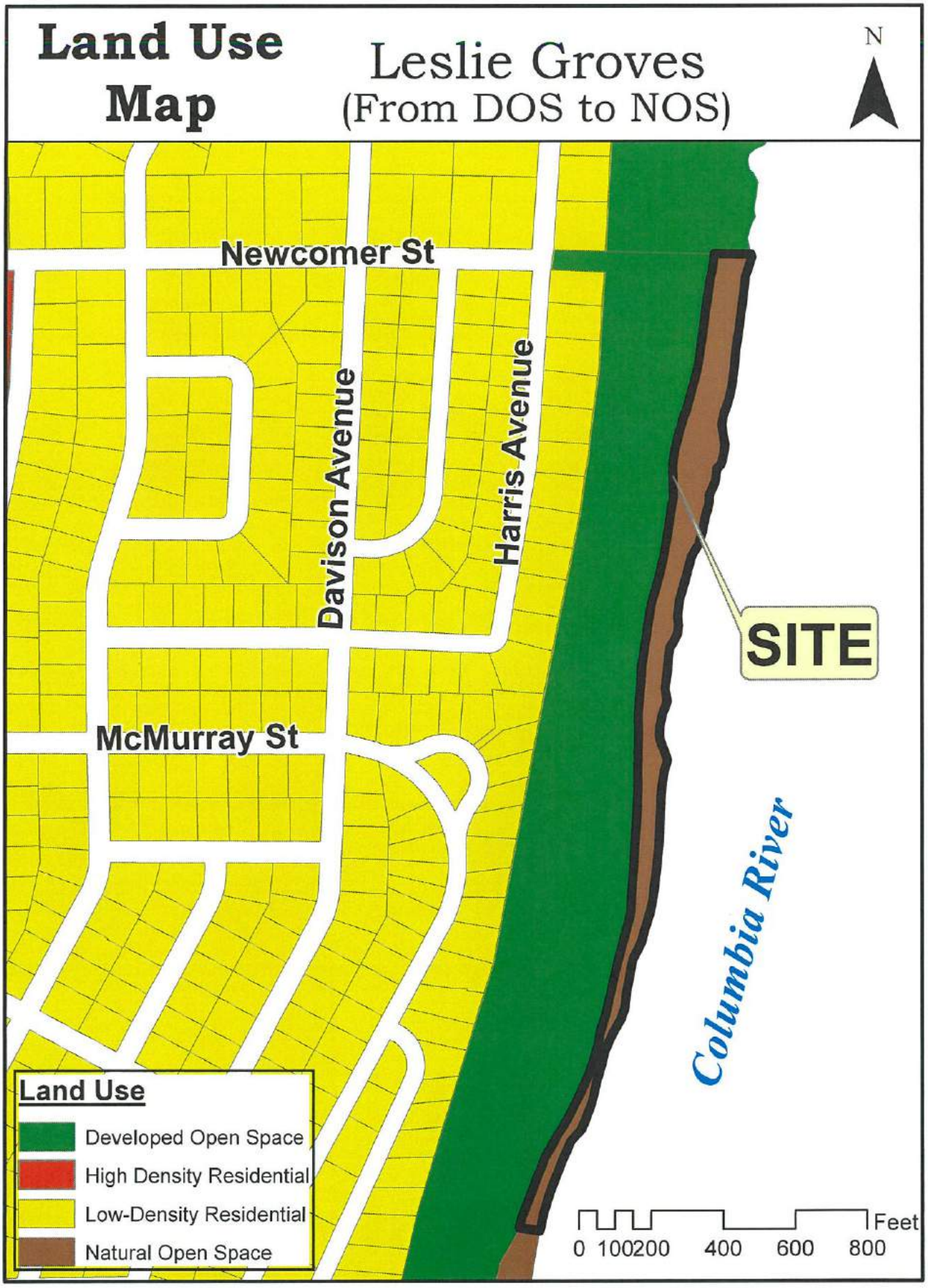
Short Plat #3592 Lot 2 from DOS to High Density Residential
Short Plat #3592 Lot 4 from DOS to Commercial



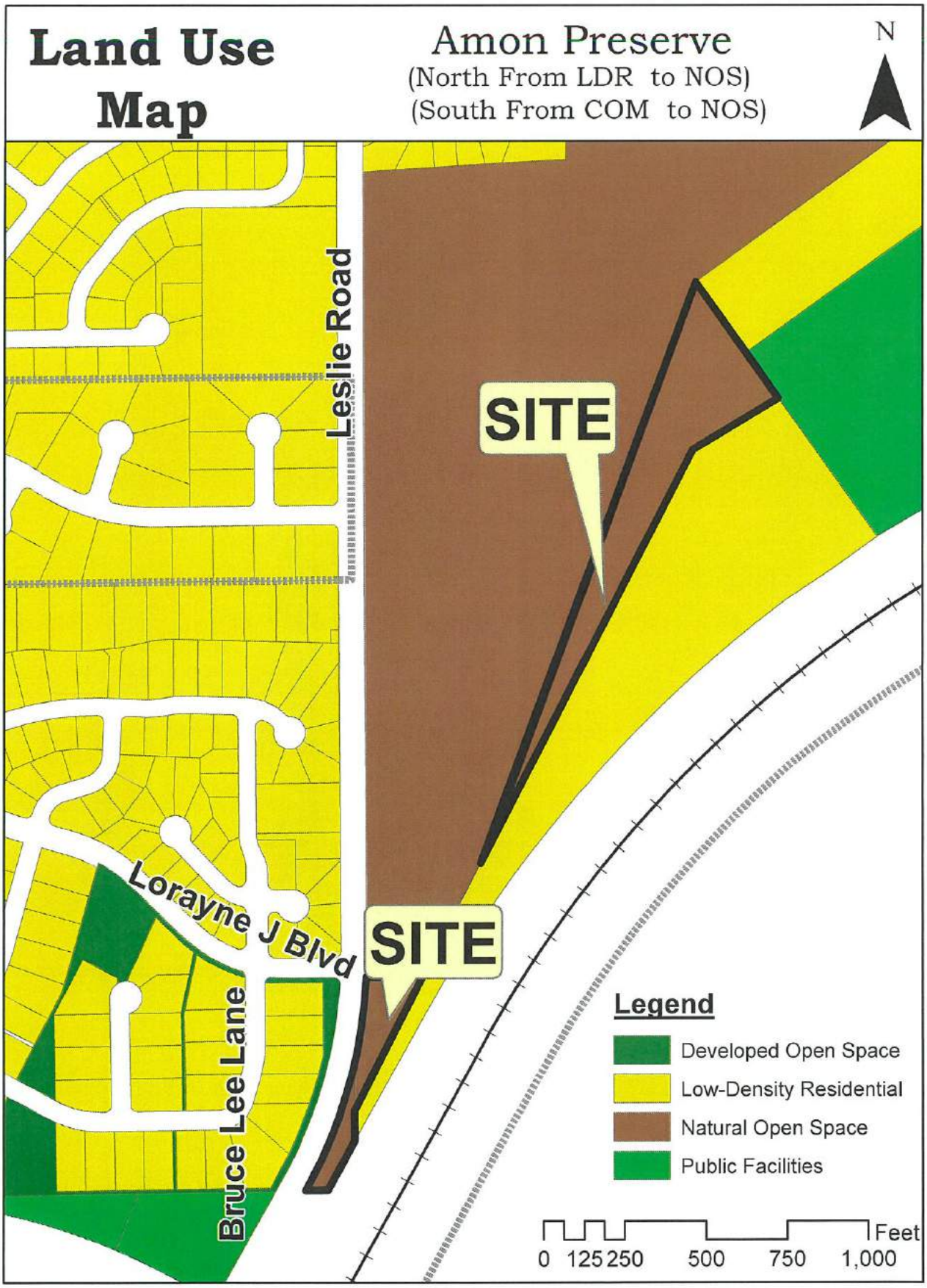
# Land Use Map Assign Parks & Public Facilities Land Use




Land Use Map
Howard Amon
(From NOS to DOS)
N
0 100 200 400 600 800 Feet
SITE
SITE
SITE
Columbia River
Jadwin Ave
George Washington Way
Lee Blvd
Bradley Blvd
Land Use
Central Business District
Commercial
Developed Open Space
Medium Density Residential
Public Facilities
Waterfront

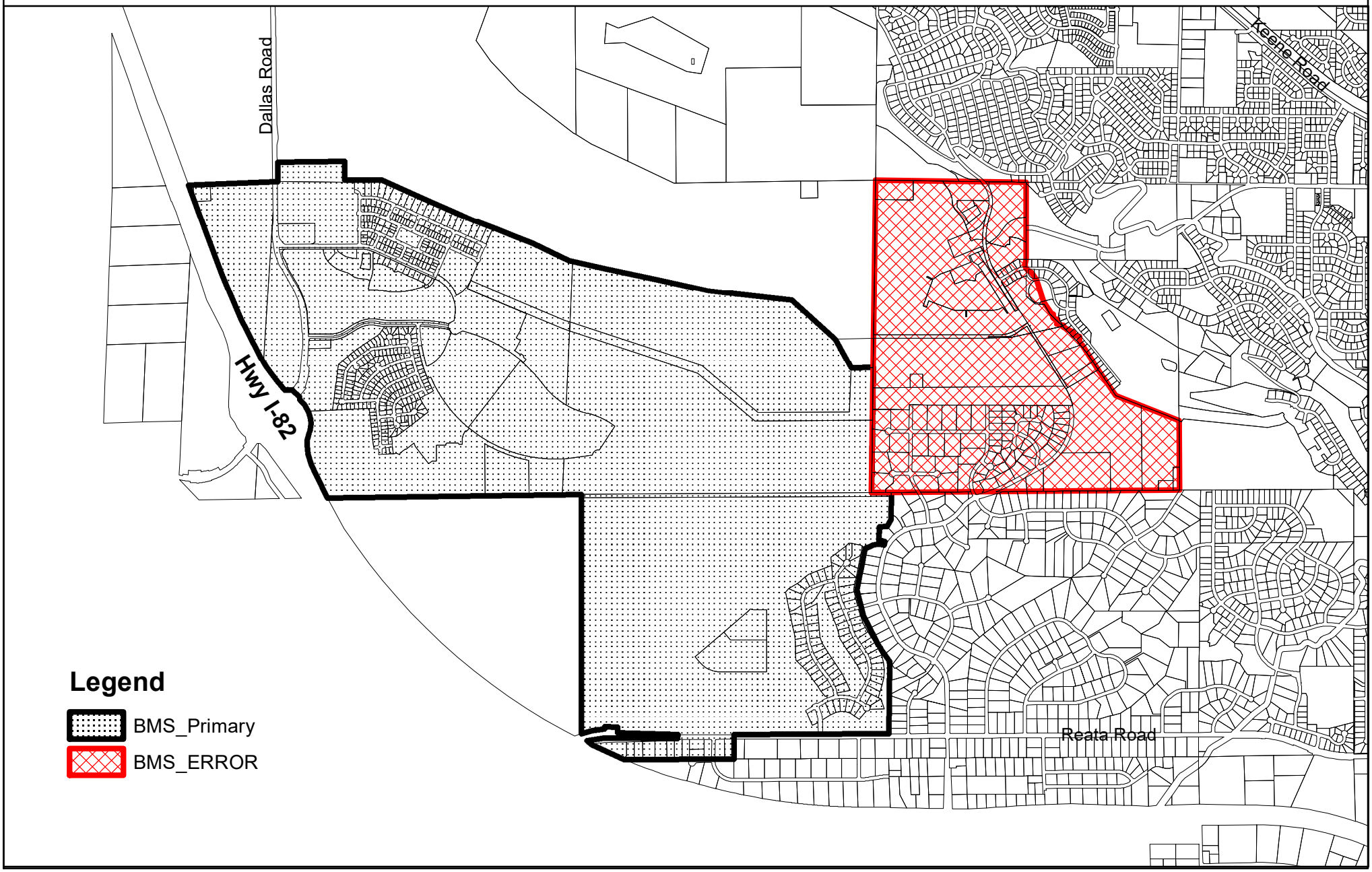

Land Use Map
Leslie Groves
(From DOS to NOS)
N
Newcomer St
Davison Avenue
Harris Avenue
McMurray St
SITE
Columbia River
Land Use
Developed Open Space
High Density Residential
Low-Density Residential
Natural Open Space
0 100200 400 600 800
Feet

Land Use Map
Amon Preserve North
(From MDR to NOS)
N
Broadmoor Street
Eastwood
Piper Street
SITE
Land Use
Developed Open Space
Low-Density Residential
Medium Density Residential
Natural Open Space
Public Facilities
0 75 150 300 450 600
Feet


Land Use Map
Amon Preserve
(North From LDR to NOS)
(South From COM to NOS)
N
Leslie Road
SITE
SITE
Lorayne J Blvd
Bruce Lee Lane
Legend
Developed Open Space
Low-Density Residential
Natural Open Space
Public Facilities
0 125 250 500 750 1,000
Feet

Land Use Map
W.E. Johnson Park
(From NOS to DOS)
N
Van Giesen Street
SITE
Yakima River
Bypass Highway
Land Use
Agriculture
Commercial
Developed Open Space
Low-Density Residential
Natural Open Space
Public Facilities
0 200 400 800 1,200 1,600 2,000
Feet

# Badger Mountain South Sub-Area Plan
# Scrivener's Error Correction



# Exhibit C

# Comprehensive Plan of the City of Richland

# City of Richland

# Comprehensive Plan 2017

# CITY OF RICHLAND
# COMPREHENSIVE PLAN

## 2017 – 2037

October 3, 2017

Updated October 1, 2019

**Prepared for**

City of Richland

**Prepared by**

Oneza & Associates

**Prepared with assistance from**

Anchor QEA

J-U-B Engineers Inc.

ECONorthwest

# ACKNOWLEDGEMENTS

Thank you to the members of our community for valuable input. Thank you also to current and previous City Council Members and Planning Commissioners for your time and effort in the creation of this document and the original plan to build on.

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# INTRODUCTION

### In this chapter, you will find:

- Planning Background: why we plan
  - Growth Management Act (GMA)
  - Benton County Countywide Planning Policies
- Richland Community Profile
- Public Participation Plan
- Comprehensive Plan Framework

## BACKGROUND

The Comprehensive Plan is a basic foundation for local government planning. Richland's Comprehensive Plan acts as a guide for the community's physical development (land use) over the long term that reflects the community's values, activities, and future growth. It guides the City's decisions on land use, transportation, infrastructure, housing, economic development, and the environment.

Cities and other government jurisdictions adopt comprehensive plans to serve as guides for future activities. A comprehensive plan does not carry the weight of law. Rather, it is a policy statement that points the way to a future in which the City of Richland thrives and maintains all the qualities its citizens value. The vision, goals, and policies included in this plan are developed through extensive communication with a wide range of groups and individuals.

### GMA Planning Goals:

- Urban Growth
- Reduce Sprawl
- Transportation
- Housing
- Economic Development
- Protection of Property Rights
- Predictable Permits
- Natural Resource Industries
- Open Space and Recreation
- Environmental Protection
- Citizen Participation and Coordination
- Public Facilities and Services
- Historic Preservation
- Shoreline Management

The City uses the policies in a comprehensive plan as a guide for its future activities, particularly the crafting of ordinances that relate to zoning, land use, and development. The plan provides a consistent framework for legislative and administrative action, always steering the City towards the desired future and away from a patchwork of laws and rules

that conflict with the vision or with one another.

## Growth Management Act

In 1990, the Washington State Legislature adopted the Growth Management Act (GMA), mandating growth to occur within Urban Growth Areas (UGA). Its goals include concentrating development in urban areas to prevent sprawl, encouraging affordable housing, efficient transportation systems and economic development, providing adequate public facilities, and protecting historic and natural resources. It contains additional goals for citizen participation, permit processing, private property rights etc.

Richland developed its first Comprehensive Plan under the GMA guidelines in 1998. The population in Richland has grown at an average rate of two percent each year in the last 20 years. With the plan in place, the City has accomplished many of its planning goals to accommodate growth. This updated Comprehensive Plan will serve as a guideline for the next 10 years under the Growth Management Act. As the City continues to experience steady population and economic growth, delivering public services is key to maintaining this continued growth pattern.

## Benton County Countywide Planning Policies

Managing growth can be ineffective if it is carried out in a patchwork fashion. Therefore, the GMA provides a framework for regional coordination. Counties planning under the GMA should prepare Countywide Planning Policies (CWPP) and establish urban growth areas (UGAs). Cities and the county are required to be consistent with the Countywide Planning Policies in their comprehensive planning.

The Benton County Board of Commissioners adopted the "Benton Countywide Planning Policies" in 2016 (Appendix B). This document establishes policies that the City's Comprehensive Plan follows in addressing everything from transportation to the provision of municipal services to economic development to fiscal considerations.

# COMMUNITY PROFILE

The City of Richland lies at the confluence of the Yakima and Columbia Rivers, in the geographic region known as the Mid-Columbia Basin. Richland and the nearby communities of Pasco and Kennewick are commonly called the Tri-Cities. This Comprehensive Plan looks at the area in Richland from the Hanford Nuclear Reservation on the north, to Kennewick on the south, and from the Columbia River on the east, to the Yakima River and the City of West Richland on the west. The Yakima River delta has shaped the City's growth into two areas, the north and south sides of the City.

Due to its location, Richland enjoys access to water and natural resources. The Columbia and Yakima Rivers provide water for irrigation of nearby farmland as well as for domestic use. They offer a variety of opportunities for the City, such as open spaces, recreation systems, parks, and waterfront developments.

## History

Native Americans lived at the mouth of the Yakima River, which they called the Tapteal, in an area that is known as Richland today.

Richland falls within the Southern Plateau, part of the larger Columbia Plateau culture area. The Yakima-Columbia confluence has a rich archaeological record, with sites in the area attributed to all of the Southern Plateau cultural phases. The area has been "occupied more or less continuously for the last 10,000 years" (Western Heritage 1983:4). There are many recorded archaeological sites within a mile of the confluence. National Register-listed properties include the Columbia Point area,

Bateman Island, and the Tri-Cities Archaeological District (Anchor QEA, 2014).

In 1943, Richland was a small farming town of about 300 residents. In that year, the US Army Corps of Engineers, Manhattan Engineer District purchased most of the area for a massive project to produce plutonium. The federal government planned and built a complete community to serve this project, including schools, housing, and parks. Two years later, Richland residents working at the new Hanford Nuclear Reservation produced the plutonium fuel for America's first nuclear detonation and for the second nuclear bomb used in World War II. By the end of World War II, the population in Richland swelled to 21,000 persons.

For 15 years, only employees of the Hanford Reservation could live in the town that the federal government built. After several years of discussion at both the local and federal levels, the federal government began the process of turning Richland into a self-governing city. Citizens were able to purchase their government-owned houses and Richland was incorporated as a first-class Washington city in 1958. The federal government began to sell the prefabricated housing erected for Hanford workers, which had been intended to be temporary. Much of that housing was renovated and remains in use today.

*F house*

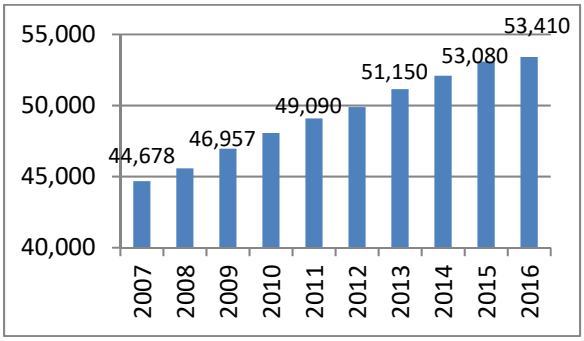
In addition to prefabricated homes, Alphabet Homes were built in Richland between 1943 and 1951. The Alphabet Homes were based on a series of house plans denoted by a letter in the alphabet (an A house, an F house, etc.).

## Current Trends

Richland has experienced rapid growth in the last decade. The Tri-Cities Metro area is one of the fastest growing areas in Washington State. In addition to its 2016 population of 53,410 in the City limits, and 54,732 including the UGA boundary, the City is expected to add 23,699 persons in the next 20 years.

Much of the development within the City can be linked with the Department of Energy's activities at Hanford. Most of the highly skilled Hanford workforce, such as researchers, engineers, and scientists, live in Richland. The top three employers in the Tri-Cities metro area, Battelle/Pacific Northwest National Laboratory (PNNL), Kadlec Regional Medical Center (KRMC), and Bechtel National, are all located in Richland. The economy of the City, however, is becoming more diverse with the rise of the healthcare sector (Kadlec), education (WSU Tri-Cities and Columbia Basin College (CBC)), and the agricultural industry in the region.

**Figure INT-1: Population Growth in the Last 10 Years in Richland**




*Source: Office of Financial Management, 2016 estimate*

# PUBLIC PARTICIPATION

The City of Richland updated its Public Participation Plan in 2016. Cities and counties planning under the GMA must establish "…procedures providing for early and continuous public participation in the development and amendment of comprehensive land use plans and development regulations implementing such plans."

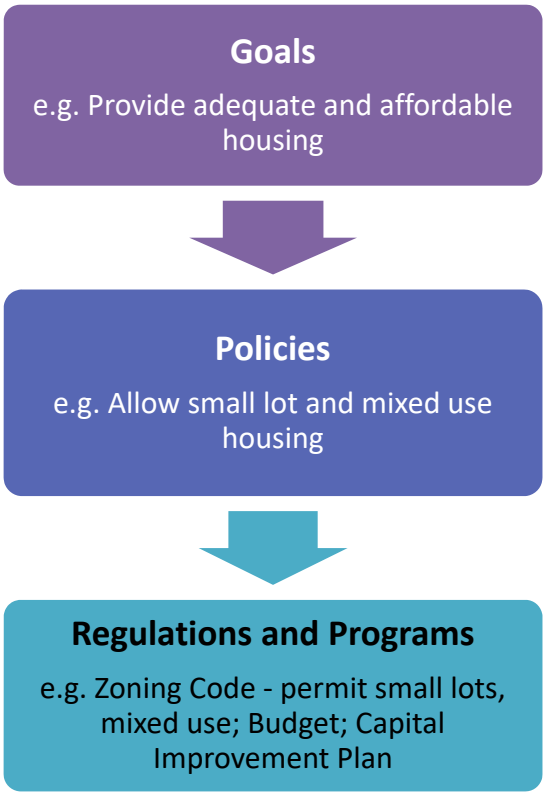
In 2016 and 2017, the City conducted multiple opportunities for public involvement in the form of public workshops, topic group discussions, open houses, citizen surveys, etc. The City established a Comprehensive Plan webpage to disseminate information to, and gather input from, the public. The City reached out to stakeholders such as Pacific Northwest National Lab (PNNL), Richland School District, Columbia Basin College, and Benton Franklin Council of Government (BFCG). The City also held Planning Commission and Council workshops. Planning Commission hearings were held in May and August of 2017 with published notices. The City Council adopted the Plan on October 3, 2017. The Plan's goals and policies directly reflect the input received from the public.

# PLANNING FRAMEWORK

Richland's Comprehensive Plan includes major planning components, visions, goals, policies, and analyses.

A vision is a collective value and target of a community, it is what a community wants to become.

Goals are individual values aimed at achieving the vision.




Policies define how we accomplish the goals.

Regulations, codes and ordinances implement policies.

There are six key elements in the Comprehensive Plan: economic development, land use, housing, transportation, utilities, and capital facilities.

**Plan Elements:**

- Economic Development
- Land Use
- Housing
- Transportation
- Utilities
- Capital Facilities

Goals and policies are included in relevant elements in order to ensure they carry out the vision of the community. There are sub-

elements under some of these elements with specific goals and policies.

This Core Comprehensive Plan is designed to be user-friendly. A supporting analysis document includes additional detailed information. The supporting analysis document also includes inventory data and analysis. In order to eliminate redundancy, goals and policies are only included in the Core Comprehensive Plan.

## Integrated EIS

An integrated Environmental Impact Statement (EIS) is prepared to review the significant impacts the updated Plan is likely to have. An integrated EIS is a combined GMA/State Environmental Policy Act (SEPA) document prepared in accordance with Washington Administrative Code (WAC) 197-11-235. It discusses how environmental values are considered in the plan such as goals, policies, and land use designations.

This integrated document analyzes alternatives in an environmental impact statement summary document (Appendix C).

# COMMUNITY VISION

### In this chapter, you will find:

The City of Richland's vision and values for the following,

- Community and Neighborhood Character
- Economic Development
- Land Use and Growth
- Housing and Neighborhood
- Transportation
- Open Space and Natural Areas
- Public Engagement
- Urban Design and Culture
- Sustainability
- Parks and Recreation
- Public Facilities
- Utilities
- Public Safety
- School

## VISION AND VALUES

Visions are ideas of what Richland will be like at the end of the 20 years planning period. In 2016, the City conducted several visioning workshops with the public, Planning Commission, and City Council. An online survey was also conducted with more than 850 respondents participating, offering input on multiple issues. Vision ideas were gathered from a range of people living or doing business in Richland.

***Vision***

*Richland is a progressive, safe, and family-friendly community that welcomes diversity. It is noted for excellence in technology, medicine, education, recreation, tourism, and citizen participation. This dynamic city, situated on two rivers, actively supports opportunities for economic development that are in harmony with the area's unique natural resources.*

Key components of the community's land use vision are categorized into several values discussed in the subsections below. Detailed vision information is available in the Public Involvement Summary document (Appendix D).

### Community and Neighborhood Character

Richland is a vibrant, progressive, safe, diverse, and family-friendly community with opportunities for jobs, housing, and recreation.

## Public Engagement

*Public visioning meeting*

Richland communicates with the public in a variety of ways to engage, understand, and address the community preferences, values, and concerns.

## Economic Development

Richland uses sound economic development practice to create a diverse and sustainable economy. It is a leader in technology, medical services, and research. Both small and large businesses are vibrant and growing. The City Center is walkable with mixed-uses. The mixed-use waterfront areas offer views, amenities, and recreational opportunities while protecting certain unique natural resources.

## Land Use and Growth

Richland manages growth within its urban growth area while revitalizing existing neighborhoods and the City Center. Richland's bustling Central Business District is developed as a mixed-use village with pedestrian amenities, transit access, and bike paths.

## Housing and Neighborhood

Housing is available in Richland for all income and age groups. It offers multiple housing choices such as single-family, multi-family, mixed-use, and assisted living facilities.

## Transportation

The City's transportation system is efficient and multi-modal. Richland's neighborhoods are well connected for car and transit, and safe for bike and pedestrian traffic. It maintains efficient connectivity with neighboring jurisdictions.

*Streets and crosswalks*

## Open Space and Natural Areas

The community recognizes that natural resources add value to the quality of life. Richland preserves and protects existing natural resources, and critical areas. Uses along the riverfront protect natural resources.

## Urban Design and Culture

Richland is a physically appealing community with a diverse cultural heritage. It is a hub of arts, culture, and education.

*Farmers' market*

The community values high quality design in shaping its natural and physical character in building, landscape, and streetscape design. Its urban areas are revitalized with public spaces and pedestrian-friendly features.

## Sustainability

Sustainable growth in Richland brings opportunities for mass transit, and bike and pedestrian trails. The community practices water conservation, recycling, and natural resource protection.

## Parks and Recreation

*Howard Amon Park and the Community Center*

Richland protects and maintains its highly valued parks and recreation system. Richland's park system meets a variety of user needs including sports and other recreational activities in its developed and undeveloped parks.

## Public Facilities

Richland provides quality public facilities for all age and income groups. This includes education, library, medical, municipal, and community facilities.

## Utilities

Richland is forward thinking in providing utilities with systems that are sustainable and support the planned growth.

## Public Safety

*Richland Fire Station 74*

Richland highly values public safety and a safe lifestyle. As such the City maintains public safety for all ages and neighborhoods.

## Schools

Schools that provide quality education are important for the community. Richland's schools are economically and ethnically diverse, providing neighborhood stability and excellent education outcomes for all students. Richland coordinates with school districts to ensure schools are located appropriately to serve its community.

# GENERAL COMMUNITY GOALS

**Community Goal 1: Ensure and enhance the continuing sense of a livable and sustainable community in Richland.**

**Community Goal 2: Create a vibrant, progressive, and physically, socially, economically, and culturally diverse community providing choices of jobs, housing, and recreational opportunities to its residents of all ages.**

**Community Goal 3: Encourage continued interaction with other city, county, regional, tribal, state, and federal governments in order to coordinate regional efforts.**

**Community Goal 4: Encourage the identification, preservation, and enhancement of historic elements to give the future of the City continuity with the past.**

**Community Goal 5: Encourage the identification, preservation, and restoration of the City's open space and natural areas to maintain habitat, provide opportunities for residents to connect with nature, and meet educational, health, and outdoor recreational needs with associated economic opportunities to the community.**

**Community Goal 6: Implement programs for the improvement of the built environment and its aesthetic quality to maintain a clean, safe, and attractive community.**

**Community Goal 7: Develop a vibrant Central Business District planned on a high density land use.**

**Community Goal 8: Provide infrastructure and public facilities that serve the best interest of the community.**

**Community Goal 9: Provide and support an efficient, varied, and well-maintained transportation network.**

**Community Goal 10: Achieve a diversified mix of private industry and commerce capable of supporting a strong and growing economy.**

**Community Goal 11: Work to implement the City's Strategic Keys.**

**Community Goal 12: Continue active citizen involvement and outreach education in development decisions and planning for Richland's future.**

# ECONOMIC DEVELOPMENT ELEMENT

**In this chapter, you will find:**

- Goals and policies guiding economic development in Richland
- Challenges and opportunities
- Trends and forecasts
- Key recommendations

## INTRODUCTION

The economic development element of the comprehensive plan is intended to guide investments through a framework of strategies and policies with the overall goal of growing economic opportunities in the City. The intent is to identify sound economic development practices to build a strong economy where local businesses are welcomed and encouraged by the City, and ensure the economy is resilient, dynamic, and sustainable for current and future generations.

The City's ability to understand its competitive advantages and proactively work to attract a wide range of employers will in turn create more high-wage jobs, which will in turn produce municipal revenues for maintaining and enhancing quality service levels, infrastructure, and facilities.

# GOALS AND POLICIES

**ED Goal 1: Build the diversity, resiliency, and equity of the City's economy to ensure opportunities for growth and shared prosperity.**

Policy 1: Support the growth of a balanced mix of companies in the following sectors: high technology, professional service, personal service, retail trade, agricultural processing, energy industries, manufacturing, and tourism.

Policy 2: Support expansion and improvement of business recruitment, retention and expansion programs to provide outreach and assistance to startup and existing businesses.

Policy 3: Encourage educational institutions and non-profits to train a skilled future workforce.

Policy 4: Recognize that infrastructure, including transportation and utility planning are vital to economic development and attracting businesses.

**ED Goal 2: Make Richland a center of entrepreneurial business, and research and development opportunities.**

Policy 1: Develop a detailed strategy to help grow technology businesses in the City of Richland.

Policy 2: Leverage scientific and technology research at PNNL and WSU-Tri-Cities for spin-off local businesses.

Policy 3: Enhance Richland's physical and business environment for technology-based companies.

Policy 4: Remove unnecessary barriers for start-ups and entrepreneurs.

**ED Goal 3: Support businesses of all sizes.**

Policy 1: Ensure that small and medium businesses receive similar advantages as large businesses in terms of assistance from the City and other agencies.

Policy 2: Streamline and administer regulations to ensure predictability, efficiency, and transparency.

**ED Goal 4: Work closely with healthcare, education, and other regional institutional partners to strengthen collaboration.**

Policy 1: Enhance the connection between sectors – medical, educational, research, and technology to encourage collaboration and skilled job placement.

Policy 2: Engage local and regional partners in discussions about land use, transportation, and facilities to complement business development.

Policy 3: Support growth and expansion of Kadlec Regional Medical Center and diverse medical companies, WSU-Tri-Cities, Columbia Basin College, and PNNL within the City.

**ED Goal 5: Ensure that Richland's economic development goals are aligned with regional economic development and marketing efforts.**

Policy 1: Coordinate with local, regional, and state economic development organizations in activities to attract new businesses and industries to the community.

Policy 2: Facilitate collaboration with Tri-City Development Council (TRIDEC) and the Tri-Cities Visitor and Convention Bureau to develop and implement seamless, collaborative, low-cost, and effective marketing efforts designed to recruit new businesses, expand existing businesses, and build a positive national image.

Policy 3: Accommodate the continued use of the Port of Benton barging facilities in north Richland, consistent with the City's Shoreline Master Program (SMP).

Policy 4: Market the newly transferred 1,341 areas land from DOE to the City, the Port of Benton, and Energy Northwest for large industrial developments.

**ED Goal 6: Encourage vibrant mixed-use areas in Tri-Cities as destinations to live, work, and visit.**

Policy 1: Stimulate the development of quality retail and entertainment venues through incentives and infrastructure investments.

Policy 2: Assist small business owners to enhance their skills and profit opportunities.

Policy 3: Work with public and private groups to expand the range of tourist attractions within the city.

Policy 4: Facilitate retail development and encourage infill in the Central Business District, Uptown, and nearby commercial areas.

Policy 5: Promote performing arts venues and activities through partnerships with regional economic development agencies.

Policy 6: Expand the range of options for housing in areas planned for higher density development.

Policy 7: Support development of higher density housing.

Policy 8: Attract young professionals by promoting their preferred types of job, housing, and entertainment options.

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

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

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

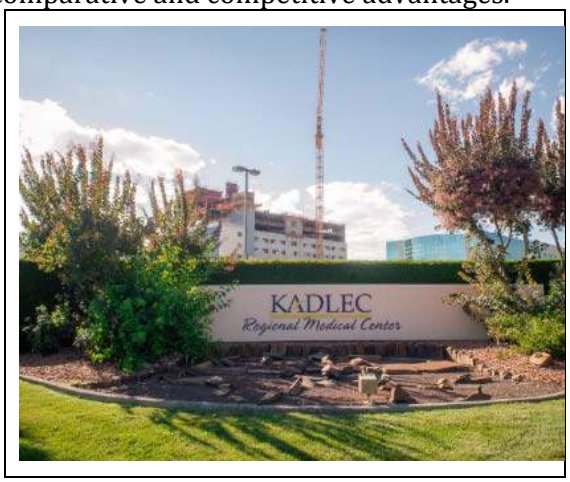
Policy 3: Provide opportunities for active and passive recreation in parks and open spaces.

Policy 4: Promote quality design for public projects as well as private developments.

# CHALLENGES AND OPPORTUNITIES

Richland includes major employers of the Tri-Cities area. The work performed at the Hanford site in tandem with the research at PNNL have driven economic development in the region and City for decades. This is currently the region's largest economic strength and a source of its greatest economic opportunity.

The region has shown strong growth in economic output over the past several decades leading to sustained employment growth. From a regional economic perspective, the agricultural sector is one of the most competitive in the region, which is not surprising given the region's agricultural advantages. The region has a strong industrial/manufacturing base that has sustained itself over time yet the largest portion of the economy is service-based (both professional/business and personal) that continues to drive economic growth in the recent decade. However, growth in most other sectors have mirrored the nation as a whole; fueling economic conversations that the region needs to find new growth in sectors that can produce and sustain both comparative and competitive advantages.




The City of Richland contains a large concentration of the region's professional service sector. The City is home to the two of the largest non-governmental employers in the region, PNNL and Kadlec, that account for nearly 8,000 employees in the City. From a land use perspective, Richland has more than half of the region's commercial office space and industrial space, respectively; and is second only to Kennewick in the amount of retail space.

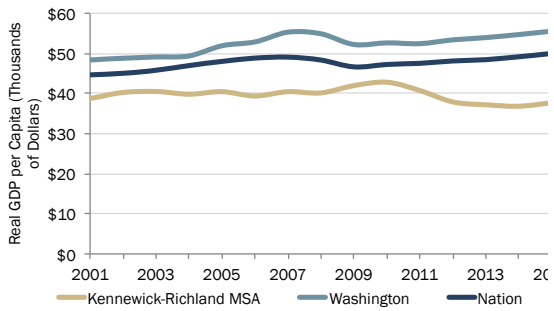
Additionally, Richland has strong demographics for future economic growth. Employees and households are on average better educated and better paid, with a larger segment of the population in its prime working age. From this perspective, the City should be well positioned to capitalize its past performance and existing assets to extend its economic growth.

# TRENDS AND FORECAST

The economy of the Tri-Cities region is primarily service-based. Goods-producing industries (such as manufacturing) make up for less than 25 percent of the total economic output. The Tri-Cities economy was less impacted by the recession in 2008, due to the increase in employment at Hanford as part of the American Recovery and Reinvestment Act (ARRA) of 2009. The total output declined from $10.3 billion in 2010 to $8.6 billion in 2014 partly due to the end of ARRA and partly reflecting the national recession trends. However, most recent data has indicated that economic conditions have continued to improve over the past two years.

On a Gross Domestic Product (GDP) per capita basis, the Tri-Cities region is not as productive when compared to Washington State and to the nation. On this measure, the region has been slower to recover than the state as a whole. GDP per capita is the most common indicator of economic performance of regions. GDP per capita is calculated by measuring Gross Domestic Product in a year, and dividing it by the population. The reasons for the lower GDP per capita in the region are complex but are due to the large presence of government-supported activities.

**Figure ED-1: GDP per Capita, 2001-2015**




*Source: Bureau of Economic Analysis, 2016*

The Tri-Cities area is unique in that its employment base is dominated by a select number of large employers.

**Table ED-1: Top Ten Tri-Cities Employers**

| | Company | Industry | Employees |
|---|---|---|---|
| 1 | Battelle/ Pacific Northwest National Laboratory | Research & Development | 4,365 |
| 2 | Kadlec Regional Medical Center | Health Services | 3,304 |
| 3 | Bechtel National | Engineering & Construction | 2,898 |
| 4 | ConAgra Foods | Food Processing | 2,727 |
| 5 | Kennewick School District | Education | 2,130 |
| 6 | Washington River Protection Solutions | Environmental Remediation Services | 2,077 |
| 7 | Pasco School District | Education | 2,015 |
| 8 | Mission Support Alliance, LLC | Support Services, Hanford/Dept. of Energy Site | 1,928 |
| 9 | Richland School District | Education | 1,500 |
| 10 | CH2M Hill | Environmental Remediation Services | 1,400 |

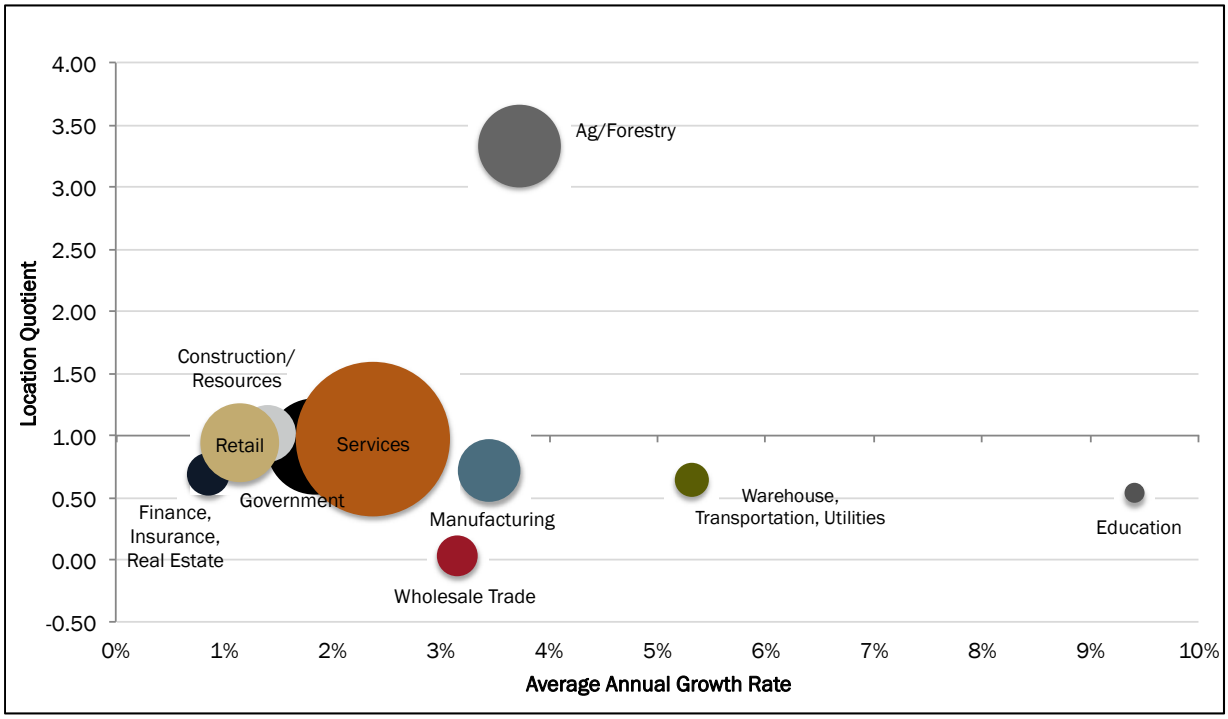
*Source: Tri-City Development Council (TRIDEC), link. Accessed February 14, 2017*

Roughly one in five of an estimated 116,000 jobs in the Benton-Franklin area are from one of the 10 largest firms/agencies listed below. Eight of the 10 top employers in the Tri-Cities are located in Richland, a legacy largely due to significant federal investments in the Hanford Nuclear Reservation.

The chart below shows the local concentration of jobs by sector (location quotient) along with measures of industry size and average annual employment change in the Tri-Cities region. Location quotients measure the concentration of jobs in a sector compared to the statewide average. A value of 1.0 signifies that the sector possesses the same level of employment concentration as the state. Values above 1.0 are more concentrated than the state average. The size of the bubble represents the number of jobs within that sector. Sectors with sizable employment and higher than average concentration represent strengths for the region. Fast growing sectors, even if they are not very large, represent potential opportunity areas.

In the Tri-Cities region, the largest sectors—services and government—have a similar concentration as the state, and are growing at a rate of one to three percent a year, indicating they are the base of the regional economy. The agriculture sector is a strength in the Tri-Cities; it is much more concentrated relative to the state and is growing at a rate of 3.7 percent per year. Education, manufacturing, wholesale trade, warehousing, transportation, and utilities are also growing at a rate of more than three percent a year, but are smaller and less prevalent in the Tri-Cities compared to the state. Much of the growth in food manufacturing, wholesale trade, warehousing, transportation, and utilities may be related to the growth and prevalence of the agriculture sector in the Tri-Cities.

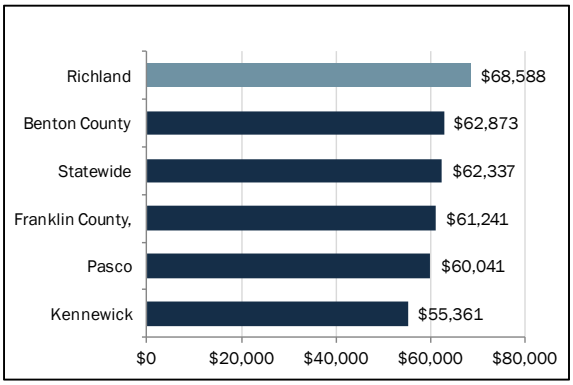
**Figure ED-2: Benton & Franklin Counties Employment Concentration and Change by Sector, 2006-2015**




*Source: Washington State Employment Security Department*

Federal funding for Hanford has been a significant economic catalyst for the Tri-Cities Region generally with Richland at the forefront. Even with significant downsizing at Hanford in the 1990s, household incomes in Franklin and Benton Counties continued to grow steadily.

Today, household incomes for Richland residents are nearly ten percent higher than the County average and more than twenty percent higher when compared to those of Kennewick residents. Richland enjoys economic prosperity not just compared to their Tri-Cities neighbors, but compared to state averages as well, as illustrated in Figure ED-3. Higher incomes are the result of technical and professional positions that require higher levels of education.




*Source: US Census Bureau, American Community Survey, 2015 5-year, Table B19013A*

Relative to Kennewick and Pasco, Richland is home to a highly educated workforce. The demands for engineers and scientists generated by Hanford and its subsidiary research and development activities have been a central employment and demographic characteristic for the Tri-Cities Region, in particular for Richland.

**Figure ED-3: Median Household Income**

# KEY OPPORTUNITIES

## Area 1. Create a resilient economy

The single greatest threat to the Richland and Tri-Cities economy is the winding down of business and employment and the Hanford Nuclear Reservation without suitable economic opportunities in place that would provide for a comparable standard of living. A reduction in work at Hanford will mean less direct employment in Richland and large negative impacts on the businesses that support them directly as well as the resulting households whose wages they support. However, Hanford is also an asset to the community and has been effective at attracting a highly educated workforce in science and technology. These fields produce professional-wage jobs and have produced spinoff businesses coming from PNNL.

To ensure the stability and resiliency of the economy, the City should leverage existing assets but adapt them to a changing economy. These efforts should focus on increasing primary sector, non-Hanford science and tech employment by creating a business environment that encourages and welcomes local business. Additionally, the City should develop partnerships with TRIDEC, PNNL, Kadlec, and other major employers to plan for expansion and delivery of adequate infrastructure and services.

## Area 2. Build and attract a more entrepreneurial and dynamic economy

Richland is the regional hub for highly educated science and technology professionals. Labor force participation is high, particularly for the most productive segment of the population – 30 to 54 year olds. With access to innovation partners and relatively low land costs when compared to bigger cities like Seattle, the climate for entrepreneurial startup companies is present. However, attracting innovation and investment is a goal of many municipalities. The City can advance this environment through infrastructure investment, streamlined regulation, and "second paycheck" benefits such as livability and access to recreation. Working with its regional education and economic development partners, the City can play its role by creating and supporting a rich "entrepreneurial ecosystem" in the area.

## Area 3. Leverage the natural landscape as an asset for economic development

Richland's location along the Columbia River offers exceptional opportunities to easily access attractive natural recreational spaces, as well as close proximity to the region's vibrant agri-tourism and wine industries. In addition to this, professional service employees living in Richland enjoy lifestyle amenities, also called the "second paycheck." These include access to parks, walkable business districts, good schools, diverse housing options, quality restaurants, and arts and cultural activities. Richland's ability to leverage its natural environment to directly spur economic activities and provide an attractive setting for professionals will further enhance its competitive advantage. However, residents must be cognizant of maintaining a healthy balance between environmental preservation and economic development activities.

## Area 4. Closely monitor zoning and land use in the City

The City has the dual challenge of planning for urban infill development as well as planning to accommodate development on many large and relatively undeveloped sites within the City. To ensure zoning is responsive to market conditions, it should be monitored periodically to evaluate potential hindrances. Working to concentrate development in areas with existing infrastructure and near job centers will be instrumental to optimize the City's funding.

# LAND USE ELEMENT

**In this chapter, you will find:**

- Goals and policies guiding land use in Richland
- Existing land uses and future projections
  - Overall capacity
- Proposed land use
- Sub-elements:
  - Critical areas
  - Mineral resources
  - Open space
  - Historic and cultural resources
  - Urban design

## INTRODUCTION

The Land Use Element guides and accommodates future growth of the City while maintaining the community's high quality of life and unique characteristics. It determines the community's need for and distribution of residential, business, governmental, recreational, open space, and other types of land uses. The accompanying land use map (Fig. LU-3) identifies land use categories within the City limits and the UGA. A key component of the GMA and the Comprehensive Plan is to allow growth within the urban growth area.

Richland implements its various land uses through zoning designations as shown in Table LU-1 below.

The City must assess its financial ability to provide services at its urban density level and provide an appropriate supply of land uses for new developments. The desired result is to provide a greater market choice in lands for development while allowing for the maximum accountability for public funds

needed to provide for existing and planned urban areas. The City's Capital Improvement Plan is a six-year plan that reassesses priority areas for funding should the funding falls short of meeting the existing needs. To that effect, the City also adjusts its long term land use goals to align them with the funding availability.

**Table LU-1: Land Use Implementation by Zoning**

| Land Use Designation | Zoning Categories |
|---|---|
| **Residential** | |
| Low Density Residential | R-1-12, R-1-10, SAG |
| Medium Density Residential | R-2, R-2S |
| High Density Residential | R-3, C-LB |
| Badger Mountain South | Badger Mountain Master Plan |
| **Commercial** | |
| Business Commerce | B-C |
| Central Business District | CBD |
| Commercial | C-1, C-2, C-3, C-LB, CW |
| General Commercial | C-3 |
| Regional Retail | C-2 |
| Waterfront | WF |
| Commercial Recreation | CR |
| **Public Lands/Open Space** | |
| Developed Open Space | PPF |
| Natural Open Space | NOS |
| Urban Recreation | UR |
| Public Facility | PPF |
| **Industrial** | |
| Business Research Park | B-RP |
| Industrial | I-M, M-2 |
| **Mixed Use Designations** | |
| Agricultural | FP, AG |
| Residential Office | C-LB |
| Urban Reserve | AG |

# GOALS AND POLICIES

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

Policy 1: Revitalize areas that are already within the City, especially areas within the Central Business District, such as the Parkway and Uptown, and the Island View areas.

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

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

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

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

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

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

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

Policy 2: Encourage higher residential densities especially in and near the Central Business District area.

Policy 3: Innovative and non-traditional residential developments can occur through the use of planned unit developments, density bonuses, new types of housing, and multi-use or mixed-use developments.

**LU Goal 4: Promote commercial and industrial growth that supports the City's economic development goals.**

Policy 1: Accommodate a variety of commercial land uses including retail and wholesale sales and services, and research and professional services.

Policy 2: Promote developments such as business and research parks, office parks, technology centers, manufacturing and processing facilities, and other types for high-tech uses.

Policy 3: Locate neighborhood-oriented commercial land uses in Neighborhood Retail Business areas.

Policy 4: Encourage the use of buffers or transition zones between non-compatible land uses.

Policy 5: In areas where residential uses are in close proximity to industrial or commercial lands, adequate development standards should be used in industrial or commercial developments to mitigate the impacts on residential uses.

Policy 6: Support industrial developments on lands previously owned by the Department of Energy and transferred to the City and the Port of Benton.

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

Policy 1: Locate commercial uses so that they conveniently serve the needs of residential neighborhoods, workplaces, and are easily accessible via non-motorized modes of transport.

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

## Central Business District

**LU Goal 6: Develop an attractive and vibrant Central Business District that displays the unique character of Richland.**

Policy 1: Revitalize declining commercial areas by promoting clean, safe, and pedestrian- and bicycle-friendly environments.

Policy 2: Designate land use and zoning for higher-density residential uses, mixed-use, and business uses within and adjacent to the Central Business District.

Policy 3: Encourage infill development and redevelopment in the Central Business District.

## Public Facilities

**LU Goal 7: Encourage efficient use and location of public facilities such as transit centers, utility facilities, schools, parks, and other public uses.**

Policy 1: Locate municipal facilities within their service areas and ensure the grouping of facilities within neighborhoods, whenever feasible.

Policy 2: Ensure that the scale, and location of public facilities are compatible with or buffered from existing and planned surrounding areas.

Policy 3: Wherever possible, the City will locate park and school facilities together for efficient use of public facilities.

Policy 4: Encourage the development of private and public regional sports and recreational facilities of a size and quality to attract significant numbers of users and spectators.

## Land Use in Specific Areas

**LU Goal 8: Address unique land use situations in the urban area with policies specific to those situations that ensure compatibility between land uses without infringing on private property rights.**

Policy 1: Ensure that lands designated Urban Reserve remain in this holding category to serve future demand for land.

Policy 2: Apply the Agricultural designation in the Yakima River floodplain.

Policy 3: At designated Waterfront land use locations, encourage an active mix of commercial, residential, and marine uses as allowed in the SMP.

Policy 4: Identify and encourage the preservation of lands, sites, and structures that have historical or archaeological significance.

Policy 5: Define and identify mineral resource lands located within its boundaries that are not already compromised by on-site, immediate, or adjacent urban growth and that have long-term significance for the extraction of minerals on a commercially-viable basis.

Policy 6: Property and/or mineral rights owners should work with the City and appropriate agencies for protection of these sites. Designate mineral resource lands located in the City of Richland that meet the Criteria for Classification of Mineral Resources (WAC 365-190-070).

Policy 7: Ensure that land uses surrounding the Richland Airport are compatible with existing and future airport operations and do not restrict the airport's ability to maintain or expand its existing and future aviation demands. Coordinate with

the Port of Benton to restrict land uses in airport areas that would create conflict or negatively impact the safe and effective airport operations.

**LU Goal 9: Within Island View, the City will implement a Single Family Overlay land use designation for clusters of property that are currently used as single family residences which have high probability of being redeveloped with non-residential land uses.**

Policy 1: The city will use the Single Family Overlay concept only in those instances where the majority of property owners have expressed a preference for its use.

Policy 2: Areas designated as Single Family Overlay will be zoned for single-family residential uses, as identified in the city's R-2 Medium Density Residential zoning district.

Policy 3: Areas designated as Single Family Overlay will remain as such until property owner(s) bring forward a request to remove the overlay and change the zoning to the designation contained in the Island View Subarea Plan. In such cases, an amendment to the comprehensive plan is not necessary.

Policy 4: Applicants bringing forward a request to change the zoning of property designated Single Family Overlay should demonstrate that the land proposed for amendment is:

a) large enough to support redevelopment for non-single family residential land uses; and

b) will have sufficient access to City streets and utility systems to support redevelopment.

Policy 5: Whenever properties designated with the Single Family Overlay are rezoned for non-single family residential uses in accordance with Policy 4 above, the Single Family Overlay designation should be removed from the subject property.

## Private Property Rights

**LU Goal 10: Follow controlling law and constitutional requirements, both state and federal, to ensure the appropriate protection of private property rights.**

Policy 1: Monitor evolving state and federal statutory amendments and judicial precedent so that timely amendments or changes can be made in the process of implementing the comprehensive plan policies and development regulations.

Policy 2: Process comprehensive plan amendments and development regulations using a fair and open hearing process, with adequate public notice and opportunities to participate to ensure the protection of all due process rights.

Policy 3: Process timely, fair, and predictable processing and review of land use permit applications in conformance with applicable federal and state legal and regulatory requirements.

## Natural Environment

**NE Goal 1: Promote the protection, conservation, and restoration of natural areas, shorelines, and critical areas as unique assets to the community, and provide public access for enjoyment of such facilities based on the ability of the resource to support the use.**

Policy 1: Use the critical areas ordinance, SMP, the state environmental policy act (SEPA), and other ordinances, as applicable, to designate and protect the critical areas and natural environment.

Policy 2: Consider the goals and policies of the SMP as part of this Comprehensive Plan. Encourage development of water-oriented recreational, cultural, and commercial facilities in certain Columbia River locations, consistent with the SMP and its criteria of no net loss of ecological functions, to enhance and diversify Richland's community recreational resources and its attractiveness to tourists.

Policy 3: Ensure public access to shorelines on public land, subject to regulations protecting public safety, sensitive habitat areas, and wildlife.

Policy 4: Encourage the public and/or private acquisition of the prominent ridges in the south Richland area to preserve views, protect shrub-steppe habitat, and to provide public access. Consider the preservation of the ridges and hillside areas through various standards.

Policy 5: Develop an integrated pedestrian trail system to provide access through the City's important natural features, such as prominent ridges and rivershore areas and provide necessary trail linkages between these natural features.

## Historic and Cultural Resources

**HP Goal 1: Preserve significant historic structures, districts, and cultural resources that are unique to Richland.**

Policy 1: Encourage preservation and promotion of adaptive reuse of historic "Alphabet Homes" of Richland.

Policy 2: Coordinate with local tribes, federal, state and local agencies to protect historic and cultural resources.

## Urban Design

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

Policy 1: Establish and enhance the positive attributes of residential, commercial, central business, and other districts with appropriate transition between them.

Policy 2: Encourage redevelopment and upgrade of suitable commercial areas.

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

Policy 4: Promote public arts, museums, and interpretive centers in coordination with public plazas and community spaces that reflect the unique history and culture of Richland.

**UD Goal 2: Revitalize commercial areas, such as areas in the Central Business District including the Uptown retail area and the Island View area.**

Policy 1: Enhance the appearance, image, and design character of the Central Business District.

Policy 2: Ensure adequate public transit, bicycle, and pedestrian access in the commercial centers along with parking and landscaping.

Policy 3: Enhance the welcoming experience into the community through well-designed gateway features in prominent locations.

Policy 4: Design the public realm, including streetscapes, parks, plazas, and civic amenities for the community to gather and interact.

Policy 5: Provide continuity among adjacent uses by using cohesive landscaping, decorative paving, street furniture, public art, and integrated infrastructure elements.

**UD Goal 3: Development through appropriate design, should protect natural features such as rivers, shorelines, ridgelines, steep slopes, and archaeological and historical resources.**

Policy 1: Development should be sensitive to existing topography and landscape, and should minimize environmental impacts.

Policy 2: Hillside development should, as much as practical, blend with the natural shape and texture of the land.

Policy 3: Lighting should be designed so as to promote public safety as well as promote "Dark Sky" principals.

**UD Goal 4: Promote community beautification by enhancing public spaces and thoroughfares and encouraging private property beautification.**

Policy 1: Improve the appearance of all city-owned space and major thoroughfares.

Policy 2: Promote programs to improve landscaping. Encourage xeriscaping and use of native plants.

Policy 3: Promote more attractive signage throughout the City, especially in commercial districts.

# EXISTING LAND USE

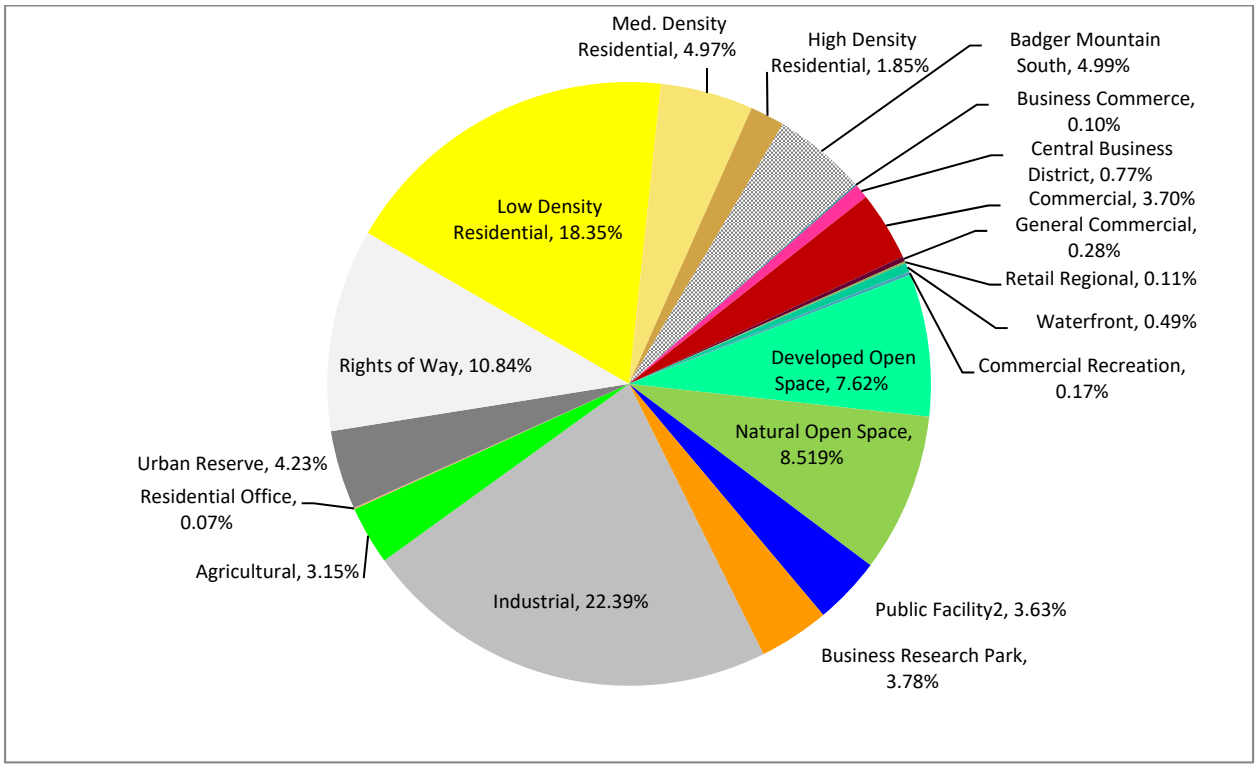
Richland includes a variety of land uses as follows:

- Agriculture (AG)
- Low Density Residential (LDR)
- Medium Density Residential (MDR)
- High Density Residential (HDR)
- Badger Mountain South (BMS)
- Multifamily Residential Office (RO)
- Central Business District (CBD)
- Commercial (C)
- Retail Regional (RR)
- General Commercial (GC)
- Business Commerce (BC)
- Single Family Overlay (SFO)
- Commercial Recreation (CR)
- Waterfront (WF)
- Industrial (I)
- Business/Research Park (BRP)
- Public Facility (PF)
- Developed Open Space (DOS)
- Natural Open Space (NOS)
- Urban Reserve (UR)

Richland's land area consists of a total of 28,694 acres (25,846 acres in the City limits and 2,848 acres in the UGA). Richland's land use is dominated by residential land use consisting of about 32 percent of the total land use (low, medium, and high density land uses combined), followed by 22 percent industrial, and 16 percent open space (developed and natural) land use. Single-family residential use is predominant in both LDR and MDR land uses areas. Industrial land includes a recent transfer of 1,641 acres of land from the

Department of Energy (DOE) to the City, the Port of Benton, and Energy Northwest on the north side of the City. A major portion of this land was located outside of the UGA, and is currently being processed to be included within the UGA.

**Figure LU-1: Existing Land Use Distribution in City Limits and UGA**




## Land Use Pattern and Compatibility

Due to the linear geographic pattern of the City along the Columbia River running north and south, Richland's land is also distributed primarily from north to south covering approximately 25,000 acres in the current incorporated limits and additional over 2,800 acres in the UGA. Residential lands are concentrated in three major areas, the central area between the Columbia River and SR 240, areas south of the Yakima River, and the Horn Rapids area. The Yakima River delta and associated natural open space land run almost through the middle of the City. Although commercial lands are distributed throughout the City, the major concentrations are found in the Central Business District, Queensgate, and the Island View areas. Much of the industrial and research uses are located on the northern part of the City starting from Richland Airport on the south side to the north City limits.

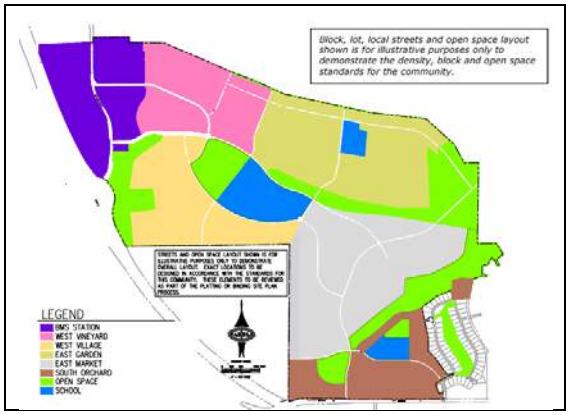
Richland's land use distribution focuses on placing compatible land uses next to each other. Compatibility is based on the intensity of land uses. Generally speaking, industrial is the most intense use due to the impacts of its operations (noise, light, dust, etc.), need of supporting facilities, and overall impact on the land. Natural areas are considered the least intense as there are no developments or improvements on such areas. Therefore, a low density residential next to a heavy industrial land use would be considered incompatible because of the impacts industrial use may have on the residences.

Appropriately designed buffers, landscaping, and transition areas between uses should be considered between incompatible land uses.

Mixed uses are encouraged in Richland where they are allowed. Such uses are generally mutually supportive of each other. Locating residences, offices, neighborhood shops, cafes, etc. in the same building or same site promotes walkability and reduces the vehicle miles traveled.

## Badger Mountain South

Badger Mountain South is a master-planned community of 1,480 acres located in the southwest side of the City. The area is intended to be developed with 5,000 homes, businesses, and other community activities. The sub-area plan sets forth various uses in the area and was adopted by Richland City Council in 2010.




The purpose of this area is to establish neighborhoods with a range of housing types and to accommodate a population of diverse ages and incomes. The plan promotes pedestrian-friendly and mixed-use neighborhoods with areas for parks, trails, and open space in a connected network.

## Central Business District

Richland CBD is planned to encourage the transformation of the area from principally a strip commercial auto-oriented neighborhood to a more compact development pattern. The area is characterized by its close proximity to the Columbia River and Howard Amon Park, concentration of pedestrian-oriented businesses, and the presence of medical, educational, and public institutions. Multiple planning studies and efforts have been conducted in the past decades, many of which have been or are being implemented in this area including public investments on infrastructure and streetscape improvements, and code revisions to attract private investment.

The Parkway has been a center of pedestrian-oriented retail and restaurants. Kadlec Regional Medical Center's campus and Columbia Basin College's Health Science Center both are located in the CBD. The Swift Corridor improvement will connect the CBD with the waterfront parks and recreation areas.

## Columbia Point

The Columbia Point area is located between I-82 to the south and George Washington Way to the west. The area is developed with a mix of shops, hotels, restaurants, offices, condominiums, and recreational amenities. Recreational amenities include a golf course, park, marina, and waterfront trail. The area is close to buildout.

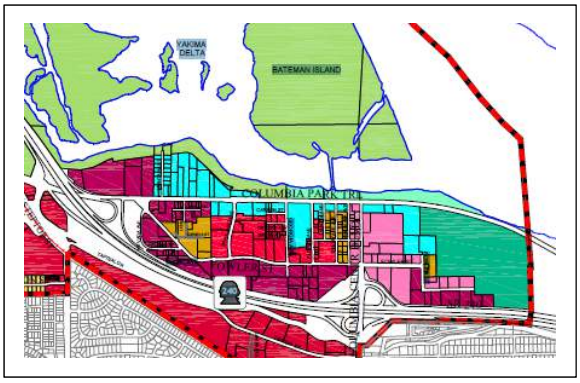
## Horn Rapids

The Horn Rapids area is located on the north side of the City. This constitutes two planning areas: a) the Horn Rapids Industrial Park area, a triangular area bounded by Horn Rapids Road to the north and SR 240 to the south; and b) the 1,641 acres Horn Rapids North Industrial Area, north of Horn Rapids Road.

A master plan for Horn Rapids Industrial Park was originally adopted in 1995 and updated in 2011 and 2016. This area has been envisioned as an employment and economic center in the region. The master plan identifies the necessary infrastructure required to serve the area and associated cost for infrastructure improvements. The Horn Rapids planned residential community is located south of this area.

The 1,641-acre industrial area has recently been transferred from the Department of Energy to the City, the Port of Benton, and Energy Northwest by an act of Congress. This 1,341-acre Horn Rapids Industrial Area is specifically set aside for industrial development. The City and the Port plan to market the property to industrial developers as "mega-sites" of 200 acres or larger. The proximity of this land to highways, rail, and utility services together with the large acreages available provide development opportunities for industries that exist in very few places throughout the Pacific Northwest.

## Island View



The Island View area, also known as Richland Wye, is located on the southeast side of the City between the Columbia River to the north and SR 240 to the south. It is north of the regional Columbia Center Mall in Kennewick. Columbia Park West is located to the east and Bateman Island to the north of the area.

The Richland Wye Master Plan was prepared in 1998 to revitalize the area and provide a general guideline for the planning and future development of the area. The objective of the master plan includes stimulating mixed use development, providing flexibility in the changing market condition, and ensuring high quality developments with increased opportunities for waterfront recreation. Implementation strategies were developed to address infrastructure, land use, and economic development issues. The area consists of a mix of General Commercial and Regional Retail on the south side, Business Commerce and Multi-family Residential Office in the middle, with Waterfront land use designation on the north side fronting the Columbia River. The entire length of the Columbia River waterfront has public access. The area is now being revitalized with uses such as, residential, commercial, business park, marina, etc.

# POPULATION TRENDS AND PROJECTIONS

The Tri-Cities Metro area is one of the fastest growing areas in Washington. The City has grown rapidly in the last decade with a 24 percent growth from 2000 to 2010, and an 11 percent growth from 2010 to 2016.

Based on the 2016 estimate of the Office of Financial Management (OFM), the City of Richland's current population is 53,410. The population including the UGA boundary is 54,732.

Benton County's county-wide allocation and projected population numbers for Richland are 76,533 for the year 2035 and 81,366 for the year 2040. The end of the 20-year planning horizon is 2037. Based on current trends, Richland's projected population in the year 2037 will be 78,431 persons. This means over the next 20 years, the City and its UGA will add 23,699 (78,431-54,732) persons in addition to its existing population. Identifying land for growth and delivering public services will be important to maintaining the high quality of life for its residents.

**Figure LU-2: Projected Population Growth**

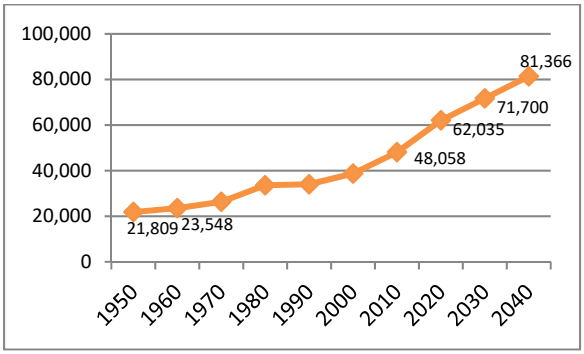



**Table LU-2: Population and Employment Projections for 2037**

| Year | Population | Jobs |
|---|---|---|
| 2016/ 2017 | 53,410 | 37,675[1] |
| 2037 Projection | 78,431 | 50,295 |

*[1] Estimated jobs in 2017*

*Source: OFM, US Census, OnTheMap; Washington Employment Security Department; ECONorthwest.*

## Future Land Capacity

In order to identify land necessary to meet the future demand, an analysis of available land was performed. Details of the analysis are available in the Comprehensive Plan Supporting Analysis (Appendix A). This analysis used the City's existing land use density and land inventory in order to identify

vacant and undeveloped land within the City and UGA. The results of this analysis indicated that the City has sufficient land within its UGA to accommodate the land needs for the projected residential and commercial growth. In 2016, the City and the Port of Benton received land from the Department of Energy that is specifically targeted for future industrial use. This land, together with the vacant industrial land that is within the City, provides an adequate industrial land supply for future employment growth.

A significant portion of future residential growth will occur in the Badger Mountain South and Horn Rapids areas. Additional growth will take place in the existing vacant residential lands throughout the City. It is also anticipated that commercial and waterfront areas will accommodate some high-density and mixed-use growth.

Some lands designated as "Urban Reserve" in the land use plan will need to be re-designated for residential land uses to ensure that an adequate land supply is provided to serve future growth.

### Lands for Public Purposes

According to the GMA, the City is required to identify the needs for public facilities, including lands for public purposes. Current City-owned public facilities include parks and open spaces, transportation, water, sewer, storm water, solid waste, energy, and municipal facilities. Using the existing ratio of land per capita for public use, there is a surplus of 72 acres for public facilities land. The City's developed open space requirement for parks facilities is determined by the parks level of service. The existing parklands are adequate to meet the demand. However, areas with new residential land use discussed in the next section will require an additional community park. The natural open space is determined by the existence of critical and natural areas, and other priority areas within the City. As the City grows, natural open spaces will be identified based on the GMA criteria and best available science (BAS). Existing data and findings from similar communities indicate Richland has adequate open space to meet the future demand. Additional information regarding the City parklands and open space can be found in the Capital Facilities Element under "Parks, Recreation and Open Space" in this Plan, and in the supporting analysis in Appendix A.

## PROPOSED LAND USE

The City is planning to accommodate future growth in two areas within the City, on the north and west sides of the City. One area is located on the southwest side near the City View area, abutting Kennedy Road to the south and Queensgate Drive to the east. The other area is located on the north side of the City abutting the Horn Rapids residential development.

The land use in the City View West area is re-designated from Urban Reserve to a mix of Low, Medium, and High Density Residential, Commercial, Public Facility, Developed, and Natural Open Space. The land use in the Horn Rapids Northwest area is re-designated from Urban Reserve to Low, and Medium Density Residential uses. These are shown in Table LU-3.

Additional land use re-designation includes a portion of an area in Columbia Point South, re-designated from Developed Open Space and Public Facility to Urban Recreation and Natural Open Space. The existing Natural Open Space land in the Columbia Point South area remains unchanged. Additional Natural Open Space land is designated along the shoreline. See Table LU-3, Proposed Land Use, and Figure LU-3, the Future Land Use Map.

**Table LU-3: Proposed Land Use**

| Land Use | Acres |
|---|---|
| Horn Rapids Northwest | |
| **Existing Land Use** | |
| Urban Reserve | 272 |
| **Proposed Land Uses** | |
| Low Density Residential | 230 |
| Medium Density Residential | 42 |
| Total | 272 |
| City View West | |
| **Existing Land Use** | |
| Urban Reserve | 340 |
| **Proposed Land Uses** | |
| Low Density Residential | 143 |
| Medium Density Residential | 25 |
| High Density Residential | 34 |
| Commercial | 55 |
| Public Facility | 40 |
| Developed Open Space | 5 |
| Natural Open Space | 38 |
| Total | 340 |
| Columbia Point South | |
| **Existing Land Uses** | |
| Public Facility | 33 |
| Developed Open Space | 71 |
| Natural Open Space | 153 |
| Total | 257 |
| **Proposed Land Uses** | |
| Urban Recreation | 80 |
| Natural Open Space | 177 |
| Total | 257 |

# NATURAL ENVIRONMENT

## Critical Areas

Richland's environmentally critical areas include wetlands, fish and wildlife habitat areas, frequently flooded areas, geologic hazard areas, and natural aquifer areas. Most of the critical areas are discussed under the open space subsection below. The critical areas map (Fig. LU-4) indicates wetlands, fish and wildlife habitat areas, aquifer recharge areas, and other critical areas such as landslide, erosion, or seismic hazard areas.

The City uses the best available science in developing policies and development regulations to protect the functions and values of critical areas and give special consideration to conservation or protection measures.

## Shoreline

Richland's shoreline consists of approximately 2,600 acres of land on the Columbia and Yakima Rivers shoreline. A Shoreline Master Program (SMP) was developed and adopted by Richland City Council and approved by the Department of Ecology in 2014. This Comprehensive Plan incorporates the SMP by reference. The SMP aims to utilize Richland's shoreline for various water-oriented uses and facilities while protecting the ecological functions and cultural and historic values of the shoreline. The SMP designates eight shoreline environments as follows:

1. Natural Environment
2. Recreation Conservancy Environment
3. Recreation Environment
4. Rural Environment
5. Residential Environment
6. Waterfront Use Environment
7. Industrial Conservancy
8. Aquatic Environment

## Open Space

Open space in Richland and the UGA comprises over 17 percent of the total land. These areas include natural areas (Natural Open Space) and more formal developed parks and trails (Developed Open Space) in the land use map. Developed Open Space is discussed under the Parks and Recreation

Sub Element under Capital Facilities. This section discusses the natural open space.

The natural open space system includes the Yakima River and Columbia River shorelines, islands, greenways, and designated areas within residential developments. It also includes environmentally sensitive areas or critical areas where development would be constrained by wetlands, geologic hazards areas, aquifer recharge areas, fish and wildlife habitat areas, and frequently flooded areas along river or stream corridors.

The natural open spaces on or near the Yakima River include:

- The Tapteal Greenway, located on the lower Yakima River. It provides potential opportunities for non-motorized recreation, education, and habitat protection. The Tapteal Greenway is owned by multiple public and private entities including US Army Corps of Engineers (USACE).
- The Chamna Natural Preserve, located on the north bank of the Yakima River. This area is owned by USACE.
- The Riverview Preserve is located at the confluence of the Yakima and Columbia Rivers and is owned and managed by the USACE.
- Bateman Island in the Yakima River Delta is also owned by the USACE and leased to the City.
- W.E. Johnson Park is located south of Van Giesen Street and is owned by the City of Richland.
- The Amon Natural Preserve, a part of the west branch of the Amon Basin is owned by the City. This area is located on the south end of the City near the Interstate-82.

On the Columbia River, natural open spaces include:

- A portion of Leslie Groves Park area located between Snyder Street and Ferry Street.
- A portion of Columbia Point South area; a largely undeveloped area located at the confluence of the Yakima River and the Columbia River.
- The islands on the river that are part of the McNary National Wildlife Refuge.

In 2004, the City worked with community groups and several funding agencies to help Benton County acquire from willing sellers a 575-acre preserve on Badger Mountain located north of the Badger Mountain South area. The City also worked with community groups and funding agencies to purchase properties from willing sellers along the west branch of Amon Basin in order to enlarge the City-owned natural open space areas.

## Mineral Resources

Mineral resource lands are resource lands that are primarily devoted to the extraction of minerals or that have known or potential long-term commercial significance for the extraction of minerals. The GMA requires cities and counties to designate natural resource lands where appropriate and adopt development regulations to assure the conservation of agricultural, forest, and mineral resource lands. The City undertook a detailed analysis of its mineral resources in 1998 and determined that no lands within the Richland UGA should be designated as mineral resource lands.

# BUILT ENVIRONMENT

## Historic and Cultural Resources

Due to its settlement history, the City of Richland does not have an abundance of historical resources. Historic structures

unique to the City include 12 tract farm houses in the central city and six buildings in downtown that predate World War II, and the Alphabet Homes, built between 1943 and 1951. The Alphabet Homes were based on a series of house plans denoted by a letter in the alphabet (an A house, an F house, etc.). In addition, several apartment buildings and pre-fabricated homes were part of this development scheme. These houses have historical significance in that they were built as part of the federal city created for the Hanford project. Historic structures that have been formally recognized on the National Register of Historic Places include the "Gold Coast" District, a north Richland neighborhood comprised of Alphabet Homes that have largely retained their original character.

Cultural resources are typically discovered during excavation and site preparation for development proposals. While it is difficult to know where every cultural resource site exists, the Washington State Office of Archaeology and Historic Preservation has records of previous investigations in the region. As discussed before, there are recorded archaeological sites within a mile of the Yakima River confluence. National Register-listed properties include the Columbia Point area, Bateman Island, and the Tri-Cities Archaeological District (Anchor QEA, 2014).

Goals and policies in the Comprehensive Plan provide a framework for reviewing and permitting future development proposals. Coordination with the State Office of Archaeology and Historic Preservation and implementation of policies relating to the preservation of cultural and historic resources will help to ensure that these resources are protected.

## Urban Design

Urban design applies to the three-dimensional aspects of the built environment such as buildings, streets, sidewalks, open spaces, and plazas. It also addresses other urban issues such as circulation and connectivity, sustainability, neighborhoods, and districts.

### Design

The City aims to achieve quality design in citywide civic projects such as public buildings and plazas, streetscape and corridor development, public art, parks, and open spaces. High quality design in public projects will set the standards for the City and may encourage further quality developments by the private sector. Richland's Public Library, Community Center, and the Reach Interpretive Center all display quality design. The City promotes quality design in the commercial and residential developments through its development standards. The City is also planning to add gateway features in the downtown area that will enhance the identity of the community.

### Pedestrian and Bicycle-Friendly Environment

It has been a priority of the community to create a vibrant and livable community in Richland. Goals and policies are geared towards creating a pedestrian-friendly community. Mix of uses, higher density, access to transit, safe sidewalks, streetscape elements, network of paths and trails, building orientation, and articulation are some of the considerations for creating a pedestrian-friendly community. Richland has prioritized its downtown area to be more pedestrian- and bicycle-friendly. Swift Corridor development is already underway that will create a pedestrian- and bicycle-friendly connection between the downtown businesses and the residential neighborhoods. The Parkway area, CBD, and Kadlec campus are designed with pedestrian-friendly components.

## Circulation and Connectivity

Connectivity between major destinations and neighborhoods within the City and the region is important to Richland. Richland's transportation system aims to provide a multi-modal circulation system for pedestrian, bike, car, and transit users. Richland has multi-use trails connecting its parks and natural areas, as well as some key locations within the City. The City works with public agencies and private developers to create an efficient circulation pattern within business and residential neighborhoods. The proposed Duportail Bridge, once built, will make a significant improvement in connecting the northern and southern parts of Richland.

## Public Realm

Richland's public realm includes plazas, parks, playgrounds, sidewalks, and open spaces. Each public realm is different and serves a different purpose in their formal, semi-formal, or natural settings. They offer places for gathering, interaction, and recreation. Public places are further enhanced by artworks and pedestrian amenities. The John Dam Plaza is a heavily used public place for community gathering and events, while the Parkway area offers an urban setting for the community. Parks and natural areas offer recreation and tranquil environment for the residents.

## District

The visual character of the Richland UGA varies widely from downtown, Uptown, and the Richland Wye/Island View area, to relatively new commercial areas such as Queensgate and City View, to master planned areas like Columbia Point and Horn Rapids to older alphabet housing neighborhoods in central Richland and to the new residential neighborhoods in Badger Mountain South. Each of these distinct areas calls for a different design approach. In older areas, the emphasis needs to be placed on revitalizing neighborhoods; in other areas, maintenance can be a priority. In newly developing areas, the emphasis needs to be placed on building design and site planning standards. The City recognizes that it needs to take a targeted approach with different urban design standards and strategies to reflect the differing needs of each area within the City.

## Environment and Sustainability

Richland's built and natural environment is maintained through multiple design and environmental protection approaches. Its natural resources are protected under the Critical Area Regulations, the SMP, as well as State and Federal Laws. The City also maintains energy efficiency, renewable energy, and recycling programs. The City encourages the use of sustainable standards including, but not limited to, passive solar energy, geothermal energy, solar hot water systems, Green Building Certification, Energy Star Certification, bird-friendly buildings (i.e., those that are designed to minimize collisions with birds). The City encourages minimizing light trespass for energy savings, dark sky ambience, and glare reduction.

## Landscaping

Landscaping is important for maintaining Richland's attractive physical appearance. Proper landscaping can highlight an area's features and add aesthetic value. Landscaping is applicable for both public and private developments. Given the hot-arid climate in the Tri-Cities area, native landscape and plants are more desirable. Using xeriscape principles can make a water-efficient landscape and signify the area's climate and geology. Selection of trees that offer shade on hot summer days is important for this area.

**Figure LU-3: Future Land Use Map**

**Figure LU-4: Critical Areas Map**

**Figure LU-5: Shoreline Map**

**Figure LU-6: Open Space Map**

# HOUSING ELEMENT

**In this chapter, you will find:**

- Goals and policies guiding housing in Richland
- Existing housing condition
- Projected needs and addressing the demand

## INTRODUCTION

Providing affordable housing for all groups is a priority for Richland. Providing housing near shopping and transportation and offering multiple choices for owner and renter occupied housing would also benefit the City's vision for diversity.

The Housing Element of the City's Comprehensive Plan is intended to provide policy background and broad direction for housing programs and decisions towards meeting the City's goals. Similar to the other elements of the Comprehensive Plan, the Housing Element provides a framework for future planning decisions and outlines goals and objectives the City plans to implement in meeting its housing needs. The Housing Element is consistent with other elements of the Comprehensive Plan.

# GOALS AND POLICIES

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

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

Policy 2: Encourage mixed-use developments with apartments and condominiums above commercial uses in the City's urban core. Where redevelopment or infill opportunities arise, allow for increased housing density in residential-designated areas that immediately surround the CBD, while respecting the character and scale of the existing neighborhood.

Policy 3: Support the development of senior housing and long-term care/assisted living facilities in the City in close proximity to commercial uses and medical services and facilities.

Policy 4: Promote and provide incentives (such as zoning/rezoning, revised regulations, and provision of infrastructure) for infill development and redevelopment, while respecting the character and scale of the existing neighborhood.

Policy 5: Allow and regulate manufactured homes in the same way as site-built homes.

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

**HE Goal 2: Improve affordable housing opportunities for lower-income individuals, households, and first time homebuyers.**

Policy 1: Expand the supply of affordable units by promoting owner- and renter-occupied housing throughout the City, consistent with Comprehensive Plan.

Policy 2: Promote the use of mixed-income housing developments and mixed-use developments that provide both affordable housing and economic opportunities throughout the City consistent with Comprehensive Plan.

Policy 3: Sustain or improve the quality of existing affordable housing stock by encouraging rehabilitation of housing units by current owners.

**HE Goal 3: Implement the current version of the Tri-Cities Consolidated Plan.**

Policy 1: Provide assistance to lower-income households that participate in local improvement districts for infrastructure projects. Assistance may be limited to selected neighborhoods or to the neediest households based upon a percentage of median income and fund availability.

Policy 2: Assist infrastructure activities that revitalize and stabilize older or declining neighborhoods or areas in which the majority of households are lower-income.

Policy 3: Improve access for persons with disabilities and the elderly by improving streets and sidewalk systems.

## Neighborhood Character

**HE Goal 4: Encourage the maintenance and preservation of existing housing stock and residential neighborhoods.**

Policy 1: Encourage reinvestment in older residential neighborhoods and support the revitalization of such neighborhoods by keeping the streets and other municipal systems in good repair.

a) Encourage the formation of local improvement districts.

Policy 2: Implement the City's affordable housing and weatherization programs.

a) Continue to participate in the Tri-Cities HOME Consortium.

b) Continue to utilize federal Community Development Block Grant and HOME funds for housing rehabilitation and first-time homebuyer opportunities.

Policy 3: Continue to allow accessory dwelling units in single-family residential districts.

Policy 4: Accommodate non-profit and public agencies' efforts to purchase, construct, and rehabilitate housing to meet the affordable and other housing needs of the community.

Policy 5: Strive to increase the rate of owner-occupancy over time through City's assistance programs.

Policy 6: Maintain a strong code enforcement program.

Policy 7: Update and implement the Island View Master Plan to include mixed-use housing and multi-family residential rehabilitation and construction.

Policy 8: Encourage the use of the City's Crime Prevention Through Environmental Design (CPTED) program in developments.

Policy 9: Continue to participate in the City Police Department's Crime Resistant Community Living (CRCL) Program, which provides free training for property owners and landlords to help provide safe, crime-resistant communities for all residents.

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

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

**HE Goal 6: Improve Public Facilities.**

Policy 1: Support the revitalization of neighborhoods by improving and supporting public facilities that serve neighborhoods of all income levels.

Policy 2: Improve parks and recreation facilities in targeted neighborhoods by supporting a range of improvements to existing or new parks such as building bicycle and walking paths, improving public restrooms, landscaping, or installing play equipment.

Policy 3: Support beautification of our community by integrating art into public facilities in creative and engaging ways.

# EXISTING CONDITIONS

Based on American Community Survey (ACS) Census data of 2015, Richland has a total of 22,130 housing units. About 65 percent of the housing units are owner-occupied and 35 percent renter-occupied. This is similar to the United States occupancy rate of 64 percent owner-occupied and 36 percent renter-occupied. Single unit detached housing types dominate the existing housing inventory with 63 percent of the total share. Based on this data, the housing occupancy rate in Richland is 94 percent.

**Table HE-1: Housing Occupancy in Richland**

| Occupancy Type | Units | % |
|---|---|---|
| Owner-occupied | 13,622 | 65.5 |
| Renter-occupied | 7,170 | 34.5 |
| Total occupied[1] | 20,792 | 100 |
| [1] 94% of the total housing units | | |

Richland's single-family homes are mostly concentrated between Spengler Street and the greenbelt (Abbott Street) in north Richland, and between Columbia Park Trail and Interstate 82 in south Richland. Another concentration of housing exists in north Richland in the Horn Rapids area. The City has new housing developments as well as the old Alphabet Homes built between 1943 and 1951. Alphabet Homes are mostly located in the older part of the City near the downtown area.

# PROJECTED NEEDS

As discussed in the Land Use Element, Richland's population growth will require additional housing units in the City in the next 20 years. An increase of over 23,000 people in the City and UGA will require 1,270 additional housing units. This will include housing demand for all income and age groups. With the baby boomers retiring, there is a growing need for affordable senior housing in the City. Based on a discussion with the affordable housing group for seniors over the period of 2010 and 2016, occupancy at the affordable senior housing communities averaged 98 percent. This indicates a high demand for affordable senior housing. The expansion of educational institutions triggers the need for student housing and multi-family housing in conjunction with the region's growing need for single-family housing.

# ADDRESSING THE NEEDS

This demand of additional housing will be met by developments in the existing planned areas, infill developments, and by re-designating two Urban Reserve areas. This plan will create a mix of residential, commercial, and public facilities land uses as shown in the land use plan (Fig LU-3). This will add additional

housing units including single-family, multi-family, and apartment homes.

The City's current housing assistance program will continue to assist homeownership for Richland citizens. The City's policies promote infill development, which will be another option for housing development where infrastructure already exists. The City provides additional housing choices by allowing accessory dwelling units in single-family neighborhoods.

# TRANSPORTATION ELEMENT

**In this chapter, you will find:**

- Goals and policies for transportation
- Existing systems and future improvements for:
  - Motorized systems
  - Non-motorized systems

## INTRODUCTION

The City of Richland maintains a complete multi-modal network of transportation facilities serving residents and businesses. A brief summary of transportation facilities is provided here, with more details provided in the supporting analysis document (Appendix A).

## GOALS AND POLICIES

**TE Goal 1: Provide an efficient and multi-modal transportation network including road, trail, rail, water, and air, to support the City's land use vision and existing needs.**

Policy 1: Plan new street segments and consider modifying existing streets to provide comfortable and safe elements for bicyclists, pedestrians,

and transit users in addition to vehicles.

Policy 2: Identify and secure the rights of way for new and/or expanded transportation corridors.

Policy 3: Support rail services for industries and commerce within the area.

Policy 4: Support regional planning efforts for roadway, rail, air, and non-motorized travel.

Policy 5: Plan and implement transportation system improvements that meet the needs of all areas and residents.

Policy 6: Plan transportation facilities that are compatible with adjacent land uses.

Policy 7: Plan and implement an appropriately classified and designed roadway system that provides for efficient movement of people and goods and the comfort and safety of residential neighborhoods.

**TE Goal 2: Improve safety, connectivity, and operating efficiency of the transportation system.**

Policy 1: Implement appropriate access control for arterial collectors and arterial streets.

Policy 2: Link local street networks through subdivisions to provide efficient local circulation, as appropriate, and provide additional collector arterial access for major residential areas.

Policy 3: Evaluate, plan, and install traffic control devices and intersection designs to improve travel safety and efficiency.

**TE Goal 3: Encourage the use of transportation modes that promote energy conservation, circulation efficiency, and an active lifestyle.**

Policy 1: Support increased use of transit, bicycling, and pedestrian travel.

Policy 2: Plan facilities for non-motorized travel across jurisdictional boundaries.

Policy 3: Require sidewalks, improved shoulders, appropriate signage, or off-street trails within new developments to accommodate internal bicycle and pedestrian circulation within and between neighborhoods.

Policy 4: Encourage new developments to be pedestrian-friendly and compatible with the public transportation system.

Policy 5: Design a circulation system to become a bicycle-friendly community with complete streets.

**TE Goal 4: Ensure that the road network is sensitive to the natural and built environment and offers a sense of the community.**

Policy 1: Use appropriate streetscape and gateway features along the major entryways into the City.

Policy 2: Implement landscaping and other types of buffers along major transportation corridors.

Policy 3: Construct street system improvements to reduce traffic congestion as a measure to improve air quality.

Policy 4: Plan new streets and consider modifying existing streets to include storm water management best practices to reduce pollution from stormwater runoff.

Policy 5: Plan and implement new streets with features that mitigate the hazard to wildlife.

Policy 6: Plan and implement new streets and consider modifying existing streets to improve access control to sensitive areas.

# EXISTING SYSTEM AND FUTURE IMPROVEMENTS

The most recent Transportation Plan for the City of Richland was completed in 2005 and was used to prepare the 2008 Comprehensive Plan. Many of the improvements identified in that Plan have been completed. Several studies have been conducted to identify preferred improvements in corridors where congestion is occurring today. These studies have determined the basis for many of the short-range improvements that are identified in the Capital Improvement Program for the City.

A major transportation challenge within the City of Richland transportation system is the congestion facing north-south travel during commute times. Several factors contribute to this situation, such as the major regional employers situated north of the City, and significant amount of housing is provided south and east of the Yakima and Columbia Rivers within the region. Regional commute traffic from south Richland, Kennewick and Pasco, is currently limited to SR 240 and George Washington Way for north-south travel through the City of Richland due to the challenge of providing adequate capacity to cross the Yakima River to the south and Columbia River to the east. I-182 also creates a barrier given that there are only three access points and four crossings within the city as well. Congestion as a result of this north-south demand at commute times is manifest at several locations as discussed in the supporting analysis document. A number of planned projects are being considered to address this issue; but the considerations are complicated by the needs and vision of residents as they relate to George Washington Way. As described above George Washington Way is a key element in supporting a regional travel need. George Washington Way is also a City street passing through areas of Richland in which a regional commute route doesn't align with the users goals. Achieving acceptable performance levels for the economic vitality of the City and region and meeting the desires for livability on the City's transportation system will continue to be significant challenges.

For the purposes of this Comprehensive Plan Update, traffic counts from 2016 conducted by the Benton Franklin Council of Governments were used to conduct an analysis of the existing system to identify any additional deficiencies. Those traffic counts were also used to calibrate and update the regional traffic model to be consistent with anticipated land use for year 2040. Subsequently, an analysis for forecast traffic volumes was used to identify potential long-range issues with the transportation network.

## Motorized System

### Automobile

There are over 275 miles of roadway within the City of Richland, including a functionally classified network of arterial and collector roadways as well as local streets. There are 66 traffic signals within the City (some are operated by WSDOT or the City of Kennewick) and four roundabouts.

Significant improvements identified in the short term include the Duportail Bridge over the Yakima River, the widening and extension of Queensgate Drive, South George Washington Way safety and mobility improvements, and the Center Parkway Extension west of Steptoe Street. These projects are anticipated to cost at least $53 million.

Long-range improvements include the extension of Gage Boulevard and Queensgate Drive to serve the Badger Mountain South sub-area, interchange improvements on both I-182 and SR240, as well as other collector road improvements to serve developing areas. A new arterial route is proposed to connect the existing north end of Queensgate Drive to SR 224 (with a Yakima River crossing) as well as an extension south from Kingsgate Way to connect to SR 224. Additional traffic signals or roundabouts are anticipated at several locations as well.

### Air

Commuter air travel service is provided at the Tri-Cities Airport in Pasco. The Richland Airport provides general aviation facilities on two 4,000 foot runways. The Airport Master Plan currently calls for the extension of the north-south runway to 5,000 feet in order to accommodate large aircraft. This runway extension will require further study and potential mitigation since the Runway Protection Zone will be extended over SR 240 and some developed industrial properties.

### Freight

There are currently approximately 30 miles of railroad tracks within the City of Richland. Much of this track is owned by the Port of Benton and operated and maintained through a lease to the Tri-City Railroad (TCRR). TCRR provides local freight switching and interconnect services to the Union Pacific Railroad, while the Burlington Northern Santa Fe provides direct service to the City of Richland.

The rail network has recently been expanded by the City to serve the Horn Rapids Industrial Park and includes a loop that accommodates the loading of unit trains. Additional expansions are anticipated to the north of Horn Rapids Road to serve new industrial property acquired from the Department of Energy.

### Port Barge

The Port of Benton provides a high dock as well as a barge slip along the Columbia River in the northern part of the City. These facilities are able to serve barges that travel to the Pacific Ocean and Pacific Rim markets in a cost effective transportation mode.

### Transit

There are currently nine transit routes operated by Ben Franklin Transit that serve the City of Richland, with four of those being Inter-City routes that also serve other communities and make connections at Transit Centers. Ben Franklin Transit regularly modifies its services and routes to accommodate growth and development.

## Non-motorized System

Non-motorized facilities within the City of Richland are mainly composed of sidewalks constructed in association with streets and a separate bicycle and pedestrian trail system. There are currently about 30 miles of Class I trails that serve the City of Richland, with over six miles of secondary trails and 36 miles of soft trails that traverse natural areas such as Badger Mountain or Columbia Point South and the Amon Basin. There are also over 68 miles of on-street bike routes that facilitate bicycle travel throughout the City.

# FINANCING

The City receives funding for transportation projects from a variety of sources, including impact fees, developer construction, City General Funds, Arterial Street Funds, Transportation Improvement Board grants, Highway Safety Program grants, State funding, Federal Surface Transportation Program funding as well as other Federal Grants.

The City collects Traffic Impact Fee according to Richland Municipal Code (12.03). It is called the South Richland Street Collector Financing Plan. It assists to develop the arterial street network in south Richland and to make other improvements such as traffic signals as traffic volumes grow. The impact fee area generally involves two zones and covers the area south of the Yakima River with the exception of the Badger Mountain South Sub-Area. The impact fee was updated in 2008 and 2012 and is expected to be updated again in 2017.

Details of proposed transportation improvements, timeframe and financing sources can be found in the supporting analysis document (Appendix A).

# UTILITIES ELEMENT

**In this chapter, you will find:**

- Goals and policies for utilities
- Wastewater facilities
- Water supply system and facilities
- Storm water system and facilities
- Solid waste management and facilities
- Energy services
- Utilities provided by others
  - Natural gas supply
  - Telecommunications
  - Irrigation

## INTRODUCTION

The Utilities Element of the City of Richland Comprehensive Plan describes utility policies and regulations to implement the goals of the Comprehensive Plan. It was developed in accordance with Section 36.70A.070 of the GMA to address utility service within the City of Richland over the next 20 years. It consists of the general location, proposed location, and capacity of all existing utilities in the UGA. General utility corridors are identified in this Element. The Element was also developed in accordance with the County-Wide Planning Policies and has been integrated with all other Comprehensive Plan elements to ensure consistency.

# GOALS AND POLICIES

**UE Goal 1: Utilities should support the land use and economic development goals of the City.**

Policy 1: Siting of proposed public facilities should be consistent with adopted land use policies.

Policy 2: When available and permitted under prevailing power supply contracts, the City will use its market access to low-cost electricity to provide favorable rates targeted at expansion and attraction of industries offering additional family-wage jobs.

Policy 3: Ensure that aesthetic impacts of utilities will be addressed through measures such as landscaping and screening.

**UE Goal 2: Maintain existing service levels to current customers and ensure that public facilities and services necessary to support development are planned, sized, and constructed to serve new development.**

Policy 1: Maintain current utility service levels based on local, state, and federal standards.

Policy 2: Use a minimum 20-year planning horizon to plan for City-provided public utilities and identify new facilities, expansions, and improvements that will be needed. The City will work with other purveyors of public services to provide facilities and services concurrent with development.

Policy 3: Promote the efficient use of land and minimize environmental disturbance by requiring that the facilities of various utilities be located together in the City right-of-way wherever possible.

Policy 4: The City will designate utility corridors and utility facilities as required to facilitate and promote the expansion of commercial and industrial development.

Policy 5: The City will actively cooperate with other utility providers to establish a City electrical service territory boundary that allows the City's municipal utility to serve new loads.

**UE Goal 3: Provide utility facilities that ensure environmentally sensitive, safe, and reliable service.**

Policy 1: All utility expansion and construction will consider the environment and ways to minimize impacts to it in siting, construction, and use.

Policy 2: The City will use the best available technology to mitigate adverse impacts resulting from utilities projects.

**UE Goal 4: Adopt programs to conserve and promote sustainable use of resources.**

Policy 1: Establish public outreach programs to promote the conservation of resources, waste reduction, reuse, and recycling.

Policy 2: Implement the City's utility systems management plans.

**UE Goal 5: Coordinate with outside utility providers for efficient, cost-effective, and reliable utility service.**

Policy 1: Ensure that land will be made available for the location of utility lines, including location within transportation corridors.

Policy 2: Promote, when feasible, location of new public and private utility

distribution facilities in shared trenches, and coordination of construction timing to minimize construction-related disruptions to the public and reduce the cost of utility delivery.

Policy 3: When and where natural gas franchises exist, promote the extension of natural gas distribution lines to and within the UGA, constructed or reconstructed.

Policy 4: Promote a wider range of high-speed internet providers to encourage competition.

# WASTEWATER FACILITIES

The Richland sanitary sewer system was originally developed to serve the Richland core area, but has been extended to other areas as they have developed, including north Richland, south Richland, the Badger Mountain area, and the Horn Rapids community. The sanitary sewer system includes a conveyance system, a wastewater treatment facility, and effluent disposal. A General Sewer Plan was adopted in 2016, which provides a general evaluation of the sewer collection system and Wastewater Treatment Plant, a Capital Improvement Plan (CIP) with a particular emphasis on the next 20 years, and assessment of the utility's financial condition and ability to support the recommendations of the CIP.

The existing Richland sanitary sewer collection system serves approximately 40 square miles of area that is divided into seventeen drainage basins. The collection system consists of over 262 miles of gravity collection pipes, which range in size from six inches in diameter to 54 inches in diameter. The City owns and operates 14 pump stations, ranging in size from 1.5 to 35 horsepower. Overall, the collection system had adequate hydraulic capacity to convey current flows as well as future flows. Although the hydraulic analysis indicated relatively few capacity issues, the collection system is showing its age and a proactive renewal and replacement program has been developed to address this.

All flows collected by the Richland sanitary sewer collection system are transported to and treated at the Richland Wastewater Treatment Plant. Since its completion in 1985, the plant has consistently achieved the discharge requirements specified in its National Pollution Discharge Elimination System (NPDES) permit. The plant provides primary sedimentation, followed by secondary treatment using an activated sludge process. Plant effluent is disinfected with chlorine prior to discharge to the Columbia River. Several renewal and replacement projects have been identified at the Wastewater Treatment Plant through the planning period.

# WATER SUPPLY SYSTEM

The Richland water system was constructed during the 1940s to support the wartime activities at the Hanford Nuclear Reservation. This temporary system has developed into the modern permanent water system used in the City today. The City's water supply system consists of wells, a surface water treatment plant, pump stations and chlorinators, interties, water lines, and reservoirs. A Water System Plan was completed in 2016 to be adopted in 2017, which provides a general evaluation of the water distribution system and Water Treatment Plant, a CIP with a particular emphasis on the next 20 years, and assessment of the utility's financial condition and ability to support the recommendations of the CIP.

The majority of the population within the corporate limits of the City of Richland is served by the City of Richland Water Utility. The Utility serves approximately 18,689 connections (as of 2016), which includes residential, commercial, and industrial users.

The City has a total available water right of 34,948 acre-feet per year and 43,786 gallons per minute (gpm) for instantaneous flow. The City appears to have adequate water rights for future growth. The City's potable water sources include a wellfield and the Columbia River Water Treatment Plant (WTP). The wellfield has a total capacity of 15 million gallons per day (MGD) while the WTP has a capacity of 36 MGD. Source capacity is adequate for future growth, and water supplied to the City of Richland is of high quality meeting federal and state drinking water standards.

The City has approximately 340 miles of pipelines in the water distribution system ranging in size from two inches in diameter to 36 inches in diameter. There are ten storage facility sites that provide approximately 22 million gallons of storage and ten booster pumping stations that provide direct water storage to seven pressure zones within the City. Several projects to address capacity as well as renewal/replacement have been identified through the planning period.

# STORM WATER SYSTEM

Richland's storm water system facilities consist of collection and conveyance, pumps, underground injection control (UIC) facilities, regional detention/ water quality facilities. and regional outfalls. A Storm Water System Plan was developed by the City in April 2017.

Collection and conveyance facilities include catch basins, manholes, pipes, forced main, culvert and open channel. There are currently over 4000 catch basins and over 127 miles of gravity pipe in the City.

There are seven public and privately owned pump stations throughout the City.

Some storm water runoff generated within the City is infiltrated via the City's over 280 UIC facilities.

Regional detention/ water quality facilities include 22 ponds, 2 bioretention cells, 6 underground storm chambers, and 21 swales.

Stormwater runoff that does not infiltrate is conveyed to surface receiving waters via 21 regional outfalls that discharge to the Columbia River, the Yakima River, and the Amon Wasteway.

Future improvements of the storm water system are identified to reduce:

- Existing conveyance capacity and flooding issues;
- Potential future conveyance capacity and flooding issues;
- Pollutant loading to receiving water bodies; and
- Chronic system maintenance needs.

# SOLID WASTE MANAGEMENT

The City of Richland Solid Waste Division provides municipal solid waste collection and disposal services to residences and businesses within the City limits. About 26 percent of the solid waste is recycled in Richland based on the 2015 tonnage of generation, recycling, and disposal.

The City of Richland owns and operates the Richland Landfill (also known as the Horn Rapids Landfill). The landfill site is 275 acres in size. Approximately 46 acres are permitted for solid waste disposal. The site also includes a 14-acre composting facility, a residential and small commercial customer transfer station, a

scale house and administration building, and an operations and equipment maintenance building.

The City offers curbside recycling to its residential and commercial customers. The City currently operates seven drop-box recycling collection centers throughout the City and delivers the collected recyclable items to Clayton-Ward Recycling in Richland.

The City's waste generation is forecast to increase to 80,000 tons by 2031. The current space in the Landfill will be used up sometime in 2020 at the City's current rate of waste placement. The City is planning for its future solid waste disposal capacity by exploring two options:

1. Expanding landfill capacity on the current site by building a landfill that meets current state and federal design regulations; or
2. Building a transfer station and hauling waste to a large regional landfill.

It is expected that a decision will be made in calendar year 2017, after which preparations will be made to construct the necessary facilities. Regardless of the disposal alternative selected, the City anticipates maintaining its current customer service levels at the Richland landfill.

# ENERGY

Richland provides electrical service throughout the City, most of the UGA, and the City's 50-square mile service territory using 552 miles of primary line and eight substations. Ownership and operation of these facilities is shared by the City and the Bonneville Power Administration (BPA). Bulk transmission of electrical power supply to customers in the UGA has historically been provided from the BPA transmission grid, with the local utilities providing final pass-through services. Benton PUD also provides power to a limited number of people in Richland through a service agreement between Benton PUD and the City.

The City currently runs an energy efficiency program by providing incentives for reduced energy usage. Its renewable option program allows residents to purchase clean, zero-emission wind energy. The City also offers low-interest loans to promote use of solar power.

Electrical service plans are designed and upgraded to provide for future growth and accommodate new and increased loads. Richland maintains a performance based level of service where failure in one system will not cause failure of other systems and can be picked up by other components within eight hours.

Future deficiencies are identified based on projected loads. The City has identified multiple capital improvement projects through the year 2027. Major capital improvement projects include: plan, design, and construction of a new substation in the Dallas Road and Leslie Road area; construction of Kingsgate substation for the Horn Rapids Industrial Park; design and implementation of smart grid/smart metering infrastructure; and purchase of southwest service area infrastructure.

# OTHER AGENCY UTILITIES

## Natural Gas Supply

Cascade Natural Gas Corporation builds, operates, and maintains natural gas distribution facilities serving the City of Richland. It currently serves most parts of the City. Natural gas is made available concurrently with growth to the best of the purveyor's ability. The City will promote locating utility distribution lines together and

using existing utility easements wherever possible.

## Telecommunications

Telecommunication in Richland is provided by the licensing agency's franchise agreements with the City. Telecommunication is mostly regulated at the state level by the Washington Utilities and Transportation Commission.

The City of Richland currently franchises Charter Communications to serve its population. Charter provides cable TV, Internet, and phone services in Richland. Some other phone and Internet services providers include but are not limited to Verizon, Cellular One, U.S. Cellular, AT&T Wireless, T-Mobile, and Cingular Wireless. Telecommunication facilities offer services through cell towers on tall poles, lattice towers, and/or co-located in buildings.

As growth occurs within the City, demand for reliable telecommunication services also grows. Telecommunication companies provide adequate services according to Federal Communications Commission (FCC).

## Irrigation

Only portions of the City of Richland currently have irrigation services. The southern part of the City is served by the Columbia, Kennewick and Badger Mountain Irrigation Districts. Columbia Irrigation District operates an irrigation canal and a pump station in that area.

Within the unincorporated UGA, irrigation services are provided by the Columbia and Badger Mountain Irrigation Districts.

# CAPITAL FACILITIES ELEMENT

**In this chapter, you will find:**

- Goals and policies for Capital Facilities
- Parks, recreation, and open spaces
- Municipal facilities
- Fire and emergency services
- Police services
- Schools
- Essential public facilities

## INTRODUCTION

The Capital Facilities Element addresses facilities that are important for the City's growth in the next 20 years. Accommodation of the additional growth within the City's available land area and the provision of adequate services for the expected growth are two key aspects to be addressed in the comprehensive planning process. The Comprehensive Plan Supporting Analysis (Appendix A) provides additional details of the Capital Facilities Plan.

This element integrates the Comprehensive Plan with the City's Capital Improvement Plan (CIP) for capital facilities budget allocations. The CIP prioritizes the needs of the City for infrastructure and other capital needs, both within the City and the UGA. Prioritization for budget decisions are made based on the goals and policies and future growth indicated in the Comprehensive Plan. The Capital Improvement Plan (CIP) is a tool for

identifying and prioritizing capital projects and major capital purchases for budget consideration. The plan provides a project planning schedule for at least a six-year period and identifies funding sources for projects approved in the current budget cycle.

The CIP is useful in coordinating community planning, determining financial capacity and ensuring capital expenditures demonstrate support for the key elements of the City's Strategic Plan. The CIP is comprised of projects that maintain, enhance, or construct new facilities and infrastructure.

The Richland CIP uses many revenue sources to fund the capital investment projects identified in the CIP, including various taxes, revenues, bonds, and grants. The City also collects park impact fees to mitigate park impacts. Impact fees collected from specific park zones are used within that park district to address the impact by providing park and facilities according to the standards set in the 2014-2019 Parks, Recreation and Open Space Plan.

# GOALS AND POLICIES

## General Goals and Policies

**CF Goal 1: Ensure that adequate infrastructure and public facilities exist or can be provided concurrent with new development takes place.**

Policy 1: The City will work with other purveyors of public services to provide facilities and services concurrent with development.

Policy 2: The City will strive to ensure convenient and safe student access to school sites.

**CF Goal 2: The City will provide capital facilities that ensure environmentally sensitive, safe, and reliable service.**

Policy 1: The City will consider ways to minimize environmental impacts in siting, construction, and use of all capital facility expansion and construction projects.

Policy 2: The City will mitigate adverse impacts resulting from capital facilities projects according to the State Environmental Policy Act (SEPA) and other local, state and federal requirements.

Policy 3: The City will locate capital facilities identified as essential public facilities to provide the necessary service to the intended users with the least impact on surrounding land uses.

**CF Goal 3: Provide adequate resources for capital improvements and make efficient use of fiscal and other resources.**

Policy 1: Prioritize capital improvement needs that are consistent with overall planning goals.

## Parks, Recreation and Open Space

**CF Goal 4: Provide an integrated system of parks, recreation facilities, trails, and open spaces as an asset consistent with the Parks, Trails, Open Space, and Facilities Master Plan that enhances the community's quality of life.**

Policy 1: Implement the Parks, Trails, Open Space, and Facilities Master Plan and programs for park and recreation facilities.

Policy 2: Coordinate the development of City of Richland trails, open space, and other recreational facilities and programs with other municipal facilities development, where appropriate.

Policy 3: Develop and adopt Master Plans for specific parks as necessary.

**CF Goal 5: Provide diverse active and passive recreational opportunities for residents and visitors of all ages, based on needs.**

Policy 1: Develop participation and interest in organized and individual recreation based on trends and changing lifestyles.

Policy 2: Provide adequate facilities to meet the sports and active recreational needs of different age groups.

Policy 3: Help citizens make full use of existing facilities through increased public awareness, revised and clear maps, and directional signage.

**CF Goal 6: Identify, prioritize, and preserve unique natural habitat, ecologically critical areas, shorelines, and significant landforms and develop public recreational activities appropriate to these resources.**

Policy 1: Develop property and ecological management programs consistent with the SMP, and Critical Areas Ordinance.

Policy 2: Provide public access and use of the Columbia River and Yakima River shoreline consistent with the SMP.

Policy 3: Evaluate opportunities to acquire and/or protect additional open space to protect significant landforms, critical habitat areas, and appropriate native vegetation areas.

Policy 4: Promote environmental education in an appropriate manner based on the sensitivity of the subject area.

**CF Goal 7: Enhance the community and region's cultural and historic heritage through features incorporated in community and regional parks.**

Policy 1: In cooperation with the Arts Commission, incorporate art in suitable public locations.

**CF Goal 8: Extend and improve the multi-use trail system to link parks, activity centers, schools, and employment centers.**

Policy 1: Identify desirable trail linkages and trail extensions needed to connect with the City's trail network as part of existing trail plan.

## Schools

**CF Goal 9: Work with the Richland and Kennewick School Districts to help meet the needs of the school districts to serve the community.**

Policy 1: Coordinate with the school districts to identify locations of future school sites.

Policy 2: Continue to work closely with the Richland and Kennewick School Districts and special user groups to promote joint use recreation programs and facilities.

Policy 3: Develop and maintain safe routes to schools by pedestrian and other modes of transportation.

## Municipal Facilities

**CF Goal 10: Provide municipal facilities as needed for efficient services, rapid response times, and convenient customer service.**

Policy 1: Consider leveraging investments in new municipal facilities that help the City achieve other goals and operate efficiently.

**CF Goal 11: The City's investment in municipal facilities should, to the extent practicable, encourage additional private investment.**

Policy 1: Consider strategically locating certain municipal facilities in areas that can act as catalysts for private developments.

## Fire, Police, and Emergency Services

**CF Goal 12: The City will provide efficient, cost-effective, and concurrent levels of public safety services designed to maintain quality of life.**

Policy 1: The City will identify the funding mechanism to construct and staff fire and emergency service facilities in areas of the City wherever five hundred homes or more are located outside a four-minute drive time from an existing Richland Fire & Emergency Services facility or a neighboring jurisdiction facility with similar staffing levels participating in an automatic aid agreement.

Policy 2: The City will identify a funding mechanism to increase staffing levels from three to six in station's initial response districts when the resources/crew out of service norm

reaches 4.8 hours per 24-hour period for emergency response.

Policy 3: Policy 3: The City will identify the funding mechanism to construct and staff Fire & Emergency Service facilities in areas of our city wherever 1350 or more employees work outside a 4 minute drive time from an existing Richland Fire & Emergency Services facility or a neighboring jurisdiction facility with similar staffing levels participating in an automatic aid agreement.

Policy 4: The City will evaluate the adequacy of the public safety facilities and equipment, mutual and auto aid agreements, and personnel staffing levels and deployment needs for the present and projected change.

**CF Goal 13: Maintain and improve safe neighborhoods in Richland.**

Policy 1: Maintain an adequate force of police officers throughout the City.

Policy 2: Implement physical planning and Crime Prevention Through Environmental Design (CPTED) principles to enhance user surveillance, de-opportunize criminal activities, and minimize potential for crimes.

Policy 3: Create a high level of public awareness and support from the community for positive engagement with the police and crime prevention and deterrence programs

**CF Goal 14: Provide efficient, cost-effective, and concurrent levels of public safety services designed to maintain quality of life.**

Policy 1: Maintain community education programs on crime and fire prevention to increase the level of community awareness.

Policy 2: Emphasize continued cooperation through inter-local agreements with rural fire districts, fire, and police agencies of adjacent jurisdictions and other public safety service providers.

Policy 3: Evaluate the adequacy of public safety facilities and equipment, mutual aid agreements, and personnel staffing and program needs, for the present and for changes in needs with anticipated growth.

Policy 4: Ensure quality public safety personnel to serve the community.

## Library Facilities

**CF Goal 15: Maintain the Richland Public Library as a safe, inviting, inclusive destination, as well as a center of creativity and innovation that also offers services, collections, and gathering spaces that meet diverse needs.**

Policy 1: Provide library facilities appropriate for Richland's population, circulation, technology, books, and material resources.

Policy 2: Maintain adequate service levels, based on comparative statistics gathered by the Washington State

Library for libraries of a similar statistical size.

Policy 3: Maintain and accommodate technological advances in resource and information management.

# PARKS, RECREATION, AND OPEN SPACE

Richland's parks system consists of neighborhood parks, community parks, regional parks, special use areas, linear parks, and natural open spaces in 2,286 acres of land. Although some natural open spaces are included, many natural open space areas are not included in the park system. Richland's natural open space in general is discussed under the Land Use Element.

**Table CF-1: Park Categories**

| Park type | Acres | Number of Parks |
|---|---|---|
| Neighborhood Parks | 78.6 | 25 |
| Community Parks | 220 | 4 |
| Regional Parks | 170 | 2 |
| Special Use Areas | 702 | 11 |
| Linear Parks | 240 | 9 |
| Natural Open Space | 873.98 | 7 |
| Total Parks and Recreation Areas | 2,285.6 | 58 |

In addition to City-owned parks, Richland residents enjoy parks and recreational facilities owned by other agencies such as the Badger Mountain Centennial Preserve owned by Benton County, the open space owned by USACE, and Richland School District facilities, etc.

The City also has a system of trails consisting of Class 1 trails, secondary trails, and soft trails. The existing trails map (Fig. TE-6) indicates the locations and distribution of trails throughout the City.

Richland Parks and Public Facilities Department offers events, aquatic, and athletics programs in multiple City-owned facilities (see Table CF-2). Listed below is a brief sample of activity categories with categories changing based on demand:

- Aquatics swim lessons, lap swim, open swim pre-school educational activities
- Arts & Crafts, General Education-chess, hunter education, first aid, and more
- Dog training, park ranger programs, geocaching, hikes, and classes
- Home and garden, language, computer and technologies
- Fitness
- Yoga, martial arts, dance, wellness-check-ups
- Sports: team and individual sports
- Adventure camp for youth
- Cards, socials trips

**Table CF-2: School District and City of Richland Facilities**

| Facility Type | Existing Inventory |
|---|---|
| Youth Baseball Game Fields | 10 Fields |
| Youth Baseball Practice Fields | 12 Fields |
| Youth Softball Game Fields | 5 Fields |
| Youth Softball Practice Fields | 10 Fields |
| Adult Softball Fields | 4 Fields |
| Indoor Basketball Practice Courts (Richland School District) | 7 Courts |
| Indoor Basketball Game Courts (Richland School District) | 5 Courts |
| Indoor Volleyball Courts | 21 Courts |
| Outdoor Swimming Pool | 1 Pool |
| Youth Soccer Practice Fields | 27 Fields |
| Youth Lacrosse Game Fields | 0 Fields |
| Youth Lacrosse Practice Fields | 0 Fields |
| Youth Football Game Fields | 1 Field |
| Youth Football Practice Fields | 0 Fields |
| Golf Driving Ranges | 1 Range |
| Golf, 18-Hole Courses | 1 Course |

| Facility Type | Existing Inventory |
|---|---|
| Archery Ranges | 1 Course |
| Skateboard Park | 22,700 sf |
| Outdoor Tennis Courts | 28 Courts |

As the City grows, the use of park and recreation facilities will increase. The current inventory of neighborhood parkland is adequate to meet the future demand. New areas re-designated with this Comprehensive Plan update will require one additional community park to serve the area. There is a need to complete the park amenities at Badger Mountain Park and Hanford Legacy Park. Master plans have been completed for each Community Park. Additional recreational facilities will be needed such as sports fields and courts, golf courses, etc.

Although Richland includes more open space than adjacent communities do, there is community interest in preserving open space. Approximately 34 acres of Urban Reserve land along the Yakima River is re-designated to Natural Open Space (Table LU-3). The need for open space and associated cost to maintain them should be further assessed through stakeholders and public involvement.

# MUNICIPAL FACILITIES

This section describes the City of Richland's administrative buildings and other municipal facilities, including City Hall, City Hall Annex, Community Center, Development Services Center, and the City Shops and Warehouse Facility.

The current City Hall, located at the intersection of Swift Boulevard and George Washington Way was constructed in 1959. It houses the Council Chambers, along with a few other departments. The City Hall Annex adjacent to it was built in 1977.

The Community Center was constructed in 2002 and serves a dual role as a new senior center and a recreation and meeting facility. It also houses the administrative offices of the Parks Department.

The Development Services Center building was acquired from the federal government as surplus property and renovated to become a one-stop planning and development facility.

The City's shops complex is located on a 160-acre parcel near the Queensgate interchange. The complex was constructed in 1999. In 2010, the City constructed an addition to house the City's IT data center. The complex consists of three separate buildings and outdoor storage.

An evaluation of the City Hall building was done last in 2003 and was assessed that the facility was inadequate in size and flexibility and does not comply with basic accessibility and energy code requirements. Based on this, a new City Hall has been planned across the street from its current location, in the parking lot of the Federal Courthouse. The new building will be three stories, approximately 46,000 square feet, and will combine the City Hall, the City Hall Annex, and the Development Services Building into one facility, therefore eliminating three aging buildings. Construction will begin in 2017 and will be completed in 2019.

An assessment of major municipal facilities is available in the supporting analysis document (Appendix A), under the Capital Facilities Element.

# FIRE AND EMERGENCY SERVICES AND FACILITIES

Fire and emergency medical services are a key part of public safety services for the citizens of Richland and the thousands of visitors and workers who pass through the City. The City of Richland has a professional fire department, which provides fire and life safety protection, emergency medical services (EMS), technical rescue and hazardous materials response to citizens, visitors, and the business community.

The Richland Fire & Emergency Services Department also provides Advanced Life Support EMS through Inter-local Agreements to segments of unincorporated areas of Benton County.

The Richland Fire & Emergency Services Department has developed a facility deployment model based on the current and projected needs of the community over the next 10 years. This plan encompasses potential growth and development in the community, current and future urban growth boundaries, the City of Richland transportation improvement plan, and industry standard response times. The facility deployment model aligns with the City of Richland Core Focus Areas as well as meets the mission and vision of Richland Fire & Emergency Services.

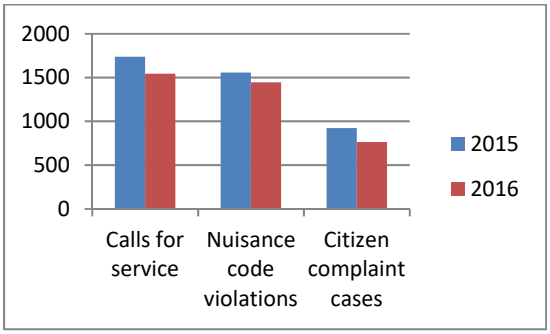
# POLICE SERVICES

The Richland Police Department provides law enforcement services within the City limits. Law enforcement within the unincorporated UGA is currently provided by the Benton County Sheriff's office. The Police Department is located at 871 George Washington Way. The station was constructed in 2001.

The Richland Police Department established a partnership with the Washington State Department of Corrections (DOC) in 2002 to better monitor criminals who are under active DOC supervision and living in Richland. At present, Richland Police is also leading the Benton County Emergency Management Agency's activities.

Based on 2015 and 2016 data, the incidence of some types of crime is decreasing while other types are increasing. For code enforcement cases, calls for service, code violations, and citizen complaints are decreasing as shown in the table below.

**Figure CF-1: Code Violations**




Richland Police provides a value-based service. Richland measures its levels of service for public safety based on the committed and uncommitted time of the officers and support staff. Future growth will increase demand for police protection services and police department community programs. However, the Department is currently not seeking an increase in the number of police officers as it aims to meet its demand through an efficient allocation of committed time. It continues its current programs of community services and crime prevention programs.

# LIBRARY FACILITIES

Library services for Richland residents are provided primarily by the Richland Public

Library, operated by the City of Richland Parks and Public Facilities Department. Additional library services are available at the Washington State University (WSU) Consolidated Information Center (CIC), Columbia Basin College in Pasco, and the Mid-Columbia Library System in the adjacent jurisdictions. The Kadlec Neurological Resource Center has a specialized library on neurological disorders that is open to the public.

# SCHOOLS

Richland is served by both Richland and Kennewick School Districts, as the school district borders do not follow the municipalities' geographic borders. Schools serving Richland students are as follows:

Elementary schools: Badger Mountain, Jason Lee, Jefferson, Lewis and Clark, Marcus Whitman, Orchard, Sacajawea, Tapteal, White Bluffs, William Wiley, and Vista.

Middle schools: Carmichael, Chief Joseph, Enterprise, and Desert Hills.

High schools: Richland High, Hanford High, Rivers Edge, Three Rivers HomeLink, and Kamiakin.

Special education schools located outside Richland but serving the region include: Delta High School (Science, Technology, Engineering, Math) located in Pasco and Tri-Tech Skills Center located in Kennewick.

School districts provide services based on population growth. Currently, the planned growth of the Badger Mountain South area is creating the need for future schools in this area. The Richland School District is planning to expand service in this area on approximately 54 acres owned by the school district. Adequate services such as roads, utilities, and safety are needed in this area to serve the school site once built. The school districts face challenges in locating school sites within the UGAs. Coordination between the school district and City during the planning process helps addressing the siting issues.

# ESSENTIAL PUBLIC FACILITIES

Essential Public Facilities (EPF) include facilities that are typically difficult to site due to difficulties in finding the suitable and appropriate locations and perceived or real environmental, economic, or social impacts. Examples of EPF include airports, state education facilities, state and local correctional facilities, solid waste handling facilities, state or regional transportation facilities, the interstate highway system etc.

Cities and counties are required to establish a process for identifying and siting essential public facilities and adopt or amend its development regulations as necessary to provide for the siting of secure community transition facilities.

Richland reviews the siting of such facilities with a process established in the Richland Municipal Code (RMC 23.42.060, Essential public facilities).

# REFERENCES

Anchor QEA, 2014. City of Richland Shoreline Inventory, Analysis and Characterization Report. 2014.

# APPENDICES

A. Comprehensive Plan Supporting Analysis
B. Benton County Countywide Planning Policies
C. Environmental Impact Statement Summary Document
D. Public Involvement Summary
E. City of Richland Shoreline Master Program Update , 2014
F. City of Richland Capital Improvement Plan 2017 to 2030
G. 2015 General Sewer Plan Update
H. City of Richland Comprehensive Water System Plan, 2017
I. City of Richland Storm Water Management Plan , March 2016
J. City of Richland 2011 Solid Waste Management Plan
K. Parks, Trails, Open Space and Facilities Master Plan, 2014-2019
L. Strategic Leadership Plan

Exhibit 5

City of Richland

# Badger Mountain Subarea Plan

April 2010

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# Badger Mountain Subarea Plan

## 1 Introduction

The Badger Mountain Subarea Plan is an appendix to the City of Richland Comprehensive Plan and is designed to identify the City of Richland's future growth opportunities presented in the 1,998-acre area located south and east of the Badger Mountain Centennial Preserve and north of I-82. The plan sets out a vision for orderly and efficient development and includes direction for land use, transportation, utilities and public services, in accordance with the provisions of the City of Richland Comprehensive Plan, and other adopted plans and policies. It is intended to be practical in economic terms and visionary in terms of its ability to address emerging issues such as sustainability -- while being flexible to respond to future market conditions. It is intended to provide an overall understanding and rationale for the quality and character of the uses, the proposed level of service and infrastructure needed. It addresses land uses, traffic circulation, housing, parks and recreation and public facilities. Some facets of the plan are prescriptive while others provide guidance to encourage creative responses to emerging issues.

A subarea plan is one way the city can implement its goals and policies for a specific geographic area. It functions as a supplement to the city's Comprehensive Land Use Plan and it is intended to provide guidance for growth and development in this area of the city over the next 20 years. In this case, the Badger Mountain Subarea is unique in that the majority of the undeveloped portions of the site are largely in single ownership, with much of the other undeveloped portions of the site controlled by a second major landholder. The Subarea Plan contains both a detailed master plan for the western 1,480

acres, which is referred to in this plan as Badger Mountain South, and a land use plan the remaining 518 acres of the Subarea.

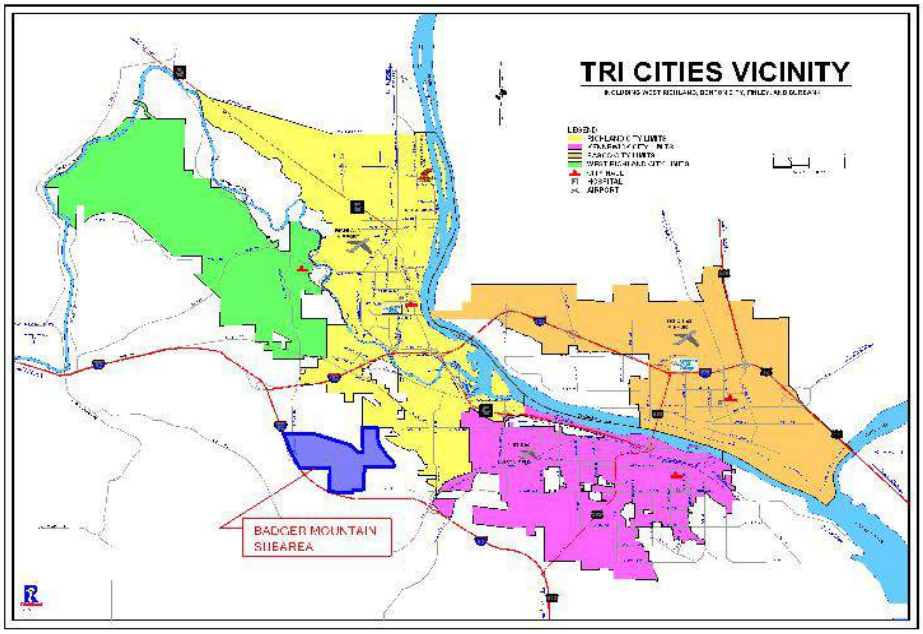
The Badger Mountain Subarea was identified by Benton County, in conjunction with the City of Richland, as part of the city's Urban Growth Area (UGA) in 2006. This means that urban expansion will occur here, in conjunction with the construction of the necessary and appropriately sized urban infrastructure.

While the Badger Mountain Subarea has capacity to absorb growth and development for the city, timing for the creation of new neighborhoods and the type and amount of areas built for commercial activity will be influenced by the state, regional and local economy, by the level of accessibility, by the extension of public services and by other external factors. The Subarea Plan is intended to forecast and plan for the growth of the city while being responsive to these decision factors and to the fluctuations in demand of the land market over time.

# 2 Location and Setting

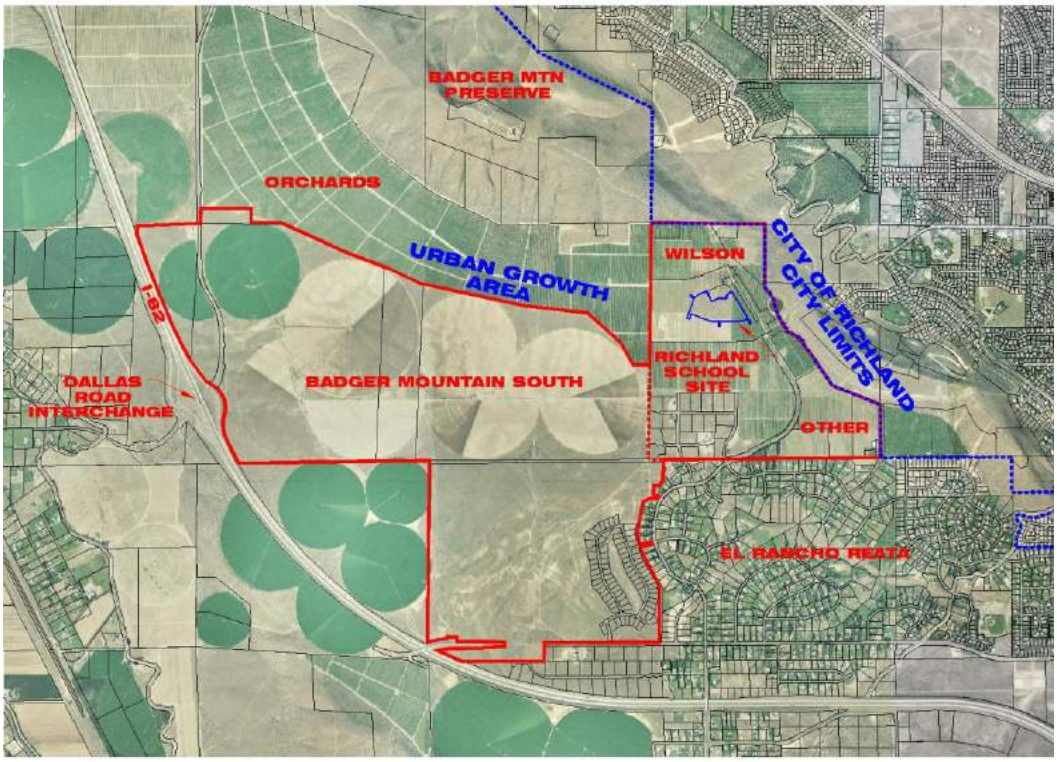
The Badger Mountain Subarea is located south and east of Badger Mountain lying east of I-82, and north of Reata Road. It lies about eight miles southwest from downtown Richland. The Dallas Road I-82 interchange intersects the site north to south in the western part of the Subarea. The Tri-Cities Regional Airport in Pasco is about 16 miles from the Subarea, a distance easily traveled by freeways and local roads, and provides excellent access and connection for future residents and businesses.

**Map 1: Badger Mountain Subarea in Relationship to the Tri-Cities**




The proximity of the Badger Mountain Subarea to existing transportation facilities, community services, and regional commercial and cultural facilities makes it a prime location for urban development.

**Map 2: Badger Mountain Subarea Plan Boundaries – Local Setting**




## 2.1 Surrounding Land Uses:

Properties surrounding the area of the Subarea Plan are shown above in **Map 2: Badger Mountain Subarea Plan Boundaries – Local Setting,** and are generally described as follows:

- North: The Subarea Plan properties are bordered to the north with orchards that are outside of the Urban Growth Area, the Badger Mountain Centennial Preserve, and then moving northeast, to the City of Richland's existing city limits.
- South: Properties to the south lie outside of the Urban Growth Area. Areas south of Reata Road are developing as large lot subdivisions in the County.
- East: Properties to the northeast lie within the City of Richland and are undeveloped while those in the southeast are in the County in the developed El Rancho Reata subdivision.
- West: The Subarea Plan properties are bordered by Interstate 82 and by the pie-shaped section in the southwest which lies outside of the Urban Growth Area.

As can be seen in **Map 2**, the property that is the pie-shaped parcel in the southwest lies north and adjacent to the I-82 freeway; it contains about 254 acres that are now in agricultural uses. It is not included within the city's Urban Growth Area and therefore lies outside of the planning area of the Badger Mountain Subarea Plan, remaining within Benton County jurisdiction. Previous County approvals for related residential development south of I-82 included requirements that this pie-shaped area would remain in agricultural uses until the County adopts revised or new density regulations. If in the future Benton County authorizes the further expansion of Richland's Urban Growth Area, this property could be annexed by the city, and then would be subject to city requirements and controls.

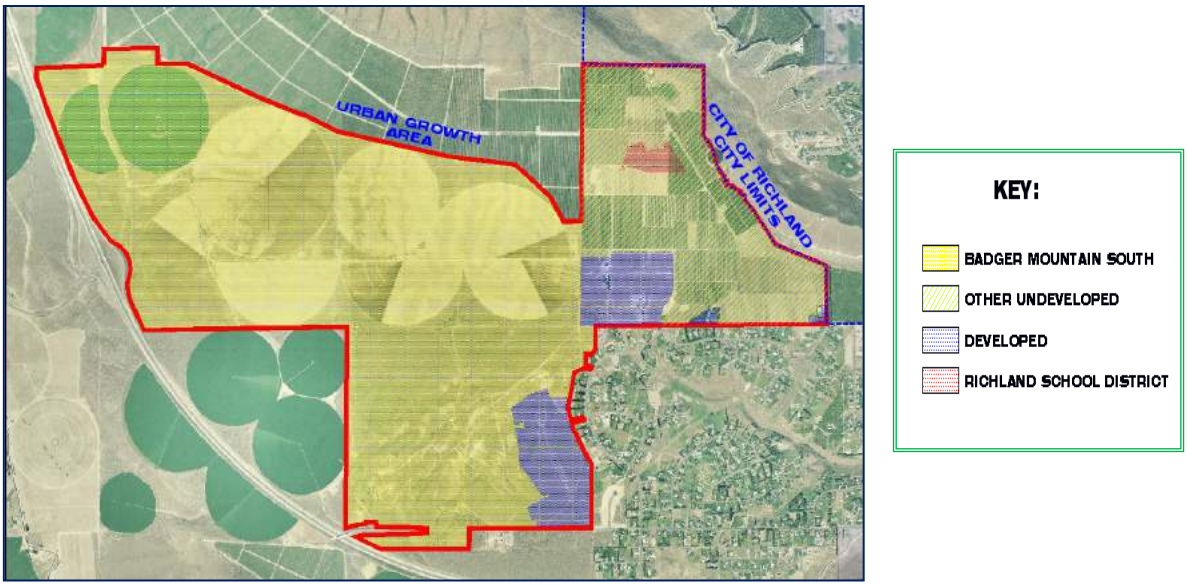
## 2.3 Badger Mountain Subarea Properties General Description

The properties within the Subarea are primarily undeveloped with a moderately rolling topography and a gradual northern slope to the Badger Mountain saddle where they meet the City of Richland's current corporate boundary. Elevations generally range from 700' in the westerly, southwest corner of the site near Dallas Road, to 850' on the south side along east Reata Road, then to 1050' in the northeast corner of the UGA.

Much of the Subarea is visible from vehicles travelling along I-82. Panoramic views are generally available in the higher elevations of the Subarea along the south facing hillside towards the high ridges in the distance. The soils in the Badger Mountain Subarea are primarily silt loam of variable thickness and present no barriers to development. Some existing natural drainage channels are evident in the topography generally running to the southeast and southwest, although they are typically dry due to low precipitation conditions. Except for water service, the majority of the undeveloped portions of the site are generally unserved by utilities and other urban infrastructure.

While much of the vacant land is either planted with agricultural crops or covered in grassy vegetation, a large portion of the site, known in this plan as Badger Mountain South, previously had received Benton County's approval for a large, low-density residential and golf course development, with associated commercial uses. Phase 1-A of the previously approved development, located in the southeast portion of the site and called the Reata Ridge Subdivision, was developed with 78 residential lots that are now in the process of being marketed for sale. While no houses have yet been built within this subdivision, for planning purposes it is considered developed property. The Badger Mountain Subarea Plan proposes a different vision for the remainder of the Badger Mountain South area.

**Map 3: Developed and Undeveloped Parcels**




In addition to the newly developing Reata Ridge subdivision, the other developed portion of the Subarea is located north and east and contains moderate slopes to the north. This area, called the Badger Mountain Plateau Subdivision, contains single-family residences on two-acre lots. The developed areas of the planning area are served with private septic systems, roadways and utilities, and border existing development outside of the UGA to the south and east. No additional development is expected to occur within these developed portions of the Subarea.

**Table 1: Acreages in the Badger Mountain Subarea**

| Undeveloped Area | Developed Area | Total |
|---|---|---|
| 1,892 acres | 121 acres | 2,013 acres |
| 94% | 6% | 100% |

Undeveloped properties are those owned by large and small property owners and which are now planted in orchards or in other agricultural uses, or otherwise vacant. Also included within the Undeveloped Area category is a 15 acre parcel owned by the Richland School District which was previously acquired for future development as an elementary school.

## Table 2: Undeveloped Acreages by Ownership[3]

| Badger Mountain South | Wilson[4] | Other[5] | Richland School District | Total Undeveloped Area |
|---|---|---|---|---|
| 1,480 acres | 296 acres | 101 acres | 15 acres | 1,892 acres |
| 78% | 16% | 5% | 1% | 100% |

[3] Acreages are rounded up to the next whole number.
[4] During the development of this Subarea Plan, Wilson filed a preliminary plat application with Benton County for the Hidden Hills Subdivision, containing approximately 41 acres and creating 58 residential lots within the area of the Subarea Plan. These lots are adjacent to and east of the developed Badger Mountain Plateau Subdivision.
[5] This category includes 16 acres south of Reata Road and 85 acres of other undeveloped parcels.

# 3 Vision

*The Badger Mountain Subarea neighborhoods are home to people in all stages of their lives, from children to the elderly. People here share and enjoy an exceptional quality of life due to the unique physical environment, which complements that found in other Richland neighborhoods. Residents find numerous opportunities to stay healthy by using the connected trails and parks that offer beautiful vistas to the nearby ridges. Just a walkable few blocks away from many homes is a park or a community gathering place where people come together to barbeque, play sports or have a quiet conversation. Most children can walk to their schools because they are only a short distance from their homes. Parents feel safe for their children because they know their neighbors and other parents along the school routes.*

*Residents also come together at the farmers' market, bookstore, shops or other gathering places. Young professionals are attracted here because the area offers a wide range of housing choices, many in neighborhoods that are built with the latest green technologies. They find a variety of stores, restaurants, and recreational opportunities that cater to people at all stages of their careers. They appreciate the quality of life as reflected in building and landscape design, and the human scale of the commercial structures. Older residents enjoy their homes without having to maintain large yards; they meet over the community gardens or at one of the community centers for an outdoor summer concert.*

*Residents can get anywhere within their community on local streets, the pedestrian trails, by bike or by accessing the fine transit service that runs within the neighborhoods. Some people who live in this area of the city will have opened their own business here, while others will work nearby at one of the office parks, businesses or other employment places. Tourists will find their way to the distinctive Badger Mountain South Wine Village and related shops where they can stay to explore the many tasting rooms and view demonstration vineyards that have many sustainable features, or take classes and explore the fine regional wineries located in nearby Red Mountain and throughout the area.*

This Vision Statement is intended to guide future planning efforts as well to describe the quality of life being advanced through the Subarea Plan. The Badger Mountain Subarea is intended to be developed to protect existing residential land uses, conserve and protect natural systems, and provide quality and choice in housing, shopping, employment, education, transportation, and recreation. The Subarea Plan proposes a healthy balance of market-driven, private sector uses along with a range of public facilities, open space, parks and trail uses. It anticipates the future by identifying and promoting uses, activities and institutions that will accommodate and attract new jobs to the City of Richland. It identifies the community facilities and infrastructure necessary to support the planned uses including the local

transportation system, pedestrian trails and bikeways. The location and mix of uses within the area of the Subarea Plan are intended to minimize noise, traffic and other potential environmental impacts to create residential and business neighborhoods that are healthy to the people who live, work or visit there.

The Badger Mountain Subarea is sufficiently large and well-situated to accommodate new local and regional employment centers while providing opportunities for a full range of commercial activity from those supporting local convenience needs to areas for regional tourist activities. Additional jobs associated with these types of uses will range from entry level to professional and can help to diversify the local Richland economy. A more diversified economy will help to sustain the balance between jobs and housing that supports the high quality of life found in the City of Richland.

Residential neighborhoods are the foundation of the Richland community and the residents provide strong support for local business growth and expansion. The Subarea Plan establishes a range of housing densities in neighborhoods that can accommodate a variety of housing preferences. Many neighborhoods will be close by a walking or bike trail to facilitate a healthy lifestyle and to offer transportation options. Most streets will be planned with multiple connections and in some areas higher density will be encourage along arterials to support the future expansion of transit.

Key to this development concept is that much of the current undeveloped portion of the planning area, that is, the large, vacant acreage now under single ownership and referenced in this plan as Badger Mountain South, will be developed according to sustainable development principles intended to advance the quality of life of residents and businesses, and reduce energy use and conserve resources. The consideration of the Badger Mountain South as a whole permits the creative deliberation of both thoughtful planning and intelligent architecture so that energy efficient measures for both infrastructure and land uses can yield the greatest benefit to the community, the city and the region. Conservation measures and development standards will be built into the related Badger Mountain South Development Agreement (BMSDA). The development agreement is a legal tool that allows the customization of development standards that most efficiently and effectively implement the City's Comprehensive Plan on a project-specific basis. It is within the BMSDA that the broad principles of sustainability and project design described in the Subarea Plan are defined. The BMSDA would be reviewed and approved at time of annexation into the city.

# 4 Goals and Policies

A Subarea Plan must be consistent with the general goals and policies of the City of Richland's Comprehensive Plan, which is itself consistent with the Benton County-Wide Planning Policies and the Growth Management Act. The Badger Mountain Subarea Plan (BMSP) is consistent with the Comprehensive Plan goals and policies and further implements those goals in an identified area where the city's growth will occur, accommodating its future land use needs. The BMSP treats that portion of the subarea called Badger Mountain South as unique and distinct because it is expected to follow sustainable development principles that introduce additional development constraints and opportunities, as compared to the remainder of the city. Certain policies and implementation tools are to be tested in this area and considered for application in other areas of the city in the future.

The Subarea Plan is also a document that reflects the city's direction found in the City of Richland's Strategic Plan "7 Keys to Unlock Our Future." The Strategic Plan identifies the city's desire, or vision, to:

- Grow the city's tax base;
- Leverage investment though public-private partnerships;
- Acquire property for infrastructure and investment;
- Protect water resources;
- Establish entryways and gateways;
- Identify opportunities for recreational and leisure activities:
- Optimize the use of new parks and recreation facilities to meet the needs of the community; and
- Encourage the development of walkable neighborhoods with nearby services.

These strategic elements of the city's vision are addressed within the BMSP. The goals and policies of the City's Comprehensive Plan also apply to the Badger Mountain Subarea. In addition, new policies are proposed that focus on development of the Badger Mountain Subarea. The new policies are numbered and identified below to reflect the Comprehensive Plan element goal most closely associated with the new policy including Land Use, Economic Development, Housing Element or Urban Design. "BMLU" for example, means *Badger Mountain Land Use.*

## 4.1 Badger Mountain Subarea Goals and Policies

***Comprehensive Plan Land Use Goal 1. The City will establish land uses that encourage cost-effective development.***

> BMLU Policy 1.1 – Phase development within the Badger Mountain Subarea over a 20-year planning period so that it can capitalize on existing and planned infrastructure improvements and develop those uses with the best revenue generation potential first in order to support the required initial infrastructure investments.

BMLU Policy 1.2 – Link development of the northeast portion of the Badger Mountain Subarea into the existing street network to the south and east, and over time, to the City's planned transportation network.

BMLU Policy 1.3 – Focus development at the Dallas Road and I-82 interchange where projected land uses can most readily accommodate anticipated costs for infrastructure improvements.

BMLU Policy 1.4 – Support the sustainable development practices proposed for Badger Mountain South including a mix of land uses and densities to facilitate transit use and walkability, and increased water and energy conservation measures.

***Comprehensive Plan Economic Development Goal 6. Richland has established a sense of place that appeals to citizens of all ages. The City has become the entertainment and upscale retail center for the Tri-Cities with a range of retail and service businesses that meet the needs of local residents and visitors to the community.***

BMED Policy 6.1 – Provide areas for new commercial activity that can accommodate the needs of businesses, residents and visitors.

BMED Policy 6.2- Accommodate employment growth with a balance of retail, business, commercial, office park and tourism-related uses.

BMED Policy 6.3 – Encourage the development of Neighborhood Activity Centers where local shopping needs can be accommodated while supporting the reduction of travel trips.

BMED Policy 6.4 – Cooperate with other governmental entities to develop tourism uses that capitalize on the growing Washington wine industry.

BMED Policy 6.5 – Consider opportunities for public-private partnerships that enhance Richland's economic competitiveness and promote job growth.

BMED Policy 6.6 – Encourage the siting of commercial uses and business areas to serve adjacent neighborhoods.

BMED Policy 6.7 – Capture emerging housing and commercial market growth by providing the necessary infrastructure.

BMED Policy 6.8 – Ensure the availability of sufficient quantities of land suitable for new employment centers.

***Comprehensive Plan Housing Element Goal 3. Accommodate growth and maintain affordability.***

BMHE Policy 3.1 – Support the development of residential neighborhoods that provide a variety of housing types, styles and densities to serve a broad spectrum of incomes, ages, and life stages.

BMHE Policy 3.2 –Promote walkable neighborhoods by encouraging a mix of land uses, nodes of higher land use intensity and access to sidewalks and a connected trail and parks system.

BMHE Policy 3.3 –Encourage higher density housing close to employment centers, retail and services, and along arterials to support the efficient expansion of public transit.

BMHE Policy 3.4 –Support the development of energy-efficient housing choices.

***Comprehensive Plan Land Use Goal 5. The City will encourage efficient use and location of municipal and public facilities such as transportation centers, utility facilities, schools, parks and other public uses.***

BMLU Policy 5.1 – Accommodate bicycles and pedestrians in roadway designs.

BMLU Policy 5.2 – Identify a sufficient area for a future transit facility within the Badger Mountain Subarea.

BMLU Policy 5.3 –Locate school facilities using sound urban design principles and work with the school districts to identify future school sites that are walkable.

BMLU Policy 5.4 – Encourage the wise use of public dollars by providing for the joint use of public facilities, particularly between schools and parks.

BMLU Policy 5.5 – Provide for an integrated system of parks, trails, and open spaces that will link to other city facilities as growth occurs.

BMLU Policy 5.6 – Provide opportunities for multi-use civic facilities such as community centers, libraries, parks, schools, gazebos and other gathering places.

BMLU Policy 5.7 – Participate in the dialogue among residents and educational institutions when those institutions seek to expand or make significant changes to their facilities or campuses.

BMLU Policy 5.8 – Consider new and emerging technologies that support sustainable development principles and encourage the use of appropriate technologies with Badger Mountain South.

***Comprehensive Plan Land Use Goal 6. The City will protect and conserve its natural resources and critical lands and provide public access based on ability of the resource to support the use.***

BMLU Policy 6.1 – Encourage the creation of a system of connected neighborhood and community parks, open spaces, trails and preserved natural areas within the Badger Mountain Subarea.

BMLU Policy 6.2 – Link new trails to the city's existing trail system when possible.

BMLU Policy 6.3 – Promote the use of native and climate-adapted landscaping materials where possible.

BMLU Policy 6.4 – Plan the location and design of trails, open space and parks to include known areas of geologic or environmental significance including steep slopes, natural drainage contours, significant views, glacial erratics and others.

***Comprehensive Plan Urban Design Goal 1. The City will create a well-planned community with an aesthetically pleasing environment.***

BMUD Policy 1.1 – Use site planning techniques such as buffers, setbacks or trail corridors to transition development of the Badger Mountain Subarea with existing neighborhoods.

BMUD Policy 1.2 – Consider additional dark-sky measures beyond those in existing city code.

BMUD Policy 1.3 – Support the development of the Badger Mountain South area by encouraging a development pattern that resembles traditional neighborhood design.

BMUD Policy 1.4 – Develop and adopt the use of a detailed land use and development regulation for Badger Mountain South to facilitate the overall design and sustainability objectives of the planned development.

BMUD Policy 1.5 – Consider alternate road widths, parking standards, and unique approaches to streetscape design for areas within Badger Mountain South to accommodate multi-modal transportation choices, to enhance pedestrian safety and to encourage walkability.

# 5 Land Use Plan: Overview

Development in the Badger Mountain Subarea is intended to provide a healthy balance of market driven, private sector uses with a wide range of public uses. The Land Use portion of the plan is fundamental to creating a platform for a vibrant, economically strong, environmentally responsible, and attractive area that captures future growth. Its main focus is establishing areas where people will live, where they will work and where public spaces, parks and natural areas will be located. **Table 3** below provides an overall summary of the land uses with acreages within the Subarea and **Figure 1** shows this in graphic form. The Subarea contains a variety of opportunities to develop housing and commercial uses as well as locations for educational uses, parks, civic spaces and other uses that complement Richland's urban character and strengthens and diversifies its economic base.

**Table 3: Badger Mountain Subarea Land Use Summary**

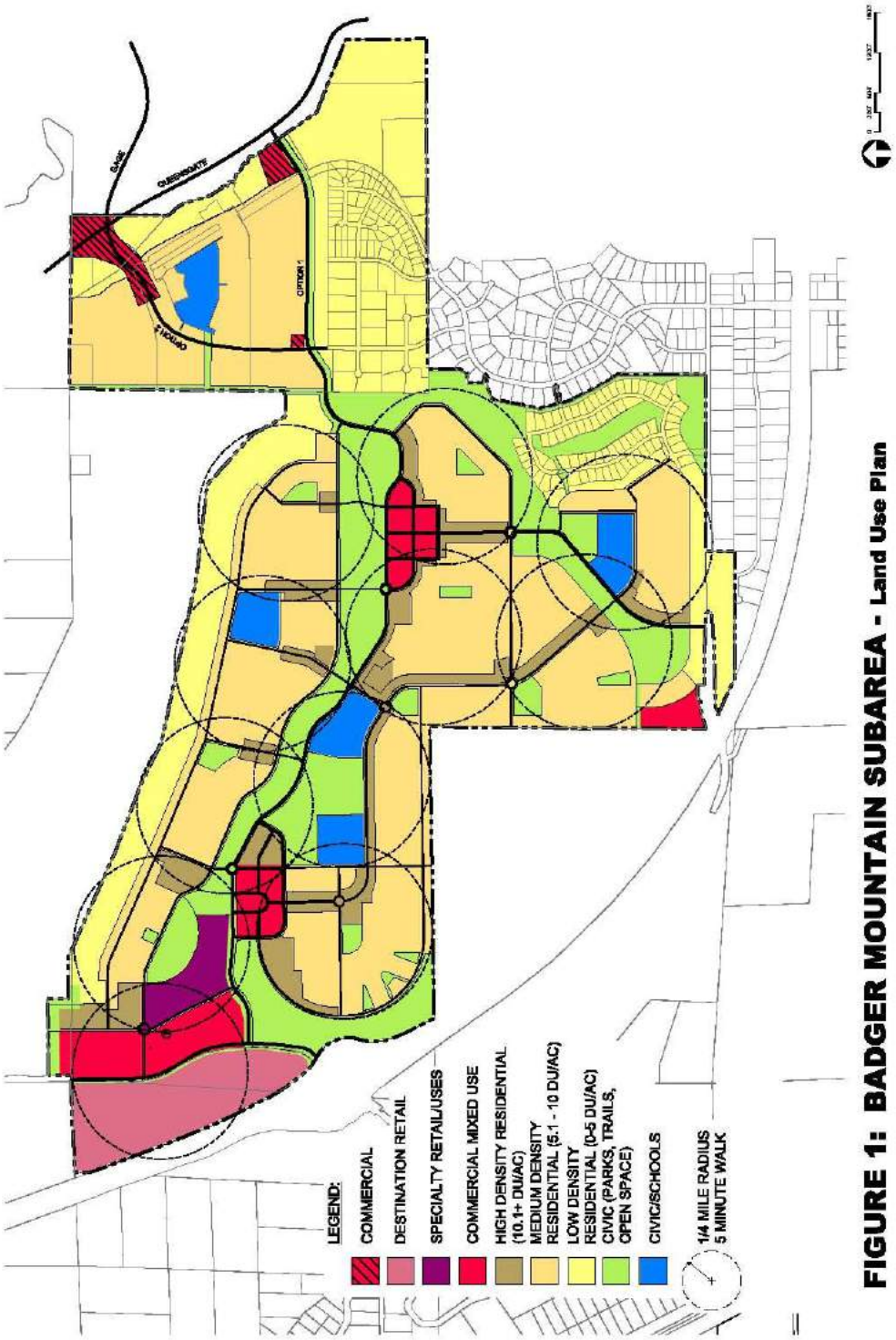
| Land Use by Type | Gross Acreage[6] (estimated acres) | Percentage of Total | Estimated Number of All Housing Units[7] |
|---|---|---|---|
| All Residential | 1,324 acres | 66% | 6,247 units |
| Low-density[8] | 451 acres | (34% of residential) | 571 units |
| Medium-density[9] | 718 acres | (54% of residential) | 3,676 units |
| High-density[10] | 155 acres | (12% of residential) | 2,000 units |
| Commercial/Office/Retail/ Destination Retail[11] | 225 acres | 11% | NA |
| Open space, parks, trails schools and other public buildings[12] | 464 acres | 23% | NA |
| Total All Uses | 2,013 acres | 100% | NA |

[6] "Gross Acreage" figure includes future ROW; actual acreage will be refined during the site plan and subdivision process.
[7] "All Housing Units" category includes an estimate of new units as well as those all ready existing within the Subarea; actual number of new units will be determined during subdivision process.
[8] Low-density development ranges between 0-5 DU/acre.
[9] Medium-density ranges between 5.1-10DU/acre.
[10] High-density of 10.1+DU/acre found only in Badger Mountain South.
[11] Includes 200 acres in Badger Mountain South and 25 acres in all other undeveloped properties.
[12] Includes 444 acres in Badger Mountain South, 15 acres owned by Richland School District and 20 acres in all other undeveloped properties.

Today within the Badger Mountain Subarea, 75 percent of the land area is controlled by a single ownership group; that area is called Badger Mountain South in this plan. The previous development concept for Badger Mountain South, approved by the Benton County Board of Commissioners in 2001, was a suburban-style, low-density residential development with golf course and, near Dallas Road, commercial uses. That original development concept is no longer proposed. In its place, and included within this document, is a project that more closely reflects the historic urban qualities found in the City of Richland, with an added focus to foster sustainable development including the principles of complementary mix of uses, a connected street system providing transportation choice, and compact building design, all with the goal of creating great neighborhoods. These development concepts apply to Badger Mountain South while the City's traditional land use regulations apply to the remainder of the subarea.

Undeveloped areas located within the Subarea but outside of Badger Mountain South are proposed to develop primarily as single family residential land uses with some commercial uses.

**Figure 1: Badger Mountain Subarea Land Use Plan**



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The following sections discuss in more detail the proposed land uses and their distribution within the Subarea and distinguish between properties within Badger Mountain South and all other properties in the Subarea.

## 5.1 Land Use Designations

The City of Richland wishes to capture residential growth to develop as healthy neighborhoods and attract new workers and businesses that add to the economic vitality of the community. The Land Use Plan contains nine (9) separate land use designations which are defined below and are illustrated in **Figure 1, Badger Mountain Subarea Land Use Plan**. These land use categories are intended to accommodate the needs of residents within new neighborhoods, deliver the need for additional goods and services within Richland and from other nearby cities, and to capture revenue from area tourists. Within the Badger Mountain South area, a mixing of the following land use categories will be encouraged to implement sustainable development principles.

## 5.2 Residential Land Uses Categories

In the Badger Mountain Subarea Plan, residential land uses consume about 69 percent of the total gross land area. Three residential classifications are proposed. Each of these residential classifications represents a range of residential densities allowed within any particular development. By allowing a range of densities, residential development can provide a mix of housing types to better meet the needs of housing consumers at different stages of their lives, and in different economic situations. Having a broad range of housing choices allows people more opportunities in choice of jobs, schools, and connection to the community at large while fostering vibrant and age-integrated neighborhoods.

Within the classification of residential uses, densities that range between 1 and 20 dwelling units to the acre will result in about 6,247 housing units being added in the City of Richland over the course of the 20 year planning timeline.

A small number of these dwelling units are already developed or developing now in the Subarea. The Badger Mountain Plateau neighborhood just north of Rancho Reata has 23 two-acre lots that were previously developed. A final plat was recently approved for the 78 lot Reata Ridge subdivision lying in the southeast of the Subarea. A preliminary plat called Hidden Hills with 58 half-acre-plus lots and located just east of and adjacent to the Badger Mountain Plateau neighborhood, was recently approved by Benton County. The Reata Place preliminary plat with 15 residential lots and located south of Reata Road was recently submitted to Benton County[13]. These developed or developing residential land uses

[13] Both the Hidden Hills and the Reata Place subdivisions are considered as "undeveloped" properties in the Subarea Plan because neither has reached final plat approval in the County review process.

complement the established residential neighborhood of El Rancho Reata and those south of Reata Road as properties at both locations will be bordered by other, low-density residential land uses.

Other undeveloped properties in the Subarea, identified in **Table 2** as "Wilson" and "Other," are expected to continue to develop primarily with low and medium-density residential land uses, resulting in an estimated additional 1,143 housing units, although the actual number of new units developed may be higher or lower over the planning timeline[14].

In the Badger Mountain South properties, neighborhoods are intended to include a mix of housing types, densities and other complementary, non-residential uses. Most residences will be connected both within each neighborhood and to the greater community through their relationship to a trail, park or preserved open space. This mix of uses and densities will foster a unique and high quality of life for people living here. The proposed development pattern will also help reduce traffic congestion and long commutes by having locations for employment both within and close by residential neighborhoods. In neighborhoods that contain more than one type of land use, uses are regulated by building type and by design standards in order to control intensity, protect neighborhood scale and maintain pedestrian access. This approach provides development flexibility by identifying other land uses that are compatible with residential while also protecting the integrity of those same neighborhoods.

Among residential land use categories within Badger Mountain South, single family land uses predominate with an anticipated 3,000 units. Urban-size lots that average 5,000 square feet will consume about 553 gross acres; larger single-family lots of about 20,000 square feet are also included, consuming about 142 gross acres, located primarily along the project boundaries. Development of housing other than single family residences is also anticipated. Townhomes, apartments, live-work spaces and residential within mixed-use buildings are also planned, averaging about 18 dwelling units to the acre, or about 2,000 total multi-family units.

**Table 4** below provides a summary of residential land uses in Badger Mountain South and **Figure 2** provides a conceptual, pictorial representation of how development could occur there. New residential development in Badger Mountain South will contribute to the diversity of Richland's existing housing stock including housing prices which can support moderate to middle income households. Accessory dwelling units may provide affordable housing options for new households or for older adults such as a parent or elderly relative while housing in mixed-use structures is often well-situated to persons new to the housing market. Residential units within mixed used buildings are located to take advantage of transit and nearby services and can add to the liveliness of the neighborhood. Units found in mixed use structures are included within the multi-family unit counts below; accessory dwelling units are not identified in the unit counts.

[14] Figure is comprised of an estimate of 1,128 new housing units north of Reata Road and 15 new units south of Reata Road.

**Table 4: Badger Mountain South Residential Land Use Summary**

| Residential Use by Type | Area[15] (estimated gross acres) | Number of Units | Percentage of Total Units |
|---|---|---|---|
| Single-family Large Lot[16] | 142 acres | 250 units | 5% |
| Single-family Urban Lot[17] | 553 acres | 2,750 units | 55% |
| Multi-family Residential[18] | 155 acres | 2,000 units | 40% |
| All Residential within Badger Mountain South | 850 acres | 5,000 units | 100% |

Badger Mountain South neighborhoods will be interconnected by a variety of trails and bikeways so that neighborhoods are walkable and residents' transportation needs can be met in a number of different ways. Street layouts within the Badger Mountain South neighborhoods will be organized to allow building sites that maximize the solar access orientation of structures and that ensure safety and mobility for pedestrians and other non-motorized transport. Other sustainable development principles found in Badger Mountain South are discussed in more detail on page 34, and are intended to foster neighborhoods that are unique to the community and that provide a high quality and healthy living environment.

[15] Acreages include ROW.
[16] Large lots range from 16, 500 square feet to more than 20,000 square feet.
[17] Urban lots have an average size of 5,000 square feet.
[18] Multi-family residential includes townhomes, apartments, live-work units and residential within mixed-use structures.

**Figure 2: Badger Mountain South Land Use Concepts**

## 5.3 Description of Residential Density

**Badger Mountain Low-Density Residential (0 - 5 du/acre):**

The Badger Mountain Low-Density Residential (BMLDR) designation includes the existing and vested low-density subdivisions within the Subarea while also accommodating the development of new low-density dwellings. It is intended to accommodate a variety of housing types and sizes. It supports the idea that housing choice and opportunities for homeownership responds best when a mixture of price ranges are available within the new neighborhoods of the Badger Mountain Subarea.

The BMLDR designation also provides a transition between the existing Badger Mountain Plateau and El Rancho Reata neighborhoods with the new, denser neighborhoods proposed within the Badger Mountain South development.

**Badger Mountain Medium-Density Residential (5.1 – 10 du/acre):**

The Badger Mountain Medium-Density Residential (BMMDR) classification supports the idea that housing choice and homeownership should come in a mix of price ranges within the new neighborhoods of the Subarea.

Within Badger Mountain South, this land use designation is primarily comprised of traditional, urban-sized, single-family lots that average 5,000 square feet. However, it can also accommodate other types of dwellings including mansion apartments, cottages, condominiums, cooperatives and co-housing. Design and site standards that foster a sense of place will be applied to these Badger Mountain South properties. Medium-density designated land areas within Badger Mountain South may also include up to three elementary schools and one middle school location, sited to provide a walkable-orientation for neighborhood children.

**Badger Mountain High-Density Residential (10.1 + du/acre):**

The High-Density Residential (BMMHDR) classification is found only within the Badger Mountain South neighborhoods. It is situated principally along the main collector roads in the Subarea as well as within the identified Mixed-use Villages (Neighborhood Activity Centers). The BMMHDR designation largely provides for development of multiple family dwellings at a higher density and may include apartments, condominiums, townhomes and live-work units. Some units may be within mixed-use structures. The BMHDR category also supports and facilitates economic development because housing developed within this type of classification is shown to attract residents likely to work in emerging labor markets of the knowledge-based economy.

The intent of the BMHD classification is to provide a quality, multiple-family living environment that is attractive to a broad demographic including the elderly, married couples without children and single people who want to live in an urban environment, close to shopping and to their work.[19] The BMHDR category will also provide sufficient design flexibility to adjust the type of residential units to best meet the objectives of the unique Badger Mountain South goals of sustainability and walkability, as well as providing higher density housing adjacent to transportation facilities that can encourage the expansion and use of public transit within the Subarea. Uses such as private parks and open spaces/institutional facilities, churches and other religious institutions, and commercial uses which are compatible with and oriented towards the needs of these developments may also allowed.

## 5.4 Other Land Use Designations

Besides residentially designated property, the Subarea Plan contains six (6) other land use designations which are defined and illustrated in **Figure 1**. The nonresidential land use classifications are intended to accommodate the needs of the new residents, the need for additional services within Richland and other nearby cities, as well as accommodating tourists and other visitors over the 20 year planning timeline. **Table 5** below provides an overall summary of the development potential of the commercially designated properties in the Badger Mountain Subarea.

[19] "As (baby boomers) sell off their homes, they will relocate into smaller ones, including multifamily options. Other demographic trends are afoot as well. In addition to more senior households, the numbers of households without children will represent the lion's share of household growth. Indeed, single-person households will rival households with children and will be the fastest-growing market segment." Nelson, Arthur C., "Demographic Outlook", *Urban Land*, Sept. 2009: 196.

**Table 5: Badger Mountain Subarea Commercial Land Use Summary**

| Commercial Use by Type | Area (estimated gross acres) | Percentage of Total Commercial Acres | Potential Developable Commercial Square Feet[20] |
|---|---|---|---|
| Commercial | 25 acres | 11% | 544,500 sq. ft. |
| Commercial Mixed-Use | 90 acres | 40% | 490,050 sq. ft. [21] |
| Specialty Retail | 28 acres | 12% | 250,000 sq. ft. [22] |
| Destination Retail | 82 acres | 37% | 1.8M sq. ft. |
| All Commercial Uses | 225 acres | 100% | 2,859,550 sq. ft |

## 5.6 Commercial Categories

For Richland to continue to have a strong economy and to thrive, the city must have land for employment centers that can capitalize on the city's historic strengths, respond to emerging markets and provide room for economic diversification through business expansion and new business establishment. The Badger Mountain Subarea Plan includes a variety of areas for economic activity as described in the following paragraphs. Areas identified for economic activity are intended to provide a flexible range of commercial and business-related environments that are tailored to different business needs, i.e., highway oriented commercial, hospitality, neighborhood centers and independent retail, medical or commercial office and pedestrian-oriented mixed use. By providing opportunity for business growth and expansion, related job growth will occur for occupations ranging from manager to entry-level positions.

Some commercial designations described below apply only to areas within the Badger Mountain South properties while others apply to the remaining properties of the Subarea. The commercial categories

[20] Assumes a typical commercial lot consumes 50% of area for nonbuilding footprint (parking, landscaping and other); buildings will vary from one to three stories tall although this figure is most closely aligned with single-story structures.
[21] Assumes mixed-use buildings will contain about 25% commercial to 75% residential; actual build out percentages will respond to market conditions.
[22] Development concept for Specialty Retail includes wine-related businesses, retail and wine-industry support facilities and hospitality, education center, and outdoor amphitheater.

that apply only to Badger Mountain South are distinct because they are tied to development and design standards that are intended to be part of the Badger Mountain South Development Agreement.

**Commercial:**

The Commercial (C) designation would allow retail business and service uses that provide products and services. It is found in future commercial nodes in areas outside of Badger Mountain South. The Commercial designation may include areas that provide limited retail business for the convenience of nearby neighborhoods or areas that provide a wider array of business and service uses.

**Badger Mountain Commercial Mixed Use:**

The Badger Mountain Commercial Mixed Use (BMCMU) designation applies only to properties in Badger Mountain South. It is concentrated within two neighborhood centers as well as being applied to some of the land area adjacent to Dallas Road. The purpose of the BMCMU designation is to concentrate a greater variety of activities within key areas of the community that include public transit, retail, medical and office uses along with residential uses. In many instances, residential will be located within many of the same commercial structures; some residential units may be live-work units where the living quarters is above one's shop or office. Residents will benefit by having a short walk for groceries, or to other stores and service providers, and businesses benefit by having customers living above or around them. Other areas identified for BMCMU may be appropriate for general and corporate office or limited medical facilities and other professional activities. In all cases, in areas identified as BMCMU an important component will be the inclusion of gathering places, public areas that help to provide a sense of identity and an opportunity for community-building.

The type, configuration, and density of development here will also appeal to neighborhood shoppers and will encourage pedestrian traffic between businesses, facilitate efficient mass transit, and consequently require less reliance on motor vehicles. Low intensity uses are not desirable within this area. However, places of worship and public uses including a fire station, satellite police facility, or public library branch can be important additions to the mixed use districts.

**Badger Mountain Specialty Retail:**

The Badger Mountain Specialty Retail (BMSR) commercial designation is identified for areas that will be developed to have a particular draw for tourists or other visitors, while also providing goods and services to the local population. This land use designation is only found within the Badger Mountain South area. It is intended that areas identified as BMSR be developed according to distinct design standards found in the related Badger Mountain South Development Agreement to ensure that a sense of cohesiveness is achieved through coordinated use of building materials, landscaping, signage and lighting. Its location near the freeway interchange will allow the creation of an attractive and inviting entry to South Richland and will concentrate the impact from more auto-oriented uses away from the primary residential neighborhoods.

The area identified as BMSR is being planned to develop as the Badger Mountain South Wine Village and would include a variety of uses and employers such as a wine business incubator, other wineries, demonstration vineyards, boutique hotel, other retail, and goods and services associated with wineries and hospitality in general. The concept plan also includes a public gathering plaza, outdoor amphitheater and sustainable design demonstration features. The build out of the Badger Mountain South Wine Village would occur in stages dependent upon market conditions.

**Badger Mountain Destination Retail:**

Badger Mountain Destination Retail (BMDR) is a land use designation applicable to properties in Badger Mountain South that lie west of Dallas Road at the I-82 interchange. The purpose of this designation is to capture retail and other commercial users that provide goods and services to both the nearby neighborhoods and to the traveling public. At full build out this area would contain a well-conceived and well-designed retail center with a variety and mix of uses, including anchor stores, multi-screen theater, restaurants, service stations, as well as a major, stand-alone retailer. This district is especially suitable for freeway-related uses, including high volume retail, food and specialty stores. Uses here would be sited using the design guidelines found in the Badger Mountain South Development Agreement in order to provide an attractive southern gateway to the City of Richland and to the neighborhoods within the Badger Mountain Subarea.

## 5.7 Other Categories

**Badger Mountain Civic Uses:**

Badger Mountain Civic Uses are uses and places that play an important component to community placemaking. They help to identify a neighborhood or area and give it a distinct and recognizable identity. Neighborhoods and communities are often identified by the school attended by neighborhood children or by the park or other community facility within the neighborhood. In this Plan, civic uses and spaces include schools, neighborhood and community parks, green spaces, trails, community facilities or buildings including churches, post office or public service buildings, plazas and playgrounds. Not all civic spaces are places that are owned and maintained by the city but they are places that people know, gather and relate to because some activity within the space appeals to and functions with some or all within the community. Within the Badger Mountain South properties, approximately 30 percent of the land area is identified as Civic Uses.

In **Figure 1**, the Land Use Plan found on page 19, schools, which are identified here as civic uses, are distinguished from other civic uses because it is important to shown how they relate to and are integrated within the proposed neighborhoods. Civic uses that include active and passive open space and park uses are discussed in more detail beginning on page 38, the **Parks, Trails and Open Space Section.**

# 6 Population Projections and Assumptions

## 6.1 Population

Population growth in the Badger Mountain Subarea will respond to national, statewide and regional population and economic trends. With the national economy in its current state, most communities in Washington are expected to grow slower for the next few years.[23] However, the City of Richland's economic outlook is strong and the city can expect additional job growth and housing demand particularly in light of 2009 federal financial commitments of nearly $2 billion through the American Recovery and Reinvestment Act to fund Hanford cleanup activities.

The Washington State Office of Financial Management (OFM) calculates population projections and assigns them to each county. Benton County apportions its allocated projected population to each jurisdiction in the county. The City of Richland was assigned 28 percent of the total expected population growth in the county. The Benton County Comprehensive Plan, using OFM's high projection allocation, identifies that Richland's population by 2030 will be 69,540 persons, or 22,530 more people than included in the city's 2009 OFM population estimate.

During the expected 20 year planning period, the Badger Mountain Subarea will capture a major portion of Richland's expected population growth and will reflect the age demographics of the city as a whole.

**Table 6: Badger Mountain Subarea Population at Build Out**

| Total Number of New Housing Units[24] | Percent of Occupied Housing Units[25] | Average Household Size[26] | Estimated Population |
|---|---|---|---|
| 6,247 | 94.5 | 2.49 | 14,670 |

[23] See OFM's "Washington Population Growth Continues to Slow," June 29, 2009.
[24] See full discussion of Badger Mountain Subarea housing in Table 3 and related text.
[25] U.S. Census Bureau, Census 2000, Profile of General Demographic Characteristics for the City of Richland.
[26] Latest OFM Data.

**Table 7: City, County and State Age of Population (2000 Census)**

| Age | City | Benton County | State |
|---|---|---|---|
| Birth to 17 years | 27% | 30% | 26% |
| 18 to 44 years | 35% | 37% | 40% |
| 45 to 64 years | 25% | 23% | 23% |
| 65 and older | 13% | 10% | 11% |
| Median Age | 38 | 34 | 39 |

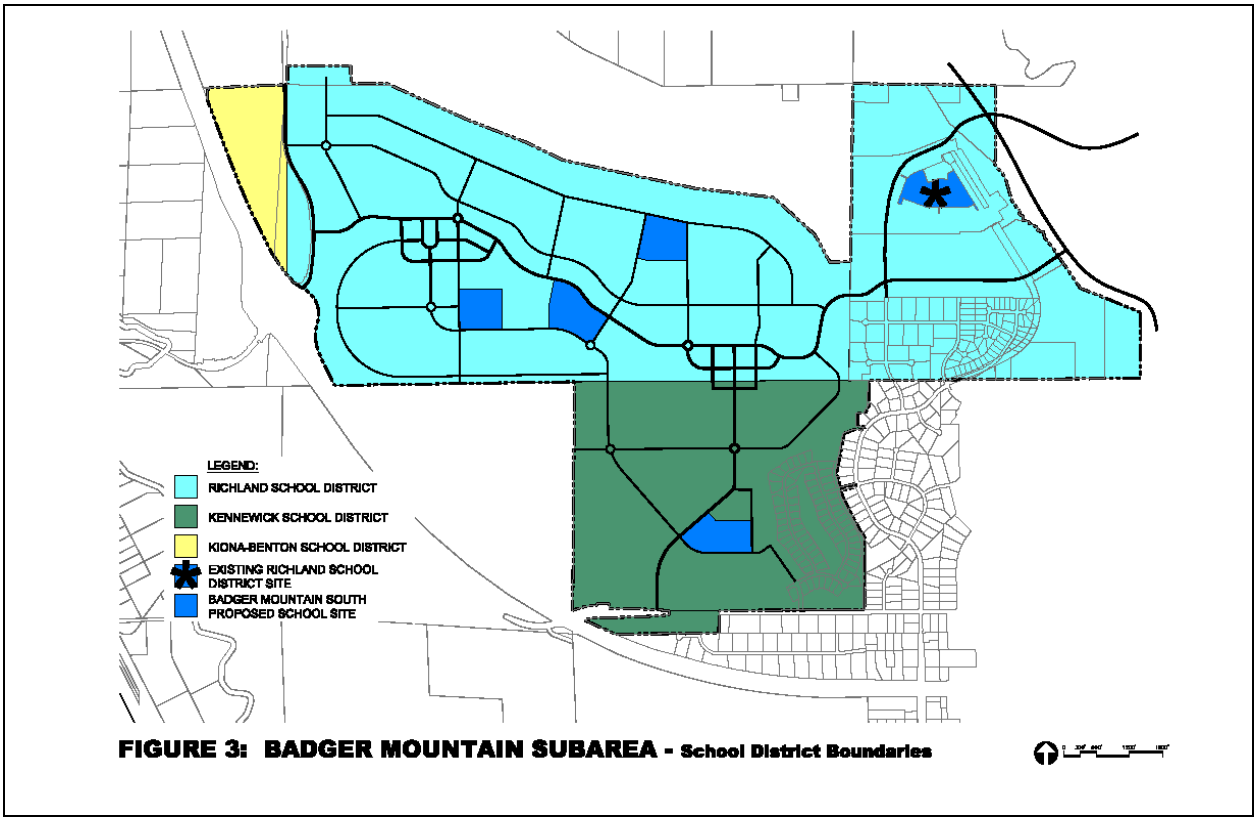
## 6.2 School Population

The Badger Mountain Subarea includes properties that lie within three school districts, the Kiona-Benton School District, the Richland School District and Kennewick School District, see **Figure 3** below. Because no residential development is planned within the Kiona-Benton School District, the following discussion about schools and projections of numbers of school children that could be generated from residential development here is focused on the remaining two districts.

School-aged children will be among the new residents of the Badger Mountain Subarea as it is expected that about 66 percent of the gross land area will become housing.[27] By projecting enrollments using the average numbers of students enrolled today in elementary and middle schools, it is anticipated that over time, there will be sufficient numbers of school children living within the Badger Mountain Subarea to impact school capacity in both the Richland and Kennewick School Districts for elementary-aged children. Within the area of the Richland School District, middle school-aged children will also be of sufficient numbers to impact the district's middle school facilities. It is not anticipated that either school district will see significant numbers of high school-aged children living within the Subarea.

[27] See "Land Use Plan Overview", page 20.

**Figure 3: Badger Mountain Subarea School District Boundaries**




The Richland School District now owns a 15 acre parcel located in the northeast of the Subarea. An additional four sites were identified for future school facilities in the area of Badger Mountain South, one in the Kennewick School District and three in the Richland School District. Both the possible school sites and the existing school district property are identified in **Figure 3.**

School sites which fall within the Badger Mountain South area were placed within neighborhoods and adjacent to other public facilities, like trails and parks, to promote a walkable facility and to support the overall development concept for Badger Mountain South of creating a "walkable and sustainable community." Whether or not any of these sites become the actual locations for future school facilities within the Subarea will be determined as the project builds out over time and the districts determine their need for additional school capacity. If identified sites within the area of Badger Mountain South do not become school locations, these areas will develop with housing.

# 7 Sustainability Principles in Badger Mountain South

Throughout this Subarea Plan distinctions are made between Badger Mountain South and other areas included in the Subarea Plan. That distinction occurs because Badger Mountain South is intended to be designed as a walkable and sustainable community of neighborhoods and business areas that combine many of the historic Richland neighborhood development patterns with current thinking about sustainability. **Figure 4** below is a presentation of a schematic land use plan for Badger Mountain South. In the Badger Mountain South Development Agreement (BMSDA), the general layout and land use concepts will be consistent with the schematic concepts illustrated in **Figure 4**.

In Badger Mountain South, "sustainable development" means development that looks to the long-term social and environmental health of the community. Sustainable development is often best understood through its core principles of compact design, mix of uses, energy conservation, walkability, connectivity and housing and transportation choice. The goal of sustainable development is to promote a livable community and make better use of both land and public investment in infrastructure.

- Compact Design

Compact design is recognized as an element of sustainable development because it includes a reduction in infrastructure, yields a higher proportion of contiguous preserved open space, is more conducive to walking and promotes transit use.[28] Although compact design can take many forms, within Badger Mountain South it means that housing areas will include a mix of densities, including areas of higher density, and that other non-residential uses will be permitted when they are designed to address the issues of scale, form and intensity.

- Mix of Uses

The integration of mixed land uses into neighborhoods is a key element of creating an attractive place to live. Commercial uses in close proximity to residential areas encourage alternatives to driving -- walking and biking become viable mobility options. Mixed land uses also provide a more diverse and sizable population and commercial base for supporting public transit. Businesses recognize the benefits of attracting more customers and workers who live nearby.

- Energy Conservation

Reducing energy use through conservation, design and construction plays a significant role in sustainability. In Badger Mountain South building placement and materials, parking layout and landscape material selection will all reflect the underlying goal of reducing energy use.

[28] Ford, Jonathan, P.E. "Smart Growth and Conventional Suburban Development: Which Costs More?" An infrastructure case study completed for the EPA , Morris Beacon Design, July 9, 2009.

- Walkability

A walkable community locates goods (such as housing, offices, and retail) and services (such as transportation, schools, libraries) that a resident or employee needs on a regular basis within an easy and safe walk. It makes pedestrian activity possible, expanding transportation options, and creating a streetscape that better serves a range of users -- pedestrians, bicyclists, transit riders, and vehicles. Incorporating schools into neighborhoods promotes walkable schools. In Badger Mountain South walkability is addressed by using the "5 minute walk" yardstick. Each neighborhood is designed to create multiple destinations within a five-minute walk for 75 percent of the future households.

- Connectivity

In Badger Mountain South approximately 30 percent of the developable area will remain available for the community as parks, trails and open space. Connected open space in Badger Mountain South means a resident living near Reata Road will be able to walk or bike to the commercial and employment activities near Dallas Road, without ever getting onto the street system. Vehicle users will have multiple ways to get from one place to the other because of the connected layout of streets.

- Housing Choice

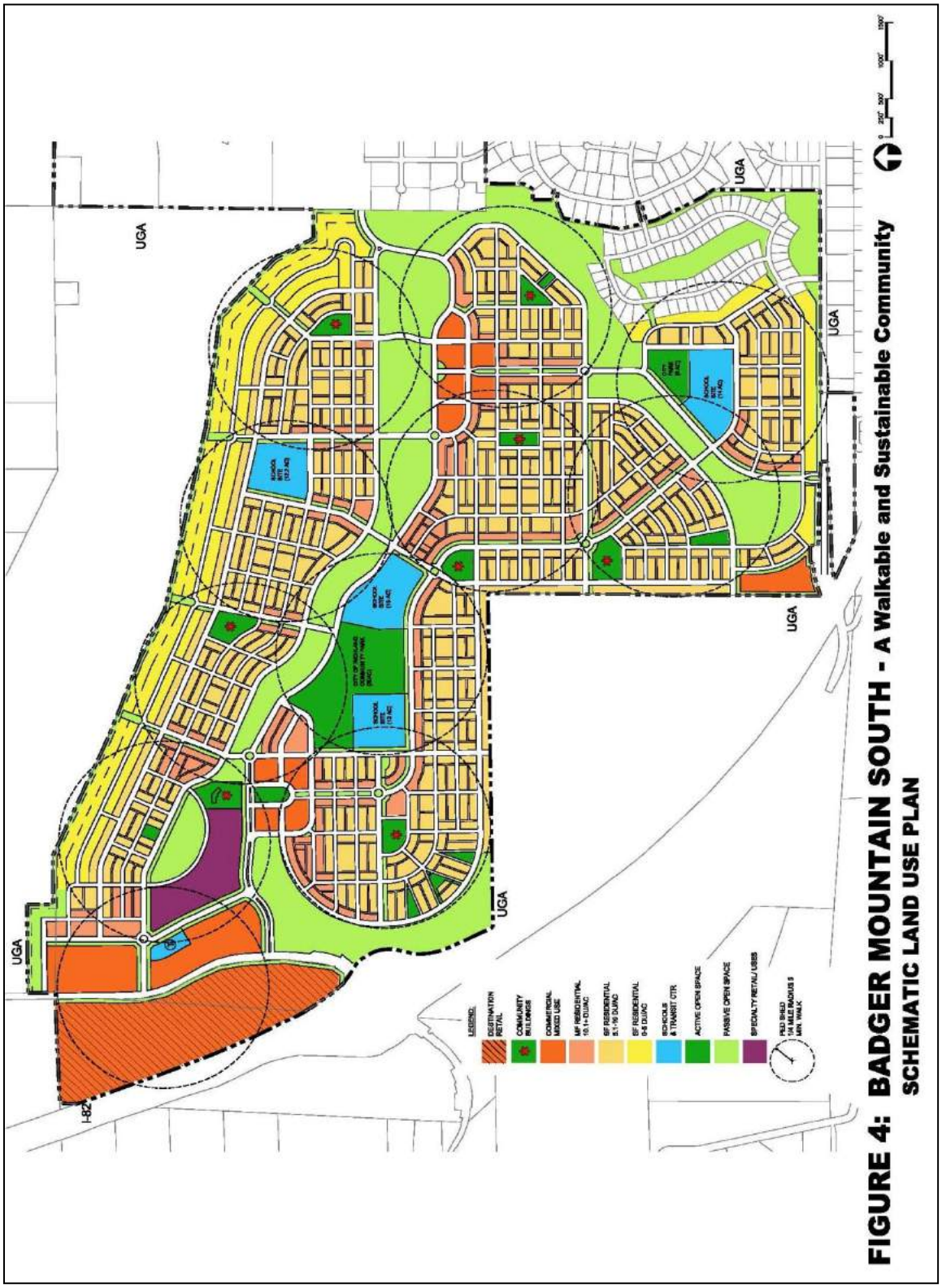
By providing a range of housing options for people in both types of housing and housing price, individuals and families can choose housing that best suits them. Housing diversity enables families to "move up" without moving out of their neighborhoods. When housing is available to a person at all stages of his or her life, intergenerational neighborhoods are created.

- Transportation Choice

To support transit at a minimum level, residential density must average four to five dwelling units to the acre.[29] Within Badger Mountain South residential densities will average about nine dwelling units to the acre.[30] To encourage transit long-term as a viable transportation option within Badger Mountain South, a site is identified adjacent to the major employment areas that may be appropriate for a future transit facility or in the short run, for vehicles of those participating in van pool transit.

[29] "Fun with Density and Transit Statistics," posted June 26, 2007, wwwPedShed.net.
[30] Net 9DU/acre is achieved by dividing all residential acres in Badger Mountain South by the total number of dwelling units.

**Figure 4: Badger Mountain South – A Walkable and Sustainable Community**



# 8 Relationship to City Codes, Regulations and Comprehensive Plan

The City of Richland has adopted zoning regulations (Title 23 in the Richland Municipal Code) that are consistent with and serve to implement the city's Comprehensive Plan. The Badger Mountain Subarea Plan will become an appendix of the Comprehensive Plan and related zoning and other development standards will implement the City's long-range plan.

In areas identified for single-family residential uses outside of Badger Mountain South, the Richland Zoning Regulations provide a range of residential densities. Those include the R-1-12, Single-Family Residential District with 12,000 square feet average lot size, the R-1-10, Single-Family Residential District with 10,000 square feet average lot size, and the R-2, medium density residential.

In areas identified for commercial uses outside of Badger Mountain South, the C-LB, Commercial Limited Business or the C-1, Neighborhood Retail Business District may be most appropriate.

To accommodate the goal of creating a walkable and sustainable community as proposed by Badger Mountain South, the zoning regulations will be replaced with land use and development regulations that are intended to be adopted as part of a Planned Unit Development. These regulations are designed to address both land uses as well as building forms including the relationship between building facades and streets; the form and mass of buildings in relation to one another; and the scale of streets and blocks. This approach can be used to implement the Badger Mountain South property owners' vision for compact, pedestrian-scale development.

This approach to implementing the Badger Mountain Subarea Plan zoning is supported by the city's Comprehensive Plan Land Use Goal 7 which states that "the City will address unique land use situations in the urban area with policies specific to those situations."

# 9 Parks, Trails and Open Space

The Badger Mountain Subarea is near the Benton County 574-acre Badger Mountain Centennial Preserve. This landmark is outside of the UGA and the Badger Mountain Subarea but it provides a strong sense of place or reference for all who will live, work or play in this area of Richland. People who live in the new neighborhoods or work in the commercial areas of the Badger Mountain Subarea will additionally find an array of recreational places, spaces and facilities available to them as the Subarea develops. People who live elsewhere in the city will also come here to use the bike trails, the public playfields or to enjoy the other civic spaces and activities. All will benefit from the wide variety of well-maintained parks, trails and open spaces. As the City of Richland's Parks, Trails and Open Space Master Plan (Parks Master Plan) states:

> *Every community needs facilities for recreational activity that includes physical education, organized athletics, and leisure time pursuits. These needs cannot be met without a wide variety of indoor and outdoor facilities. These facilities are essential in supporting community values and quality of life (p.5).*

One of the most valued elements of a high quality living and working environment is a system of parks, trails and open spaces. The City currently maintains a recreation system that includes eight types of parks and open spaces – mini parks, neighborhood parks, community parks, regional parks, special use parks, linear parks, natural open space, and pathways and trails. The Richland Parks Master Plan also identifies Richland School District recreational facilities among those available to city residents as well as private recreational facilities that are most closely associated with particular groups, clubs or other private organizations. This wide assortment of recreational opportunities available for city residents indicates the importance the community assigns to these types of facilities, activities and places.

The Badger Mountain Subarea Plan includes the establishment of an extensive system of parks, playgrounds, trails and active and passive open space totaling approximately 460 acres and is spread across much of the Subarea. The list of types of uses and acreages associated with them are detailed below in **Table 10: Parks, Trails and Open Space Summary** and are geographically identified in **Figure 5: Badger Mountain Subarea Parks, Trails and Open Space Plan.**

The overarching goal to identifying this recreational network is to provide a range of activities that match the interests of Richland's residents and establish a quality of life that encourages the enjoyment of the outdoors and natural habitats. As can be noted in **Table 10**, some of the amenities identified here will be city-owned, developed and operated while others will be developed and operated by private homeowners associations as neighborhoods are built out. Since many of the facilities will be privately developed and maintained, the city's commitment to ongoing maintenance costs associated with such facilities is reduced.

In addition to space allocated to a city-developed, 30-acre Community Park and a 6-acre Neighborhood Park, other parks found here will include other privately-developed neighborhood parks, pocket parks, tot lots, picnic areas, dog parks and other specialty parks. Within Badger Mountain South a two miles-long linear park will include places for community gardens, trails and other recreational activities. This linear park helps give definition to the future neighborhoods and complement areas retained as natural habitat or open space. The extensive development of parks and play areas within the Badger Mountain South properties reflects the development commitment and goal of creating a "walkable and sustainable community."

Within the Badger Mountain South area identified as Specialty Retail in **Figure 1**, page 19, the development concept includes a water feature and public amphitheater or informal performance venue, including a performance platform and grass seating area. These facilities will add to the attraction of the retail and hospitality uses expected to develop here but they also would be available to the community at large and provide different types of amenities than found elsewhere within the Subarea. By layering different types of recreational opportunities within the development of the Subarea, people who live, work or visit here will find a rich assortment of places to discover and enjoy. These activities, facilities and places will also facilitate intergenerational recreational events that support families, children, young adults and the elderly.

The city's Parks Master Plan identifies Park Area Level of Service (LOS) Standards and these are captured below in **Table 9**. By identifying the extensive network of trails, open space and recreational facilities in **Table 10,** including an area for a city-developed 30-acre Community Park and 6-acre Neighborhood Park, the Subarea Plan meets City of Richland's identified LOS for parks and other recreational facilities.

The city has adopted a park mitigation ordinance that requires developers to dedicate and/or improve park land or pay fees in lieu of park dedication. This system ensures that the necessary park facilities are provided to serve the population of the new development. It is anticipated that within Badger Mountain South, significant park lands will be dedicated to the city that will offset payment of mitigation fees. Some impact fees may be paid by developers of other properties within the Subarea.

**Table 9: Level of Service (LOS) Standards**

| Facility | Existing LOS | Proposed LOS |
|---|---|---|
| Neighborhood Park[31] | ½ mile radius | Five neighborhood parks |
| Community Park | 2 mile radius | One 30-acre community park |
| Other parks | NA[32] | 60 acres of other parks in Badger Mountain South |
| Trails | NA | Additional Trails and Open Space = 320 acres |
| Open Space | NA | |

## 9.1 Goals and Objectives

The City of Richland's Parks Master Plan includes a number of goals and objectives related to the development, maintenance and programming for parks and recreational activities. It defines these as:

> *A goal is usually a broad statement, which gives the community a sense of direction and an end to which effort is directed. Objectives are a more precise statement, some specific action toward which effort is directed (p.20).*

Below is a review of some of the City of Richland Parks Master Plan goals with new objectives identified that are specific to properties within the Subarea. In the text below, *BMSP* stands for "Badger Mountain Subarea Park."

***Goal #1. Provide an integrated system of parks, recreation facilities, trails and open spaces as an asset that enhances the community's quality of life.***

BMSP Objective 1.1 - Develop parks and open space that includes retaining existing drainage areas as natural open space, creating linear and other park types, and establishing a range of recreational opportunities that are linked by trails and walkways.

BMSP Objective 1.2 - Integrate natural habitat into parks and trail systems through the use of native and other drought-tolerant plantings that support the local wildlife and conserves water.

[31] One of the five Neighborhood Parks is intended to be a city-developed and maintained park.
[32] NA indicates that a LOS for this type of park has not been established.

***Goal #4. Provide diverse active and passive recreational opportunities for residents and visitors of all ages, based on needs.***

BMSP Objective 4.1 - Create opportunities for active and passive recreation through the establishment of civic gathering spaces, tot lots and other playgrounds, picnic areas, community gardens and a dog park.

BMSP Objective 4.2 – Establish public recreational facilities that also serve to enhance the visitor experience to the City of Richland.

***Goal #6. Promote community beautification through enhancement of public spaces and thoroughfares, and encouragement of private property beautification.***

BMSP Objective 6.1 - Provide a public gathering place with a panoramic viewpoint.

BMSP Objective 6.2 - Site a public art piece in Badger Mountain South dedicated to the concept of sustainable community.

BMSP Objective 6.3 - Integrate civic spaces or gathering places within commercial areas.

***Goal #8. Develop new parks and redevelop existing parks to provide amenities in accordance with master plans and citizen input.***

BMSP Objective 8.1 – Complete a master plan for the community park and for one of the neighborhood parks located within the Badger Mountain Subarea and implement.

## Table 10: Badger Mountain Subarea Parks, Trails and Open Space Summary

| Active Parks | | | | |
|---|---|---|---|---|
| **Quantity** | **Type** | **Site Size[33] Total Acres** | **Typical Features** | **Service Area/ Maintenance** |
| 1 | City Community Park | 30 acres/ 30 acres | Natural areas, connected to trail system, recreational buildings, sports fields and courts, restrooms, picnic and playgrounds. | Service radius of 1 – 2 mile area; CM[34] |
| 1 | City Neighborhood Park | 6 acres/ 6 acres | Playfields and courts, playgrounds, picnic shelter and tables. | Service radius of 1 mile and less; CM |
| 5 | Badger Mountain South Neighborhood Parks | 3 to 4 acres/ 14 acres | Playgrounds, play courts, picnic areas, tables. | Service radius of 1 mile and less; MHOA[35] |
| +/-10 | Badger Mountain South Mini Park | +/-1 acre/ 10 acres | Tot lots, benches, picnic tables. | Service radius of 2 to 3 blocks; MHOA |
| 10 | Badger Mountain South Special Use Park | 1- 5 acres/ 20 acres | Serves individual neighborhoods with a wide range of types of activities including active/passive recreation; community gardens; dog park. | Service radius of ½ mile; MHOA |
| **Total** | | **84 Acres** | | |
| **Passive Open Space and Trails[36]** | | | | |
| Several | Passive Open Space<br>Class 1 trail<br>Secondary trail | 320 acres | Includes natural open space areas as well as trail systems that connect Badger Mountain South neighborhoods and major open space areas. | Serves entire community; CM for maintenance of trail surfaces only. |
| 1 | Equestrian Trail | | Equestrian link between Reata Ridge and Rancho Reata subdivisions. | |
| Several | Public plazas and open space within Specialty Retail area | | In addition to plazas, Specialty Retail area will include other public recreation features. | |
| **Total** | | **320 Acres** | | |

[33] Acreages are approximate and will be finalized during platting and subdivision.
[34] CM means facility maintained by the City of Richland
[35] MHOA means facility maintained by private Home Owners Associations
[36] In a recent Richland Parks and Recreation Survey, over 66% of survey respondents identified the City's trail system as the most important recreation opportunity for their household.

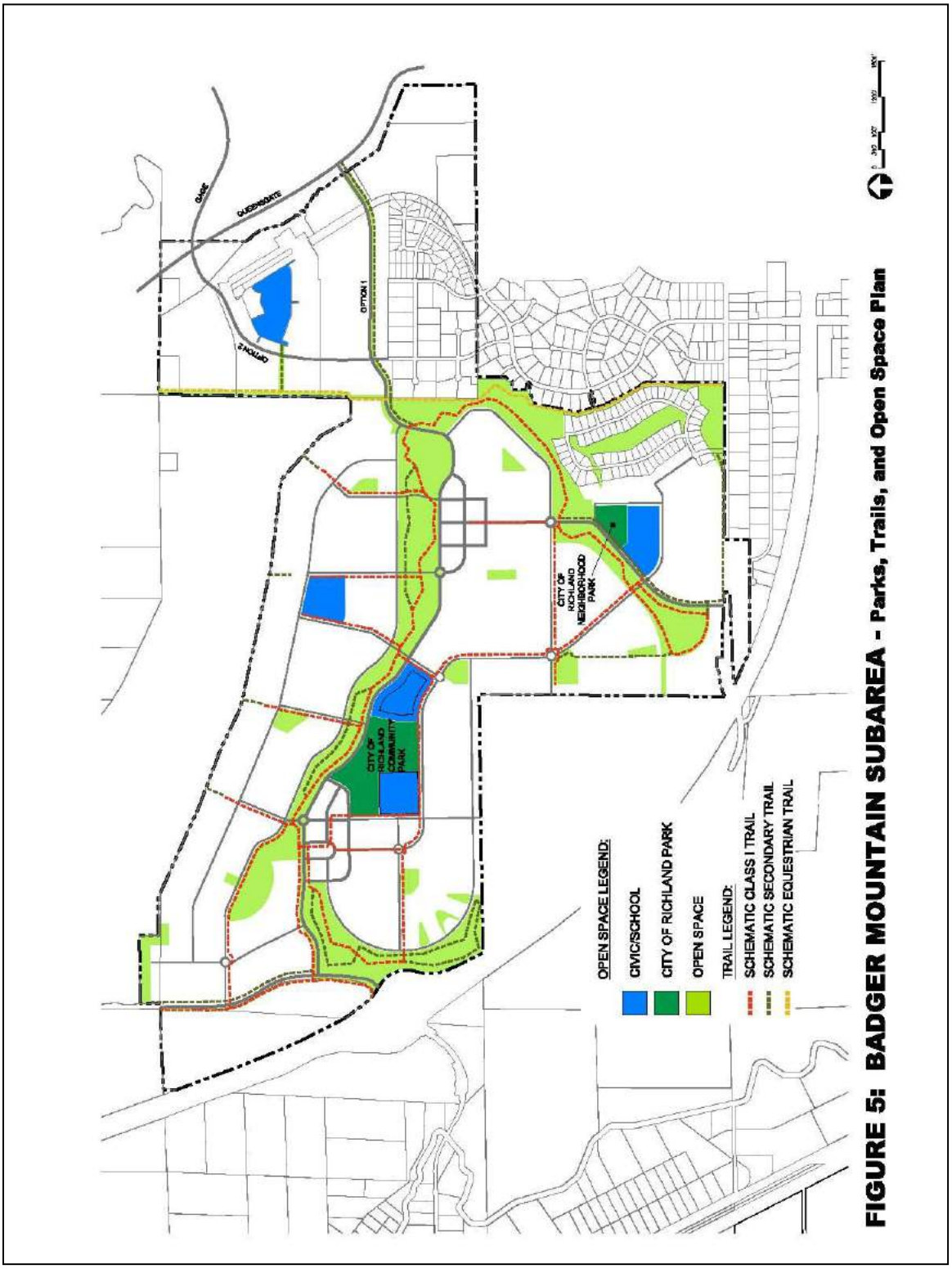
## Table 10: Badger Mountain Subarea Parks, Trails and Open Space Summary

*continued*

| Community Building Area Open Space[37] | | | | |
|---|---|---|---|---|
| **Quantity** | **Type** | **Site Size/ Total acres** | **Features** | **Service Area** |
| 1 | Middle School | 10 acres/ 10 acres | Playfields/ passive green areas | Serves entire community |
| 4 | Elementary School | 8.5 acres/ 34 acres | Playfields/ passive green areas | Serves entire community |
| 8 | Community Centers | 2 to 3 acres/ 16 acres | Variety of open space areas | Serves entire community |
| **Total** | | **60 acres** | | |
| | | | | |
| **Total Parks, Trails and Open Space Acreage in Badger Mountain Subarea** | | | | **464 acres[38]** |

[37] Actual sites for public buildings and other structures are larger than the acres shown here; Table 10 cites only acres developed as open space and playfields, not including the area of the building footprint.
[38] Total parks, trails and open space in Badger Mountain South = 444 acres; all other properties' parks, trails and open spaces = 20 acres.

**Figure 5: Badger Mountain Subarea Parks, Trails and Open Space Plan**



# 10 Transportation

The transportation system in the Badger Mountain Subarea is expected to accommodate traffic, pedestrians and bicyclists. The street system should be attractive and will be an important component to the final outcome of the neighborhood. Streets in the Subarea are expected to contribute to the quality of life and offer opportunities for multi-modal transportation options.

Portions of the Badger Mountain Subarea Transportation Plan are summarized here but it is fully developed in **Tab 1.** The plan includes an analysis of existing conditions at key intersections, evaluates the impact of future growth, and proposes appropriate mitigation measures.

## 10.1 Existing Conditions

Existing traffic volumes were recorded and analyzed at eleven major intersections that may be affected by development of the Subarea. The analysis of the existing conditions at these intersections found that most of the intersections and approaches operate with an existing Level of Service A or Level of Service B. Specific results are outlined in **Table 11: Existing Level of Service,** below.

**Table 11: Existing Level of Service**

| *Intersection* | *Control* | *Approach* | *LOS* | *Delay (seconds per vehicle)* |
|---|---|---|---|---|
| **(1) Dallas Rd & I-82 (SB)** | Stop | Southbound | A | 9.3 |
| | | Westbound | A | 3.8 |
| **(2) Dallas Rd & I-82 (NB)** | Stop | Northbound | A | 9.5 |
| | | Eastbound | A | 3.4 |
| **(3) Queensgate & Keene** | Signal | Eastbound | C | 33.7 |
| | | Westbound | C | 29.6 |
| | | Southbound | C | 30.0 |
| | | Overall | C | 30.9 |
| **(4) Queensgate & I-182 (EB)** | Signal | Eastbound | C | 22.1 |
| | | Northbound | A | 6.1 |
| | | Southbound | B | 10.7 |
| | | Overall | A | 9.9 |
| **(5) Queensgate & I-182 (WB)** | Stop | Northbound | A | 2.3 |
| **(6) Queensgate & Duportail** | Signal | Eastbound | B | 19.6 |
| | | Westbound | B | 18.7 |
| | | Northbound | A | 3.2 |
| | | Southbound | B | 14.5 |
| | | Overall | B | 13.7 |
| **(7) Keene & Bombing Range** | Roundabout | Eastbound | B | 12.1 |
| | | Northbound | B | 14.2 |
| | | Westbound | A | 8.2 |
| | | Southbound | B | 14.7 |
| | | Overall | B | 12.8 |
| **(8) Leslie & Gage** | Signal | Eastbound | C | 21.0 |
| | | Westbound | C | 26.7 |
| | | Northbound | B | 19.3 |
| | | Southbound | B | 19.1 |
| | | Overall | C | 22.2 |
| **(9) Badger & Leslie** | All-Way Stop | Eastbound | C | 21.7 |
| | | Westbound | C | 16.3 |
| | | Northbound | D | 27.2 |
| | | Southbound | C | 17.5 |
| | | Overall | C | 21.9 |
| **(10) Badger & I-82 (WB)** | Stop | Westbound | B | 14.5 |
| | | Southbound LT | A | 8.1 |
| **(11) Badger & I-82 (EB)** | Stop | Westbound | B | 11.3 |
| | | Southbound LT | A | 8.0 |

## 10.2 Future Conditions (Phase 1 of Development)

The analysis of future conditions assumes that primary access to the Subarea is to be via Dallas Road and the existing I-82 ramps. As the Subarea continues to develop, additional connections to Reata Road will provide access. A connection to the future extension of Queensgate Drive would also be provided by full build out of the Badger Mountain Subarea.

The number of trips at full build out of the Subarea was projected by using Land Use Codes found in the ITE Trip Generation Manual. Additionally, a significant amount of the future traffic volumes are

expected to remain internal to the Subarea. Trips between the retail/commercial sites and the residential areas would not add trips to the external intersections. An internal capture rate of 17 percent was utilized in the analysis.

The analysis of future conditions assumes that the build out of the Badger Mountain Subarea will be phased with the first phase expected to be built in roughly 5 years (year 2015) while the full build out of the Subarea will take 20 years. The first phase of development is assumed to be roughly 20% of the full Subarea build out, focusing on the west side of the Subarea.

The eleven intersections considered in **Table 11** were analyzed for future conditions (2015) both with and without the addition of traffic generated from the Badger Mountain Subarea. The future conditions without Badger Mountain traffic is similar to the existing conditions except that there are additional intersections operating at reduced level of service with low to moderate delays. The future conditions with Badger Mountain 2015 traffic indicate that the addition of Phase 1 Badger Mountain traffic would require several mitigations in order to ensure adequate flow on the roadway network surrounding the site. Specific results of the analysis are outlined in the following table.

**Table 12: Future 2015 Level of Service**

| *Intersection* | *Control* | *Geometry* | *Without Project* | | *With Project* | |
|---|---|---|---|---|---|---|
| | | | *LOS* | *Delay (seconds per vehicle)* | *LOS* | *Delay (seconds per vehicle)* |
| **(1) Dallas and I-82 (SB)** | Stop | Southbound | A | 9.5 | F | 137.4 |
| | | Westbound | A | 3.9 | A | 6.3 |
| **(2) Dallas and I-82 (NB)** | Stop | Northbound | A | 9.7 | C | 20.7 |
| | | Eastbound | A | 3.4 | A | 1.1 |
| **(3) Queensgate and Keene** | Signal | Eastbound | D | 38.2 | D | 35.5 |
| | | Westbound | C | 34.5 | D | 37.4 |
| | | Southbound Overall | D | 29.3 | D | 40.6 |
| | | | D | 37.5 | D | 38.2 |
| **(4) Queensgate and I-182 (EB)** | Signal | Eastbound | C | 25.5 | C | 29.7 |
| | | Northbound | A | 6.1 | A | 6.7 |
| | | Southbound | B | 18.0 | C | 20.7 |
| | | Overall | B | 14.6 | B | 16.8 |
| **(5) Queensgate and I-182 (WB)** | Stop | Northbound | A | 2.6 | A | 3.1 |
| **(6) Queensgate and Duportail** | Signal | Eastbound | B | 19.5 | B | 19.7 |
| | | Westbound | C | 25.0 | C | 26.7 |
| | | Northbound | A | 3.3 | A | 3.3 |
| | | Southbound | B | 15.4 | B | 15.7 |
| | | Overall | B | 17.1 | B | 18.2 |
| **(7) Keene and Bombing** | Round-about | Eastbound | B | 12.8 | B | 13.4 |
| | | Northbound | B | 16.0 | B | 17.3 |
| | | Westbound | A | 8.2 | A | 8.5 |
| | | Southbound | B | 15.1 | B | 15.6 |
| | | Overall | B | 13.5 | B | 14.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(8) Leslie and Gage** | Signal | Eastbound | D | 29.2 | D | 31.1 |
| | | Westbound | C | 18.9 | C | 19.7 |
| | | Northbound | E | 41.2 | F | 62.8 |
| | | Southbound | C | 21.8 | D | 29.2 |
| | | Overall | D | 30.4 | E | 41.0 |
| **(9) Badger and Leslie** | All-Way Stop | Eastbound | D | 29.2 | D | 31.1 |
| | | Westbound | C | 18.9 | C | 19.7 |
| | | Northbound | E | 41.2 | F | 62.8 |
| | | Southbound | C | 21.8 | D | 29.2 |
| | | Overall | D | 30.4 | E | 41.0 |
| **(10) Badger and I-82 (WB)** | Stop | Westbound | C | 16.6 | C | 24.4 |
| | | Southbound LT | A | 8.3 | A | 3.3 |
| **(11) Badger and I-82 (EB)** | Stop | Westbound | B | 11.9 | B | 12.4 |
| | | Southbound LT | A | 8.1 | A | 8.1 |
| **(12) Dallas and Badger Mountain** | Signal | Eastbound | - | - | A | 4.3 |
| | | Westbound | - | - | C | 33.4 |
| | | Northbound | - | - | B | 10.5 |
| | | Southbound | - | - | C | 20.8 |
| | | Overall | - | - | B | 18.1 |

## 10.3 Recommended Mitigations

Potential mitigations to accommodate the addition of Phase 1 Badger Mountain traffic are listed below:

*Dallas Road*

Phase 1 of the Badger Mountain Subarea is expected to add roughly 900 trips to Dallas Road just north of the I-82 ramps during the PM peak hour, and over 9,400 daily trips. While Badger is currently a high speed, low-volume road with significant excess capacity, the additional volumes would require the roadway to be widened to a four-lane cross section between the site and the I-82 NB ramp intersection. Dallas Road north of the site should be adequate as a two-lane section.

*Dallas Road and Project Access*

While the access configurations are not known at this time, some preliminary analysis indicates that a major project access could require dual left turn lanes for the westbound approach. Dallas Road would require left turn lanes at project entrances, and right turn lanes would be advisable.

*Dallas Road and I-82 SB Ramps*

This intersection would see heavy delays for the left turn from the off ramp onto Dallas Road. MUTCD Warrant 3 is met for the PM peak hour. Recommended mitigation for this intersection is widening on Dallas Road for a left turn lane for the westbound to southbound turn onto the on ramp. In addition, the southbound off-ramp approach should be widened for a separate left turn lane. Finally, the intersection should be signalized.

*Dallas Road and  I-82 NB Ramps*

While this intersection would meet MUTCD Warrant 3 for the PM peak hour, delays at this location would not be as severe as at the I-82 SB ramp intersection.  Recommended improvements include a free right turn lane for the I-82 NB off ramp approach (this movement becoming the additional travel lane required on Dallas between I-82 and the project as listed above), and a free right turn drop lane for the turn from Dallas onto the NB on ramp.  Finally, the eastbound Dallas approach should be widened for a left turn lane for the eastbound left turn onto the on ramp.  This would be a continuation of the left turn lane widening for the SB ramp intersection (continuous 3-lane section for Dallas between the two ramp intersections, assuming adequate space is available under the I-82 overpass).  This intersection should be monitored for signal warrants as the project develops.

*Dallas Road and Badger Mountain Parkway*

At the start of Phase 1, this intersection should have additional left turn lanes and right turn pockets on Dallas Road.  The intersection could operate adequately with stop control for Badger Mountain Parkway at roughly up to 60% of Phase 1 volumes, or 7.5% of full build out.  At higher volumes, a signal should be considered to mitigate delays.  At full build out this intersection should be widened with separate lanes for all turning movements, and dual left turn lanes for the westbound approach.

*Queensgate Drive & I-182 EB Ramps*

This intersection should perform adequately with project traffic assuming WSDOT improvements are in place.

*Leslie Road & Badger Road*

This intersection is to be reconstructed from its current all-way stop configuration to a roundabout, as listed in the City of Richland TIP.  Performance at this intersection would depend upon the roundabout configuration.

## 10.4 Future Conditions with Project and Mitigation

The analysis of future conditions including Badger Mountain 2015 traffic, and assuming the mitigations recommended above are completed, is summarized in the following **Table 13.**

**Table 13: Future 2015 LOS with Project & Recommended Mitigation Improvements**

| *Intersection* | *Control* | *Approach* | *LOS* | *Delay (seconds per vehicle)* |
|---|---|---|---|---|
| **(1) Dallas Rd & I-82 (SB)** | Stop | Southbound | D | 28.6 |
| **60% Ph 1, no imps** | | Westbound | A | 5.6 |
| **(1) Dallas Rd & I-82 (SB)** | Stop | Southbound | D | 27.1 |
| **60% Ph 1, no imps** | | Westbound LT | A | 7.8 |
| **(1) Dallas Rd & I-82 (SB** | Signal | Southbound | A | 7.2 |
| | | Eastbound | A | 6.6 |
| | | Westbound | B | 13.2 |
| | | Overall | A | 9.4 |
| **(2) Dallas Rd & I-82 (NB)** | Stop | Northbound | C | 15.2 |
| | | Eastbound LT | A | 8.7 |
| **(4) Queensgate & I-182 (EB)** | Signal | Eastbound | C | 31.5 |
| | | Northbound | A | 2.2 |
| | | Southbound | C | 22.2 |
| | | Overall | B | 15.2 |
| **(9) Badger & Leslie** | Round About | Eastbound | B | 14.2 |
| | | Northbound | B | 11.6 |
| | | Westbound | B | 16.3 |
| | | Southbound | B | 11.5 |
| | | Overall | B | 12.7 |
| **(12) Dallas & Badger Mtn Pkwy** | Stop | Eastbound | A | 9.6 |
| **60% Ph 1, lanes added** | | Westbound | C | 21.4 |
| | | Northbound LT | A | 7.6 |
| | | Southbound LT | A | 8.1 |
| **(12) Dallas & Badger Mtn Pkwy** | Signal | Eastbound | A | 4.3 |
| | | Westbound | C | 33.4 |
| | | Northbound | B | 10.5 |
| | | Southbound | C | 20.8 |
| | | Overall | B | 18.1 |

# 11 Water

The Badger Mountain Subarea is located within the Retail Service Area for the Badger Mountain Irrigation District (BMID). Neighboring the BMID to the north is the City of Richland Water Service Area. Based on initial discussions, domestic water will be supplied to the Subarea by the BMID which will construct a reservoir within the City of Richland service area. The City will become a wholesale water supplier to the BMID which will then provide the water supply to serve the whole of the Subarea. When complete, the water system will be dedicated to the BMID for operation and maintenance as part of the overall system. More detailed information is provided in **Tab 2, Badger Mountain Subarea Water System Plan.**

Within the area of Badger Mountain South, additional techniques will be used to reduce water consumption overall. First, creating attractive landscapes means incorporating the use of xeriscaping techniques including the use of native and other drought tolerant plants that have adapted to dry conditions and require less water once established. Second, residential and commercial structures will include low-flow and water-efficient appliances. Developers of commercial structures will be encouraged to consider the use of "green roofs" or "cool roofs" on their buildings. Also, the majority of communities that promote water conservation do so by educating their residents.[39] In the Badger Mountain South area, all private homeowners associations will be provided education materials for their membership that provides water conservation methods for the typical household.

# 12 Storm Water

The Badger Mountain Subarea Stormwater Management Plan (BMSSMP) evaluates the facilities needed to accommodate future growth, and proposes strategies that are compliant with federal and state stormwater requirements; it is fully developed in **Tab 3**. The BMSSMP uses procedures described by the Department of Ecology's Stormwater Management Manual for Eastern Washington for Hydrologic and Hydrology design. The Department of Ecology manual establishes the minimum requirements for modeling small and large drainage basins. The manual outlines stormwater quantity, quality, and erosion control Best Management Practices that have been adopted as the standard of practice in the City of Richland and Eastern Washington.

The BMSSMP identifies that development within the Subarea can use Low Impact Development (LID) techniques as a solution for most stormwater management. These systems would be developed as development occurs and would be maintained under private ownership. LID is a stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic predevelopment hydrologic functions. Most LID techniques infiltrate, filter, store, evaporate, and/or detain runoff as close to its original source as possible. The use of LID techniques benefits the local creeks, streams, rivers, and lakes and may be in addition to, or in lieu of traditional stormwater management solutions.

Conventional stormwater management techniques typically address increases in peak flows from large, infrequent events, but not the increase in annual volume or the increase in peak flows from smaller, more frequent events. Studies have shown that LID techniques can infiltrate and treat 95 percent or more of the annual volume. LID techniques are conducive to implementation in new projects.

[39] The City of Richland has had an environmental education program since 1996.

The most common LID techniques include:

**Bioretention** – Construct landscaped areas with a special soil and plant mix that is conducive to filtering and storing runoff and is aesthetically attractive.

**Disconnectivity** – Direct runoff from impervious areas to landscaped and vegetated areas to reduce the volume of runoff, encourage groundwater recharge, and filter runoff.

**Open Swales –** Provide grass or other vegetated areas at the edges of roadways, parking lots, or other runoff-producing areas to slow and filter the runoff, promote infiltration, and remove pollutants.

**Permeable Pavements –** Install porous concrete, porous asphalt, geo-grid, or pavement blocks that allow water to flow to an underground gravel area where water can infiltrate and/or be slowly released.

**Soil Amendment** – Amending soils is a method of regaining some of the absorption and infiltration capability of the soil, and increasing the ability to retain runoff and filter pollutants.

# 13 Sewer

The Badger Mountain Subarea Sewer Plan, fully detailed in **Tab 4, i**s prepared as a preliminary analysis of the sewer needs to support future development within the Subarea. It concludes that there is adequate capacity in the City of Richland sewer treatment plant to serve the anticipated level of development proposed in the Subarea Plan. It is understood that aspects of the Plan may need to be updated based on the planning, design and construction phases of future development here. However, the Badger Mountain Subarea Sewer Plan includes the major design assumptions considered in preparing the design and analysis of the sewer system to serve the Subarea including the phasing of improvements and design and construction standards.

The Sewer Plan includes a review of planning data and sewer flows, systems analysis and modeling method with alternatives and capital improvements.

# 14 Public Services

The City of Richland's Comprehensive Plan reflects the Benton County-Wide Planning Policies and the requirements of the Growth Management Act (GMA) to ensure that growth can be accommodated without decreasing the City's current level of service (LOS) for Public Services.

## 14.1 Police

Development of the Badger Mountain Subarea will have an impact on the city's Police Services as households are established and commercial activity areas grow. The city has identified in its Capital Facilities Element of the Comprehensive Plan as Goal 1 that it "…*will provide cost-effective and concurrent levels of public safety services designed to maintain quality of life."*

The Comprehensive Plan has identified Police Services LOS as 1.36 commissioned officers per 1000 population and a 1 to 5 minute average response time for high priority calls. In 2006 when the City Council adopted its ordinance to approve a revised area for the Badger Mountain Urban Growth Area, it found that the city could provide law enforcement services to the UGA with the addition of staff and equipment, but without the need for new facilities in the area.

## 14.2 Life Safety Services

Development of the Badger Mountain Subarea will have an impact on the city's Life Safety or Fire and Emergency Services. Currently this area is served by Benton County Rural Fire District No. 1. If the City of Richland assumes life safety services for the Subarea, a new station may be required, as identified in the ordinance approving the revised Urban Growth Area Boundary. According to the City of Richland Comprehensive Plan, a threshold of 500 hundred homes outside a 4-minute drive time from an existing Richland Fire and Emergency Services Facility will trigger a process to identify funding mechanism to construct and staff a new facility. The Comprehensive Plan also states the city's current LOS for fire protection and emergency medical service is measured in terms of response times, that is, from time of dispatch to time on scene. The desired goal is to achieve a 5-minute response time for 90 percent of all calls. The actual response time measured during the 2002-2003 study period and captured in the Comprehensive Plan is 8.03 minutes for all call types.

Transportation improvements within the Subarea will promote more efficient fire and emergency service response times by the city's existing facilities, maximizing the service area per station and the

number of properties served. Providing more efficient services by existing facilities is also more efficient for taxpayers as costs for operating a fire station are fixed and are mostly operating costs. In cities that have analyzed the degree to which a connected street network impacts Fire Station service areas, higher connectivity or street grids as found in traditional neighborhood development patterns, and as proposed in Badger Mountain South, allows larger service areas that can distribute fixed operating costs over a greater number of households.[40]

A fire station facility would require up to 2 acres of land and would be best located on an arterial or collector. Under current city policy, lands will be set aside for public acquisition in developing areas should sites be determined to be necessary for public facilities. As the city works to meet its identified LOS for fire and emergency services system-wide, the timing of the impact of growth on fire and emergency services in the Subarea will need to be evaluated further as development progresses.

## 14.3 Natural Gas

Natural gas is available through the Cascade Natural Gas Company and there is a Cascade pipeline at Reata Road so an extension of service from the south of the Subarea could be possible if desired. The actual extension of a natural gas network would be based on interest at time of development.

## 14.4 Communications

Standard telephone service is supplied by the Verizon Telephone Company and a number of additional cellular phone providers available. Charter Communications is the current cable TV provider.

The area is currently unserved by fiber-optic infrastructure but it is a desired utility.

## 14.5 Electrical Service

The City of Richland's Energy Services Department currently has about 23,000 customers. These customers currently use approximately 202,500 KVA out of a total capacity of 316,000 KVA. Until the specific power requirements of the commercial customers have been determined, it is not possible to accurately predict total power demand for the Badger Mountain Subarea. However, the addition of approximately 5,564 new residential units would likely be enough load to require a new single bank substation with some support from one or more adjacent substations. The City has two substations north of the Badger Mountain Subarea from which the City could extend lines. Given the fact that only

[40] See studies conducted by the City of Charlotte, NC.

about 64 percent of the available power capacity has currently been utilized by the total customer base of the City, it can be safely assumed that sufficient capacity exists to serve this area.

The City has worked with Benton PUD to address service territories. Currently, the area of the Badger Mountain Subarea is identified to be served by Benton PUD. However in 2015, the City will be responsible for serving all new electrical loads in the Subarea. At that time, the City can purchase the existing electrical infrastructure from Benton PUD although the PUD has indicated that they do not plan to sell the entire pre-2015 electrical infrastructure to the City. As development proceeds upon annexation, there will be several options for how to proceed with power here because of this split service responsibility until 2015. This will be a determined at time of development submittal.

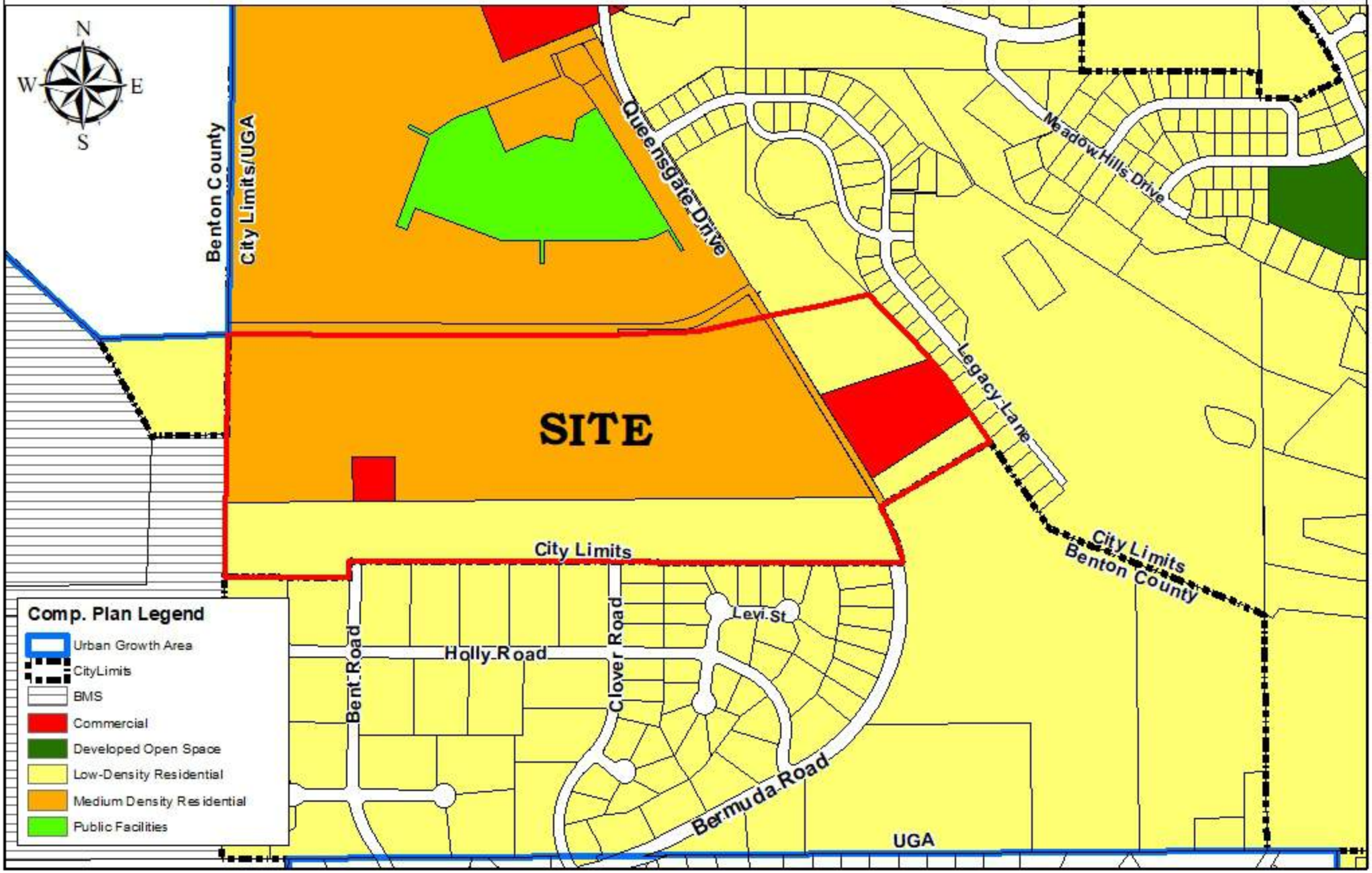
In the instance of the development of the Badger Mountain South properties, it is the intention to establish a development and building pattern that includes significant goals for energy conservation.

# 15 Conclusion

The Badger Mountain Subarea is a unique geographic area that will add choice and diversity to the quality of life available to residents of the City of Richland. The Badger Mountain Subarea Plan reflects the general concepts of the city's vision statement and Comprehensive Plan goals and provides the flexibility needed to respond to market conditions.

# Land Use Map

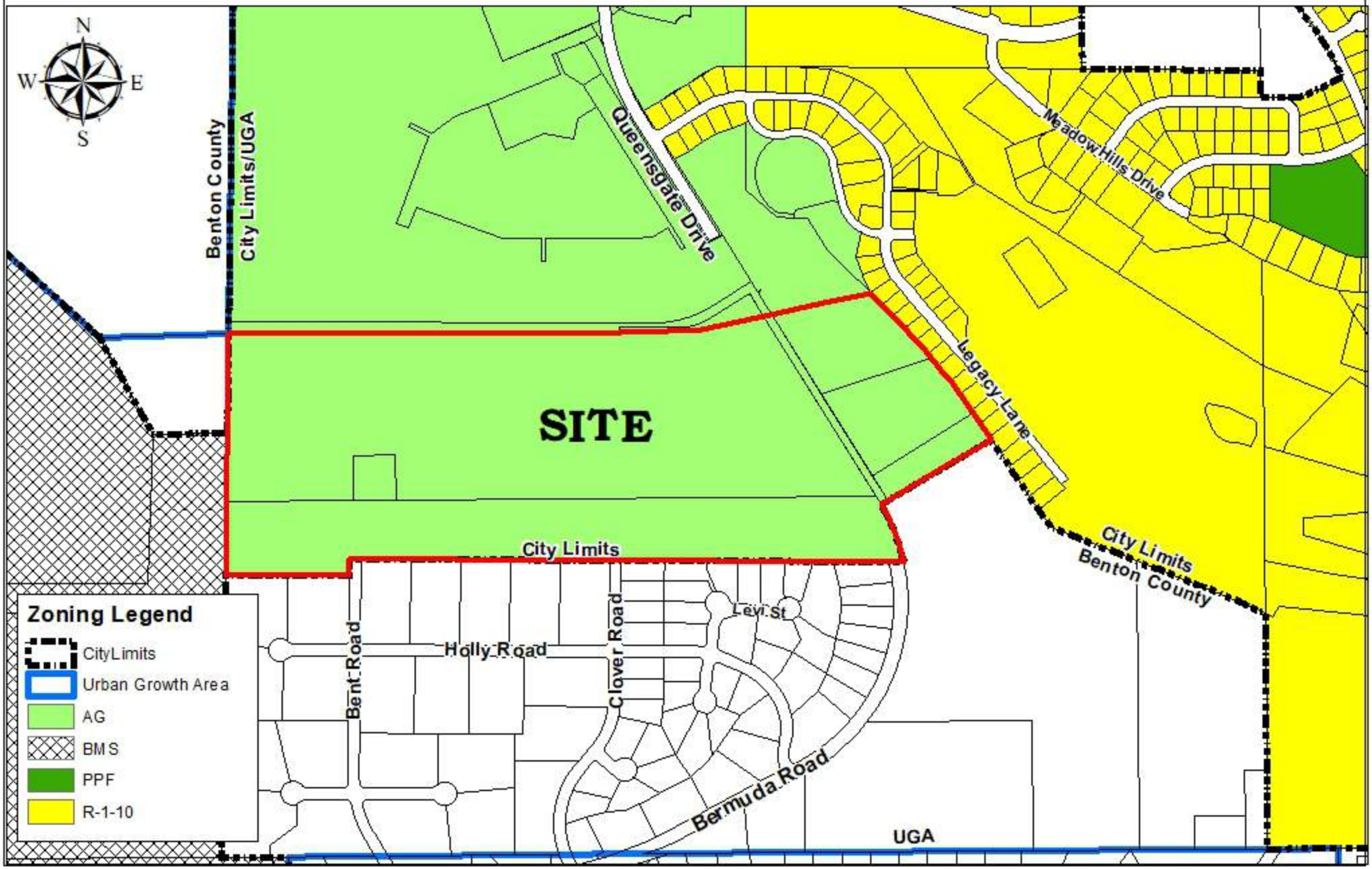
Item: Preliminary Plat of Sienna Hills Exhibit 7
Applicant: Richland Properties LLC c/o Greg Johnson
File #: S2019-101



# Zoning Map

Item: Preliminary Plat of Sienna Hills

Exhibit 8

Applicant: Richland Properties LLC c/o Greg Johnson

File #: S2019-101