ORDINANCE NO. 2017-04

ADOPTING THE WESTSIDE PLANNING PROGRAM REFINEMENT PLAN
FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan (Exhibit A) complies with the provisions of ORS §197.200 and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the Westside Refinement Plan addresses the requirements of Metro Urban Growth Management Function Title 11 (Planning for New Residential Areas) and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the following background documents were prepared and provide the factual basis supporting the Westside Refinement Plan:

- Westside Infrastructure Overview, December 2014;
- Westside Transportation Baseline Report, January 2015;
- Westside Natural Resources Overview, January 2015;
- Geological and Geotechnical Assessment Report, February 2015;
- Revised Final Westside Water, Sewer, and Stormwater Infrastructure Report, June 2016;
- Infrastructure Funding Approach Report, December 2016; and
- Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative, March 2017; and

WHEREAS, the Westside Refinement Plan provided opportunities for community participation to influence preparation of recommendations; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015, and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017, on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017, and May 11, 2017, as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017, and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017, and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017, and oral testimony on May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09 (Exhibit C); and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the Westside Planning Program Refinement Plan (Exhibit A) and making the changes recommended by the Planning Commission as shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

Peter B. Truax, Mayor

EXHIBIT A

WESTSIDE PLANNING PROGRAM REFINEMENT PLAN

Adopted August 14, 2017
Ordinance 2017-04

FOREST GROVE OREGON

Metro

SCJ ALLIANCE
CONSULTING SERVICES

urbsworks

FCS GROUP
Solutions-Oriented Consulting

PBS
Engineering + Environmental

Preface

With a strong sense of place and community pride, the City of Forest Grove continues to experience steady and sustained development activity. The City is ideally situated at the western edge of the Portland region with recreational, employment and educational opportunities nearby making Forest Grove a wonderful place to live or start a business. As development continues and approved lots are built upon there will be pressure for new subdivision activity. This is especially true within the areas of the urban growth boundary north of David Hill Road. Little advance planning work has taken place within these areas. A framework to guide development is necessary to ensure future development meets community expectations and needed infrastructure is provided in a cost-efficient manner for both property owners and the City.

This Westside Refinement Plan provides a blueprint to guide public and private land use decisions and infrastructure investments in developable areas primarily north of David Hill Road. This includes decisions related to traffic circulation, water and sewer line sizes and locations, and zoning with an eye toward creating sustainable and complete neighborhoods. It is with this in mind that the Westside Refinement Plan provides a direction to further the City's Vision Statement and City Council goal to *"Promote Safe, Livable and Sustainable Neighborhoods and a Prosperous Dynamic Green City".* This goal will be achieved in the Westside Planning area by:

- Supporting a land efficient development pattern that minimizes infrastructure cost and environmental impact as described in Chapter 4: Land Use and Chapter 12: Funding Strategy;
- Identifying opportunities to cluster development to increase development densities within the project area while minimizing environmental impacts of development as described in the Chapter 7: Natural Hazards and Chapter 14: Implementation Actions;
- Promoting a transportation network that minimizes out of direction travel and vehicle miles traveled and enables multiple modes of travel and described in the Chapter 8: Transportation;
- Providing opportunities so that residents are able to shop and work close to their place of residence if desired as described in Chapter 4: Land Use;
- Establish a land use pattern supportive of transit and described in the Chapter 4: Land Use and Chapter 8: Transportation; and
- Encourage a transition from outer-neighborhood suburban residential to a more walkable environment as described in the Chapter 8: Transportation.

The Westside Planning Program Refinement Plan also addresses regional planning requirements contained in the Metro Regional Urban Growth Management Functional Plan and Regional Transportation System Functional Plan. This includes planning for new collector roadways to serve development and identifying land use designations to guide development as property is annexed into the City.

The Westside Planning project was funded through a Metro planning grant. The City wishes to thank Metro for partnering with the City and funding this important project.

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Westside Refinement Plan

Chapter 1 – Introduction

Purpose

The Westside Refinement Plan provides a conceptual framework to guide public and private development decisions in two largely undeveloped areas within the urban growth boundary. The Refinement Plan also provides policy direction for implementation actions necessary to carry-out the Plan. The Plan addresses land use, natural resources, recreation, cultural and open space resources, natural hazards, transportation, and public services. In addition, the Plan includes an approach for funding the "backbone" infrastructure necessary to serve future development.

The Plan will be implemented through amendments to the Forest Grove Comprehensive Plan Map, zoning map, Development Code, Transportation System Plan and updates to the City's infrastructure master plans. A collective effort between property owners, developers, the City, Washington County and Metro is paramount to realizing the vision outlined in the Plan.

Setting

The "Westside" area includes two largely undeveloped areas north of David Hill Road. The Westside Plan area covers approximately 590 acres of which about 460 acres are considered developable. The map on the next page shows the extent of the Westside planning area.

The Westside area is relatively flat north of David Hill Road between Highway 47 and Thatcher Road. This area is used for farming. An east-west drainage feeding into Council Creek and a vegetated corridor serves as the northern boundary of the planning area. This area was added to the urban growth boundary in 2014.

In contrast to the area between Thatcher Road and Highway 47, the area west of Thatcher Road is hilly with forested tracts. Several tracts are also used for agricultural purposes. In addition, this area has several single family homes on large tracts of land. Although this area has a rural feel it's been in the urban growth boundary since 1980. Development in this area is constrained by steep slopes and lack of roads and infrastructure especially sanitary sewer.

The areas addressed by the Plan are shown on the map below.

Westside Planning Refinement Areas

The first area covered by this plan is generally located north of Gales Creek Road and west of Thatcher Road. This location, referred to as the "David Hill Planning Area" was included in the original urban growth boundary and the City's planning area going back to the 1980s. As the name suggests, the David Hill area is hilly with the highest elevations in the City. The developable area is approximately 350 gross acres and is one of the City's prime growth locations. The David Hill area is largely designated in the Forest Grove Comprehensive Plan for residential development. Metro development forecasts suggest that over 90% of the area could develop by 2025. Therefore, it's critical that the City establish a framework for necessary infrastructure improvements including a road network to support a desired land use concept for the area.

The second area is generally located west of Highway 47 and north of David Hill Road. This area is referred to as the "South of Purdin Road/Council Creek Urban Growth Boundary Area" and was added to the urban growth boundary by the Oregon Legislature in 2014. The Purdin area is approximately 240 gross acres in area and is generally flat making it suitable for a variety of land uses including residential, park, school and commercial uses. Since the area was recently added to the urban growth boundary little long range comprehensive planning has been done. This includes planning for desired land uses and identifying possible locations for

roads and other infrastructure including water and sewer lines. The Westside Refinement Plan is intended to address these needs. The Refinement Plan also provides an indication of the costs associated with providing the infrastructure necessary to serve the area and provides an approach for funding infrastructure needs.

To assist with this planning initiative, the City applied for and received a community planning grant from Metro to prepare this much needed refinement plan. Grant funds were used by the City to retain the consulting team of SCJ Alliance, PBS Environmental and Engineering, Urbsworks, and FCS Consulting. The team prepared the technical analysis supporting the Plan, facilitated public outreach, and developed an infrastructure funding approach. Infrastructure needs were developed by the consultants after assistance by staff and the Technical Advisory Committee, in particular Clean Water Services related to sewer and storm drainage.

The following chapters provide considerable detail on the land use concept underpinning the plan and infrastructure needed to support the vision for development in the David Hill and Purdin Road urban growth areas. The technical analysis prepared by the consulting team is attached as an appendix.

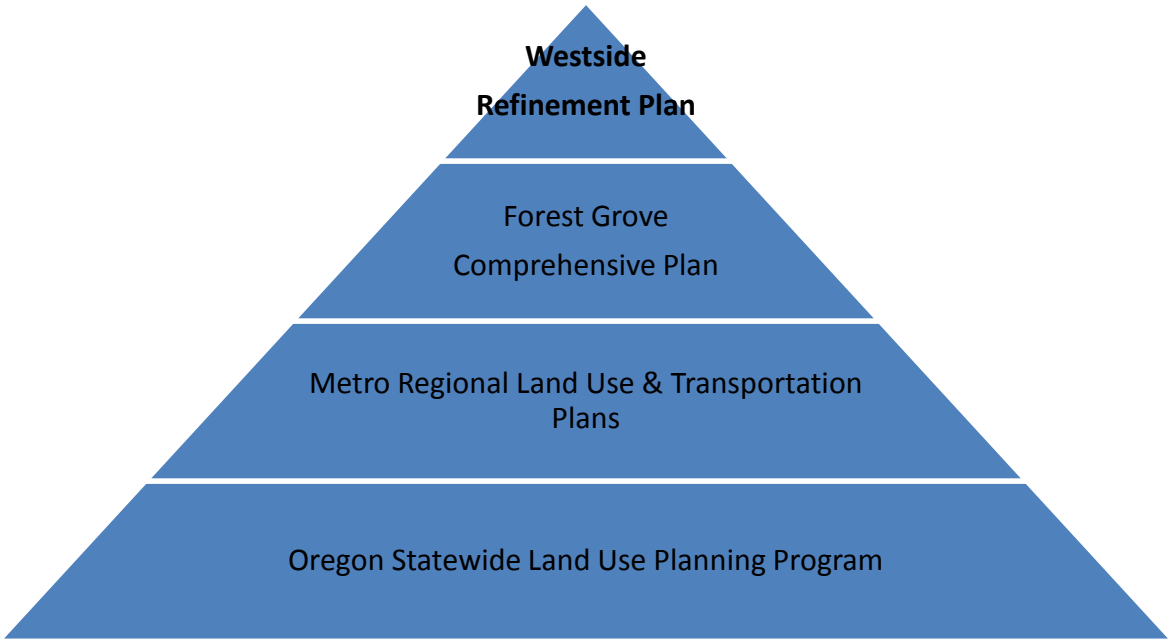
Chapter 2 – Planning Framework

Planning in Oregon and the Portland region is multifaceted and involves many partners. The Oregon Statewide Land Use Planning Program, Metro Regional Framework Plan, Metro Urban Growth Management Functional Plan, Metro Regional Transportation Functional Plan, and Forest Grove Comprehensive Plan all influence long range planning initiatives such as the Westside Refinement Plan.

As shown by the graphic below, the Oregon statewide planning program provides the foundation for the Refinement Plan. The Oregon planning program includes goals for public involvement, land use, housing, the economy, natural resource protection and urbanization to name a few. All city and county comprehensive plans in the state must address and demonstrate compliance with the Oregon planning goals. Adherence to the Statewide Planning Goals is addressed further in this chapter.

In addition to the Oregon statewide planning program, the Metro Regional Framework provides additional context to guide land use policy in the Portland region. Similar to the Oregon statewide planning goals the Metro Regional Framework plan has goals and objectives guiding land use, housing and the economy. Both the statewide planning program and Metro Regional Framework Plan provide a basis for the Forest Grove Comprehensive Plan which sets local goals and objectives for land use, housing and infrastructure such as transportation, the water system and sewer system. Taken together the Oregon statewide planning program, Metro Regional Framework Plan and Forest Grove Comprehensive Plan provide the foundation for the Westside Refinement Plan.

Planning Framework



The following sections of this chapter provide additional context to show how each of the elements of the planning framework work together to influence the Westside Refinement Plan.

The first section describes the Oregon Statewide Planning Program. This is followed by a brief overview of the Forest Grove Comprehensive Plan and Metro regional land use and transportation plans.

Oregon Statewide Land Use Planning Program

Oregon's land use planning system dates back to the 1970s with passage of Senate Bill 100 signed into law by Governor Tom McCall. The Oregon system established by Senate Bill 100 was unique in the United States by establishing statewide land use planning goals that cities and counties are required to address as part of their local comprehensive land use planning efforts. Statewide planning goals address topics such as housing, the economy (jobs and commerce), transportation, natural resource protection and the conversion of rural land to urban uses. The Westside Refinement Plan addresses the applicable goals in a variety of ways as described below.

Goal 1 - Citizen Involvement - Statewide Land Use Planning Goal 1 requires that local citizen involvement programs incorporate the following components:

- ✓ *Provide for widespread citizen involvement;*
- ✓ *Assure effective two way communication with citizens;*
- ✓ *Provide the opportunity for citizens to be involved in all phases of the planning process;*
- ✓ *Assure that technical information is available in an understandable form;*
- ✓ *Assure that citizens will receive a response from policy-makers; and*
- ✓ *Insure funding for the citizen involvement program*

Extensive amount of citizen input occurred during the course of this project. This includes placing all documents for review on the City's website. In addition, two planning charrettes and several Planning Commission work sessions were held to obtain citizen input on the background documents and potential land use alternatives. The charrettes provided an opportunity for a lively discussion on desired land uses of the area. The land use concept was revised several times in response to community input. In the end, a general consensus was reached which is reflected in the Plan. Details of the citizen involvement program are described in Chapter 3 (Citizen Participation).

Goal 2 - Land Use Planning – Goal 2 describes the basic procedures of Oregon's statewide planning program. It requires that land use decisions be made in accordance with a comprehensive plan. Goal 2 also requires that implementation ordinances be put in place to put the plan's policies into effect. Once adopted, the Westside Refinement Plan will become a component of the Forest Grove Comprehensive Plan. As part of adoption, the Comprehensive Plan Map will be amended to incorporate the adopted land use concept for the Westside area. The Forest Grove Development Code will also be amended as necessary to implement recommendations for development in the Refinement Plan area adopted by City Council. The land use component of the Westside Plan is described in detail in Chapter 4 (Land Use).

Goal 4 - Forest Lands – This goal requires an inventory of forest lands and the adoption of policies and ordinances to conserve forest lands for forest uses. The consulting team prepared a natural resource assessment for the Plan area which considered forest lands. The natural resource assessment is included in the technical appendix and is summarized in Chapter 5 (Natural Resources).

Goal 5 - Natural Resources – This goal focuses on scenic and historic areas, and open spaces. Goal 5 covers more than a dozen natural and cultural resources such as wildlife habitats and wetlands. Natural resources are also addressed in Chapter 5 (Natural Resources).

Goal 7 - Areas Subject to Natural Hazards – Goal 7 deals with development in places subject to natural hazards such as landslides. It requires that local jurisdictions apply appropriate safeguards when planning for development in areas subject to natural hazards. Consideration of potential natural hazards is especially important in the David Hill area. The David Hill area has locations that are steeply sloped and presence of a historic landslide area. The consulting team undertook a rigorous analysis of the David Hill area to document possible natural hazards. The results of this analysis are summarized in Chapter 8 (Transportation). The details are provided in the appendix.

Goal 8 - Recreational Needs – This goal calls for each community to evaluate its recreational areas and facilities and the projected demand for them. The land use concept for the Westside area included consideration of the recreational needs of residents as the area develops. It was fortunate that the City's Parks, Recreation and Open Space Master Plan was being updated during the Westside planning process. This provided an opportunity to include park needs for the Westside area in the Parks Plan. Specific recommendations for parks, recreation and open space are described in Chapter 6 (Recreational, Cultural and Open Space Resources) and Chapter 11 (Other City Services).

Goal 9 - Economic Development – This goal addresses economic activity including business creation, retention and employment. Goal 9 calls for local jurisdictions to project future commercial and industrial land needs and plan and zone enough land to meet those needs. The recommended land use concept described in the Refinement Plan responds to Goal 9 by identifying areas for commerce to serve the developing area. This is described in Chapter 4 (Land Use).

Goal 10 - Housing – Goal 10 requires that cities plan for and accommodate needed housing types, such as single family residential, multifamily and manufactured housing. Goal 10 requires each city to inventory its buildable residential land needs, project future needs, and plan and zone enough buildable land to meet those needs. The recommended land use concept for the Westside area addresses Goal 10 by identifying areas deemed suitable for a variety of housing types including large lot single family development, small lot development and attached housing. Chapter 4 (Land Use) shows areas recommended for residential development to meet housing needs over the next twenty years.

Goal 11 - Public Facilities and Services – Goal 11 calls for efficient planning of public services such as sewers, water, law enforcement, and fire protection. The goal's central tenant is that public services should be planned in accordance with a community's needs and capacities rather than be forced to respond to development as it occurs. A primary reason for preparing the Westside Plan is get ahead of development by identifying public services necessary to serve the preferred land use concept. Public facilities and services needed for the Westside planning area are described in a number of chapters including Chapter 8 (Transportation), Chapter 9 (Sewer), Chapter 10 (Water), Chapter 11 (Other City Services), and Chapter 12 (Funding Approach).

Goal 12 - Transportation - Goal 12 addresses the transportation system including roads, sidewalks, multiuse trails and movement of goods. A robust transportation system

accommodating a variety of travel options is a critical element of a livable neighborhood and city. The Westside Plan identifies a transportation network taking into account recommended land uses and topographic constraints. The recommended transportation network for the Westside area is described in detail in Chapter 8 (Transportation).

Goal 14 - Urbanization – This goal requires cities to estimate future growth and needs for land and then plan and zone enough land to meet those needs. Goal 14 also establishes criteria to be applied when undeveloped land within an urban growth boundary is to be converted to urban uses. The Refinement Plan identifies a land use concept to guide the conversion of undeveloped land to urban uses. The land use concept is described in Chapter 4 (Land Use).

Forest Grove Comprehensive Plan

The Forest Grove Comprehensive Plan is the City's coordinated policy document guiding the development of the City over a twenty year period. This Refinement Plan addresses and is consistent with several goals and policies of the Comprehensive Plan including:

Community Sustainability

Community sustainability is a cornerstone of the City's Vision Statement and has been an ongoing priority for the Forest Grove City Council. Chapter 3 of the Forest Grove Comprehensive Plan addresses community sustainability and is also reflected in the land use concept recommended for the Westside planning area.

A goal of the Forest Grove Comprehensive Plan is to:

- ✓ Create complete neighborhoods, through land use regulations, with housing, recreational opportunities, retail, services, and employment nearby and to promote transit supportive land uses. The land use concept described in Chapter 4 is based on the concept of complete neighborhoods by identifying opportunities for mixed-use development near residential areas as well as locations for parks, schools and support services such as a new site for a fire station.

The list below shows other recommendations in the Westside Plan intended to advance community sustainability including:

- ✓ Riparian enhancement along stream corridors;
- ✓ Landslide stabilization by replanting deep rooted vegetation on hillsides;
- ✓ Development regulations to preserve views from low elevations to David Hill to promote cluster development;
- ✓ Promote voluntary conservation measures and integration of built and natural systems; and
- ✓ Integrate storm water management with natural systems to improve water quality and wildlife habitat opportunities;

Land Use

Chapter 4 of the Forest Grove Comprehensive Plan addresses land use within the City's planning area – the area within the urban growth boundary adjacent to the Forest Grove city limits. The Westside Plan addresses a number of policies related to land use in the Comprehensive Plan including:

1. The City of Forest Grove will adopt a land use concept that promotes efficient use of land within the urban growth boundary.

3. The City of Forest Grove will support policies that encourage locating complementary land use in proximity to reduce demand on transportation systems [including use of transit] and improve the overall quality of life of the community.

The Chapter 4 of the Westside Plan identifies a land use concept accommodating a variety of land uses including residential and retail uses. A primary objective of the Plan is promoting long term community sustainability through private and public land use decisions. To this end the Plan strives to create complete neighborhoods. Complete neighborhoods are characterized by complementary land uses in proximity. This in turn reduces demands on the transportation system and supports cost-effective delivery of transportation services by reducing or eliminating the need to add capacity which is quite expensive.

Transportation

Transportation is one of the most important improvements provided by public agencies. Transportation affects land values, economic competitiveness, and the environment. How the transportation network is planned affects overall quality of life and influences community character. Chapter 11 of the Forest Grove Comprehensive Plan addresses transportation needs in the City's planning area including the preferred pedestrian, bicycle and roadway networks as well as a funding approach for these needs. The Forest Grove Comprehensive Plan contains the following goals and policies related to transportation:

Goal 4: Design and construct transportation facilities in a manner that enhances the livability of Forest Grove.

The infrastructure analysis for the Westside identifies a robust transportation system based on a collector street system. This transportation backbone will improve connectivity for all modes of transportation including pedestrians, bicycles, and vehicles.

Policy 4.1: Maintain the livability of Forest Grove through proper location and design of transportation facilities.

The proposed collector street network and recommended standards for the Planning Area are based on the topographic constraints of the Westside area to minimize necessary cut-and-fill and to minimize street grades. The Forest Grove Development Code limits collector street grades to a maximum 12%. Although care was taken to minimize collector street grades there are portions of segments where street grade exceeds 12%. Care was taken to minimize the length of these segments. An amendment to the Development Code is recommended to

address this issue and would provide authority to the City Engineer to approve collector street grades exceeding to 12%.

Goal 6: Establish and maintain a context sensitive set of transportation design and development regulations.

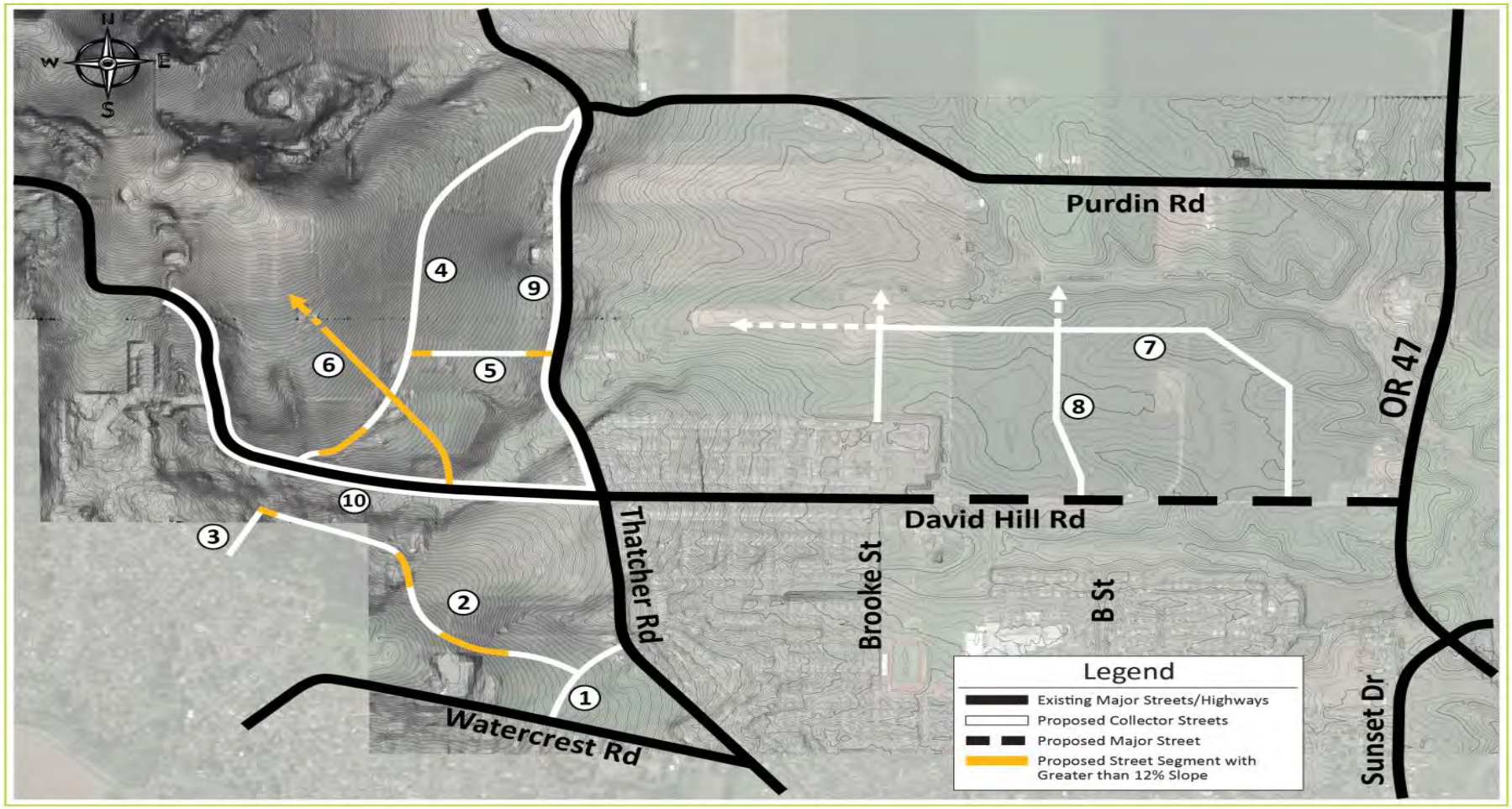
The proposed street network and recommended standards for the Planning Area are context sensitive and take into account topographic constraints of the area to minimize cut-and-fill and grades. The recommended street network is based on strategically placed collector roads providing needed circulation and access.

Policy 6.1: Streets should be designed to support their intended users.

The recommended street network is based on collector roads supporting autos, bicycles and pedestrians.

Policy 6.4: Promote context sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

The proposed street network for the Westside Planning Area is context sensitive and takes into account topographic constraints of the area to minimize cut-and-fill and grades. The recommended street network is based on strategically placed collector roads providing circulation and access as shown on the map below. The white lines show conceptual locations of collector roads. The orange shaded street segments are those with a slope exceeding 12%. This is significant since the Forest Grove Development Code limits grades for collector streets to 12%. An amendment to the Development Code is recommended to address this issue and would provide authority to the City Engineer to approve collector street grades exceeding to 12%.



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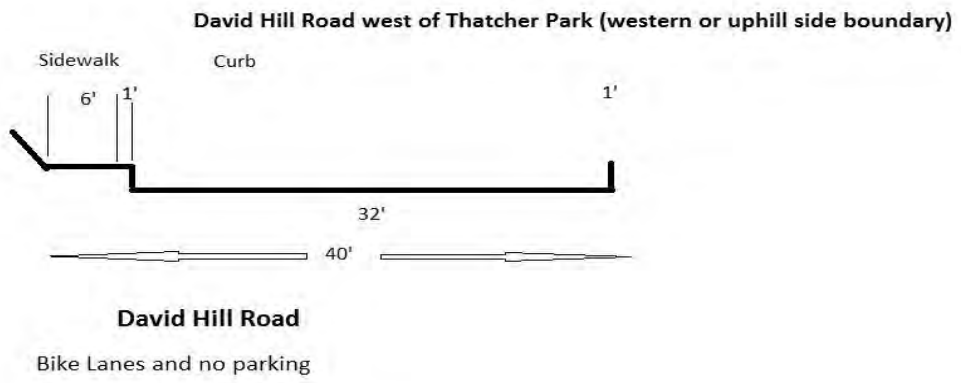
Proposed Street System

Westside Planning Project
Forest Grove, OR

Another consideration influencing the recommended street system for the David Hill area is topography along the David Hill Road segment west of Thatcher Road. David Hill Road is constrained by steep slopes and the presence of a stream south of the current roadway alignment. As a result it is recommended that the street cross-section for David Hill Road west of Thatcher Road be narrower than typically required for a collector roadway. The recommended cross-section includes 32 feet of pavement within a 40 foot right-of-way. A sidewalk on one side of the street would be accommodated within the right-of-way. The recommended cross-section for David Hill Road is shown below.



The cross-section above could also apply to other roadways with topographic constraints similar to David Hill Road west of Thatcher Road.

Estimated cost to develop the identified collector street system is approximately $ $30.2 Million. Of this amount, approximately $1.5 million is recommended for short term needs in the five- to six-year time frame to spur development. The primary short-term need is construction of Thatcher Road to urban standards north of David Hill Road.

Specific transportation projects recommended for the Westside are shown on the table below.

Transportation Projects

No.	Road Name	Project Limits	Description	Estimated Cost
1	Road 1 (Vista Drive Extension)	Watercrest Road to Thatcher Road	Construct new north-south 1,050 foot urban collector street	$1,000,300
2	Road 2	From Vista Drive Extension west 3,200	Construct new east-west urban collector street	$4,246,000

		feet		
3	Road 3 (Valley Crest Extension)	From terminus of Valley Crest Way north to Road 2	Construct new 600-foot urban collector street	$787,200
4	Road 4	David Hill Road north to Purdin Road	Construct new 4,700 foot urban collector street	$6,409,200
5	Road 5 (Plum Hill Improvement)	Existing Plum Hill Lane (privately-owned) to Road 4	Improve Plum Hill Lane to urban collector standards	$1,212,200
6	Road 6	David Hill Road to urban growth boundary	Construct new 2,300 foot urban collector street	$2,391,000
7	Road 7 (Brooke Street Extension)	Brooke Street to David Hill Road	Construct new 5,500 foot urban collector street	$4,766,200
8	Road 8 (B Street Extension)	David Hill Road to Brooke Street	Construct new 1,750 foot urban collector street	$1,583,700
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Full improvements to Council Creek crossing (short-term)	$1,454,000
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Half street reconstruction between David Hill Road to Purdin Road excluding Council Creek crossing (long-term)	$2,437,500
10	Road 10 (David Hill Improvement)	Thatcher Road to urban growth boundary	Full street reconstruction for 5,100 feet to urban collector street standards	$3,943,500
11	Improvement to David Hill Road/Highway 47 roundabout	David Hill Road/Highway 47 intersection	Addition of 2nd circulating lane to provide separate lanes for northbound left turn and northbound through traffic and separate lane for southbound right-turn	$2,500,000
12	Improvement to Purdin Road/Verboort Road/Highway 47 roundabout	Purdin Road/Verboort Road/Highway 47 intersection	Addition of northbound right-turn slip lane on the south leg of the roundabout and southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	$4,000,000
			TOTAL ESTIMATED COST	*$37,730,800*

In addition to the transportation projects identified above the Westside Plan includes the following recommendations related to the transportation system:

- Amend the Transportation System Plan to include a context-sensitive and cost-effective transportation system in the Westside Planning Area. This recommendation includes amending the TSP to include a narrower collector

street cross-section for David Hill Road west of Thatcher Road with forty feet of right-of-way, 32 feet of pavement and sidewalk on one side of the street.

- Ensure the conceptual transportation system identified for the Westside Planning Area meets the requirements of the Oregon Transportation Planning Rule and Metro Regional Transportation Functional Plan

- Amend the Development Code to allow for collector street grades of more than 12% with City Engineer approval.

- Amend the Development Code to allow for local or residential streets with grades of more than 15% for distances greater than 250 to minimize cut and fill with City Engineer approval.

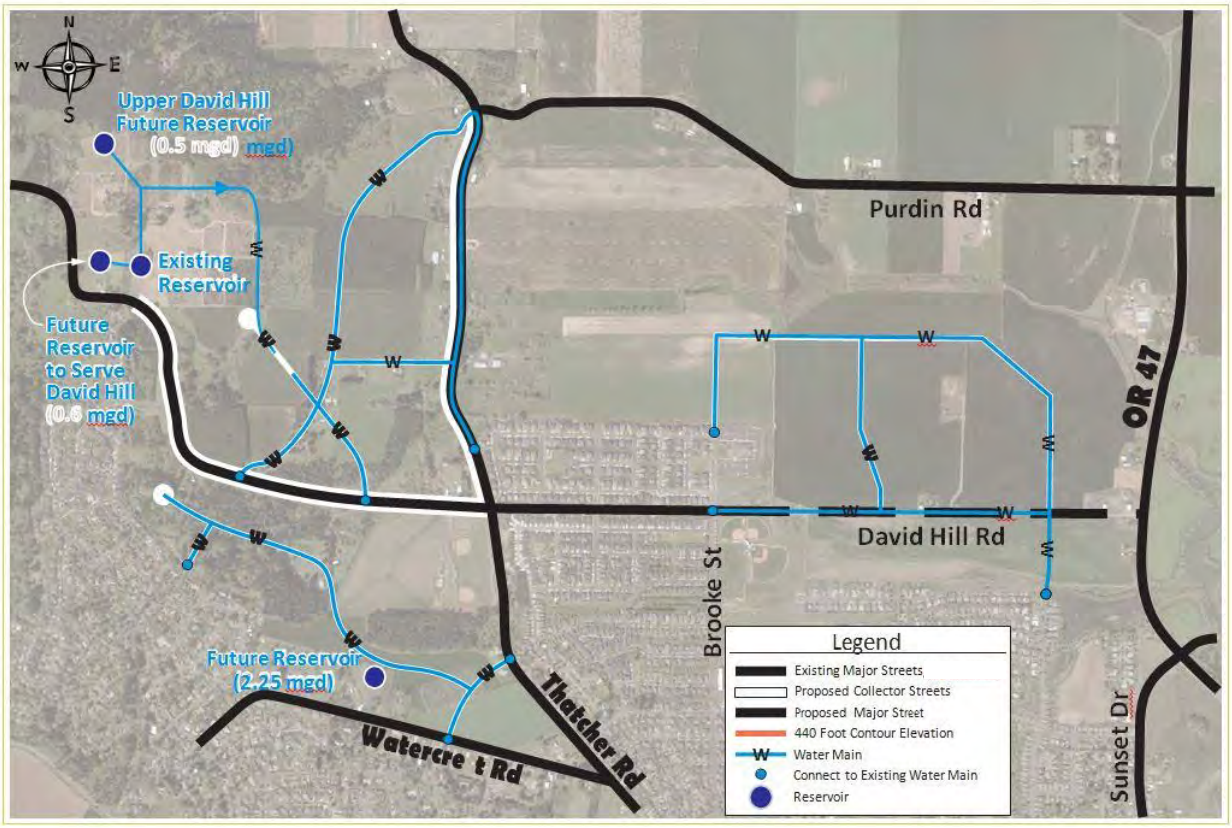
- Construct collector and arterial streets in the David Hill urban growth boundary area to allow for possible future extension into the David Hill urban reserve area.

Water System

In addition to transportation water is a critical public service. The Forest Grove Comprehensive Plan contains the following policy statements related to the water system:

1. Water facilities shall be designed and sized to serve the need of future land uses as designated in the Forest Grove Comprehensive Plan map.

The conceptual water system for the Refinement Plan area is shown on the map below. The map shows the general location of water lines and future reservoir locations.



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Water Utilities

Westside Planning Project
Forest Grove, OR

The estimated cost of the conceptual water system is approximately $8,865,500 including contingencies. The table below shows estimated costs by segment.

Water Facility Cost Estimates

Description	Linear Feet	Total Estimated Cost	Estimated Cost Westside Planning Area	Area of Benefit
Potential Short Term Project				
One 0.5 MG Reservoir[1]	EA	$4,182,500[2]	$875,000	David Hill UGB
Short Term Subtotal		$4,182,500	$875,000	
Long Term Projects				
Road 1 Water Main	1,050	$63,000	$63,000	David Hill UGB
Road 2 Water Main	3,200	$192,000	$192,000	David Hill UGB
Road 3 Water Main	600	$36,000	$36,000	David Hill UGB

[1] One reservoir required to serve development in the David Hill urban growth boundary area from 440 to 615 feet in elevation and portions of the David Hill urban reserve area between 190 feet and 615 feet. Approximately $500,000 or 10.4% of total cost is attributed to serving the David Hill urban growth boundary area above 440 feet which includes 105 dwelling units with Single Family Residential R-10 zoning or 24 dwelling units with Suburban Residential SR zoning.

[2] Including contingencies and engineering costs

Road 4 Water Main	4,700	$282,000	$282,000	David Hill UGB
Road 5 Water Main	1,250	$75,000	$75,000	David Hill UGB
Road 6 Water Main	2,300	$138,000	$138,000	David Hill UGB
Road 7 Water Main	5,500	$330,000	$330,000	Purdin Road UGB
Road 8 Water Main	1,750	$105,000	$105,000	Purdin Road UGB
Road 9 Water Main	3,500	$525,000	$525,000	David Hill UGB
Two 0.3 MG Reservoirs[3]	EA	$2,910,448	$1,950,000	Entire Area
One 2.25 MG Reservoir Near Watercrest Rd.	EA	$2,956,522	$680,000	Entire Area
Contingencies and Engineering		$5,709,728	$3,282,000	Entire Area
Long Term Subtotal		$13,322,698	$7,658,000	
TOTAL		*$17,505,198*	*$8,533,000*	

Source: Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS Group. Costs shown are in 2016 dollars.

Sanitary Sewer System

The Forest Grove Comprehensive Plan includes goals and policies guiding investments in the sanitary sewer system. These goals and policies are consistent with the Forest Grove Sanitary Sewer and Storm Drainage Master Plans. Specific policies include:

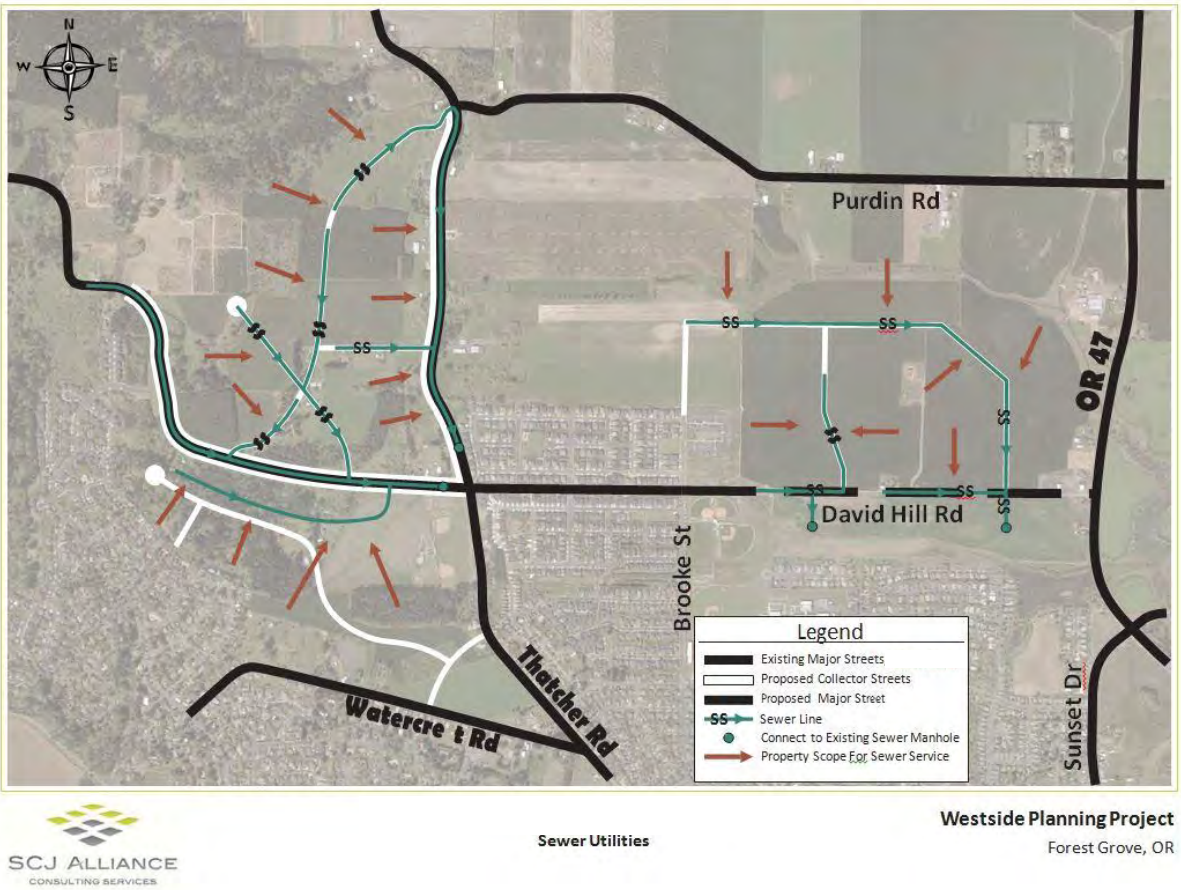
1. Sewer facilities shall be designed and sized to serve the need of future land uses as shown on the Forest Grove Comprehensive Plan Map.

2. Sewer facilities shall be located in a manner to complement other infrastructure improvements and reduce conflict with incompatible uses, be guided by existing uses and be subject to special review considerations.

The consultant team prepared a detailed infrastructure needs report for the Refinement Plan. The conceptual sewer network is shown on the map below. The system shown below only depicts sewer main lines and does not include sewer laterals necessary to serve specific development. These needs will be determined during the development review process. Construction of sewer laterals will be at developer expense.

The sewer system generally follows the street network and is designed to support gravity flows by taking advantage of topography. Designing the system to take advantage of gravity eliminates the need for pump stations which reduces system cost and improves overall system reliability.

[3] A portion of these reservoirs will be used to serve the David Hill UGB between 250 feet and 440 feet. Approximately 67% of total costs would be associated with the David Hill Planning Area.



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Sewer Utilities

Westside Planning Project
Forest Grove, OR

The estimated cost to construct the recommended sewer system is approximately $3,635,600. The table below shows estimated cost by street segment.

Sewer Facility Cost Estimates

Description	Estimated Cost	Area of Benefit
Potential Short Term Projects		
Road 9 Sewer Line	$262,500	David Hill UGB
Road 10 Sewer Line (700 linear feet/12 inch line)	$382,500	David Hill UGB
Contingencies and Engineering	$483,750	David Hill UGB
Short Term Total	$1,128,750	
Long Term Projects		
Road 1, 2, 3 Sewer Line	$225,000	David Hill UGB
Road 4 Sewer Line	$300,000	David Hill UGB
Road 5 Sewer Line	$82,500	David Hill UGB
Road 6 Sewer Line	$165,000	David Hill UGB
Road 7 Sewer Line (10 inch line)	$405,000	Purdin Road UGB
Road 8 Sewer Line (10 inch line)	$225,000	Purdin Road UGB
Contingencies and Engineering	$1,074,350	Entire Area
Long Term Total	$2,506,850	
TOTAL	*$3,635,600*	

Source: Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS Group. Costs shown are in 2016 dollars.

Storm Sewer System

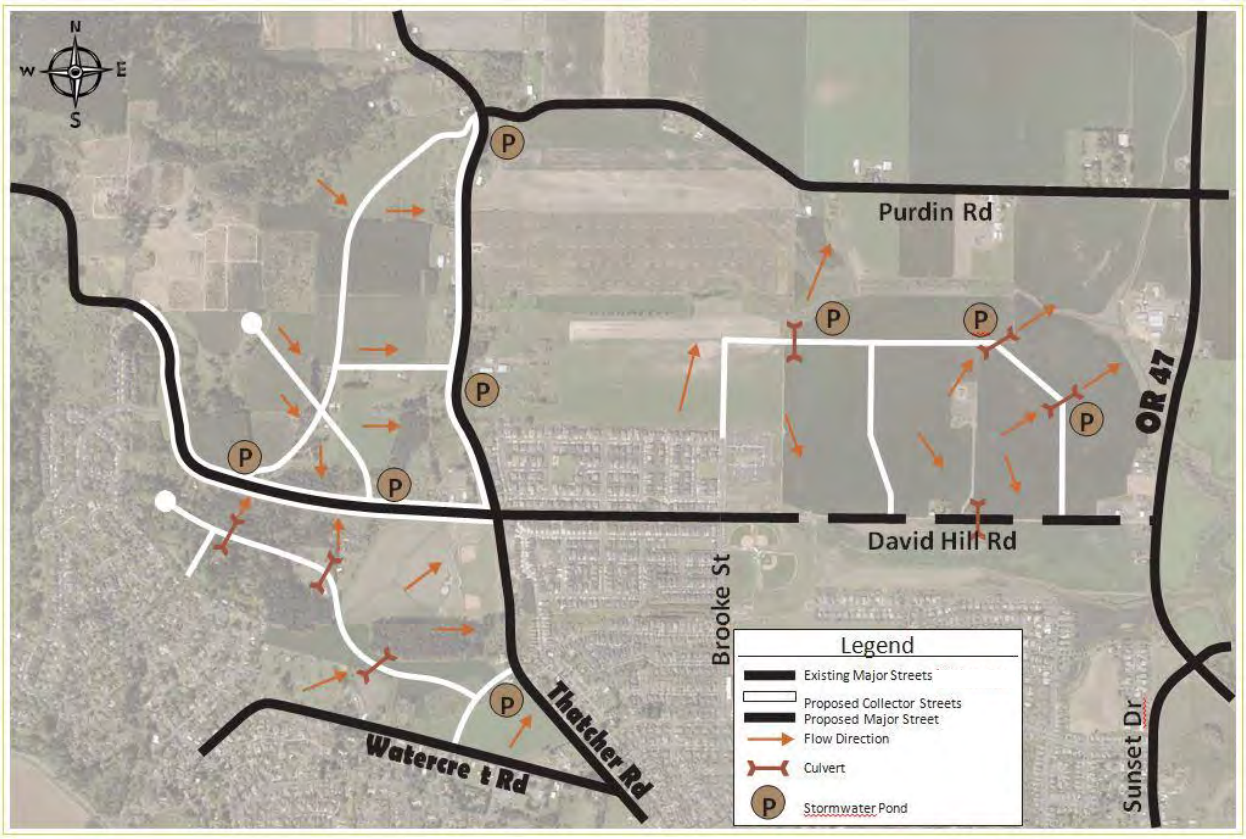
The Forest Grove Comprehensive Plan contains the following policies for the storm sewer system:

1. Storm sewer facilities should be designed to mitigate runoff conditions based on future land uses shown on the Forest Grove Comprehensive Plan map as determined by the City Engineer.

2. Storm sewer facilities should co-locate to complement other infrastructure facilities and to avoid conflicts. *The concept shows co-location of storm sewer facilities with other infrastructure facilities including roads.*

3. Design of storm water facilities shall support Comprehensive Plan land use designations.

The conceptual storm sewer system prepared for the Refinement Plan is shown on the map below. The map identifies the general direction of storm water runoff and conceptual locations of storm water ponds.



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Stormwater Utilities

Westside Planning Project
Forest Grove, OR

The estimated cost of the storm sewer system is approximately $1,575,000. Specific project cost estimates by segment are shown on the table below.

Stormwater Management Facility Cost Estimates

Description	Estimated Cost	Area of Benefit
Road 1, 2, 3 Storm Pond	$75,000	David Hill UGB
Road 4 Storm Pond	$75,000	David Hill UGB
Road 5 and 9 Storm Pond	$100,000	David Hill UGB
Road 6 and 10 Storm Pond	$150,000	David Hill UGB
Road 7 Storm Pond	$200,000	Purdin Road UGB
Road 8 Storm Pond	$50,000	Purdin Road UGB
Road 1, 2, 3 Stormwater Treatment	$35,000	David Hill UGB
Road 4 Stormwater Treatment	$35,000	David Hill UGB
Road 5 and Road 9 Stormwater Treatment	$70,000	David Hill UGB
Road 6 and 10 Stormwater Treatment	$70,000	David Hill UGB
Road 7 Stormwater Treatment	$20,000	David Hill UGB
Road 8 Stormwater Treatment	$20,000	Purdin Road UGB
Contingencies and Engineering	$675,000	Entire Area
TOTAL	*$1,575,000*	

Source: Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS Group. Costs shown are in 2016 dollars.

Public Facilities and Community Services

Chapter 7 of the Forest Grove Comprehensive Plan establishes goals, objectives and policies for public facilities and services. Key goals and policies for public facilities and community serves addressed by the Westside Plan include:

- ✓ Water System Performance Goal: Provide adequate water supply to meet the present and future water needs of the community. Recommendations for the water system necessary to provide adequate water supply for the Westside Planning area are described in Chapter 10 including an additional water reservoir.

- ✓ Water Service Goal 1: Water facilities shall be designed and sized to serve the need of future land uses as designated in the Forest Grove Comprehensive Plan map. Chapter 10 describes the recommended water facilities necessary to serve development in the Westside planning area. This includes a 12-inch water line along David Hill Road west of Thatcher Road and an additional water reservoir to supply the area and provide water pressure above the 440-foot contour elevation.

- ✓ Water Policy: The sizing of municipal water facilities shall follow land use plan designations and concentrate development close to the City Center. Chapter 10 includes an infrastructure analysis including assessment of water needs for the Westside planning area based on the land use designations described in Chapter 4 (Land Use).

- ✓ Storm Sewer Goal: Storm water facilities should co-locate to complement other infrastructure facilities and to avoid conflicts. The recommended storm water system is designed to complement other infrastructure facilities and to avoid conflicts. The recommended storm water system is based on the constructed of ponds near proposed roadway locations.

- ✓ Storm Sewer Policy 2: Design of storm water facilities shall support Comprehensive Plan land use designations. Chapter 9 describes storm water facilities necessary for the collector roadway system required to serve development. Storm water facilities for private development will be assessed during the land use review process.

- ✓ Sanitary Sewer Goal 1: Sewer facilities shall be designed and sized to serve the need of future land uses as shown on the Forest Grove Comprehensive Plan map. Chapter 9 describes sanitary sewer facilities based on the land use concept recommended in Chapter 4.

- ✓ Sanitary Sewer Goal 2: Sewer facilities shall be located in a manner to complement other infrastructure improvements and reduce conflict with incompatible uses, be guided by existing uses and be subject to special review considerations. The recommended sanitary sewer facilities described in Chapter 9 are located to take advantage of proposed roadway locations and topography for gravity flow.

- ✓ Public Safety Goal 4: Recognize that land use and transportation policies influence emergency response needs. The recommended land use concept described in Chapter 4 identifies a site for a new fire station in the Purdin Road urban growth area. This site is situated to improve emergency response needs in this part of the community including along Highway 47.

- ✓ Parks Policy 1: Provide new neighborhood and community parks, additional open space and trails and new recreation facilities to meet the needs of Forest Grove residents as the population grows and resources allow. The land use concept described in Chapter 4 identifies a site for a new neighborhood park adjacent to a new elementary school site north of David Hill Road. This neighborhood park is intended to meet the recreational needs of future Forest Grove residents living in the Purdin Road urban growth area.

- ✓ Parks Policy 6: Recognize that community and neighborhood parks provide a sense of place for community residents. The recommended neighborhood park in the Purdin Road urban growth area is situated to provide a sense of place for future Forest Grove residents living in the Purdin Road urban growth area.

Parks, Recreation and Open Space

The Forest Grove Comprehensive Plan includes goals pertaining to park needs for the community. The Forest Grove Parks, Recreation and Open Space Master Plan is an element of the Comprehensive Plan. The Parks, Recreation and Open Space Master Plan was recently updated in 2016 and addresses recreational needs in the Westside Planning Area and the Comprehensive Plan policy to:

1. Provide new neighborhood and community parks, additional open space and trails and new recreation facilities to meet the needs of Forest Grove residents as the population grows and resources allow.

The following sections additional detail about identified park needs in the Westside Planning area.

Parks, Recreation and Open Space Master Plan

The Forest Grove Parks, Recreation and Open Space Master Plan was updated in 2016 and addresses needs in the Westside planning area including the area added to the urban growth north of David Hill Road and west of Highway 47. The Parks plan identifies a location for a new public neighborhood park to serve the recreational needs of future residents living in the new urban growth boundary area. The recommended park location is included in the recommended land use plan for the Westside area shown in Chapter 4. In addition to the new park the Parks Plan also identifies improvements to Thatcher Park.

The total parks costs for the three identified projects planned in the Westside Planning Area is estimated at $6.6 million. The estimated development costs for the Purdin neighborhood park includes property acquisition as well as development costs.

Description	Total Estimated Cost	Cost Attributable to Westside Area	Cost Attributable to South of Purdin Road/Council Creek Area	Cost Attributable to David Hill Area	Area of Benefit
South of Purdin/Council Creek Area Neighborhood Park	$3,000,000	$3,000,000	$3,000,000	$0	South of Purdin/Council Creek Area
Thatcher Park Improvements	$3,400,000	$612,000	$349,799	$262,201	Westside Planning Area
Thatcher Park Dog Park Improvements	$200,000	$36,000	$20,576	$15,424	Westside Planning Area
Total Estimated Cost	*$6,600,000*	*$3,648,000*	*$3,370,376*	*$277,624*	

Chapter 6 provides additional information about recreational and open space resources and estimated park improvement costs.

Education and School Facilities

The Forest Grove Comprehensive Plan identifies education and school facility needs necessary to serve growth for the next twenty years. Education and school facility goals contained in the Comprehensive Plan applicable to the Westside Plan include:

<u>Goals:</u>

Schools shall be located in residential and commercial areas.

Schools shall be located to serve residential neighborhoods.

Policies:

Cooperate with the School District to ensure opportunities for adequate school sites necessary to serve an expanding population.

Encourage the location of schools within the urban growth boundary and within walking distance of students.

School sites based on future growth and land use expectations shall be identified on the comprehensive plan map to serve existing and future neighborhoods.

The Forest Grove Comprehensive Plan (2014) identifies a need for one additional elementary school during twenty year planning period. Consistent with this recommendation, the land use concept described in Chapter 4 identifies a site for a possible elementary school in the Purdin Road urban growth area. The school site is about ten acres in area which is typical for elementary schools based on generally accepted planning guidelines.

The Forest Grove School District is proceeding with a long range planning process to assess school needs for the next ten years. If the District determines to accommodate school needs in contrary to the Westside Plan recommendations the City will reevaluate the recommended land use designation for the proposed school site in the Purdin Road area.

School costs were not considered in the infrastructure analysis and recommended funding approach. This is because the cost is the responsibility of the Forest Grove School District and is not considered a City development cost. However, a construction excise tax is collected at time of building permit issuance for each new residential and non-residential development permit. The tax is $1 per square foot for residential construction and $0.50 per square foot of non-residential construction. Revenue collected is provided to the District for new school development.

Natural Resources and Hazards

The following provisions of the Comprehensive Plan apply to natural resources and hazards:

- ✓ Areas with known geological hazards or soils which the Soil Conservation Service has rated as severe hazard soils including shrink-swell potential, weak foundation support (shear strength), and erosion hazard shall permit construction and densities only when adhering to recommendations made through engineering analysis, review and ordinances. A proposed implementation action identified in Chapter 13 is to require engineering analysis for development proposed on sites with a slope of 10% or greater. The current requirement is 20% or more slope. This change will help identify potential geological constraints affecting development in the David Hill area.

- ✓ Those involved in development will be required to address hazard conditions by the inclusion of basic environmental data (i.e. soil type, elevation of the flood plain, geological limitations, etc.) and related designs and for engineering solutions in the submittal requirements for the development. Article 8 of the Development Code

identifies requirements that must be addressed when development is proposed in areas with potential hazards including steeply sloped areas (currently defined as 20% or more slope). Requirements include submittal of a geological assessment addressing underlying geology, soil properties, and opinion as to stability of the site.

- ✓ Adopt as a provision in both the zoning and subdivision ordinances that an environmental report be prepared and certified by a qualified engineer for all development proposals in areas having natural physical hazards and/or limitations. As part of the environmental report, the engineer shall identify the intensity of urban development to be permitted based upon the carrying capacity of the land. Open space may be required within the development in order to protect the public health and safety. Article 8 of the Development Code requires submittal of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist. This requirement currently applies to development sites with slope of 20% or greater.

- ✓ Cluster development to accommodate needed housing while preserving larger blocks of forest land and open space. Article 5 of the Development Code allows for clustering of development on sites with identified natural resources areas including riparian and upland habitat areas. To minimize potential impacts on natural resource areas lot sizes may be reduced and density may be transferred to other locations on the development site that isn't constrained.

- ✓ Establish landslide mitigation measures including logging regulations on steep slopes, landscape requirements, drainage controls, and pre-development technical studies. Article 5 of the Development Code establishes restrictions on removal of trees on development sites prior to development. These restrictions apply regardless of slope. Article 5 also restricts removal of trees in natural resource areas.

Urbanization

The Comprehensive Plan contains the following policies for the transition of rural land to urban uses:

- ✓ Establish policies to ensure an orderly and efficient transition from rural to urban land use.

- ✓ Land shall be made available within the urban growth boundary to meet all local urban land use needs.

- ✓ Implement policies to create complete neighborhoods in areas undergoing urbanization.

The Westside Plan provides clear direction guiding the transition of rural land inside the urban growth boundary to an urban development pattern. Transition of rural land for urban uses is predicated on the interest among property owners to annex land into the City and availability of infrastructure (sewer and water).

The land use concept described in Chapter 4 includes residential and some retail uses. The land identified for residential development helps meet housing needs identified in the Economic Opportunity Analysis. The land use concept also identifies residential and complementary land

uses intended to create complete neighborhoods. Complementary land uses include retail areas, an elementary school location, park site, and fire station site.

Metro Regional Land Use and Transportation Plans

The Metro Regional Framework Plan establishes a general land use concept for the Portland region. This land use concept, referred to as Region 2040, identifies regional centers, town centers, corridors, and outer neighborhoods. Downtown Forest Grove is designated a Town Center, Pacific Avenue/19th Avenue is designated a Corridor and the David Hill area is designated as an outer neighborhood. In addition to the Region 2040 land use concept, the Metro Regional Framework Plan also addresses transportation, parks and open space, and natural hazards. Local land use plans must be consistent with the Metro Regional Framework Plan.

The Metro Urban Growth Management Functional Plan implements the Metro Regional Framework Plan and contains policies guiding changes to local comprehensive plans. The Urban Growth Management Function Plan implements regional goals and objectives for housing, water quality and flood management, employment areas, and planning for new urban areas. The Westside Refinement Plan addresses and is consistent with the Urban Growth Management Functional Plan as described in this plan.

The Metro Regional Transportation Functional Plan implements the Regional Transportation Plan (RTP). The RTP establishes goals, objectives and a funding approach for the regional transportation system. The Regional Transportation Functional Plan implements the goals and objectives described in the Regional Transportation Plan . This includes goals and objectives related to transportation system design, amendments to local transportation system plans, transportation project development, regional parking management and Metro review of city and county transportation system plans. The Metro Regional Transportation Functional Plan also establishes an outcomes-based framework guiding actions and investment decisions for transportation projects affecting the regional system. The Westside Refinement Plan addresses and is consistent with the requirements of the Regional Transportation Functional Plan as described in this plan.

Washington County Urban Planning Area Agreement

In 1988 the City of Forest Grove and Washington County entered into an agreement to define planning roles and responsibilities for unincorporated land within the regional urban growth boundary near Forest Grove. This agreement called the Washington County Urban Planning Area Agreement (UPAA) established an "urban planning area" within which the City and County both agreed to maintain an interest in comprehensive planning. The City's planning responsibilities include comprehensive planning in the incorporated and unincorporated portions of the City's urban planning area. This is largely the unincorporated area within the urban growth boundary adjacent to and near Forest Grove. The City is also responsible for designating in the comprehensive plan land uses within the planning area including sensitive natural areas and hazard areas. The UPAA also reiterates that the City is identified as the appropriate provider of local water, sanitary sewer, storm sewer, and transportation facilities within the urban planning area. Exceptions include services provided other service providers subject to the terms of intergovernmental agreements.

The Westside Plan addresses many aspects of the UPAA including establishing City Comprehensive Plan designations in the Purdin Road urban growth area. The Westside Plan also addresses provision of water, sanitary sewer, storm sewer and transportation facilities within the Westside planning area.

Chapter 3 - Citizen Participation

A comprehensive public involvement approach was implemented for the Westside planning project. This approach included stakeholder interviews an in-depth 2 ½ day project charrette, two community open houses and multiple work sessions with the City Council and Planning Commission. The stakeholder interviews and design charrettes were facilitated by the consulting firm Urbsworks. The citizen participation opportunities are described more fully below.

Stakeholder Interviews

Sixteen stakeholder interviews were conducted in November 2014 for the David Hill and Purdin Road planning areas. Interviewees included property owners in the study area, residents, a realtor, Planning Commission member, Parks and Recreation Commission member; Forest Grove School District representative, and a business owner. Interviewees were asked a series of questions including:

- ✓ Based upon your connection to the area, what are the most critical issues to consider in this planning effort?
- ✓ Based upon your connection to the area, what would you like to see improved or changed?
- ✓ Based upon your connection to the area, what should be preserved?
- ✓ Based upon your connection to the area, what would represent a "win" for you?
- ✓ How would you like to be involved in the design charrette?
- ✓ What is the best way to communicate with you about the planning process?

Many thoughts were expressed during the interviews including:

- Development in the area should preserve a sense of community;
- Housing in the study area should provide choice and be accessible to lower-income households;
- Density on David Hill should not be increased above what is shown on the Comprehensive Plan map;
- Property owner rights should be respected;
- Preserve wildlife and preserve agriculture in the area;
- Promote walkable mixed-use development;
- Develop hillsides before farmland;
- Buffer existing development from new development;
- Improve transportation connections;
- Create a neighborhood on the edge that contributes to the City;
- Connect the area with the City.

Project Charrettes

The project charrette provided an opportunity for interested persons to review and comment on initial land use and transportation system concepts. The charrette began with an evening

public event where existing baseline conditions and the results of the planning process to date were discussed.

On the first full day of the charrette, property owners, stakeholders, technical committee or Planning Commission members and others will be invited to attend and participate in working sessions with project team members to develop preliminary land use alternatives for the Westside planning area. The first charrette was held on the evening of April 20, 2015. It was held at the Forest Grove Community Auditorium. Approximately 34 people participated in the first charrette.

The first charrette provided an introduction to the project. Several land use options were presented for discussion. Specific questions were posed to charrette participants including:

- ✓ Considering the proposed principles for hillside development, do you agree with the following:
    - Should new roads be aligned with slope contours to minimize disturbance from grading?
    - Should development be clustered to minimize development impacts on David Hill?
    - Should development be strategically located to among forested areas to maintain natural views and buffer development?
    - Should building be limited?
    - Should vegetation along stream corridors be increased?

Charrette participants were also asked to provide their perspective on the location and scale of commercial development in the study area. To conclude the charrette participants were asked to think about the future of Forest Grove thirty years from now and if one of the land use alternatives best represents a successful outcome for the City.

Several common themes emerged from the first charrette including:

- Views must be conserved carefully;
- Street alignments should follow contours;
- Minimal retail is desired in the David Hill area;
- Cluster housing with common areas should be considered to protect views;
- Building heights should be limited;
- Stream corridor vegetation should be increased;
- Industrial development is not appropriate in the Purdin Road area;
- Preferred zoning is single family residential (R-7) and residential multifamily low (RML).

The second charrette was held on the evening of May 20, 2015. Approximately 32 people attended the second charrette. This charrette provided an opportunity to share the feedback provided on the project and land use alternatives. An objective of the second charrette was a consensus based land use alternative for presentation to the Planning Commission.

At times the discussion was tense but several themes emerged that are reflected in the recommended land use alternative. One theme was that the Purdin Road area should not include employment uses. Approximately 75% of the charrette participants expressed this viewpoint.

In general charrette participants were divided as to whether Suburban Residential zoning (one dwelling per acre) should be retained in the David Hill area. Approximately 55% of charrette participants supported retaining Suburban Residential zoning.

Detailed responses from the charrettes are included in the technical appendix.

Planning Commission Work Sessions

The Planning Commission held work sessions on the Westside Plan on multiple occasions. Work sessions were held on:

Date	Topic
October 6, 2014	Project Approach
July 6, 2015	Planning Commission direction on land use considerations
May 2, 2016	Discussion of David Hill area in UGB and Urban Reserve
February 6, 2017	Infrastructure Needs & Funding approach

City Council Work Sessions

The City Council held work sessions on the Westside Plan on:

Date	Topic
November 14, 2016	Land Use Direction
December 12, 2016	Infrastructure Needs & Funding Approach

Chapter 4 – Land Use

The Westside planning area is comprised of two subareas (David Hill urban growth area and South of Purdin Road/Council Creek urban growth area). The David Hill area was included in the urban growth boundary when adopted in 1980. As such, City comprehensive plan map designations were established to guide future development. The land use designations were modified as part of the update to 2014 update to the Forest Grove Comprehensive Plan to promote mixed-use development throughout the City.

In contrast to David Hill, the Purdin Road urban growth area was added to the urban growth boundary by the Oregon Legislature in 2014. Since the area was added to the urban growth boundary in 2014 no City Comprehensive Plan map designations have been assigned. A primary objective of the Westside planning process was preparation of a land use concept and recommendation of Comprehensive Plan designations for the Purdin Road area to guide future development.

Several land use concepts were developed for evaluation as part of Westside planning process. Land use concepts were evaluated based on the following guiding principles:

- ✓ Promote efficient use of developable land;
- ✓ Minimize impacts to sensitive natural features;
- ✓ Promote Sustainability;
- ✓ Promote Complete Neighborhoods; and
- ✓ Support from Affected Property Owners

The initial land use concept for the Purdin Road urban growth boundary area was developed for the regional urban and rural reserves planning process. Initially much of the Purdin Road area was identified for industrial activities on sites greater than 25 acres. The emphasis on industrial activities was changed when the Oregon Legislature reduced the size of the Purdin Road urban reserve area. Initially, the boundary extended from the current city limit line to Purdin Road. The legislative action made the boundary Council Creek rather than Purdin Road reducing the area considerably and making industrial activities less feasible. Initially, most of the industrial area was envisioned along Purdin Road to allow for a buffer between residential uses adjacent to the current city limit line and industrial activities along Purdin Road. Modification to the extent of the Purdin Road urban growth area altered the approach to land use considerably. This is reflected in the recommended land use concept.

Prior to reaching a recommended land use concept several alternatives were developed to assess potential impacts especially related to traffic. This was called the "Worst Case Scenario". One alternative modified the area above the 440 foot elevation contour from Suburban Residential (one dwelling per acre) to Single Family Residential C-Low with a target density of 4.35 dwellings per acre). The "Worst Case Scenario" also included additional retail commercial and multifamily residential land in the Purdin Road urban growth area and a somewhat higher amount of development at the David Hill Road/Thatcher Road mixed-use area.

The recommended land use alternative is shown below. The recommended alternative reflects input provided during the public charrettes, open houses and work sessions. The recommended alternative strives to promote complete neighborhoods with housing, limited commercial and office uses nearby. The recommended land use alternative also attempts to balance potential

impacts including traffic. The recommended land use alternative is described in more detail below.

Recommended Land Use Alternative

The map below shows the recommended land use alternative for the David Hill and Purdin Road areas. Approximately 148 net acres is shown as residential on the map for the Purdin Road area. This represents approximately 86% of the total net area. The balance of the area is shown as commercial and institutional (school and park).

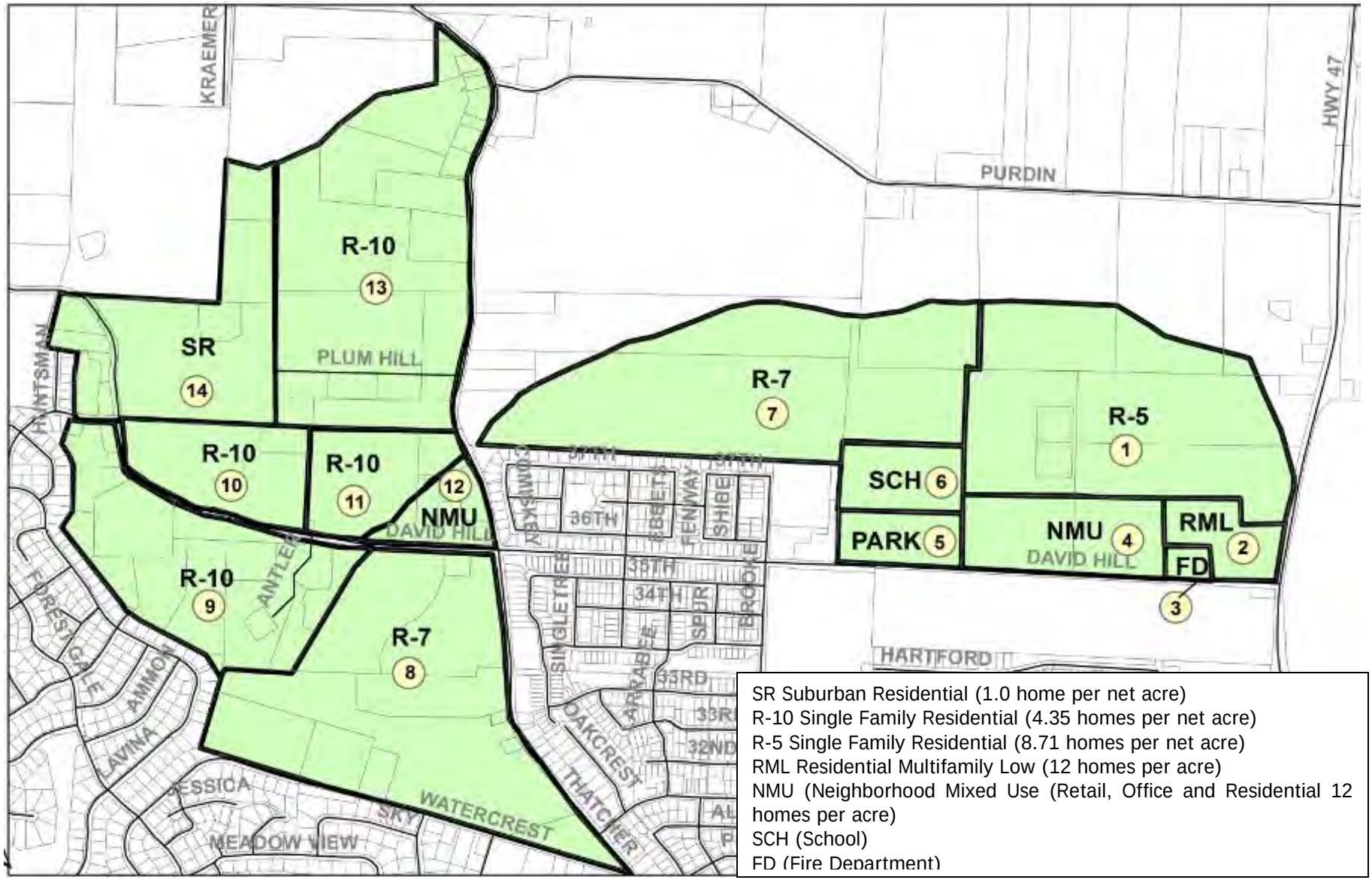
The David Hill area the same as shown on the current Comprehensive Plan map. The area shown as Suburban Residential is expanded slightly to follow property lines rather than elevation contours. The area shown as Residential Multifamily Low is currently designated as Neighborhood Mixed Use on the Comprehensive Plan map. This change is recommended to reflect public comment provided during the design charrettes.

The area south of David Hill Road, north of Watercrest Road and west of the Thatcher Road is shown as Single Family Residential R-10 and R-7. The R-10 area is larger than currently shown on the current zoning map. Much of this area is currently zoned R-7. This change reduces the density form 6.22 dwellings per net acre to 4.35 dwellings per net acre. This change takes into account the topography of the area and environment constraints including a historical landslide area.

Estimated Dwelling Yield

The table below provides an estimate of dwelling unit yield for the David Hill and Purdin Road areas based on the recommended land use alternative. The table also provides a comparison with estimated yield based on the current Comprehensive Plan designations for the area. The recommended land use concept would increase dwelling unit yield from 693 units to 1,950 units within the Refinement Plan area. This is an increase of 180% to housing capacity.

General Land Use Concept – Planning Commission Recommendation



SR Suburban Residential (1.0 home per net acre)
R-10 Single Family Residential (4.35 homes per net acre)
R-5 Single Family Residential (8.71 homes per net acre)
RML Residential Multifamily Low (12 homes per acre)
NMU (Neighborhood Mixed Use (Retail, Office and Residential 12 homes per acre)
SCH (School)
FD (Fire Department)

Land Use Analysis
Planning Commission Recommended Alternative

Analysis Zone	Area	Gross Area (ac.)	Developable Area (ac.)	Net Area (ac.)	Slope Deduction	Current Dwelling Yield	New Dwelling Yield
1	Purdin (R-5)	86.18	71.60	57.28	0%	2	498
2	Purdin (RML)	10.82	10.82	8.66	0%	0	103
3	Fire Station (FD)	2.40	2.40	2.40	0%	0	0
4	Purdin (Mixed-Use/Commercial)	24.63	24.63	19.73(1)	0%	0	140
5	Purdin (Park)	6.00	6.00	6.00	0%	0	0
6	Purdin (School)	10.00	10.00	10.00	0%	0	0
7	Purdin (R-7)	98.62	87.02	69.62	0%	3	433
	Subtotal - Purdin	***238.65***	***212.47***	***173.69***		***5***	***1,174***
8	Watercrest (R-7)	99.75	70.63(2)	56.50	10%	221	316
9	South of David Hill (R-10)	57.38	12.99	10.39	20%	36	36
10	North of David Hill - West (R-10)	24.30	17.73	14.18	15%	52	52
11	North of David Hill - East (R-10)	21.42	15.06	12.05	15%	44	44
12	North David Hill (MU-Com)	8.50	3.60	2.90	0%	12	4
13	Thatcher (R-10)	98.66	95.81	76.65	10%	300	300
14	David Hill Suburban Residential (SR)	43.12	35.62	28.50	15%	24	24
	Subtotal – David Hill	***353.13***	***251.44***	***201.17***		***689***	***776***
	Grand Total	**591.78**	**463.91**	**374.86**		**694**	***1,950***

Metro Urban Growth Management Functional Plan Title 11

The section below focuses on the planning requirements contained in Title 11 of the Metro Urban Growth Management Functional Plan. Title 11 addresses planning for new urban areas added to the urban growth boundary. The Metro Urban Growth Management Functional Plan calls for long-range planning to ensure that areas brought into the UGB are urbanized efficiently.

A. City shall adopt comprehensive plan provisions and land use regulations for the area added to the UGB.

Purdin Road Area

The Refinement Plan includes recommended Comprehensive Plan provisions for the Purdin Road area added to the urban growth boundary by the Oregon Legislature in 2014. The recommended Comprehensive Plan designations include:

Designation	Density
B-Standard	6.22 dwellings per net acre
A-Medium	8.7 dwellings per net acre
Neighborhood Mixed Use	12.0 dwellings per net acre
Institutional (Park, School, Fire Station)	Not Applicable

David Hill Area

The David Hill area included in the Refinement Plan area has been in the urban growth boundary and already has City of Forest Comprehensive Plan designations. The designations include:

Designation	Density
Suburban Residential	1.0 dwelling per net acre
B-Standard	6.22 dwellings per net acre
C-Low	4.35 dwellings per net acre
Neighborhood Mixed Use	12.0 dwellings per net acre

B. Comprehensive plan provisions for the area shall include:

a. Specific plan designation boundaries

The boundaries for specific Comprehensive Plan designations within the Refinement Plan area are described in the Land Use Chapter.

b. Provision for annexation to a city and to any necessary service districts prior to or simultaneously with application of city land use regulations.

The Urban Planning Area Agreement (UPAA) between the City of Forest Grove and Washington County identifies planning responsibilities for the unincorporated David Hill area adjacent to Forest Grove within the urban growth boundary. Under the UPAA the City of Forest Grove is identified as appropriate service

provider of local water, sanitary sewer, storm sewer and transportation facilities within the urban planning area. Exceptions include facilities provided by other service providers subject to terms any applicable intergovernmental agreements. The UPAA stipulates that unincorporated urbanizable land shall not be converted to urban development prior to annexation to the City. The UPAA will be amended to include the Purdin Road and Elm Street urban growth boundary areas.

c. Provisions that ensure zoned capacity for the number and types of housing units.

   Land annexed into the City is subject to Forest Grove Development Code. The Development Code establishes target, minimum and maximum densities for each residential zone. The minimum density is 80% of the target density. Maximum density is 115% of the target density except for the Suburban Residential and Single Family (R-10) zone which is 120% of the target density. The provisions of the Forest Grove Development Code ensure that zoned capacity is achieved.

d. Provision for affordable housing consistent with if the comprehensive plan authorizes housing in any part of the area.

   The City of Forest Grove does not provide affordable housing directly. However, the housing element of the Forest Grove Comprehensive Plan includes policies for affordable that apply. These policies include:

   - Provide and maintain an adequate supply of affordable housing opportunities.

     - Policy 4.1: Development and implement programs to offset the increasing cost of new housing construction.
     - Policy 4.2: Promote the provision of housing assistance to low and moderate income individuals in Forest Grove through the Washington County Community Development Block Grant and Home Investment Partnership programs.
     - Develop and implement programs to encourage the rehabilitation of older housing stock throughout the community.
     - Develop and support partnerships with local Community Development Corporations whose mission it is to construct and rehabilitate affordable housing in Forest Grove.
     - Implement a program to sell unneeded land owned by the City of Forest Grove for the construction of affordable housing in areas designated for residential development.
     - Continue policies to allow for manufactured dwellings on individual lots outside of designated historic districts and within manufactured home parks.

e. Provision for the amount of land and improvements for public school facilities sufficient to serve the area added to the UGB in coordination with affected school districts.

The Forest Grove Comprehensive Plan update completed in 2014 shows a need for an additional elementary school during the planning period. The recommended land use concept for the Purdin Road area shows a conceptual location for an elementary school. The site is approximately 10 acres in area.

f. Provision for the amount of land and improvements for public park facilities sufficient to serve the area added to the UGB in coordination with affected park providers.

   The recommended land use concept for the Purdin Road area shows a conceptual location for a park to serve the area. The park site approximately 10 acres in area.

g. A conceptual street plan that identifies internal street connections and connections to adjacent urban areas to improve local access and improve the integrity of the regional street system.

   The Refinement Plan includes a conceptual street for the plan area. This includes new collector roads improving traffic circulation. The street network for the Purdin Road area shows extensions of Main Street, B Street and Brooke Street into the Purdin Road urban growth boundary area. These streets tie into a new east/west collector street between David Hill Road and Council Creek which serves as the urban growth boundary.

   The conceptual road network for the David Hill areas shows an extension of Plum Hill Lane to the west. The extension of Plum Hill Lane would connect with a new north/south collector street intersecting with Purdin Road and David Hill Road. In addition, the conceptual street plan includes a new collector street beginning approximately 1,250 feet west of the Thatcher Road and David Hill Road intersection. This new collector street would run general north/northwest from David Hill Road to the interior of the David Hill planning area.

   North of Watercrest Road the conceptual street plan shows the extension of Vista Drive from Watercrest Road to Thatcher Road. This road would provide help to relieve congestion at the intersection of Thatcher Road with Gales Creek Road. The conceptual street plan for this area also shows a new east/west collector street connecting the extension of Vista Drive to a proposed extension of Valley Crest Way. This road would provide connectivity to potential future development along the south side of David Hill Road.

   The conceptual street network, as proposed, addresses the requirements for roadway connectivity in the Metro Regional Transportation Function Plan. Street connectivity in the David Hill area was not addressed in the update to the Forest Grove Transportation Plan completed in 2014. The Forest Grove Transportation System Plan identified the David Hill area as a refinement area. The Westside Planning Program Refinement Plan provided an opportunity to address street connectivity in the David Hill and Purdin Road areas in the context of the Regional Transportation Functional Plan as described more fully below.

Title 1 of the Regional Transportation Function Plan addresses transportation system design. The provisions of Title 1 ensure that the street system is designed to improve safety, support adjacent land use and balance the needs of all users including bicyclists, transit vehicles, motorists, freight delivery vehicles and pedestrians. To improve connectivity the RTFP stipulates that, to the extent practicable, local TSPs include a network of major arterial streets at one-mile spacing and minor arterial streets or collector streets at half-mile spacing. The design of the network shall be based on:

- Existing topography;
- Presence of rail lines;
- Presence of freeways;
- Pre-existing development;
- Leases, easements and covenants in place prior to May 1, 1995;
- The requirements of Titles 3 and 13 of the Urban Growth Management Functional Plan;
- Arterial design concepts in Table 2.6 and Figure 2.11 of the Regional Transportation Plan; and
- Best practices and designs for protecting natural resources and natural areas.

Each of the considerations for design of the street network are described in turn below.

Existing Topography

The topography of the Westside Planning Program Refinement Area is varied. The Purdin Road subarea is relatively flat accommodating a robust street network to serve future development. Proposed collector streets in the Purdin Road area are space approximately 1/4 to 1/3 mile apart. Therefore, this provision of the Metro RTFP is met.

In contrast to the Purdin Road area, David Hill has areas with steep slopes making street connections more difficult. The primary constraint is adhering to maximum street slope allowed under the Forest Grove Development Code. Another constraint is amount of cut and fill likely required for some road segments.

A collector street is proposed paralleling Thatcher Road approximately 1/3 mile to the west of Thatcher Road. This meets the RTFP requirements.

h. Provision for the financing of local and state public facilities and services.

The Transportation System Plan and financing analysis prepared for the Refinement Plan identify potential sources of revenue for financing public facilities and services. Sources of revenue include system development charges (SDCs), Washington County Major Streets Transportation Improvement Program (MSTIP), and federal transportation dollars allocated by Metro.

i. A strategy for protection of the capacity and function of state highway interchanges.

Not applicable.

C. The city responsible for comprehensive planning shall submit to Metro a determination of the residential capacity of any area to allow dwelling units, using a method consistent with a Goal 14 analysis, within 30 days after adoption of new land use regulations for the area.

Estimated residential capacity is shown on the table below. The capacity is based on the recommended Comprehensive Plan designations, estimated net acreage, and target density of the recommended designation. Based on the recommended land use alternative estimated residential capacity increases from 693 units to 2,054 units.

Chapter 5 - Natural Resources

Forest Grove has a strong sense of place. This sense of place is largely attributable to the City's natural setting. Defining natural features include Council and Gales Creeks, the forested Coastal Mountain Range foothills, the urban forest with many oak and sequoia trees, and, of course, nearby farm fields. It stands to reason that natural features play a prominent role in a City named Forest Grove.

The importance of the City's natural resources is further reinforced in the City's Vision Statement:

> Forest Grove is a destination that offers visitors and residents: A rich heritage preserved by honoring the city's natural, cultural, and historic treasures while also embracing the future; and
>
> Forest Grove is a community recognized for its commitment to conserve, preserve, protect and restore our natural assets.

Honoring the Vision Statement in general and the importance of natural resources specifically is a critical component of the Westside Planning Program Refinement Plan. As such, the Plan promotes development activities that take into account our local natural resources and establishes a framework to guide sustainable development. This chapter of the Plan explains how to achieve this objective.

Overview

The City of Forest Grove is situated in the Tualatin River Watershed at the western edge of the Portland metropolitan area. The surface terrain transitions from broad, flat alluvial valley floors to the basalt foothills of the Coast Range. The Forest Grove planning area is bordered to the south by the Gales Creek sub-basin and to the north by the Council Creek system.

The David Hill area is characterized by steep slopes, seasonal drainage ravines, and landslide hazard areas that create challenges for road building and development. The David Hill area is characterized by rural residential development, forest land and agricultural uses.

The Purdin Road area is relatively flat but has fine-textured floodplain soils. The Purdin Road area is also bordered by riparian areas to the north and east. Existing land use is primarily agriculture.

<u>Gales Creek</u>

Gales Creek is a major riparian corridor system containing floodplains, wetlands, wildlife habitat. The floodplain adjacent to the creek is farmed degrading riparian, wetland and wildlife habitat functions.

Gales Creek meanders in a channel between farm fields. The creek's vegetated riparian corridor ranges between 80 to 250 feet in width. Wetlands in this area are ditched and drained to varying degrees.

Anadromous and resident fish habitat is poor in Gales Creek due to a lack of large woody debris, lack of clean spawning gravels, lack of rearing and overwintering habitat and high water temperatures. In some areas the creek bed is apparently dredged to reduce flooding or to mine gravel. Although degraded conditions exist, Coho, steelhead and other resident fish are documented as being present in the Gales Creek system. Gales Creek is designated as a critical steelhead habitat by the State of Oregon.

Council Creek

The Council Creek system receives drainage from the David Hill and Purdin Road areas. The system meanders near developed neighborhoods or flows through ditches adjacent to farmed lands. There is no documentation of resident fish presence in the upper reaches of Council Creek.

Wetlands

The local wetland inventory was prepared in 1993 and reviewed in 2011 as part of the 2014 update to the Forest Grove Comprehensive Plan. The local inventory only includes land within the city limits and the review did not include the Purdin Road urban growth area. Jurisdictional wetlands may exist in areas recently added to the urban growth boundary.

Clean Water Services oversees storm water management and water quality for the urban portions of Washington County. Clean Water Services also focuses on habitat preservation and management. Clean Water Services reviews development proposals to assess potential impacts to wetlands and riparian areas. Clean Water Services review is required before the City accepts an application for land use approval.

Groundwater Resources

The Forest Grove drinking water system is supplied by five surface water intakes located on Clear, Roaring, Smith, Deep and Thomas Creeks. These creeks are tributaries to Gales Creek. In addition the City has water rights at the Tualatin River, Hagg Lake and Barney Reservoir.

The Westside planning area is not designated as a critical groundwater supply area.

The following Goal 5 resources exist in or near the planning area:

- ✓ Riparian corridors;
- ✓ Wetlands;
- ✓ Wildlife habitat;
- ✓ Groundwater resources;
- ✓ Oregon recreation trails;
- ✓ Mineral and aggregate resources; and
- ✓ Cultural areas

Statewide Planning Goal 5 encourages local governments to adopt natural resource protection programs and to conserve scenic and historic areas and open space. The Refinement Plan complements the goals and objectives for protecting natural resources contained in the Forest Grove Comprehensive Plan:

- All development shall consider, take into account, and demonstrate suitability relative to the natural hazard limitations of the Forest Grove area;
- Floodplain areas shall be protected from incompatible uses to reduce potential for property damage;
- Maintain and improve community sustainability by promoting future economic activities that are environmentally desirable.

The Forest Grove Comprehensive Plan also includes specific policies related to protection natural resources:

- Areas with known geological hazards or soils which the Soil Conservation Service has rated as severe hazard soils including shrink-swell potential, weak foundation support (shear strength), and erosion hazard shall permit construction and densities only when adhering to recommendations made through engineering analysis, review and ordinances.
- Those involved with development will be required to address hazard conditions by the inclusion of basic environmental data (i.e. soil type, elevation of the floodplain, geological limitations, etc.) in the submittal requirements for the development.
- Adopt as a provision in both the zoning and subdivision ordinances that an environmental report be prepared and certified by a qualified engineer for all development proposals in areas having natural physical hazards and/or limitations. As part of the environmental report, the engineer shall identify the intensity of urban development to be permitted based upon the carrying capacity of the land. Open space may be required within the development in order to protect the public health and safety.
- Cluster development to accommodate needed housing while preserving larger blocks of forest land and open space.
- Establish landslide mitigation measures including logging regulations on steep slopes, landscape requirements, drainage controls, and pre-development technical studies.
- Minimize the risk of loss of life and damage to property from wildfires within the City and the urban growth boundary.
- Amend development standards in areas with potential landslide hazard to minimize potential landslides while allowing appropriate development.

Goals, objectives and policies of the Comprehensive Plan are implemented through the Forest Grove Development Code generally and Article 5 (Natural Resource Areas) specifically. Article 5 establishes standards to protect and improve the functions and values that contribute to wildlife habitat including upland areas. This includes:

- Large habitat areas
- Interior habitat
- Connectivity and proximity to water; and
- Connectivity and proximity to other upland habitat areas.

Article 5 also establishes clear and objective standards and a discretionary review process applicable to development in natural resource areas in accordance with Statewide Land Use Planning Goal 5.

Article 5 identifies habitat-friendly development practices to avoid or minimize development impacts on natural resource areas by allowing flexible site design. Habitat-friendly development practices are appropriate for the Westside planning area including:

- Building setback flexibility to avoid or minimize development within Natural Resource Areas.
- Flexible landscaping requirements to avoid or minimize development within Natural Resource Areas.
- Flexible site design (on-site density transfer) to avoid or minimize development within Natural Resource Areas.

Opportunities

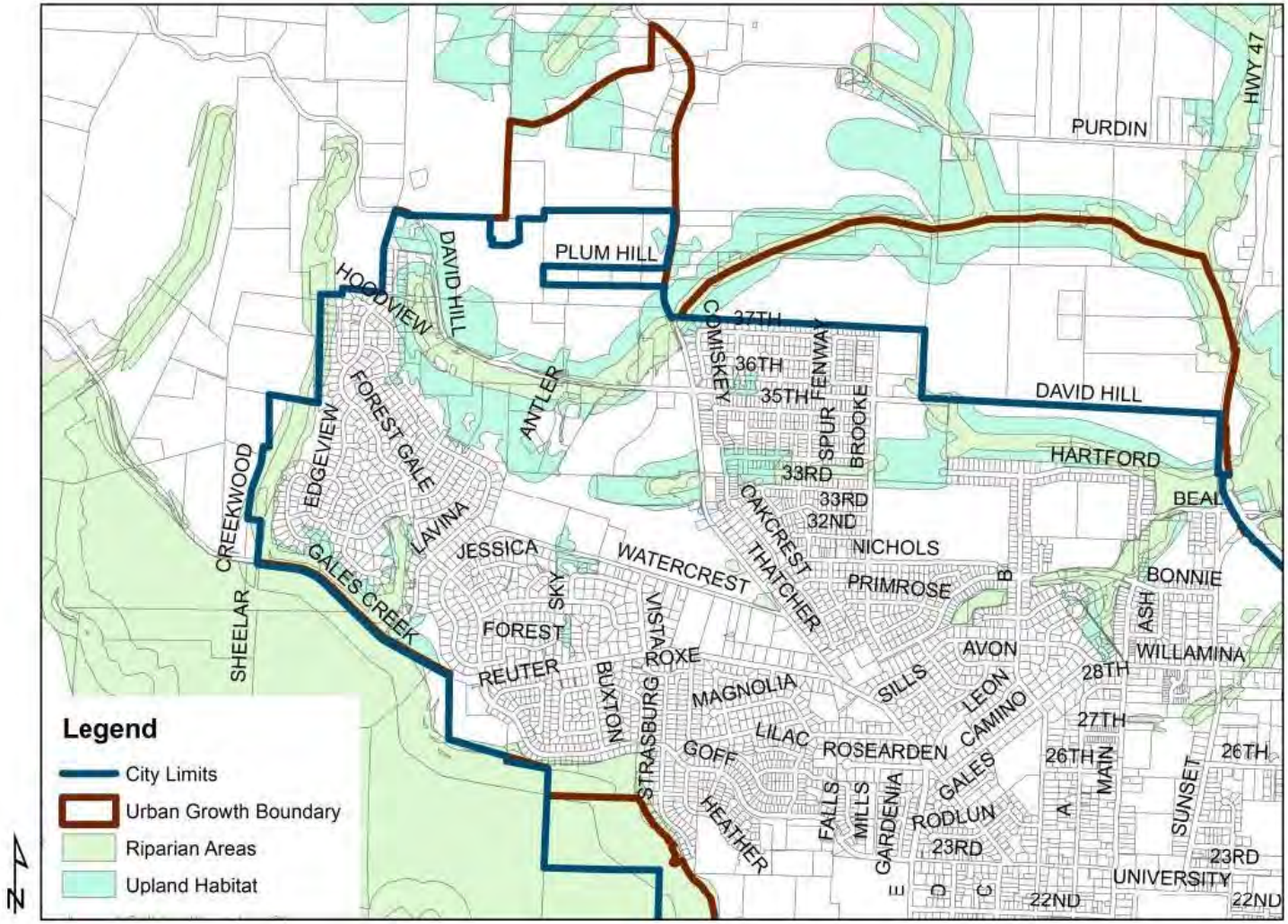
SCJ Alliance created a list of potential opportunities to protect and improve natural resource conditions in the Westside planning areas. A summary of general opportunities is provided below. The complete list of opportunities for each of the planning areas is included in the technical appendix.

- Update the 1993 Forest Grove Wetland and Stream Inventory using current definitions and mapping processes as needed;
- Blend storm water management with natural systems using constructed wetlands adjacent to natural systems to improve water quality and wildlife habitat opportunities;
- Remove invasive plants throughout the City's riparian and wetland areas to minimize invasive growth, reduce stream bank erosion and improve wildlife habitat;
- Develop new connections and cooperative efforts between landowners and other government agencies.

<u>Natural Resource Areas</u>

The Westside Refinement Plan area includes several natural resource areas including riparian areas and upland habitat. Development near natural resource areas are subject to the requirements of Development Code Article 5 which are based on the Metro regional model code.

Natural Resource Areas



Chapter 6 - Recreational, Cultural, and Open Space Resources

Recreational, cultural and open space resources is another element of makes Forest Grove the desirable place it is to live, raise a family, work or visit. The Westside planning is largely undeveloped and except for Thatcher Park, the area does not have recreational or cultural amenities. Existing and planned recreational and open space resources are described in more detail in the following sections of this chapter.

Recreational Resources

Thatcher Park is located at 750 David Hill Road just east of Thatcher Road. Thatcher is a community park complete with baseball fields, picnic shelter, picnic tables, playground, soccer field, softball fields, walking path and off-leash dog area. The park is approximately 15.4 acres in area. Thatcher Park affords views of the surrounding area and several Cascade Range peaks. The park is a jewel in the Forest Grove Parks and Recreation system.

Thatcher Park

Open Space Resources

The Westside Refinement Plan area includes open space resources including Thatcher Woods. The photo below shows the woods and the trail providing public access. The land comprising Thatcher Woods was donated to the City with the stipulation that the woods be retained as a community resource.

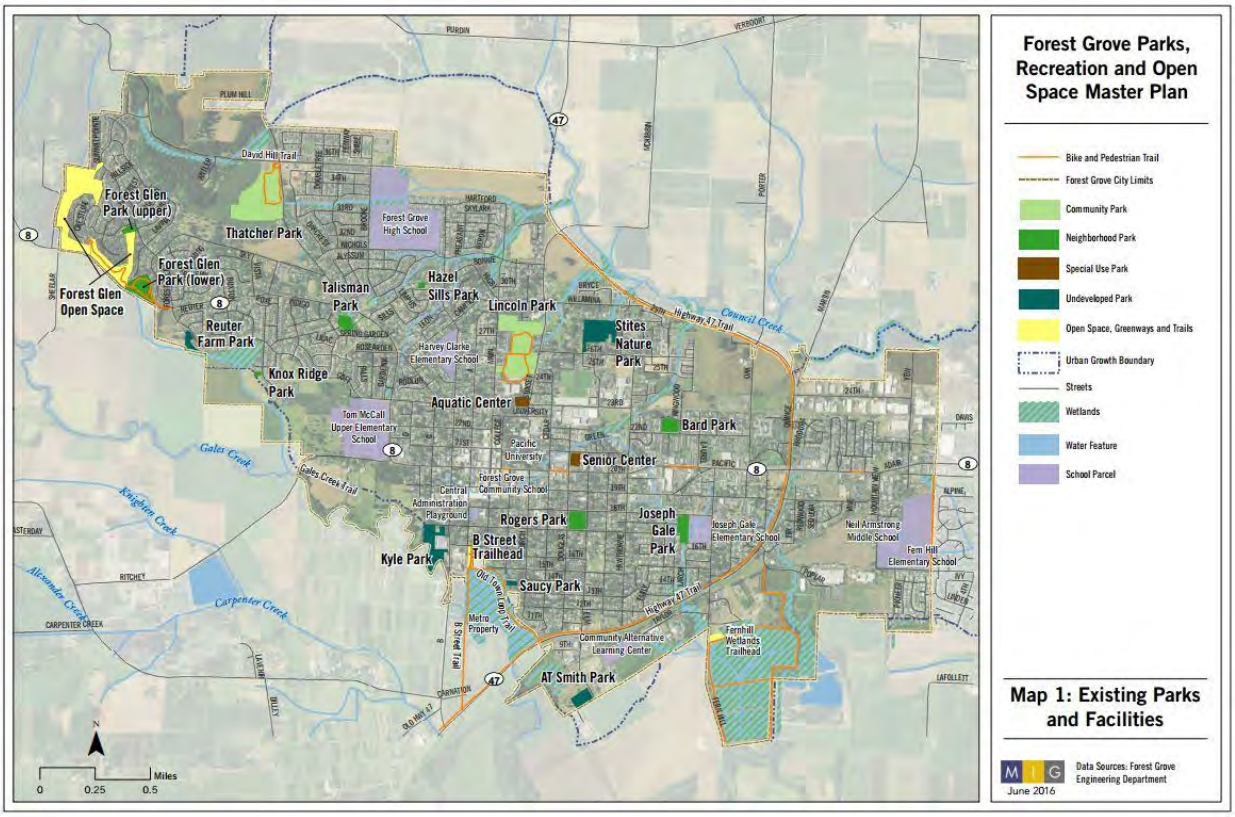
Thatcher Woods Trail

The City's Parks, Recreation and Open Space Master Plan, updated in 2016, establishes a vision for local investments in public park and recreation facilities contributing to the City's identity and livability. Parks are often the most memorable aspects of a community.

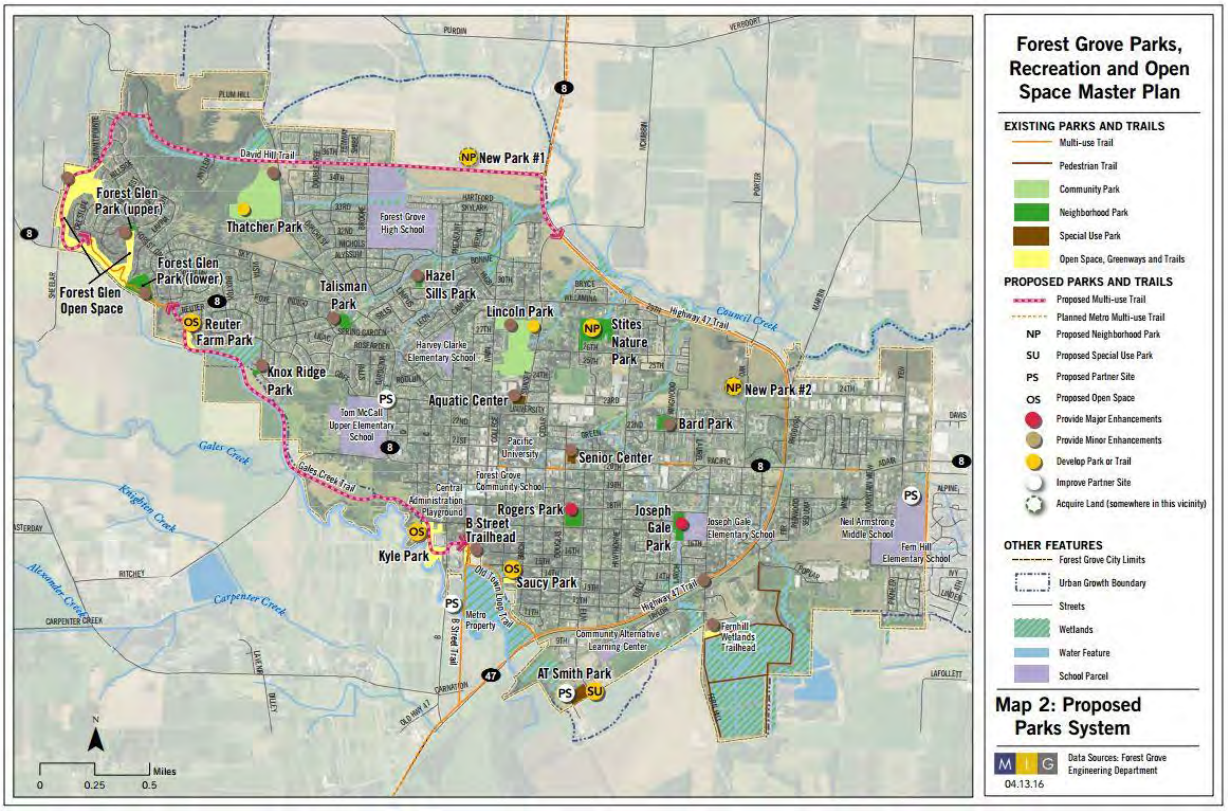
The Parks and Recreation Master Plan provides guidance for decisions regarding the acquisition, development renovation, maintenance and activating parks and recreation facilities. The Master Plan includes guidelines for the amount of desirable park land by park type. Park types include community park, neighborhood park, special use park, open space, greenways and trails.

The map below shows the locations of existing parks and recreation facilities. The City provides 68 park and recreation facilities on 158 acres of public park land. A jewel of the park and recreation system is Thatcher Park located within the Westside Plan area at the Thatcher Road

and David Hill intersection. Thatcher Park is a community park with many amenities including a dog park area, baseball field, a play area for children, covered picnic shelter and wooded hiking area.



The Purdin Road urban growth area is undeveloped and lacks urban amenities including public park land. The Purdin Road area is expected to accommodate approximately 1,200 homes and approximately 3,200 persons. Based on the desirable level of service guidelines contained the Park and Recreation Master Plan, the Purdin Road area should have a neighborhood park with at least 3.2 acres. As such, the land use concept for the Westside Planning Area includes a neighborhood park in the Purdin Road urban growth area. The identified location is approximately six acres in area and adjacent to the proposed elementary school site north of David Hill Road. This neighborhood park facility is identified in the Parks, Recreation and Open Space Master Plan as shown on the map below.



In addition to Thatcher Park and the proposed neighborhood park in the Purdin Road urban growth area, the Parks, Recreation and Open Space Master Plan identifies trails that will serve the Westside Planning Area. This includes the David Hill Trail and Council Creek Trail.

Estimated Park Improvement Costs

The Parks, Recreation and Open Space Master Plan Update includes planning level cost estimates for project identified in the Plan including those in the Westside area. The table below shows estimated costs. The estimated development costs for the Purdin neighborhood park includes property acquisition as well as development costs.

Description	Total Estimated Cost	Cost Attributable to Westside Area	Cost Attributable to South of Purdin Road/Council Creek Area	Cost Attributable to David Hill Area	Area of Benefit
South of Purdin/Council Creek Area Neighborhood Park	$3,000,000	$3,000,000	$3,000,000	$0	South of Purdin/Council Creek Area
Thatcher Park Improvements	$3,400,000	$612,000	$349,799	$262,201	Westside Planning Area
Thatcher Park Dog Park Improvements	$200,000	$36,000	$20,576	$15,424	Westside Planning Area
Total Estimated Cost	*$6,600,000*	*$3,648,000*	*$3,370,376*	*$277,624*	

Chapter 7 – Natural Hazards

PBS Engineering and Environmental prepared a geological and geotechnical assessment report for the Westside planning area. The assessment included review of aerial photography, light detection and ranging (LiDAR) imagery, geological and geo-hazard maps, and soil surveys. In addition, three geotechnical borings were completed on David Hill to provide data pertaining to slope stability issues, depth to groundwater and soil erosion potential. The complete report is included in the technical appendix.

David Hill has the highest elevation and steepest slopes in Forest Grove planning area. This topography presents opportunities as well as challenges. Opportunities include potential for innovate development design by taking advantage of topography to cluster housing in less steeply sloped areas to reduce development impacts or taking advantage of topography to maximize views. Challenges include overcoming constraints to efficient street layout and minimizing risk in areas with landslide potential.

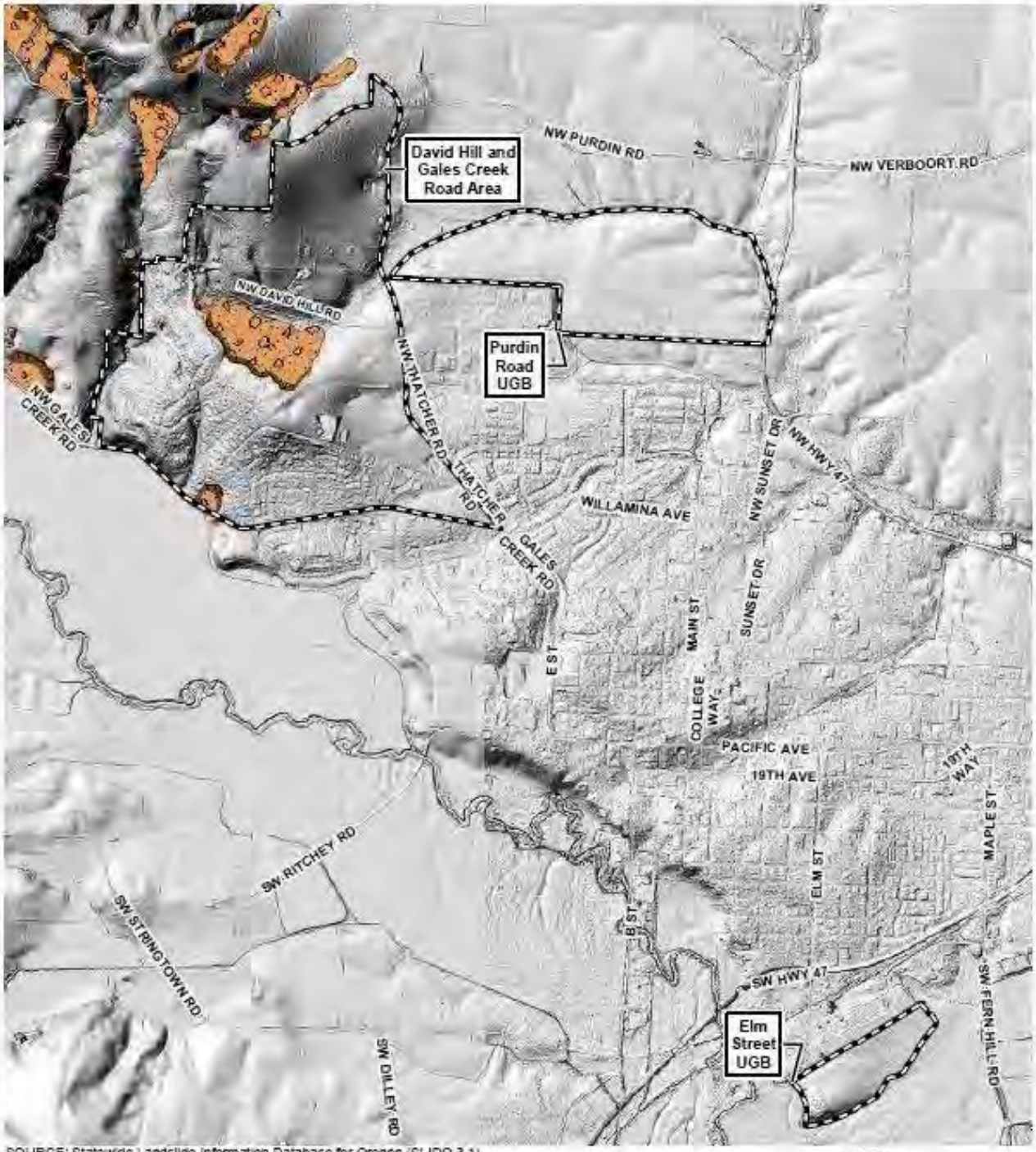
The table below shows the generalized slope characteristics for the Refinement Plan Area.

The assessment prepared by PBS indicates that certain areas of David Hill are prone to slope instabilities and historical landslides have occurred. In particular, the area between Forest Gale Drive and Antler Road is mapped by the Oregon Department of Geology and Mineral Industries as a landslide complex.

The primary geotechnical-related aspects to consider in the Westside planning project area include:

- Weak surface soils;
- Slope stability;
- Soil liquefaction during a seismic event;
- Poorly draining soils;
- Seismic ground shaking;
- Shallow groundwater;
- Potentially expansive soils; and
- Highly disturbed ground surface soil due to past farming practices

The geological analysis for the Westside planning area indicates portions of the study area are prone to slope instabilities. The location between Forest Drive and NW Antler Road is mapped by the Oregon Department of Geology and Mineral Industries as a landslide complex. In addition slopes adjacent to and within steep drainages show indications of ancient or historical instabilities. The map below shows the approximate location of the mapped landslide area.



SOURCE: Statewide Landslide Information Database for Oregon (SLIDO 3.1)

Legend

Westside Planning Study Area

Arterial streets

0 1,250 2,500 5,000'

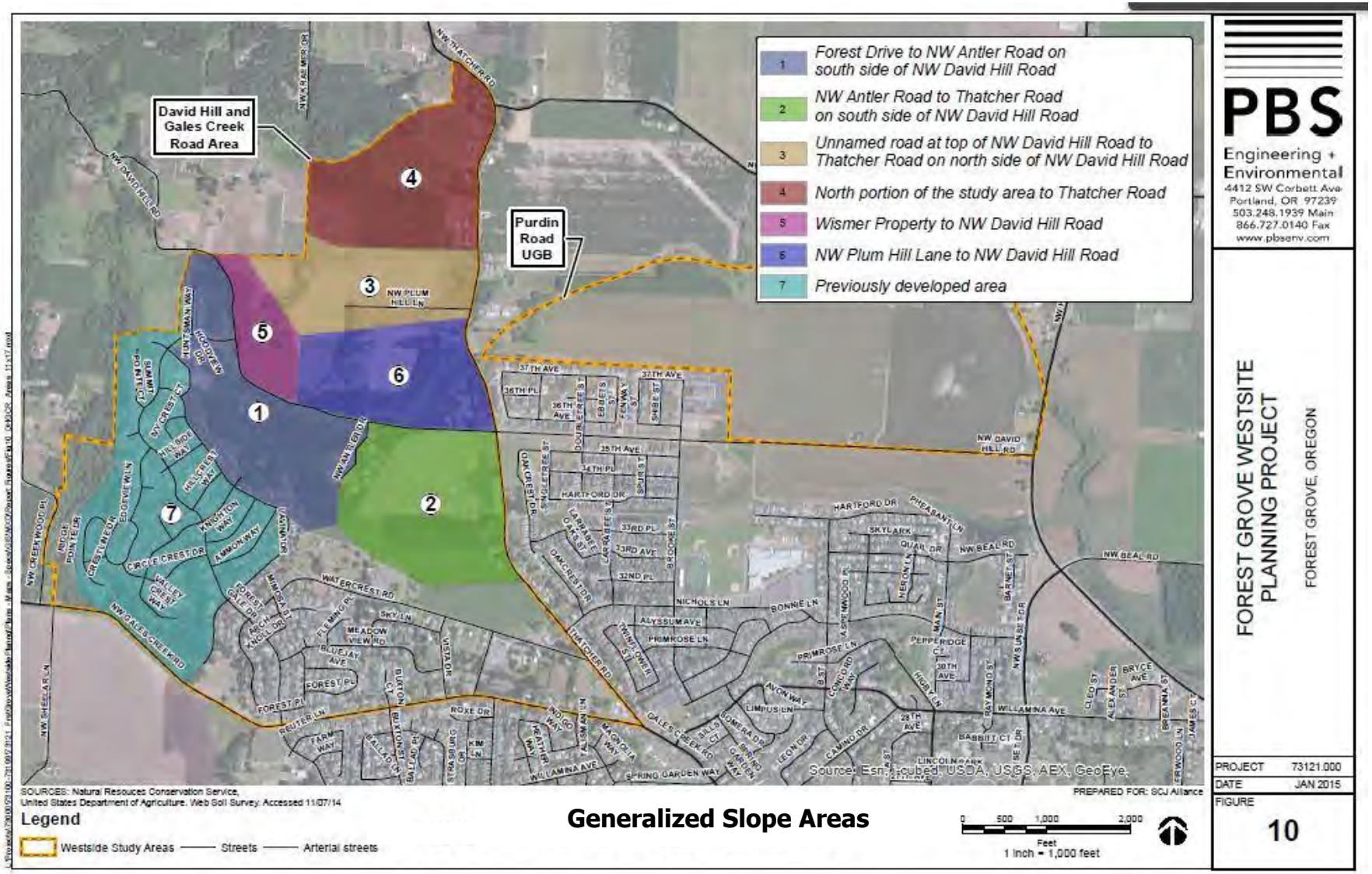
1 inch = 2,500 feet

PREPARED FOR: SCJ Alliance

The table below shows slope characteristics within specific area of the Refinement Plan area. The map area numbers are keyed to the map following the table.

Steeply Sloped Areas

Location	Map Area	Approximate Slope Trend	Slope Percent	Slope Instabilities
Forest Gale Drive to Antler Road on south side of David Hill Road	1	North	Max: 67 General: 33.5 to 17	Yes
Antler Road to Thatcher Road on south side of David Hill Road	2	North	Max: 17 General: 17 to 5	No
Unnamed Road at top of David Hill Road to Thatcher Road on north side of David Hill Road	3	East	Max: 25 General: 17 to 12	No
North portion of study area to Thatcher Road	4	East	Max: 25 General: 17 to 5	No
Wismer Property to David Hill Road	5	South	Max: 50 General: 17 to 10	Yes
Plum Hill Lane to David Hill Road	6	South	Max: 40 General: 25 to 12	Yes
Developed Area	7	Southwest and South		Yes



Generalized Slope Areas

PBS Engineering + Environmental
4412 SW Corbett Ave
Portland, OR 97239
503.248.1939 Main
866.727.0140 Fax
www.pbsenv.com

FOREST GROVE WESTSITE PLANNING PROJECT
FOREST GROVE, OREGON

PROJECT	73121.000
DATE	JAN 2015
FIGURE	10

Recommendations

The Westside planning process resulted in recommendations to address challenges associated with development in steeply sloped areas. One recommendation is that the Development Code Section 10.8.310 (Hazard Areas) be amended to require a geological assessment and geotechnical report prepared and stamped by a certified engineering geologist and geotechnical engineer in areas with a slope of 10% or greater rather than just areas with a slope of 20% or more. The required assessments should include 1) review of aerial photography and LiDAR imagery; 2) review of previous reports prepared for the subject property; 3) site reconnaissance including mapping of observable geological features and/or hazards; 4) laboratory testing of soils. The results of the required assessment shall be filed with the City.

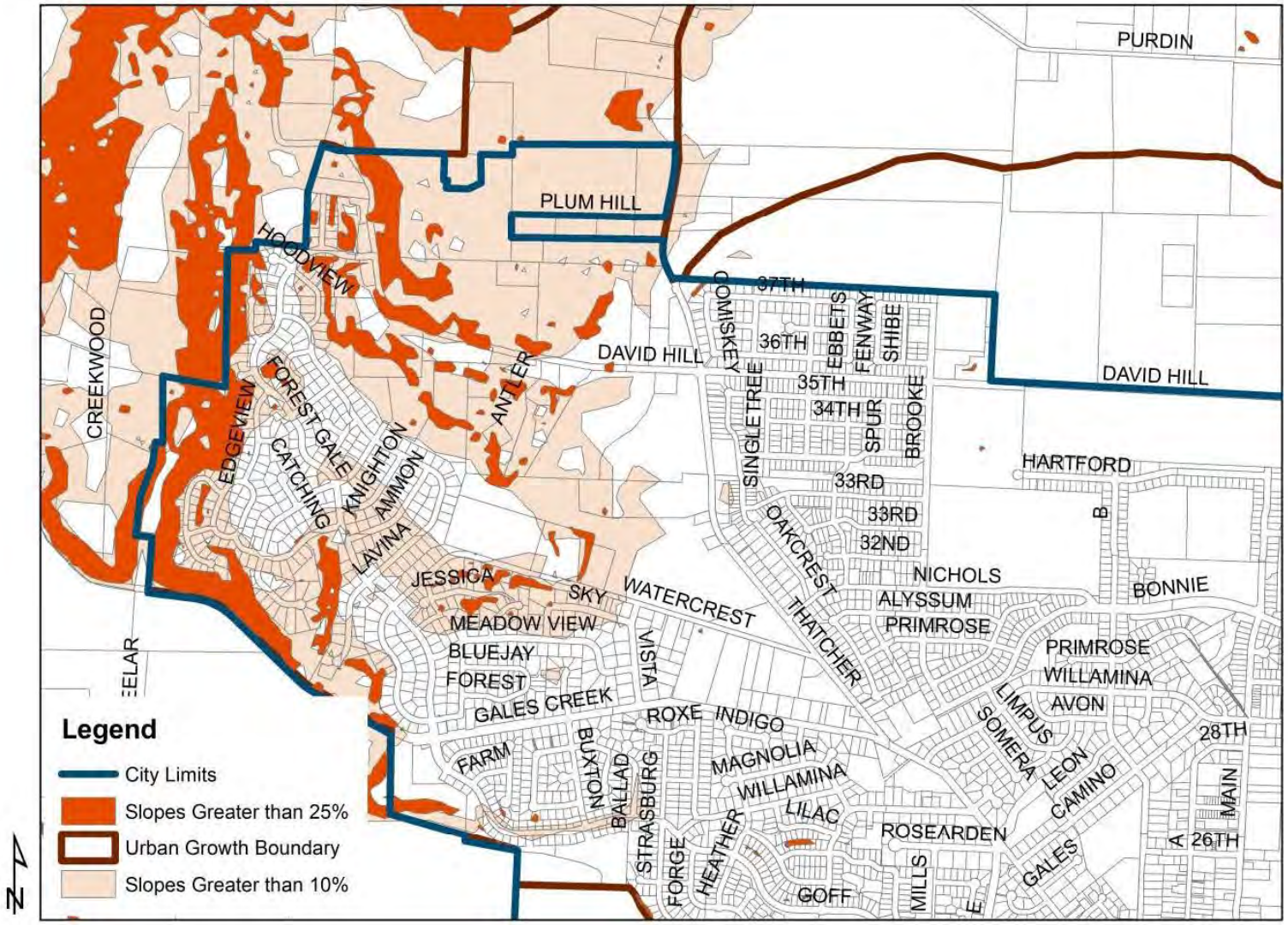
It is recommended that applicants proposing development on sites with 10% or more slope use the information developed through the geological and engineering assessment to establish methods to minimize hazard risk by:

- Site design approaches that avoids development within the identified hazard area;
- Grading, erosion control and other site preparation technics to minimize hazard impacts;
- Methods to minimize impacts from utility installation; and/or
- Techniques to minimize hazard impacts approved by the Building Official.

It is also recommended that for divisions of land, identified hazard areas be placed in an open space tract separate from areas intended for development. For development of land where a division of land is not proposed, an identified hazard area shall be held in common or placed within an easement precluding development. The tract or easement shall be restricted to open space. Utilities may be located within the tract or easement provided measures are identified to minimize hazard impacts.

The map below shows where these recommendations would apply.

Slopes


PURDIN
PLUM HILL
HOODVIEW
CREEKWOOD
EDGEVIEW
FOREST GALE
CATCHING
KNIGHTON
AMMON
LAVINA
ANTLER
DAVID HILL
COMISKEY
37TH
36TH
35TH
34TH
33RD
33RD
32ND
EBBETS
FENWAY
SHIBE
SPUR
BROOKE
SINGLETREE
OAKCREST
THATCHER
HARTFORD
B
NICHOLS
ALYSSUM
PRIMROSE
BONNIE
PRIMROSE
WILLAMINA
AVON
LIMPUS
SOMERA
LEON
CAMINO
28TH
MAIN
A
26TH
GALES
ROSEARDEN
MILLS
E
GOFF
HEATHER
FORGE
STRASBURG
BALLAD
BUXTON
FARM
MAGNOLIA
WILLAMINA
LILAC
INDIGO
ROXE
GALES CREEK
FOREST
BLUEJAY
MEADOW VIEW
JESSICA
SKY
WATERCREST
VISTA
ELAR
Legend
City Limits
Slopes Greater than 25%
Urban Growth Boundary
Slopes Greater than 10%
N

Chapter 8 – Transportation

Transportation including roadways, sidewalks, pathways and transit are essential elements for creating sustainable and complete neighborhoods. Not only does the transportation system provide a means for travel it also accounts for a considerable amount of land needed for development. In many cases 20% or more of developable land area.

The Westside Planning Program Refinement Plan identifies a conceptual transportation network intended to serve the preferred land use concept described in Chapter 4. This conceptual transportation system will be incorporated into the Transportation System Plan. Recommended amendments are described in Chapter 13 (Implementation Actions).

The Forest Grove Transportation System Plan (TSP) update, completed in 2014, noted that a street network in the Westside planning area complying with Metro Regional Transportation Functional Plan could not be identified due to unresolved land use and natural resource issues known to exist. The TSP proposed that a future refinement plan be prepared to develop a local street plan subsequent to adoption of the TSP to guide future development of the David Hill area based on topographic constraints and desire to preserve vegetative corridors in the planning area.

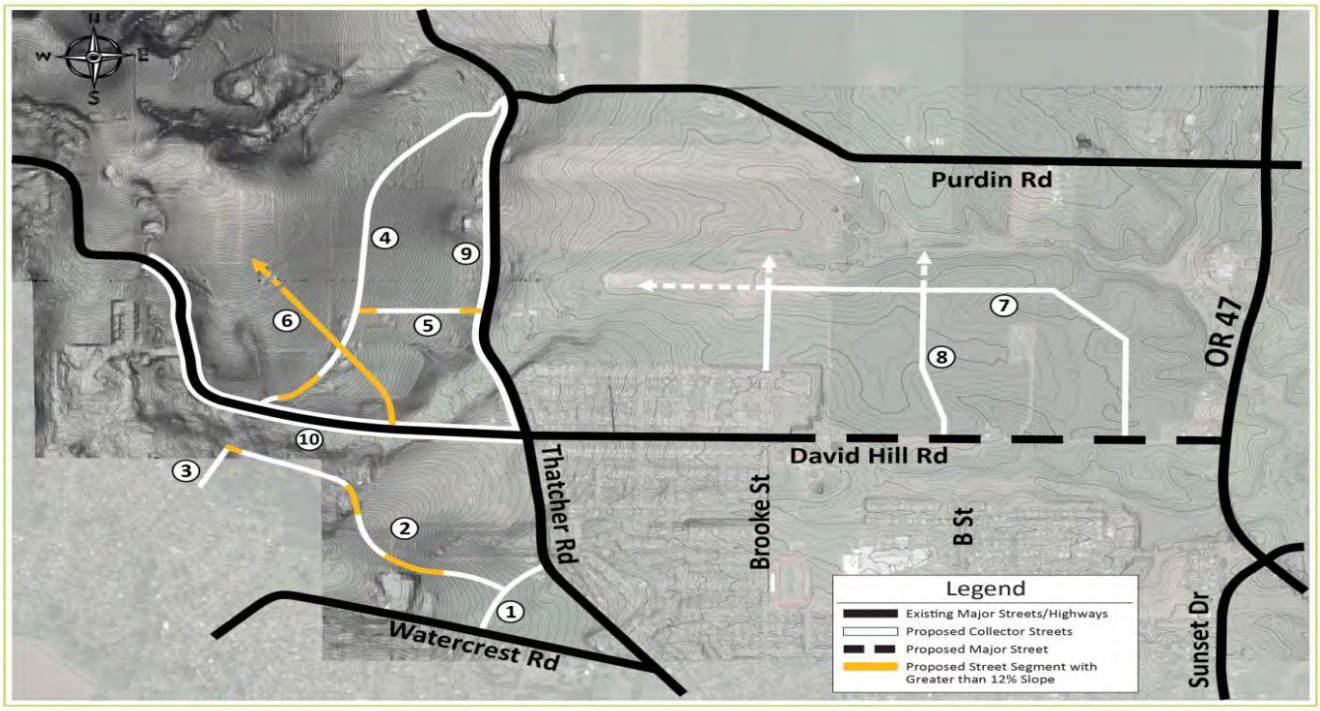
The proposed refinement areas are shown on the map below.

Future Refinement Areas

The TSP also noted a need to prepare a street connectivity plan to provide access to the new urban growth boundary area as well as circulation. The intent is to ensure that potential improvements within the planning area do not preclude creation of a logical and context-sensitive street system when the area is ultimately developed.

The consultant team identified the needed "grid" system for major roadways for the Westside area. The major roadway systems are composed of the collector network needed for traffic circulation for both the David Hill and Purdin Road areas. The street network shown below does not include local streets required for development.

Proposed Street System



SCJ ALLIANCE
CONSULTING SERVICES

Proposed Street System

Westside Planning Project
Forest Grove, OR

New Urban Growth Boundary Area

The proposed system for the Purdin Road Area shows an extension of Main Street and B Street north of David Hill Road to serve development in the Purdin Road area. The conceptual transportation network also includes an extension of Brooke Street north from its current terminus to serve the Purdin Road area. Main Street, B Street (Road 8) and Brooke Street will connect to a new east/west collector street (Road 7) located approximately half the distance between David Hill Road and Council Creek.

David Hill Area

The conceptual transportation network in the David Hill area is more complex than the Purdin Road area due to topography. The transportation network includes an extension of Plum Hill Lane (Road 5) west to a new collector street roughly parallel with Thatcher Road (Road 4). This new collector roadway will connect David Hill Road with Purdin Road.

The conceptual transportation system also includes a new roadway (Road 6) interesting with David Hill Road approximately 1,250 feet west of Thatcher Road. This location takes advantage of grades less steep than most locations along the north side of David Hill Road. From David Hill Road this new road will run approximately 2,900 feet north and west to serve the far western edge of the David Hill planning area.

The conceptual transportation also includes an extension of Vista Drive (Road 1) from Watercrest Road to Thatcher Road. This connection is currently in the Forest Grove Transportation Plan Update (2014). This new connection will relieve congestion at the intersection of Thatcher Road will Gales Creek Road. Road grade would be approximately 8% to 10%.

A new east/west road (Road 2) is proposed generally parallel to Watercrest and David Hill Road to improve connectivity as the area north of Watercrest Road develops. The road will be aligned to avoid Thatcher Park and Thatcher Woods. Valley Crest Way is proposed for extension to connect with Road 2. This will provide an alternative way to enter or exit the Forest Gale Heights area.

Traffic Operations Analysis

The consultant team prepared an analysis on the area roadways as a result of full build out of the Westside Planning Area. The analysis is included in the appendix and is considered a "worse case" land use scenario including 2,132 dwellings and 126,500 square feet of non-residential space. This compares with 1,950 dwellings and 172,000 square feet of non-residential space under the Planning Commission land use direction. (Both alternatives include 65,000 square feet for an elementary school.) A comparison of the overall Average Daily Trips (ADT) for the two scenarios would be 23,219 for the worse-case scenario and 24,155 for the Planning Commission alternative. The analysis, however, is based on peak hourly trips rather than ADT. This results in a difference of 64 more two way trips for the Planning Commission scenario. This is not a significant, particularly considering that these trips would be distributed over the entire circulation system.

The following table is the current TSP analysis for the area roads. While this analysis includes the David Hill area for development, it does not include the added traffic from the Purdin Road area since the Purdin area was not yet added to the urban growth boundary by the Oregon Legislature. Further, the assessment was based on no traffic circles for the David Hill and Purdin road intersections with Highway 47.

2035 Transportation Impacts from Current TSP

No.	Intersection	Operational Standard	Level of Service (LOS) [1]	Average Delay* (Seconds)	Volume / Capacity (V/C)
	Unsignalized Intersections				
1	Thatcher Road/Watercrest Road	LOS E/0.99	A/C	17.2 [2]	0.09 [2]
2	Gales Creek Road/Thatcher Road	LOS E/0.99	A/B	11.6 [2]	0.24 [2]
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
5	Highway 47/Martin Road	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
	Signalized Intersections				
4	Highway 47/Sunset Drive	V/C=0.99	B	16.1	0.50
6	Pacific Avenue/Quince Street	V/C=0.99	D	53.4	0.97

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

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[1] *Oregon Highway Plan, Policy Element*, Table 7, Oregon Department of Transportation, 1999.

[2] *Washington County 2020 Transportation System Plan*, Washington County, 2002.

To determine traffic impacts associated with the revised land use alternative and to identify any potential roadway improvement needs, the expected traffic volumes associated with this development must be forecast and analyzed. The process used to prepare Westside traffic projections is described in the following pages. For consistency with the adopted Transportation System Plan, the 2035 PM peak hour was used for the analysis.

The process of moving from TSP forecasts to forecasts based on the Westside land use alternative involved the following steps:

- Comparison of Land Use Projections: The household and employment forecasts that are consistent with the 2014 Comprehensive Plan and provide the basis for the Transportation System Plan were compared estimated dwelling unit and employment forecasts for the Westside area in the modified regional travel demand model.
- Calculation of Land Use Growth: Estimates of new growth in household and employment forecasts over the Transportation System Plan baseline were allocated to specific locations.
- Development of Trip Generation Estimates: Trip end estimates consistent with the Transportation System Plan were obtained from the Metro regional model for zones including the Westside planning area. These estimates were factored up or down by location consistent with the new dwelling unit and/or employment growth based on the Westside land use alternative. For the Gales Creek and David Hill areas, the trips with Westside land use alternative are expected to decrease slightly in comparison with the Transportation System Plan. This is because the number of dwelling units increased

with the Westside land use alternative and the regional transportation model originally included trips related to future employment in these areas. Since the Westside land use alternative includes only minor growth in employment in the David Hill and Gales Creek areas the net growth in trip-making in comparison to the TSP would likely decrease.

Total trips for the Purdin Road planning area are expected to increase significantly compared to the Transportation System Plan baseline because this area was not included in the urban growth boundary at the time the TSP was developed. Trip generation rates were added to the TSP 2035 PM peak hourly traffic volumes for the Purdin Road area.

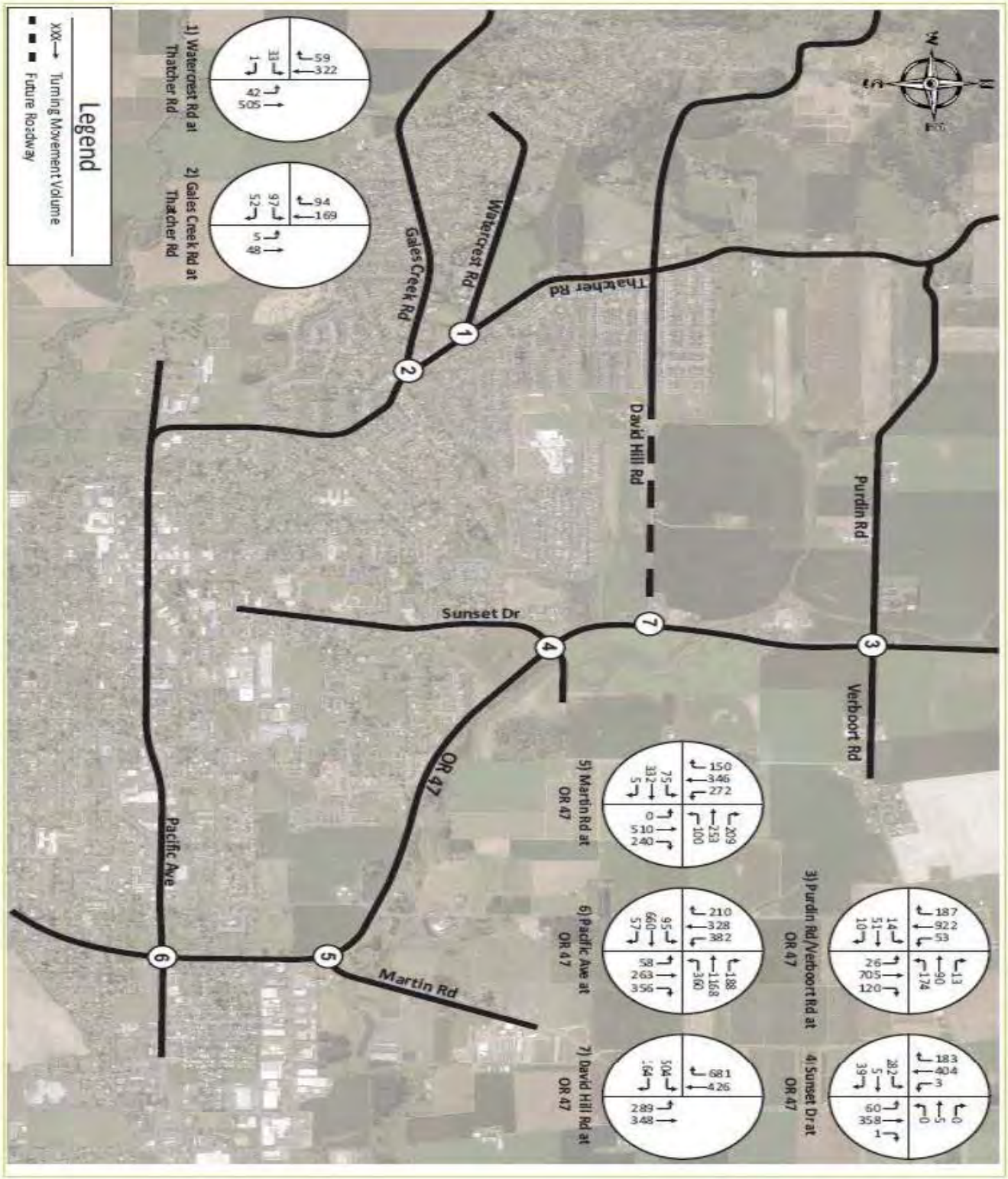
- Identification of Trip Distribution Patterns: Distribution of projected increased trips was developed through review of traffic patterns from several runs of the Metro regional transportation model. This analysis included new roadway connections included in the TSP. The analysis indicates that there is strong attractiveness from the Purdin Road planning area to and from the north and east linking Forest Grove with Hillsboro and Portland. Approximately 47 percent of new net trips are expected to travel in this direction. Approximately 25 percent of trips are expected to travel to the west and southwest and about 23 percent of trips are project to travel to the southeast. About five percent of trips are estimated to travel south. Highway 47 is an attractive route for these trips as is David Hill Road and Thatcher Roads.
- Preparation of Trip Assignment: Trips from the Westside planning areas were assigned to the street system consistent with the modeled distribution pattern.

The following roadway improvements were considered in developing the traffic forecasts for the Westside planning area. These improvements are identified in the Transportation System Plan.

- David Hill Road: The extension of David Hill Road to Highway 47. A single lane roundabout was assumed for this intersection.
- Vista Drive/Talisman Lane: The addition of the Vista Drive and Talisman Lane extensions between Gales Creek and Thatcher Roads are included in the analysis. With these improvements a significant volume of existing and projected future traffic would be diverted away from the Gales Creek Road and Thatcher Road intersection. Without these improvements it will be necessary to signalize or otherwise improve traffic operations at this intersection.
- Highway 47 at Verboort Road/Purdin Road: A single lane roundabout was included in the analysis. This improvement to the intersection and extension of David Hill Road are expected to draw some traffic away from the Highway 47/Martin Road intersection. Highway 47 at Martin Road: As noted in the Transportation System Plan, Martin Road expected to connect with a future roadway across Highway 47. This connection may reduce traffic volumes along Highway 47 but could worsen traffic operations at the intersection with Martin Road. This may result in the need for future intersection improvements that could include signalization.
- Main Street and B Street Extensions: The recommended street system for the Purdin Road planning area includes connections via Main Street and B Street. Extensions of these two streets are identified in the TSP between Hartford Drive and Martin Road and will be constructed as part of the Silverstone planned residential development.

2035 PM Peak Hour Turning Movement Projections

The figure below shows the 2035 PM peak hour turning movement projections for the Westside planning area.



2035 PM Peak Hour Operations Analysis Results

To assess the magnitude of traffic impacts associated with the Westside land use alternative a comparison was made with the 2035 PM peak hour traffic operations contained in the Transportation System Plan. These forecasts assume the roadway connections and improvements identified above.

The table below shows estimated 2035 PM Peak Hour Intersection Operations with TSP land uses and streets.

Figure 2 - 2035 PM Peak Hour Intersection Operations

(TSP Land Use and Streets)

No.	Intersection	Mobility Standard	Level of Service [1]	Average Delay (Sec)*	Volume / Capacity
	Unsignalized Intersections				
1	Thatcher Road/Watercrest Road	LOS E/0.99	A/C	17.2 [2]	0.09 [2]
2	Gales Creek Road/Thatcher Road	LOS E/0.99	A/B	11.6 [2]	0.24 [2]
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
5	Highway 47/Martin Road	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
	Signalized Intersections				
4	Highway 47/Sunset Drive	V/C=0.99	B	16.1	0.50
6	Pacific Avenue/Quince Street	V/C=0.99	D	53.4	0.97

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

As indicated in the table above, the Highway 47 at Purdin/Verboort Road and Highway 47 at Martin Road are expected to fail by 2035 during the PM peak hour.

The Oregon Transportation Planning Rule (TPR) requires coordination between land use plans and transportation plans. Under the TPR, when an amendment to a comprehensive plan is proposed a determination must be made by the local jurisdiction as to whether land uses allowed by the plan will significantly impact an existing transportation facility. Impact is measured at the end of the planning period identified in the adopted TSP. For Forest Grove this is 2035. Further discussion with ODOT is needed to address potential traffic impacts from the land uses in the Purdin Road planning area on the Highway 47 intersections with David Hill Road and Purdin Road since there will be a significant impact. The issue is whether this impact will occur before 2035 and if so how the impact will be mitigated (i.e. adding channelization to the roundabouts).

The table below shows projected intersection operations with mitigation measures. The table indicates the two roundabouts would meet be level of service and volume/capacity standards once the mitigation measures are implemented.

No.	Intersection	Mobility Standard	Level of Service [1]	Average Delay (Sec)*	Volume / Capacity
Analysis Based on TSP Traffic Volumes					
Without Roundabout (Unsignalized)					
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
With Proposed Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	**C**	**27.5**	**1.06**
7	Highway 47/David Hill Road	V/C=0.99	A	7.8	0.81
With Mitigated Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	A	9.3 [6]	0.89 [6]
Analysis Based on Westside Traffic Volumes					
With Proposed Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	**F**	**87.4** [5]	**1.34** [5]
7	Highway 47/David Hill Road	V/C=0.99	**F**	**91.4** [5]	**1.33** [5]
With Mitigated Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	B	12.4 [7]	0.92 [7]
7	Highway 47/David Hill Road	V/C=0.99	B	14.6 [8]	0.95 [8]

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

5 Pending single lane roundabout intersection improvements are assumed here.

6 Mitigation is addition of NB right-turn slip lane

7 Mitigation is addition of SB right-turn slip lane

8 Mitigation is addition of 2nd circulating lane to provide separate lanes for NB left-turn and NB through, as well as separate lane for SB right-turn.

Estimated Transportation Costs

The table below shows planning level cost estimates the street shown on the map above. More detailed information about the cost and methodology for preparing the estimates is provided in the appendix. As indicated in the table the total estimated cost for constructing the collector street system is approximately $37.7 Million. This amount does not include local street construction. All costs included in the table are expected to be private costs associated with providing access for development or traffic impact mitigation.

Identified Street Projects

No.	Road Name	Project Limits	Description	Estimated Cost
1	Road 1 (Vista Drive Ext.)	Watercrest Road to Thatcher Road	Construct new north-south 1,050 foot urban collector street	$1,000,300
2	Road 2	From Vista Drive Extension west 3,200 feet	Construct new east-west urban collector street	$4,246,000
3	Road 3 (Valley Crest Extension)	From terminus of Valley Crest Way north to Road 2	Construct new 600-foot urban collector street	$787,200
4	Road 4	David Hill Road north to Purdin Road	Construct new 4,700 foot urban collector street	$6,409,200
5	Road 5 (Plum Hill Improvement)	Existing Plum Hill Lane (privately-owned) to Road 4	Improve Plum Hill Lane to urban collector standards	$1,212,200
6	Road 6	David Hill Road to urban growth boundary	Construct new 2,300 foot urban collector street	$2,391,000
7	Road 7 (Brooke Street Extension)	Brooke Street to David Hill Road	Construct new 5,500 foot urban collector street	$4,766,200
8	Road 8 (B Street Extension)	David Hill Road to Brooke Street	Construct new 1,750 foot urban collector street	$1,583,700
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Full improvements to Council Creek crossing (short-term)	$1,454,000
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Half street reconstruction between David Hill Road to Purdin Road excluding Council Creek crossing (long-term)	$2,437,500
10	Road 10 (David Hill Improvement)	Thatcher Road to urban growth boundary	Full street reconstruction for 5,100 feet to urban collector street standards	$3,943,500
11	Improvement to David Hill Road/Highway 47 roundabout	David Hill Road/Highway 47 intersection	Addition of 2nd circulating lane to provide separate lanes for northbound left turn and northbound through traffic and separate lane for southbound right-turn	$2,500,000
12	Improvement to Purdin Road/Verboort Road/Highway 47 roundabout	Purdin Road/Verboort Road/Highway 47 intersection	Addition of northbound right-turn slip lane on the south leg of the roundabout and southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	$4,000,000
			TOTAL ESTIMATED COST	*$37,730,800*

Transportation Funding Options

The project team explored several options for funding the identified backbone/collector street network necessary to serve future development. Unlike other developable areas in City's planning area, the Westside area is devoid of any internal street system. Considering the topography of David Hill the collector street network presents engineering challenges which adds to project costs.

Although the new urban growth boundary area does not have the topographic considerations David Hill does there are challenges. The primary challenge is the traffic capacity of the two roundabouts on Highway 47 at David Hill Road and Purdin/Verboort Road. When the Forest Grove Transportation System Plan was adopted in 2014 it was not envisioned the area would be added to the urban growth boundary by the Legislature. The area was identified as an urban reserve and was anticipated to remain agricultural for at least the next fifty years. Traffic volumes contained in the TSP reflect this expectation. Since the area is now in the urban growth boundary and the City must assign urban Comprehensive Plan designations to the area traffic impacts must also be considered. Addressing traffic impacts associated with Comprehensive Plan amendments is a requirement of the Oregon Transportation Rule. Traffic associated with development in the new urban growth boundary area will significantly impact the roundabouts and degrade operations below acceptable levels as explained below. As such, the costs for improving the roundabouts to ensure acceptable operations must be considered as part of the adopting the Westside Refinement Plan. This includes identifying a potential source, such as a supplemental transportation system development charge, to fund the needed improvements. This is explored further below.

Adding a supplemental transportation system development charge to the current countywide Transportation Development Tax is one way to address transportation project costs. The amount of any supplemental transportation system development charge requires further evaluation based on a determination of total project costs, area of benefit, and estimated per unit charge. It is suggested that the funding strategy be evaluated further and include additional discussion with property owner and develop input prior to refinement and implementation. To guide this discussion and further evaluation several options for a supplemental transportation system development charge are identified below.

The current (FY 2016-2017) transportation system development tax (TDT) is $8,278 for single family detached homes and $5,425 for apartment units. The blended rate based on the estimated number of single family detached and attached units from the land use concept for the Westside area is $7,914 per unit. Based on dwelling unit yield of 1,950 units in the Westside area the total TDT revenue would amount to approximately $15.4 million. Since total estimated transportation costs for the collector street system identified above is approximately $37.7 million there is a revenue shortfall of about $22.3 million. Policy options for addressing this shortfall are described below.

Transportation Funding Policy Option 1:
(Area Wide TDT with All Projects Funded with TDT Revenue)

One policy option is to establish a supplemental TDT for the entire Westside Planning area. That is one rate for the entire area. Under this approach, a TDT amounting to $11,435 would be necessary to fill the funding gap for transportation projects in the Westside plan area. Adding the supplemental charge to the current TDT the total transportation fee would be $19,349 based on the blended rate.

This approach creates some equity issues since traffic impacts are not spread evenly throughout the planning area. For instance, development in the new urban growth boundary area north of David Hill Road requires improvement of the two Highway 47 roundabouts over time. In the David Hill area west of Thatcher Road improvement to David Hill Road and Thatcher Road is necessary as well as construction of a north-south collector street west of Thatcher Road. None of the improvements provide benefit to the new urban growth boundary area.

Transportation Funding Policy Option 2:
(Area Wide TDT with Some Projects Funded by Outside Sources:

The second policy option assumes that improvements to the Highway 47 roundabouts. David Hill Road west of Thatcher Road and Thatcher Road north of David Hill Road are all funded by outside sources. This reduces the total cost of TDT funded projects by approximately $15.3 million. If this approach is taken the supplemental TDT would be approximately $3,571 per dwelling unit. The total combined TDT would be $11,485. This amount is $7,864 less than Option 1.

Transportation Funding Policy Option 3:
(TDT Revenues and Project Costs Allocated by Subarea):

Policy option 3 looks at dividing transportation revenues and costs by project subarea. One project subarea is David Hill north of Watercrest and west of Thatcher Road. The other project subarea is the new urban growth boundary area north of David Hill Road between Highway 47 and Thatcher Road. This is explored further below.

Option 3A. David Hill Subarea: If 100% of TDT revenue generated in the David Hill Area is used to fund improvements west of Thatcher Road the supplemental system development charge would be approximately $22,860 for a total fee of $30,775. This fee could be prohibitive with result potentially being little development in the David Hill subarea. To mitigate some projects could be funded with outside sources. For example, if the Thatcher Road improvements are funded by an outside source the supplemental charge would be $11,459 and the total fee would be $19,374.

Option 3B. New Urban Growth Boundary Area: If 100% of the TDT revenue generated in the new urban growth boundary area is used to fund improvements in the new urban growth boundary area the supplemental charge would be approximately $3,883. The total fee would be approximately $11,797. If the Hwy 47 roundabout improvements were funded through an outside source there wouldn't be a need for a supplemental TDT. This is because TDT revenue based on development in the new urban growth boundary area would exceed the cost of transportation costs in the new urban growth boundary area by approximately $2.9 million.

The table below summarizes the identified policy options for consideration by the Planning Commission.

Transportation Development Tax Summary Table

Policy Option	Description	Current TDT Blended Rate	Supplemental TDT Required	Total TDT
1	Area Wide TDT – All Projects Funded With TDT	$7,914	$11,435	$19,349
2	Area Wide TDT – Some Projects Funded with Outside Sources	$7,914	$3,571	$11,485
3A	David Hill Subarea TDT	$7,914	$22,860	$30,775
	David Hill Subarea TDT – Thatcher Road Funded by Outside Source	$7,914	$11,459	$19,374
3B	New Urban Growth Boundary Subarea TDT	$7,914	$3,883	$11,797

One last thought on the policy of establishing a supplemental transportation system development charge. Washington County established supplemental transportation system development charges for the Bonny Slope and North Bethany areas. Due to concerns raised by homebuilders over the amount of the supplemental charge needed; the County adopted a policy to limit the supplemental charge to 95%of the current Transportation Development Tax. If this same policy applied to the Westside planning area the supplemental charge would be limited to $7,839. This amount is based applying the 95% factor to the blended TDT rate of $7,914. Under this approach only policy options 2 and 3B are viable since the amounts are lower than $7,839.

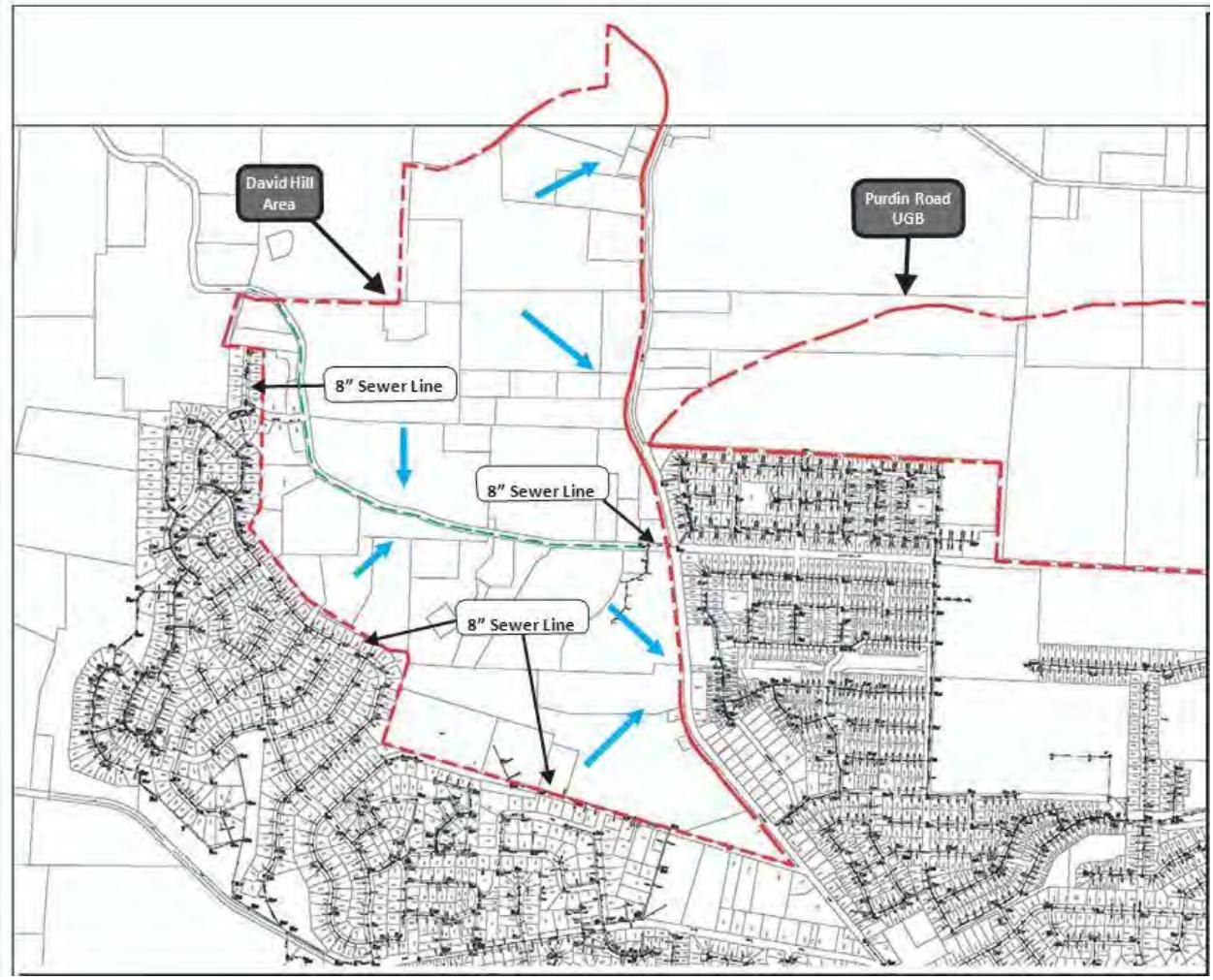
Chapter 9 – Sewer

Sanitary and storm services are provided by through a partnership between the City and Clean Water Services. Under the intergovernmental agreement the City is responsible for collection lines smaller than 21 inches in diameter as well as all manholes. Clean Water Services is responsible for the regional sewer system including large conveyance pipes and the waste water treatment plants. Anticipated revised agreements will lower the division of responsibility to lines 12-inches or less being the City's responsibility and larger lines being Clean Water Service's responsibility.

Long term investments to the sanitary sewer system are guided by the City's Wastewater System Master Plan and Clean Water Services Sewer Master Plan. The City's Wastewater System Master Plan was last updated in 2007. The Clean Water Services Sewer Master Plan Update was last updated in 2009.

David Hill Area

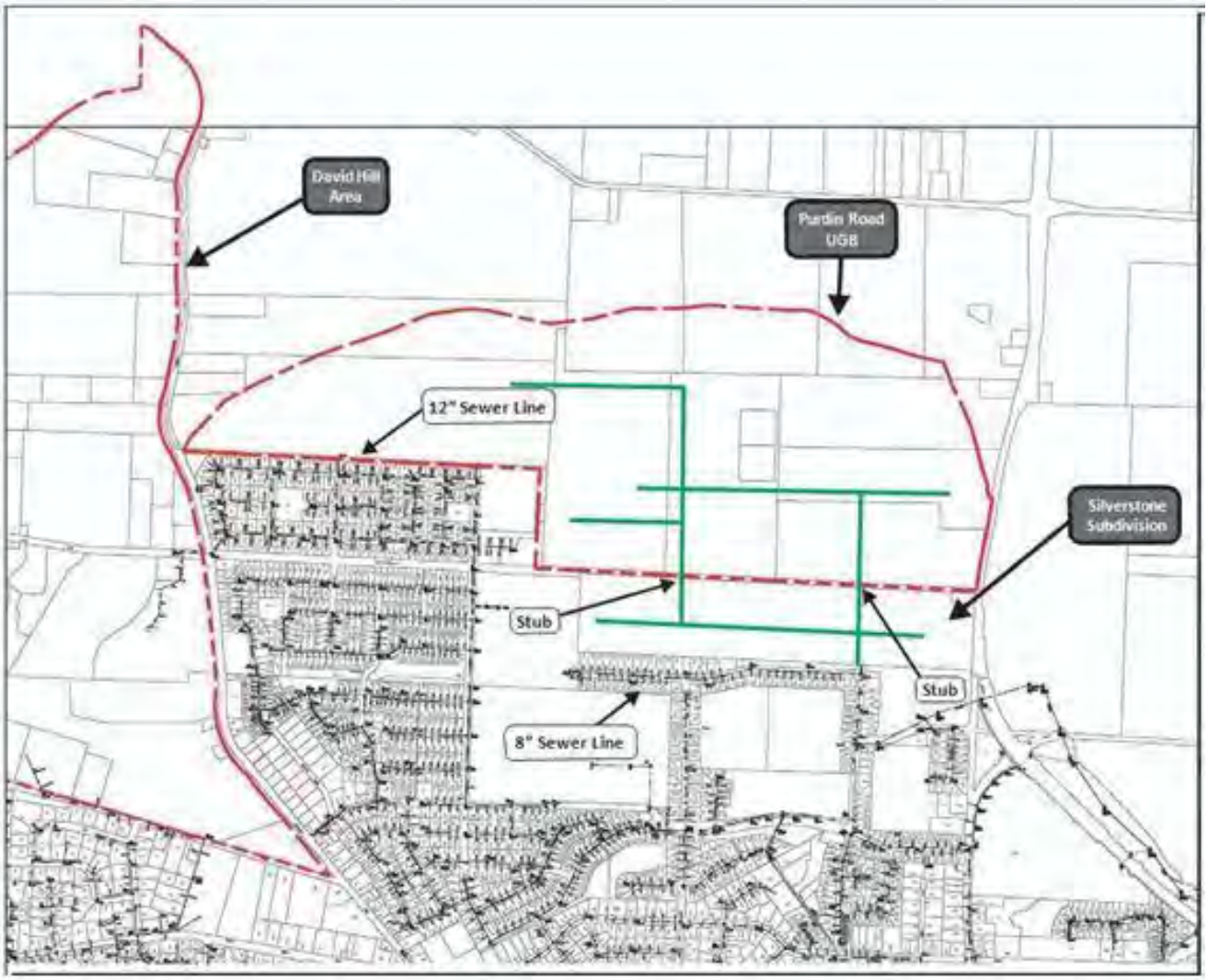
As the map below shows, the David Hill area is largely unserved by public sanitary sewer. There is an 8 inch sewer line located on David Hill Road west of Thatcher Road. This line extends approximately 200 feet west of Thatcher Road. There is a 12 incline from The Parks Development that terminates to a point on Thatcher Road approximately 550 feet north of David Hill Road.



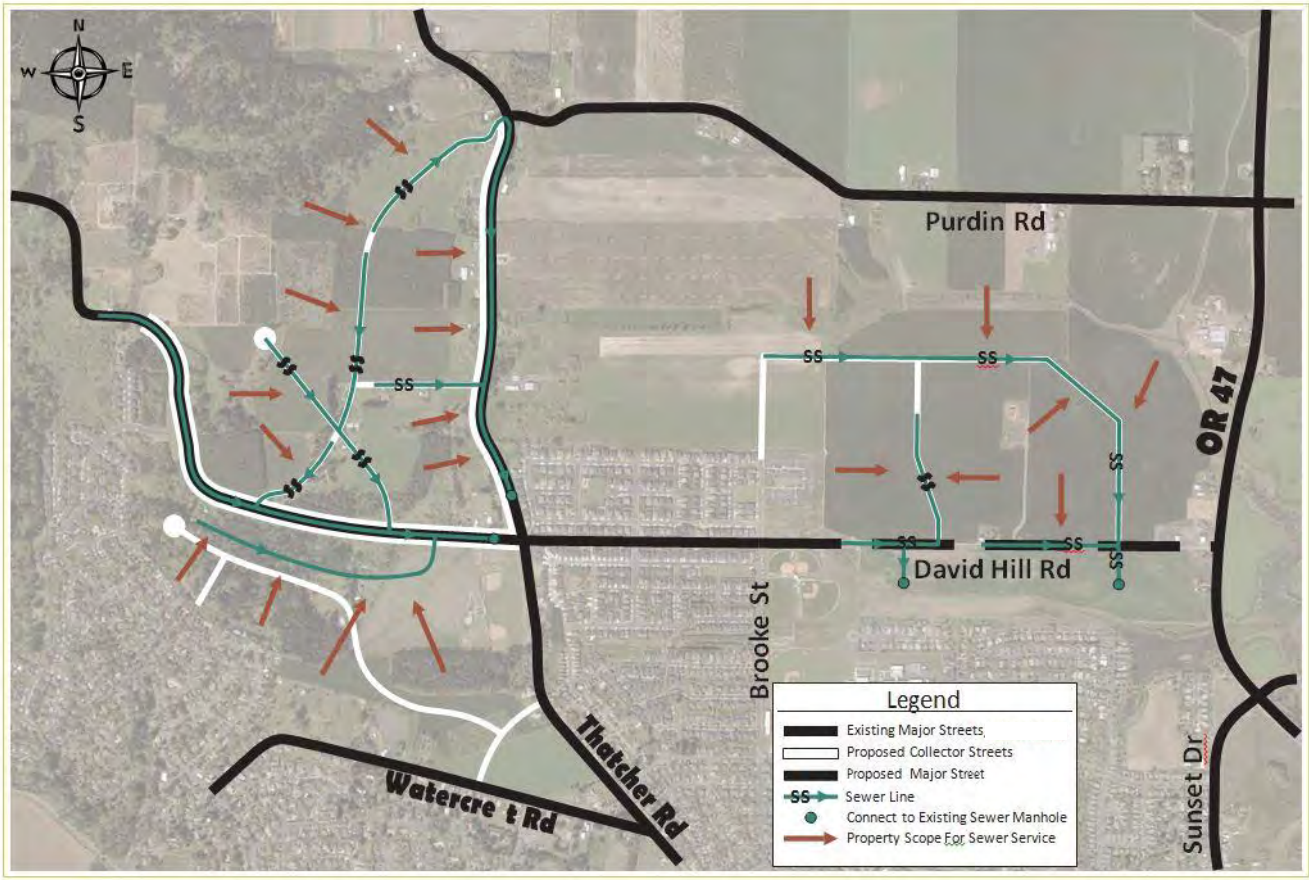
According to the Forest grove Sanitary Sewer Master Plan, it is expected that two trunk lines will serve development in the David Hill area. One line would be located on David Hill Road and the other line would be located Thatcher Road. Due to topography the line on David Hill Road should be constructed deep enough so that the collection system could be extended to the south below a small ravine. Both the David Hill and Thatcher trunk lines require a diameter of 12 inches.

Purdin Road Area

Since the Purdin Road area was added to the urban growth boundary in 2014 and all of the area is outside the city limits little consideration has been given to how this area could be served by the public sewer system. The Westside Plan helps overcome this issue. Recommendations for sanitary sewer lines needed to serve development are shown on the maps below. The maps only show the main sewer lines and not the lines needed to serve individual homes or development.



The maps below show the proposed conceptual sanitary and storm sewer systems to serve the David Hill and Purdin Road urban growth areas. The lines generally follow the street network for efficiency and to accommodate gravity flows.

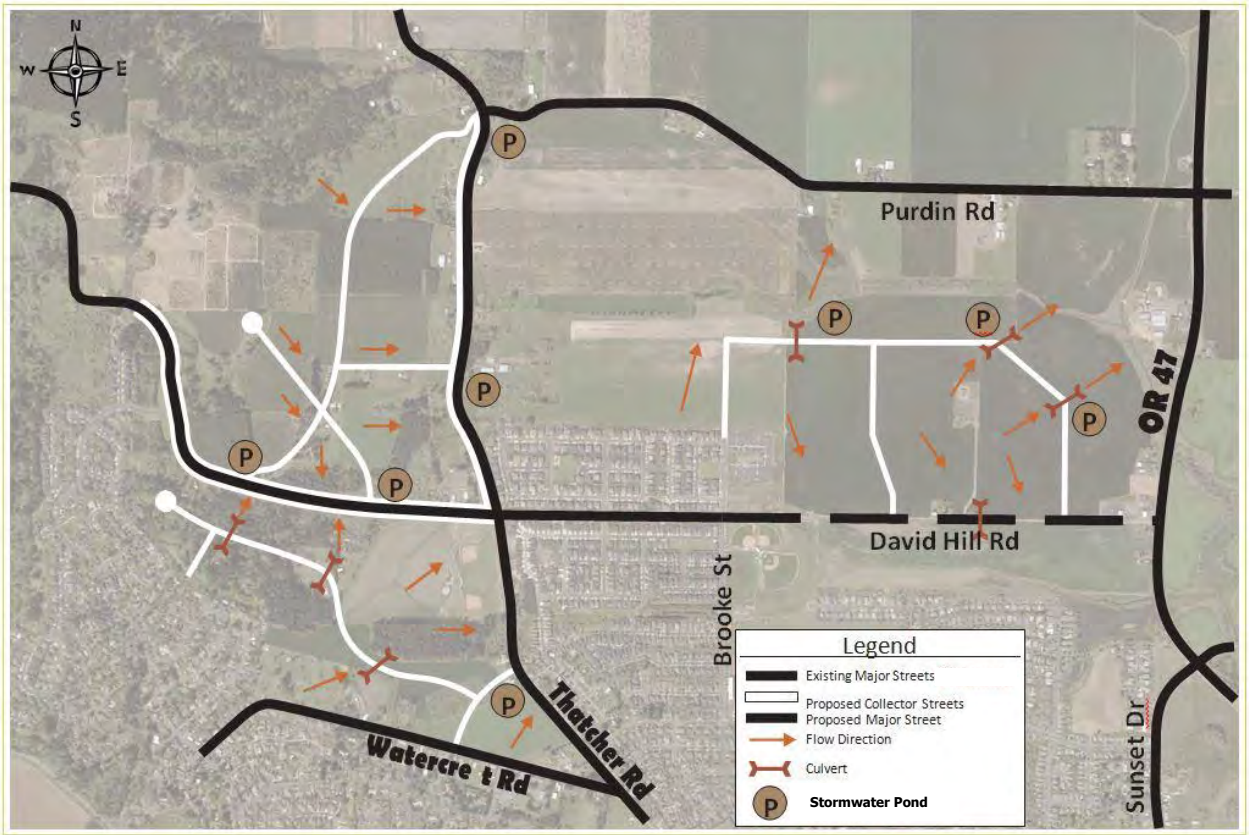


SCJ ALLIANCE
CONSULTING SERVICES

Sewer Utilities

Westside Planning Project
Forest Grove, OR

The following map shows improvements necessary to accommodate storm water drainage needed for the collector roadway system. The map also shows the general direction for storm water flows. The map does not show storm water/drainage improvements needed for individual developments. Improvements needed for individual developments will be considered during the development review process based on Clean Water Services standards and design guidelines.



SCJ ALLIANCE
CONSULTING SERVICES

Stormwater Utilities

Westside Planning Project
Forest Grove, OR

The table below shows the estimated costs for constructing the necessary sanitary sewer system. Total costs are approximately $3.6 Million including contingencies and engineering costs.

Sanitary Sewer Estimated Costs

No.	Segment	Estimated Cost
1	Road 1, 2, 3 Sewer Line	$225,000
4	Road 4 Sewer Line	$300,000
5	Road 5 Sewer Line	$82,500
6	Road 6 Sewer Line	$165,000
7	Road 7 Sewer Line (10″)	$405,000
8	Road 8 Sewer Line (10″)	$255,000
9	Road 9 Sewer Line	$262,500
10	Road 10 Sewer Line (700 LF 12″)	$382,500
	Contingencies and Engineering	$1,558,100
	Totals	*$3,561,350*

The table below shows estimated costs to construct the storm sewer/drainage system. Total estimated cost is $1,575,000.

Storm Sewer Estimated Costs

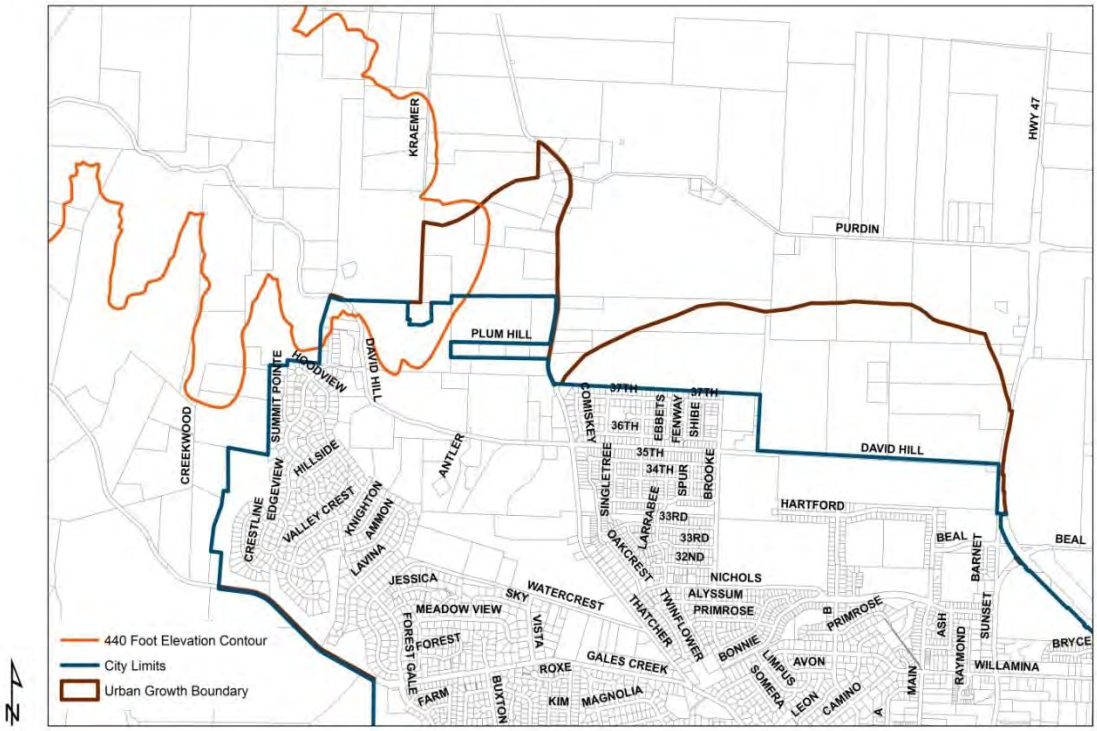
No.	Segment	Estimated Cost
1	Road 1, 2,3 Storm Pond	$75,000
2	Road 4 Storm Pond	$75,000
3	Road 5 and 9 Storm Pond	$100,000
4	Road 6 and 10 Storm Pond	$150,000
5	Road 7 Storm Pond	$200,000
6	Road 8 Storm Pond	$50,000
7	Road 1, 2 3 Stormwater	$35,000
8	Road 4 Stormwater Treatment	$35,000
9	Road 5 and 9 Stormwater	$70,000
10	Road 6 and 10 Stormwater	$70,000
11	Road 7 Stormwater Treatment	$20,000
12	Road 8 Stormwater Treatment	$20,000
	Contingencies and Engineering	$675,000
	Totals	*$1,575,000*

Chapter 10 – Water

The first public water system serving Forest Grove was built circa 1908. A water intake was constructed on Clear Creek, a tributary of Gales Creek. A transmission line was constructed using ten-inch logs with a hole bored in the center. Water was conveyed from the water intake to the present site of the water treatment facility.

In addition to Clear Creek, Forest Grove has water rights from Gales Creek, Roaring Creek, the Tualatin River, Hagg Lake and stored water at Barney Reservoir. In 1976 Forest Grove and Hillsboro formed the Joint Water Commission (JWC) to address growing water needs. Members of the Joint Water Commission now include Forest Grove, Hillsboro, Beaverton and the Tualatin Valley Water District. The JWC now provides potable water supply for approximately 50% of the City's water needs on an annual volume basis. Most of the JWC supply is used during the peak water demand season from May through September.

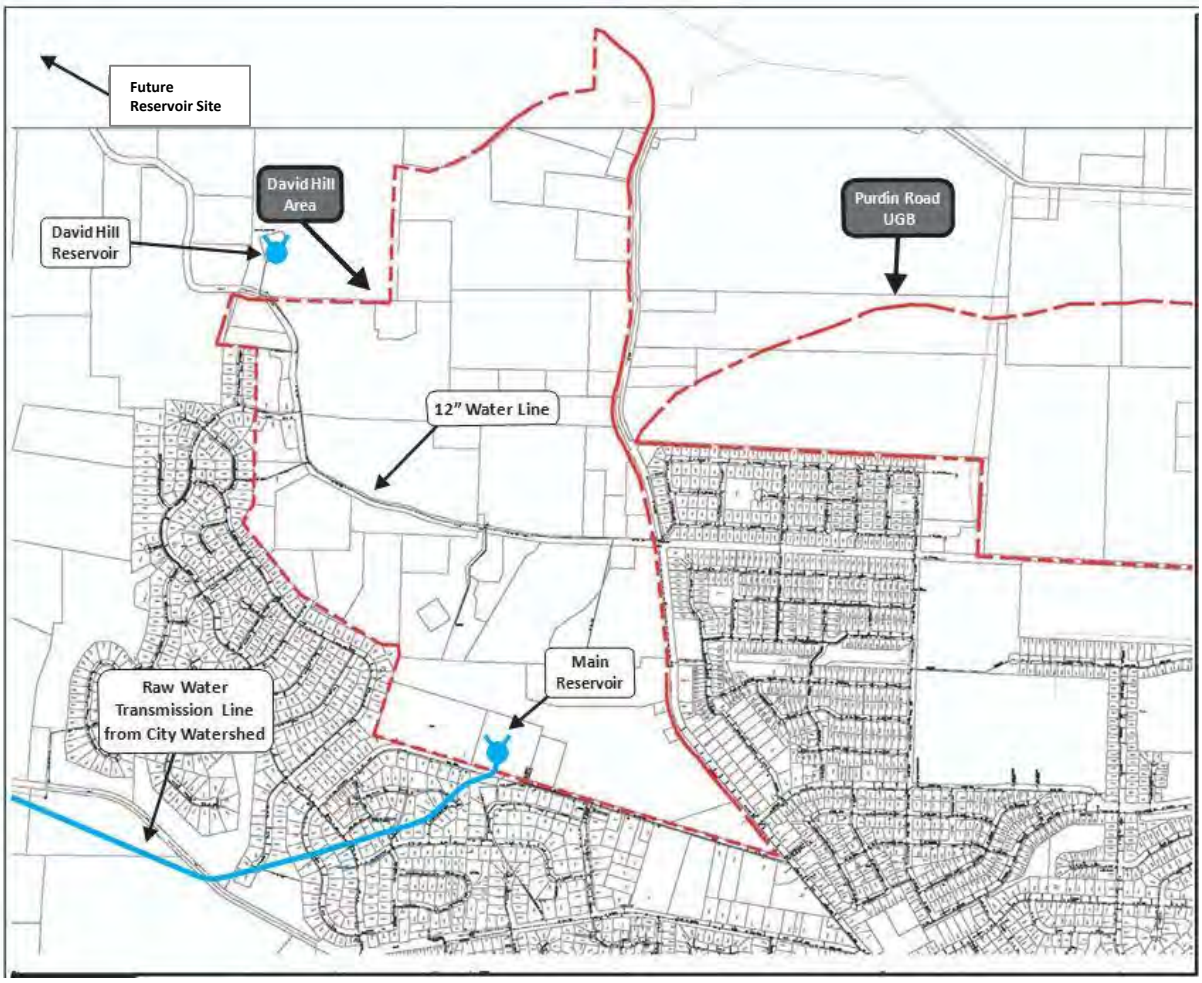
Currently, the David Hill area is served by a 12-inch water line running along David Hill Road. Most residents in the area, however, rely on well water. Based on a review of the Water Master Plan several factors are present that could affect development in the David Hill area. One factor is the existing water system cannot supply water above an elevation 440 feet above sea level (shown as the orange line on the map below) with adequate pressure.



To address this issue the Water Master Plan includes as a project installation of a new reservoir that will provide water with adequate pressure above the 440 elevation.

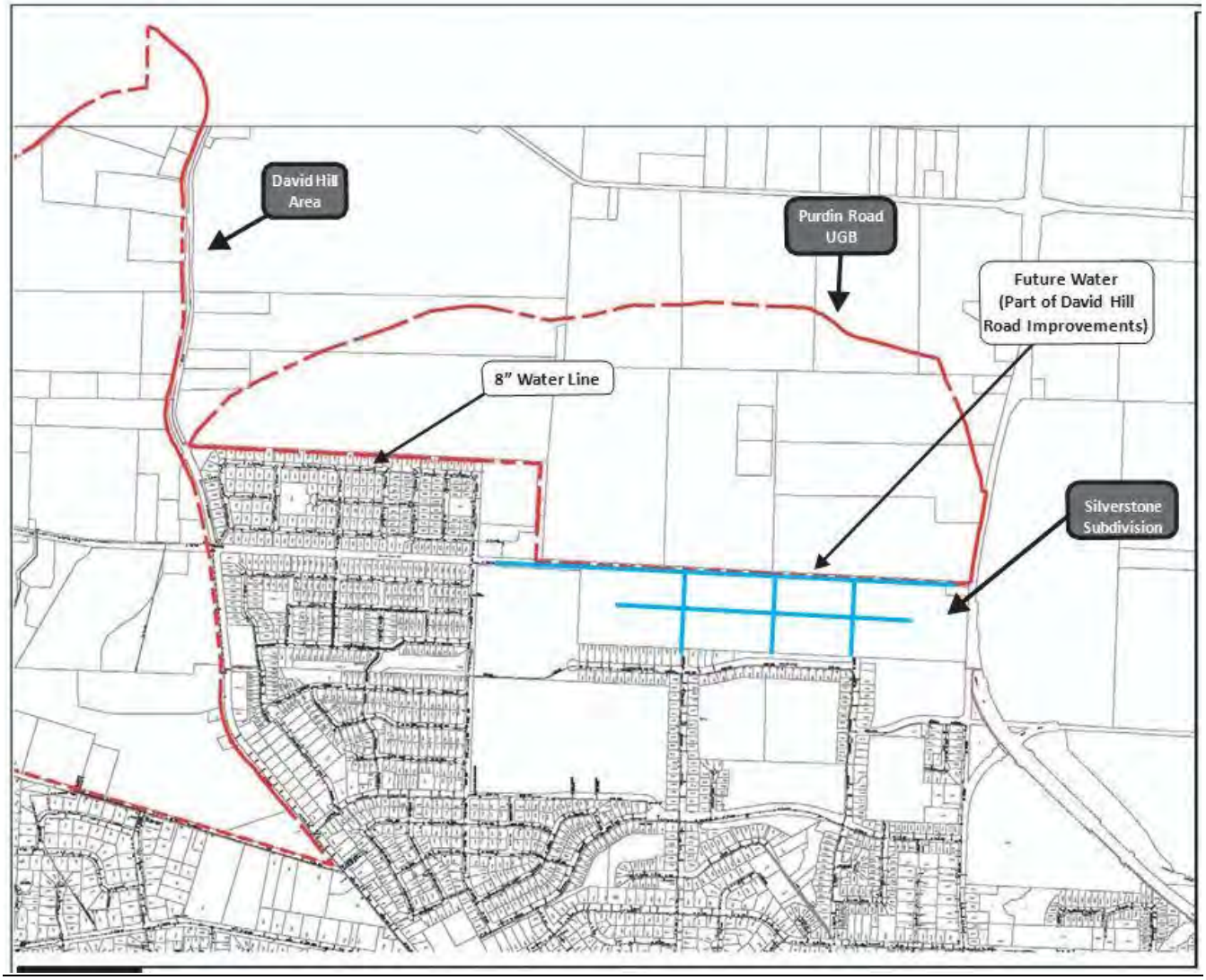
The Water Master Plan recommends building new storage at an elevation higher than the current reservoir to serve the David Hill urban growth boundary and urban reserve areas area. A reservoir elevation of approximately 690 feet above sea level is identified. The Water Master

Plan also includes a 12-inch water line extending from the existing line along David Road through the planning area.



According to the Water Master Plan water storage serving the Purdin Road UGB area includes 4.27 million gallons at the City's water treatment plant and 2.8 million from the Joint Water Commission facility.

The map below shows water mains for the Silverstone subdivision located south of David Hill and west of Thatcher Road. The lines shown in the approximate location of the B Street and Main Street extensions could be extended further to serve the Purdin Road area.



Based on review of Water Master Plan and the consultant team analysis with input from the City's Engineering Division additional water service capacity is needed to serve the Westside area. The needs are primarily based on providing adequate water pressure above the 440 foot contour elevation, meeting fire flow requirements, and cumulative future City-wide needs.

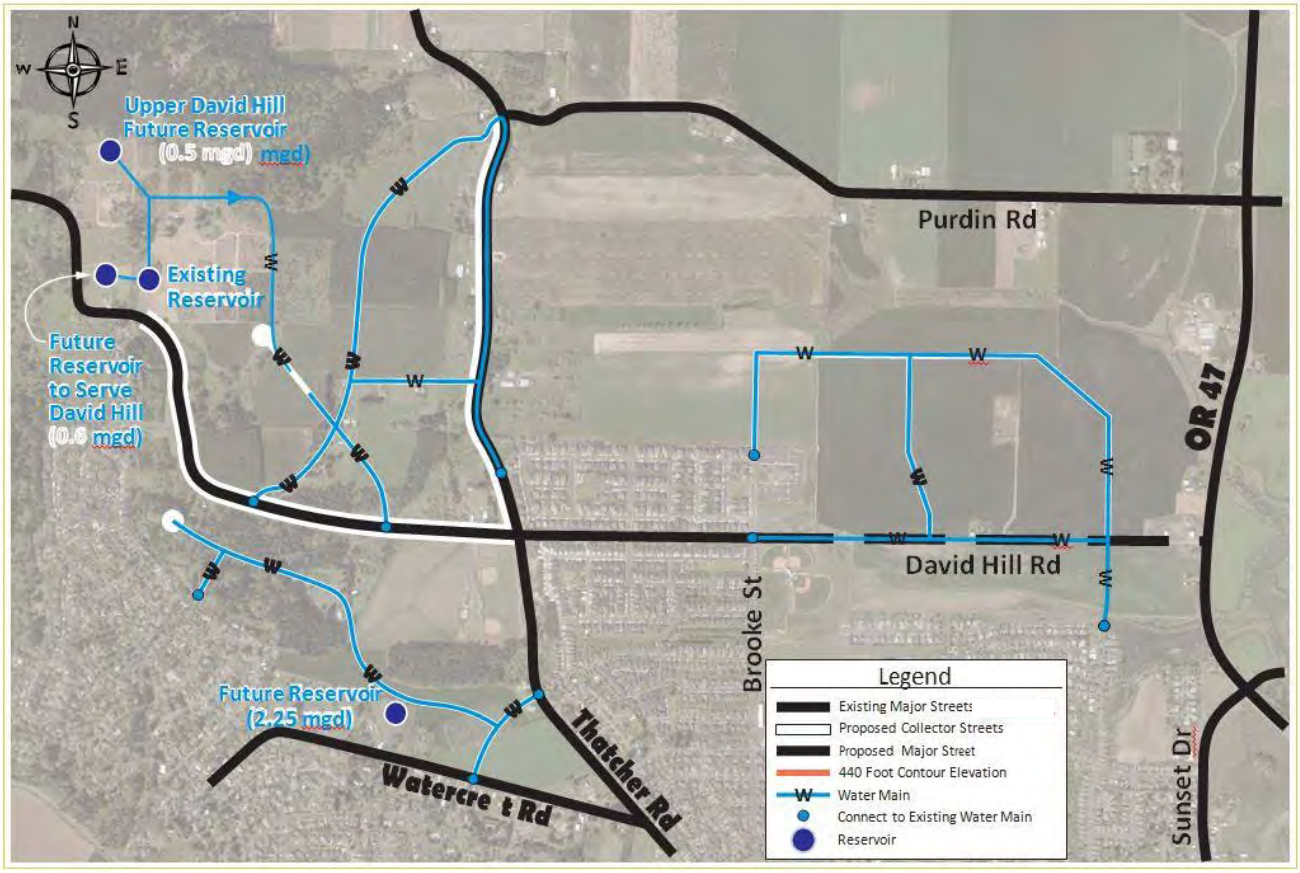
To address the needs described above, the following reservoirs have been identified:

- One 0.5 Million gallon reservoir for the David Hill urban growth boundary area between the 440 and 615 foot elevation;
- One 0.5 Million gallon reservoir for the David Hill urban reserve area between the 190 to 615 foot elevation;
- Two 0.3 Million gallon reservoirs for the David Hill urban growth boundary area between 250 to 440 foot elevation based on the current Water Master Plan. If the 0.5 Million gallon reservoir for the urban growth boundary is expanded to 0.6 Million gallons the two 0.3 Million gallon reservoirs would not be necessary; and
- One 2.25 Million gallon reservoir at the current water treatment plant to serve City-wide needs.

Reservoir needs could be modified when the Water Master Plan is updated. The next update is anticipated in 2018. For example, the construction of 1.0 Million gallon reservoir to serve both

the urban growth boundary and urban reserve areas could be constructed rather than the two 0.5 Million gallon reservoirs. However, other issues such as water turnover need to be evaluated as part of the Master Plan update.

The map below shows the conceptual water system proposed for the Westside area.



SCJ ALLIANCE
CONSULTING SERVICES

Water Utilities

Westside Planning Project
Forest Grove, OR

The table below shows estimated costs to construct the recommended water system need to serve the Westside area.

Water System Estimated Costs

No.	Description	Linear Feet	Total Estimated Cost	Estimated Cost Attributable to Westside Planning Area	Area of Benefit
1	Road 1 water main	1,050	$63,000	$63,000	David Hill
2	Road 2 water main	3,200	$192,000	$192,000	David Hill
3	Road 3 water main	600	$36,000	$36,000	David Hill
4	Road 4 water main	4,700	$282,000	$282,000	David Hill
5	Road 5 water main	1,250	$75,000	$75,000	David Hill
6	Road 6 water main	2,300	$138,000	$138,000	David Hill
7	Road 7 water main	5,500	$330,000	$330,000	Purdin Road
8	Road 8 water main	1,750	$105,000	$105,000	Purdin Road
9	Road 9 water main	3,500	$525,000	$525,000	David Hill
10	One 0.5 MG reservoir (1)	EA	$4,182,500	$875,000	David Hill
11	Two 0.3 MG reservoir	EA	$2,910,448	$1,950,000	Entire Area
12	One 2.25 MG reservoir near Watercrest	EA	$2,956,522	$680,000	Entire Area
	Contingencies and Engineering		$5,709,728	$3,282,000	Entire Area
	TOTAL		*$17,505,198*	*$8,533,000*	

(1) One reservoir expected to be used by development within David Hill from 440 to 615 feet in elevation and portions of the David Hill Urban Reserve Area between 190 and 615 feet. An additional reservoir is expected to serve the remainder of the David Hill Urban Reserve Area between 190 and 615 feet which is included herein to account for the share costs of land acquisition, piping, pressure reducing valves and a pump station. Approximately $500,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R-10 zoning. If there is a reduction in density permitted in this area to SR (1 du/acre), approximately $120,000 or 2.5% of the total cost of the reservoirs would be attributable to serving the David Hill area above 440 feet which would include an estimated 24 dwelling units.

Chapter 11 – Other City Services

Forest Grove is a full service city providing police, fire and rescue services, parks and recreation, light and power, water and sewer services in partnership with Clean Water Services. In addition, the City provides building permitting and planning services. Library services are provided through a partnership between the City and Washington County Cooperative Library Services (WCCLS).

City services are funded through a variety of sources including property taxes, fees such as system development charges for infrastructure, and intergovernmental revenues from the federal, state, regional and county levels of government.

The City's total tax rate is $5.56 per $1,000 of taxable assessed value consisting of $3.96 for the City's permanent rate and $1.60 for the local option levy passed by the voters in 2012. The local option levy is set to expire in 2018.

The City's total proposed budget for 2016 for all activities is $98.25 million. This amount includes ending cash balances and contingencies. General Fund resources total approximately $17.06 million.

As exemplified by the City Council's FY 2016-2017 goals, the City of Forest Grove is committed to promoting a prudent financial plan to maintain effective service levels of a full-service city. The adopted budget for Fiscal Year 2016-2017 allows the City to maintain and enhance services as a full-service City. Over the course of the upcoming year the community is expected to begin a discussion on what it means to be a full-service city. This includes identifying the community standards and expectations for "full-service" and assessing potential implications on future City budgets.

Fire Service

Currently, a one acre parcel has been reserved for a fire station at Thatcher Park. The Fire Department indicates the site is poorly located and there is a need for a two-acre fire station and training area near Highway 47 and David Hill. The rational for this location includes:

1. This location provides better coverage for a primary response area for current and future development in Forest Grove.

2. Secondary response to simultaneous calls is a critical consideration. The proposed location is ideally suited to provide that secondary response – the Thatcher Park location is the worst location for this consideration according to the Fire Department.

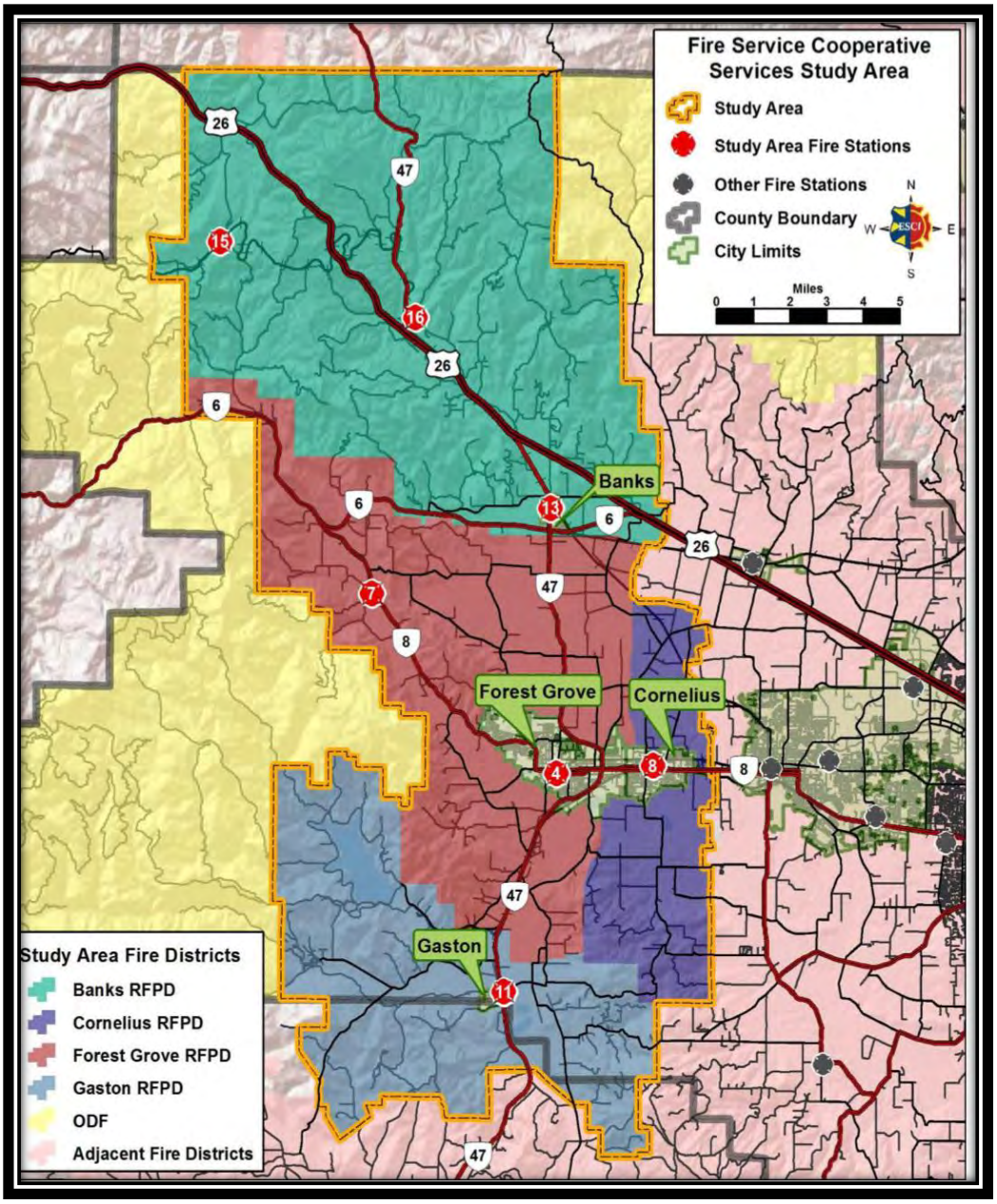
3. Response to fires requires not just to dispatch the closest unit, but to assemble an effective response force in a minimal amount of time. The Thatcher Park location is a poor location for this criterion.

4. The proposed location provides better coverage for the north end of our Rural Fire District.

5. In consideration of future fire service consolidation planning, which is supported by the recent Cooperative Fire Services Study, the proposed location will provide better coverage, operational, and logistical response for all of the proposed models.

6. The Thatcher Park location is inadequately sized for fire station needs, and is situated at a low-visibility intersection. There is a need a two-acre lot to accommodate training areas for this new station – Station 4 training area is severely limited currently.

7. The Thatcher Park location is currently being utilized as a dog park, which is a highly utilized and popular parks resource.



Chapter 12 – Funding Approach

Identifying road, water, sewer and other service needs required for development tells only a limited part of the story. Other parts include the cost of required services, how the services are paid for, who pays for the services and timing. This chapter of the Westside Plan charts a course of action for addressing these considerations.

SCJ Alliance partnered with FCS Group to prepare a funding approach that identifies ways to foster development in the Westside Planning Area based on the land use and infrastructure concepts described in the Westside Plan. This approach includes a funding framework, including tools and techniques commonly used in Oregon, identification of planning level capital costs for public facilities required to serve the Westside Planning Area, Funding evaluation and recommendations and overview of market considerations. Each of these elements are described in more detail below.

Funding Framework

When capital improvements are funded or financed by municipalities, service providers, or through development agreements funding options in Washington County generally include:

- System Development Charge (SDC);
- Transportation Development Tax (TDT);
- Utility Fee;
- Local Option Levy;
- Local Improvement District (LID);
- Reimbursement District;
- Tax Increment Financing (Urban Renewal District);
- Debt Financing; and
- Public Improvement Agreements

A general overview of these tools is provided below.

System Development Charge (SDC)

State law allows for establishment of system development charges, a one-time fee, on new development paid at the time of building permit issuance. SDCs are charged to recover a fair share of the cost of capital improvements, including the cost of existing and planned facilities that provide capacity to serve future growth.

Under state law SDCs may be used for the following capital improvements:

- Water supply, treatment, and distribution;
- Waste water collection, transmission, treatment, and disposal;
- Drainage and flood control;
- Transportation; and
- Parks and recreation

Transportation Development Tax (TDT)

The Transportation Development Tax is a county-wide tax consistent with state SDC law. The TDT was approved by County voters in 2008 and is imposed on all development within the County. The City may use TDT collections on transportation projects included on the adopted TDT project list including projects that add roadway capacity.

Utility Fees

Utility fees are paid by customers within a service area and are usually included on utility billing statements. The City of Forest Grove charges utility fees for sewer, water and electrical service. Utility fees are commonly used to help pay for required infrastructure facilities and operations.

Local Option Levy

A local option levy is a tax on property to fund capital improvements or operations. A capital levy is valid for ten years whereas an operations levy is valid for five years. A local option levy must be approved by voters. The City currently has a local option levy for operations.

Local Improvement District (LID)

The local improvement district is a common tool used by municipalities in Oregon for capital improvement projects benefitting specific property. The LID is a special assessment on property typically payable in annual installments for up to 30 years. LIDs are generally used for capital improvement projects that benefit property owners over a certain identifiable area.

Reimbursement District

A reimbursement district is similar to the LID described above. A reimbursement district is used when a specific party such as a municipality or developer agrees to pay for capital improvements up front ahead of development within a geographic area. The party that advances the funds is partially reimbursed was development occurs usually over a fifteen year period.

Tax Increment Financing (Urban Renewal District)

Tax increment financing is a tool used throughout Oregon to pay for projects intended to revitalize a specific area of a community. Tax increment financing is often used to repay public indebtedness used to finance capital improvements such as roads, water lines or sewer lines. The term tax increment comes from the way tax revenue is distributed to an urban renewal agency based on changes to taxable property value of property within an urban renewal district after the district is established.

Public Debt Financing

Public debt financing is a common method of financing the construction of roads, stormwater facilities, water and sewer lines, and parks. An example of public debt financing is the General Obligation or GO bond. Property tax collections are used to repay the bonds over time typically 20 or 30 years. GO bonds require voter approval. Other types of bonds including revenue and full faith and credit bonds, described below, do not.

Revenue bonds require an ongoing source of revenue pledged to payment of debt service. A utility fee, local option levy or LID payments could serve this purpose.

Full faith and credit bonds are a hybrid of GO and revenue bonds. Full faith and credit bonds called that because they are an unsecured claim on all the revenue streams of a municipality without the pledge of any particular revenue stream. Full faith and credit bonds do not require voter approval.

Public Improvement Agreements

Public Improvement Agreements are used when a developer is required by the City to construct public facilities to City standard as a condition of development approval. The Public Improvement Agreement provides assurances to the parties that regulations affecting construction of the improvements will not change during the term of agreement.

Estimated Capital Costs

A key objective of the Westside Plan is the identification of collector roads, sewer and water trunk lines, pump stations, and stormwater facilities needed to serve the land use concept. This section summarizes estimated conceptual, planning level cost estimates for these facilities. Additional detailed information is provided in the Westside Planning Area Funding Approach report dated December 2016 and included as an appendix to this plan.

The table below shows total estimated project costs by facility type. Total costs amount to approximately $47.6 Million in 2016 dollars. Of this amount, costs for constructing the collector street system amounts to $30.2 Million or about 64% of total infrastructure costs. Water facilities represent the second largest cost item at approximately $8.5 million. Sanitary sewer costs are estimated at $3.6 Million. Stormwater improvements are estimated to cost $1.6 Million. A neighborhood park identified to serve the Purdin Road urban growth area is estimated to cost approximately $3.6 Million.

Westside Planning Area Infrastructure Cost Assumptions

Facility Type	Estimated Cost	Percentage
Collector Streets	$37.7 Million	68.5%
Water System	$8.5 Million	15.5%
Sanitary Sewer System	$3.6 Million	6.5%
Stormwater System[4]	$1.6 Million	2.9%
Park	$3.6 Million	6.5%
Total	*$55.0*	*100%*

[4] Associated with collector street system

Funding Evaluation

Funding options were evaluated for each facility type as part of preparing the Westside Plan. This evaluation provided an assessment of the potential for implementing the recommended funding approach. The assessment included consideration of the following criteria:

- Equity;
- Reliability of Funds;
- Market Acceptance;
- Ease of Implementation; or
- Ability to Address Costs

Each of criterion is described in more detail below.

Equity

Equity is defined to mean distributing risks and costs among different groups in an evenhanded manner. For purposes of the Westside Plan equity was evaluated based on distributing costs for infrastructure among existing City residents, future Westside Planning Area residents, current property owners, and future developers.

Reliability of Funds

Reliability of funds is an important consideration for funding infrastructure especially if debt financing is used. Funding sources such as system development charges and reimbursement districts do not provide a predictable revenue stream because revenue from these sources is contingent on when and how much development occurs. In contrast, revenue bonds secured by property taxes and local improvement districts tend to be far more reliable and less risky to the agency that takes on the debt.

Market Acceptance

Timing and responsibility for provision of adequate public facilities is a significant determinant influencing when private development occurs. Over reliance on developers to fund needed public facilities upfront may drive up development costs to a level that exceeds supportable market prices. In contrast, if the City funds needed infrastructure upfront using only system development charges the City is unlikely to invest in these facilities until adequate capital reserves are established which could delay development.

Ease of Implementation

This criteria refers to adopting and administering the funding approach. Funding sources such as utility fees and system development charges do not require approval at an election to enact which adds cost and time to the implementation effort. Other funding sources such as reimbursement districts require ongoing monitoring which increases administrative costs.

Ability to Address Costs

The recommended funding approach must provide sufficient revenue to fund needed infrastructure improvements required by expected development based on the adopted land use plan. The funding approach must also provide adequate short-term and long-term funding for infrastructure needs.

Recommended Funding Approach

The recommended funding approach is described below. The recommended approach takes into account the recommended land use plan, identified infrastructure needs, and the evaluation criteria identified above.

Transportation

The City of Forest Grove currently collects the Washington County transportation development tax (TDT) for each new residential dwelling constructed. The current TDT is $8,278 for each new single family unit and $5,415 for each new multifamily unit. The blended rate based on the land use concept for the Westside area is $7,914. Based on projected development in the Westside Planning area it is estimated the TDT will generate approximately $15.4 Million. Of this amount the City retains 100% of the revenue for transportation projects in the City identified on the TDT project list.

Total cost for the collector roadway system necessary for the Westside planning area is estimated at $37.7 Million. System development charge revenue is expected to generate approximately $16.3 million in revenue based on the current fee. This results in a revenue shortfall of approximately $22.3 million. Furthermore, system development charge revue would not be available to fund the short-term improvements such as for Thatcher Road to serve development. Policy options for addressing this shortfall are described below.

<u>Transportation Funding Policy Option 1 (Area Wide TDT with All Projects Funded with TDT Revenue)</u>

One policy option is to establish a supplemental TDT for the entire Westside Planning area. Under this approach a TDT amounting to $11,435 is necessary to fill the funding gap. The total TDT would then become $19,349 based on the blended rate.

This approach creates some equity issues since traffic impacts are not spread evenly throughout the planning area. For instance, development in the new urban growth boundary area north of David Hill Road requires improvement of the two Highway 47 roundabouts over time. In the David Hill area west of Thatcher Road improvement to David Hill Road and Thatcher Road is necessary as well as construction of a north-south collector street west of Thatcher Road. None of the improvements provide benefit to the new urban growth boundary area.

<u>Transportation Funding Policy Option 2 (Area Wide TDT with Some Projects Funded by Outside Sources:</u>

The second policy option assumes that improvements to the Highway 47 roundabouts. David Hill Road west of Thatcher Road and Thatcher Road north of David Hill Road are all funded by outside sources. This reduces the total cost of TDT funded projects by approximately $15.3

million. If this approach is taken the supplemental TDT would be approximately $3,571 per dwelling unit. The total combined TDT would be $11,485. This is $7,864 less than Option 1.

Transportation Funding Policy Option 3 (TDT Revenues and Project Costs Allocated by Subarea):

Policy option 3 looks at dividing TDT revenues and costs by project subareas. One project subarea is David Hill north of Watercrest and west of Thatcher Road. The other project subarea is the new urban growth boundary area north of David Hill Road between Highway 47 and Thatcher Road.

Option 3A. David Hill SDC: If 100% of TDT revenue generated in the David Hill Area is used to fund improvements west of Thatcher Road the supplemental TDT would be approximately $22,860 for a total TDT of $30,775. If the Thatcher Road improvements are funded by an outside source the supplemental TDT would be $11,459 and the total TDT would be $19,374

Option 3B. New Urban Growth Boundary Area TDT: If 100% of the TDT revenue generated in the new urban growth boundary area is used to fund improvements in the new urban growth boundary area the supplemental TDT would be approximately $3,883. The total TDT would be approximately $11,797. If the Hwy 47 roundabout improvements were funded through an outside source there wouldn't be a need for a supplemental TDT. This is because TDT revenue based on development in the new urban growth boundary area would exceed the cost of transportation costs in the new urban growth boundary area by approximately $2.9 million.

Transportation Development Tax Summary Table

Policy Option	Description	Current TDT Blended Rate	Supplemental TDT Required	Total TDT
1	Area Wide TDT – All Projects Funded With TDT	$7,914	$11,435	$19,349
2	Area Wide TDT – Some Projects Funded with Outside Sources	$7,914	$3,571	$11,485
3A	David Hill Subarea TDT	$7,914	$22,860	$30,775
	David Hill Subarea TDT – Thatcher Road Funded by Outside Source	$7,914	$11,459	$19,374
3B	New Urban Growth Boundary Subarea TDT	$7,914	$3,883	$11,797

To fund short term transportation needs (i.e. funding improvements to Thatcher Road) creation of a local improvement district is an option. Under this approach benefitting property owners would be assessed for the cost of the improvement. The estimated assessment would be approximately $7,456 per acre or $2,000 per allowable dwelling unit assuming 90% absorption over 20 years resulting in approximately 771 new dwelling units. Benefitting property owners could finance local improvement district assessments over a 10 year (or longer) time frame.

Water System

The City of Forest Grove currently collects a water system development charge of $5,478 for each new residential dwelling constructed. Based on projected development within the Westside Planning area it is expected the water system development charge will generate approximately $11.3 Million. Of this amount the City retains 100% of the revenue.

To total estimated water infrastructure cost for projects necessary to serve future development within the City and accommodate Westside Planning Area development is $23.5 Million of which $8.5 Million is required for the Westside Planning Area. A new 500,000 gallon water reservoir, above the current David Hill reservoir elevation, is necessary to serve future development in the Planning Area. This project is needed in the short term to ensure adequate capacity for water supply including meeting daily demand, fire, and emergency needs. This improvement is needed in the short term and is estimated to cost approximately $4.2 Million. According to engineering estimates, approximately 10.4% of the cost of the new reservoir could be attributed to meeting needs of the David Hill area above the 440 foot elevation where inadequate water pressure exists for development.

The recommended funding approach for long term water infrastructure is to use a portion of the water system development charge (up to 76%) collected in the Westside Planning Area for capital improvement needs in the area. No supplemental system development charge is needed nor recommended.

For short term capital needs (i.e. constructing a new 500,000 gallon reservoir) it is recommended the City issue revenue bonds backed by water rates or a new General Obligation bond to fund such needs. Voter approval is required for a General Obligation bond.

Sanitary Sewer System

The City of Forest Grove currently collects a sanitary sewer system development charge (SDC) of $5,300 for each new residential dwelling constructed. Clean Water Services sets the amount of the SDC. Of the amount collected the City retains $212 per unit. The sanitary sewer system development charge could generate approximately $435,000 based on expected development in the Westside Planning area. Clean Water Services uses SDC revenue to fund regional SDC eligible projects in areas with the greatest need. Regional need is defined as lines larger than 12-inches while lines smaller than 12-inches are considered a local need.

The intergovernmental agreement between Clean Water Services and the City places responsibility for *maintenance* of lines less than 24-inches on the City. *Construction* of lines 12-inches or smaller is also a City requirement. Extending and constructing sewer lines to serve development is a developer responsibility addressed through the development review process. Clean Water Services has responsibility for construction of lines larger than 12-inches or larger as well as treatment facilities.

The estimated City obligation for constructing needed sanitary sewer capital improvements is approximately $3.6 Million. The recommended strategy for funding these local costs relies primarily on developer's constructing and dedicating sewer lines 12-inches or less and using sanitary sewer system development charges collected in the Westside Planning Area for these costs. Further discussion is required with Clean Water Services about allocating a portion of the SDC revenue collected in the Westside Planning Area for Westside sewer infrastructure needs. It is recommended this discussion occur as part of the next update to the City Wastewater System Master Plan.

Stormwater/Drainage System

The City currently collects a stormwater/drainage system development charge of $510 for each new residential dwelling constructed. Of this amount the City retains 100% of the revenue

collected. The stormwater system development charge is expected to generate $1.0 Million for the City based on development in the Westside Planning area.

The Westside Plan identifies stormwater/drainage improvements needed for the collector street system. The estimated cost for such improvements is $1.6 Million. In addition to the stormwater improvements needed for the collector road projects developers will be required to mitigate stormwater impacts created by development as required under Clean Water Services standards.

The funding approach for stormwater relies upon using the existing stormwater system development charge and a supplemental stormwater rate surcharge of approximately $7 per month for households within the Westside Planning area.

Parks, Recreation and Open Space

The City currently collects a parks and recreation system development charge of $3,000 for each new residential dwelling constructed. Of this amount the City retains 100% of the revenue collected. The parks and recreation system development charge is expected to generate approximately $6.1 Million based on expected development in the Westside Planning Area.

Parks and Recreation projects identified in the Parks and Recreation Master Plan Update (2016) include improvements at Thatcher Park including upgrades to the dog park area. The Parks and Recreation Master Plan Update also includes a new six acre neighborhood park serving the Purdin Road urban growth area.

Conclusions

The infrastructure funding analysis reveals the following conclusions:

- Further discussion of the recommended funding approach with property owners, developers and the City needs to be made before implementation;
- Infrastructure needed for development in the Westside Planning Area include collector streets, sanitary sewer, stormwater/drainage, and parks;
- The recommended collector street network needs to be added to the City's Transportation System Plan and Transportation Development Tax (TDT) project list to allow use of TDT in the Westside area;
- Total infrastructure cost for the Westside Planning Area is $47,622,500. Projects in the David Hill area amount to $34,932,500 and for the Purdin Road area the amount is $12,690,000;
- Current system development charge (SDC) revenue could fund water system and park improvements with residual revenues available to fund other related improvements in the City;
- Current SDC revenues are deficient to fund needed road, sewer, and stormwater improvements in the their entirety;
- To address the deficiency the recommendation is to use supplemental SDC revenues coupled with a monthly fee for stormwater over a five year period;
- The recommended approach is feasible and the cost is less on a square footage basis than other developing areas in Washington County;
- Further evaluation is needed on the following items:

- Water reservoirs;
- The percentage of SDC revenues to use for improvements;
- Whether up-front improvements should be considered to encourage development.

Chapter 13 – Policy Direction

This chapter contains goals, policies and actions recommended by the Westside Refinement Plan. The goals, policies and actions address land use, public facilities, natural resources, natural hazards, transportation and funding needed infrastructure to support the recommended land use concept described in the plan. The policy framework described below is based on the analyses supporting the plan. The analyses is generally described throughout this plan document and in detail in the plan's appendices.

Policies for funding needed infrastructure are based on development paying for needed improvements. The City will seek outside funding for infrastructure needs as appropriate especially for transportation improvements.

Land Use

Goal 1.1: Establish land use designations for the Westside planning area based on the physical limitations of the land.

Policy 1.1.1: Land use designations for the Westside planning area should be based on identified environmental constraints including steep slopes and mapped landslide areas.

Action 1.1.1: Amend the Forest Grove Comprehensive Plan Map and Official Zoning map to implement the preferred land use concept for the Westside Planning area which takes into account physical limitations of the land.

Policy 1.2.1: The physical limitations of the land should be the basis for determining the density, location and type of development in the Westside planning area.

Action 1.2.1: Amend the Forest Grove Development Code to ensure the physical limitations of the land in the Westside planning area are considered during the development review process.

Policy 1.3.1: A mapped landslide area is identified in the area south of David Hill Road between Forest Drive and Antler Lane. Development within the mapped landslide area should be avoided.

Action 1.3.1: Amend the Development Code to allow for the transfer of density from environmentally constrained areas to unconstrained locations with the approval of the Planning Commission.

Policy 1.4.1: A geological and engineering assessment for development north of David Hill Road and west of Thatcher Road shall be required to ensure suitability of proposed development from an engineering perspective.

Action 1.4.1: Amend the Forest Grove Development Code to require submittal of a geological and engineering assessment prepared by a certified engineering geologist for any development site with an average cross-slope of 10% or more or areas likely to have adverse soils. The results of the geological assessment

should provide the basis for appropriate mitigation measures needed to address geological and soil constraints.

Goal 1.2: Establish land use designations for the Westside planning area that provides opportunities for a variety of land uses including residential, commercial, educational and recreational.

Policy 1.2.1: Land use designations adopted for the Westside planning area should provide opportunities for a variety of land uses including residential, commercial, educational and recreational.

Action 1.2.1: Amend the Forest Grove Comprehensive Plan Map and Zoning map to implement the preferred land use concept for the Westside planning area which provides opportunities for a variety of land uses.

Goal 2.1: Promote efficient and cost-effective land development in the Westside planning area.

Policy 2.1.1: Establish land use designations and development densities for the Westside planning area taking into account the cost of providing and funding urban services including future repair and replacement costs.

Action 2.1.1: Amend the Forest Grove Development Code planned and subdivision regulations as appropriate to encourage clustering development to minimize infrastructure cost.

Policy 2.1.2: Encourage the efficient use of developable land through techniques such as clustering housing and providing a variety of housing types within neighborhoods including cottage housing, accessory dwelling units and attached housing on corner lots.

Action 2.1.2: Amend the Forest Grove Development Code planned development and subdivision regulations as appropriate to promote the efficient use of developable land through techniques such as clustering housing, cottage housing, accessory dwellings and attached housing on corner lots in subdivisions.

Goal 2.2: Promote an orderly transition from rural to urban land use within the urban growth boundary.

Policy 2.2.1: Establish land use designations in the Westside planning area to promote an orderly transition from rural to urban land use within the urban growth boundary.

Action 2.2.1: Amend the Forest Grove Comprehensive Plan Map and Official Zoning map to implement the preferred land use concept for the Westside planning area.

Goal 3.1: Promote complete neighborhoods where a variety of land uses and activities are located in proximity with residential areas.

Policy 3.1.1: Identify locations on the Forest Grove Comprehensive Plan Map and Official zoning map for non-residential land uses including retail, office, park land, an elementary school, and a fire station.

Action 3.1.1: Amend the Forest Grove Comprehensive Plan Map and Official Zoning to implement the preferred land use concept for the Westside planning area.

Goal 4.1: Encourage a variety of housing types throughout the Westside Planning area.

Policy 4.1.1: Establish development regulations for planned developments to encourage a variety of housing types within individual developments.

Action 4.1.1: Amend the Forest Grove Development Code to encourage a variety of housing types within individual developments.

Goal 5.1: Provide opportunity for affordable housing types in the Westside planning area.

Policy 5.1.1: Establish development regulations to provide incentives for housing types affordable to households and families earning 80% or less of the Forest Grove area median income as defined by the U.S. Department of Housing and Urban Development.

Action 5.1.1: Amend the Forest Grove Development Code to provide incentives for housing affordable to households earning 80% or less of the Forest Grove area median income as defined by the U.S. Department of Housing and Urban Development.

Goal 6.1: Ensure land development on David Hill considers the visual impacts of development from lower elevation view corridors especially the Town Center.

Policy 6.1.1: Minimize visual impacts of development on David Hill as viewed from lower elevation view corridors especially the Town Center.

Action 6.1.1: Amend the Forest Grove Development Code to require a visual impact assessment and mitigation measure for development proposals west of Thatcher Road.

Public Facilities

Goal 7.1: Ensure that adequate public utilities needed to serve development in the Westside Planning area are provided in an equitable and cost-effective manner.

Policy 7.1.1: The physical limitations of the land should be a basis for determining the location of utility connections so as to provide utilities in a cost effective manner and to minimize development impacts.

Action 7.1.1: Amend the Forest Grove Development Code and Public Works Design Standards to ensure that the physical limitations of the land serve as a basis for determining the location of utility connections to reduce the costs and development impacts.

Policy 7.2.1: Undertake studies and update the City's infrastructure facility plans to incorporate recommendations from the Westside Refinement Plan.

Action 7.2.1: Undertake a siting study to identify possible locations for future water reservoir(s) needed to serve development in the planning area.

Action: 7.2.2: Amend the Forest Grove Water System Plan to include the water system recommendations contained in the Westside Refinement Plan.

Action 7.2.3: Amend the Forest Grove Storm Drainage Master Plan should be updated to incorporate recommendations of the Westside Refinement Plan.

Action 7.2.4: Amend the Forest Grove Sanitary Sewer Master Plan should be incorporated to incorporate the recommendations of the Westside Refinement Plan.

Policy 7.3.1: Low impact design techniques for storm water drainage north of David Hill Road and west of Thatcher Road should be avoided due to poor soil infiltration characteristics in the planning area.

Action 7.3.1: Amend the Forest Grove Development and Public Works Design Standards to restrict the use of low impact design techniques for storm water drainage north of David Hill Road and west of Thatcher Road due to poor soil infiltration characteristics.

Policy 7.4.1: Opportunities for needed public facilities including an elementary school and neighborhood park consistent with the Parks and Recreation Master Plan shall be provided in the Westside planning area.

Action 7.4.1: Recreation needs anticipated from development in the Westside planning area should be included in the Forest Grove Parks, Recreation and Open Space Master Plan and locations of public park land shall be identified on the Forest Grove Comprehensive Plan Map.

Action 7.4.2: All applicable master plans as they may be amended are incorporated by reference into the Westside Plan and facilities in those master plans shall be considered as part of any proposed development where it may apply.

Policy 7.5.1: Through the next update of the City of Forest Grove Wastewater Management Plan, expected in 2018, evaluate the feasibility of implementing sanitary sewer systems such as Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) in the Westside Planning area.

Policy 7.6.1: As infrastructure costs are evaluated in future updates of facility master plans and the Transportation System Plan (TSP), these plans consider the following three approaches to pay for the infrastructure costs:

- Westside Area-wide (David Hill and New Urban Growth Boundary Area)
- Divide Westside Area into two subareas:
    - Purdin Road Area (new urban growth boundary area); and
    - David Hill Area (area west of Thatcher Road).

- Divide Westside into three subareas:
    - Purdin Road Area;
    - David Hill below the 440 foot contour elevation; and
    - David Hill above the 440 foot contour elevation.

Transportation

Goal 8.1: Establish a context sensitive street network addressing the characteristics of the Westside planning area.

Policy 8.1.1: Required cut and fill for streets should be minimized to reduce cost and environmental impacts.

Action 8.1.1: Amend the Forest Grove Development Code to allow for collector street segments exceeding 12% slope to minimize required cut and fill and environmental impacts.

Action 8.1.2: Amend the Forest Grove Transportation System Plan and Development Code to reduce the minimum right-of-way and street cross-section requirements in areas with environmental constraints.

Policy 8.2.1: Local streets serving individual homes should follow slope contours to minimize necessary cut and fill and avoid street segments exceeding 12% slope.

Action 8.2.1: Amend the Forest Grove Development Code.

Goal 8.2: Establish a transportation system that meets regional transportation planning requirements for transportation facility type and function.

Policy 8.2.1: The collector street network serving the David Hill planning area should strive to meet the Metro Regional Transportation Functional Plan requirements for collector road spacing.

Action 8.2.1: Amend the Forest Grove Transportation System Plan to identify the preferred collector street network for the Westside planning area.

Goal 8.3: Seek funding for needed transportation related improvements necessary to serve development and the wider transportation needs of the City.

Policy 8.3.1: The City should explore the jurisdictional transfer of Thatcher Road to the City and potential funding for improvement to urban standards through the Washington County Major Streets Transportation Improvement Program and regional transportation funding programs.

Action 8.3.1: Initiate discussions with Washington County for jurisdictional transfer of Thatcher Road from Gales Creek Road to Purdin Road.

Action 8.3.2: Pursue funding for improvement of Thatcher Road to City standards through County and regional transportation funding programs such as the Washington County Major Street Transportation Improvement Program and Metro Regional Flexible Funds program.

Goal 8.4: Address local and regional street network capacity constraints anticipated from development.

Policy 8.4.1: Address identified capacity constraints at Highway 47 intersections due to anticipated development in the Westside Planning area.

Action 8.4.1: when updated to address amendments the Regional Transportation Plan, amend the Forest Grove Transportation System Plan to include mitigation measures necessary to address capacity constraints at the David Hill Road/Hwy. 47 and Purdin Road/Hwy. 47 intersections due to development in the Westside planning area.

Natural Resources

Goal 9.1: Minimize development impacts on natural resources.

Policy 9.1.1: Strive to preserve tree stands over one acre to the maximum extent possible.

Action 9.1.1: A tree inventory and tree protection management plan should be prepared by a certified arborist prior to development activity.

Action 9.1.2: The tree protection management strategy should be reviewed by the Community Forestry Commission for recommendations as part of the development review process.

Policy 9.3.1: Priority should be given to clustering development to accommodate needed housing while preserving large blocks of forest land.

Action 9.3.1: Amend the Forest Grove Development to provide incentives for clustering development to avoid impacts on natural resources including forested land.

Natural Hazards

Goal 10.1: All development shall demonstrate suitability relative to the natural hazard limitations of the Westside planning area.

Policy 10.1: Applications for development north of David Hill Road and west of Thatcher Road shall include data verifying locations of potential slope and soil instabilities prior to development.

Action 10.1.1: Development regulations shall require field verification of areas with potential slope and soil instabilities prior to development in order to assess potential impacts of development and risk to the site and other properties. The field verification shall be the basis for determining appropriate mitigation measures including avoidance of the area.

Policy 10.2: Due to the presence of steep terrain (greater than 15% slope) and wooded areas, land use regulations should encourage, and where appropriate require, the use of fire resistant building materials and defensible space to minimize the risk of loss of life and damage to property from wildfires.

Policy 10.3: Applications for development in the Westside planning area shall include a liquefaction analysis for areas susceptible to liquefaction during an earthquake event. Techniques to mitigate potential impacts shall be recommended by the Geotechnical Engineer of Record.

Action 10.3.1: Amend the Forest Grove Development Code to require a liquefaction analysis based on the relevant Oregon Structural Specialty Code prior to development in areas susceptible to liquefaction during an earthquake event.

Funding Approach

Goal 11.1: Establish an equitable funding approach for needed infrastructure serving the Westside planning area.

Policy 11.1: Funding for needed infrastructure in the Westside Planning area may require a variety of funding sources including system development charges, local improvement districts, reimbursement districts, utility fees, or other funding approaches authorized by state law.

Action 11.1.1: Work with affected property owners to implement a fair and equitable funding approach for needed infrastructure.

Policy 11.2: The funding approach for needed infrastructure in the Westside planning area shall consider equity including a fair distribution of cost among property owners, developers, future Westside area residents and existing City residents.

Action 11.2.1: Work with affected property owners to implement a fair and equitable funding approach for needed infrastructure.

Policy 11.3: The funding approach for needed infrastructure in the Westside planning area shall consider timing and reliability of revenue in relationship to the planned schedule of capital expenditures.

Action 11.3.1: Amend City codes as necessary to implement a funding approach for needed infrastructure in the Westside planning area taking into account timing and reliability of revenue.

Policy 11.4: Seek outside funding for these road improvements: Thatcher Road north of David Hill Road, David Hill Road west of Thatcher Road, new collector road connecting David Hill Road with Purdin Road, Highway 47/David Hill Road roundabout improvement, Highway 47/Purdin Road/Verboort Road improvement.

Action 11.4.1: Add the transportation improvements identified above to the Forest Grove Transportation System Plan and Washington County Transportation Development Tax projects list.

Action 11.4.2: Seek adding the projects identified above to the Regional Transportation System Plan projects list.

Action 11.4.3: Apply for funding of road improvements through the Washington County Major Street Transportation Improvement Program (MSTIP), Metro Regional Flexible Funds Program, and State Transportation Improvement Program.

Policy 11.5: Work with Clean Water Services to use a share of sanitary sewer system development charge revenue to fund sewer lines in the Westside planning area.

Action 11.5.1: Initiate discussions with Clean Water Services to use a portion of sanitary sewer system development charge revenue for regional needs to fund sanitary sewer fund improvements in the Westside Planning Area.

Policy 11.6: Establish system development charges for needed infrastructure improvements in the Westside planning area as part of updates to the City's facility master plans beginning in 2018.

Action 11.6.1: Incorporate system development charge funding needs when facilities master plans are updated including the Transportation System Plan, Sanitary Sewer Master Plan, Water Master Plan and Storm Water and Drainage Master Plan.

Policy 11.7: Pursue a storm water rate surcharge to fund needed storm water facility improvements in the Westside planning area.

Action 11.7.1: Draft a resolution for City Council approval to establish a storm water rate surcharge if needed to fund storm water facility improvements in the Westside planning area.

Chapter 14 – Implementation Actions

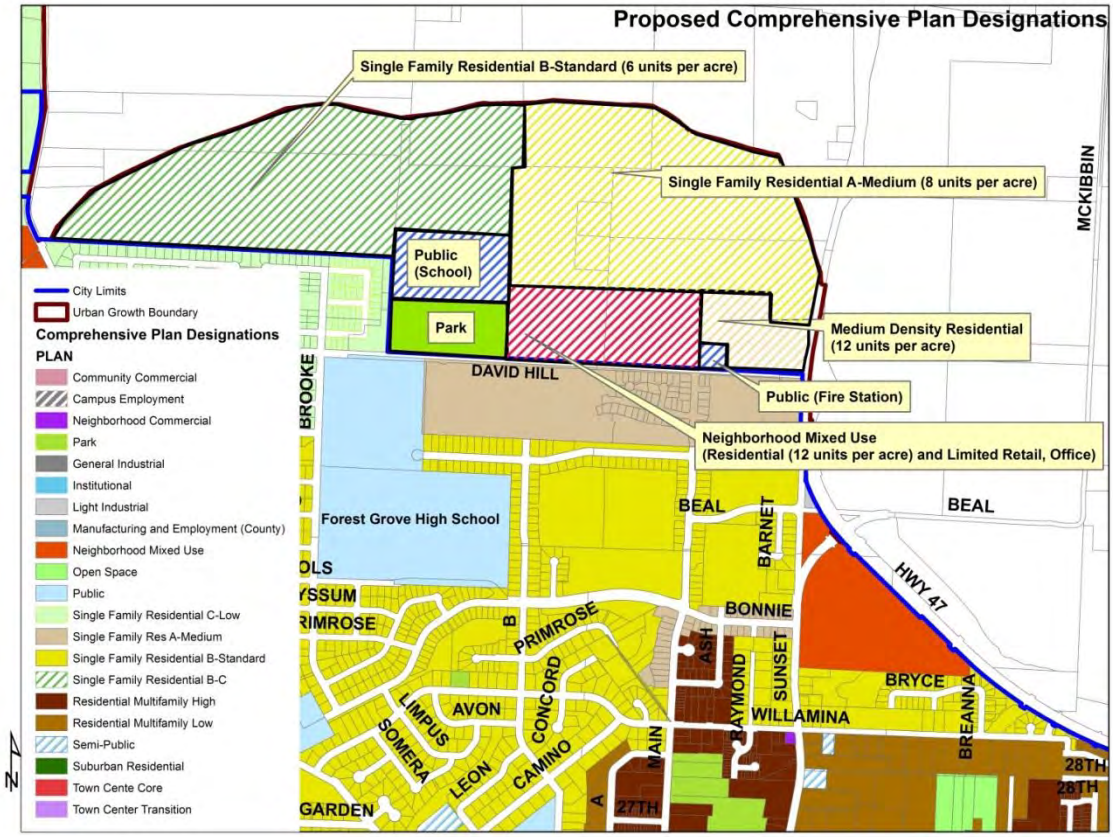
The following implementation actions are recommended for the Westside Planning Refinement Area:

Comprehensive Plan Amendments

The following amendments to the Forest Grove Comprehensive Plan Map are proposed for the Westside planning areas consistent with the land use concept described in Chapter 4.

New Urban Growth Boundary Area

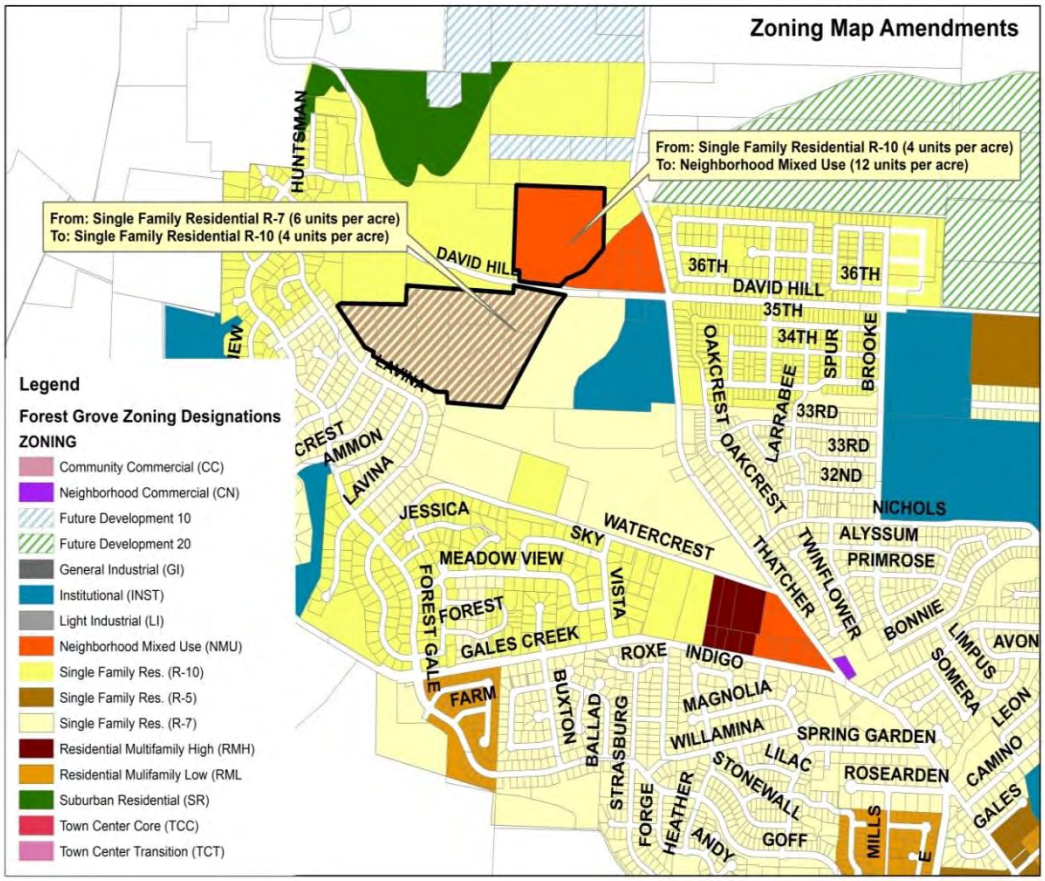
From	To	Gross Acres
Future Development-20 acre min.	A-Medium	86.18
Future Development-20 acre min.	B-Standard	98.62
Future Development-20 acre min.	Medium Density Residential	10.82
Future Development-20 acre min.	Neighborhood Mixed Use	24.63
Future Development-20 acre min.	Public (School)	10.00
Future Development-20 acre min.	Public (Fire Station)	2.40
Future Development-20 acre min.	Park	6.00



Zoning Map Amendments

The Purdin Road Urban Growth Area will be rezoned upon annexation into the City consistent with the adopted Comprehensive Plan designations. The following zoning map amendments are proposed for the David Hill urban growth area.

From	To	Gross Acres
R-7	**R-10**	36.96
R-10	**SR**	7.13



Development Code Amendments

The following amendments to the Forest Grove Development Code are proposed to implement the Westside Refinement Plan:

§10.4.315(F) TABLE 4-2: Commercial/Institutional Uses within the Village Center

NMU Zoned Area	Minimum Square Footage	Maximum Square Footage
Area 1 - David Hill/Nixon	None	15,000 SF Gross Floor Area

Area 2 - Gales Creek	None	25,000 SF Gross Floor Area
Area 3 - Davidson	25,000 SF Gross Floor Area	130,000 SF Gross Floor Area[5]
Area 4 – East David Hill Rd.	10,000 SF Gross Floor Area	150,000 SF Gross Floor Area[6]

Amendment to Development Code Section 10.8.110(E):

Transit Agency Referral: The City shall submit all development proposals along the Pacific Avenue/19th Avenue transit corridor to Tri-Met and along existing and proposed collectors and arterials in the Westside Planning area to Ride Connection/GroveLink for review and comment regarding facilities necessary to support transit. The following facilities may be required as a condition of a permit: 1. Walkways to transit stops; 2. Bus stop shelters or waiting areas; 3. Turnouts for buses.

§10.8.310 (Hazard Areas)

2. For development sites having slopes of ~~20%~~ **10%** or more, the following requirements shall be met. To ensure compliance with the provisions of this ordinance, prior to the issuance of a building permit for the construction of any new building[7] within the city, and prior to any grading, excavation or filling or other site modification within areas having a slope of ~~20%~~ **10%** or greater, there shall be submitted to the Community Development Department for review and approval, or approval with modifications:

    a. A site plan (showing any grading, excavating or filling) drawn to scale of the entire property developed and of the proposed construction;

    b. The submission of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist who is a registered geologist certified in the specialty of Engineering Geology under provisions of ORS 672.505 to 672.705 **and a Geotechnical Engineer under provisions of ORS 672.002 to 672.325**. The assessment and report shall address the entire site and meet the following requirements:

        i. The geological **and engineering** assessment shall include information and data regarding the nature, distribution of underlying geology, and the physical and chemical properties of existing soils; an opinion as to stability of the site, and conclusions regarding the effect of geo-logic conditions on the proposed development.

[5] Maximum building footprint is 50,000 square feet.
[6] Maximum building footprint is 50,000 square feet.
[7] Building: That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

Transportation System Plan Amendments

Figure 8-1: Updated Street Classification System

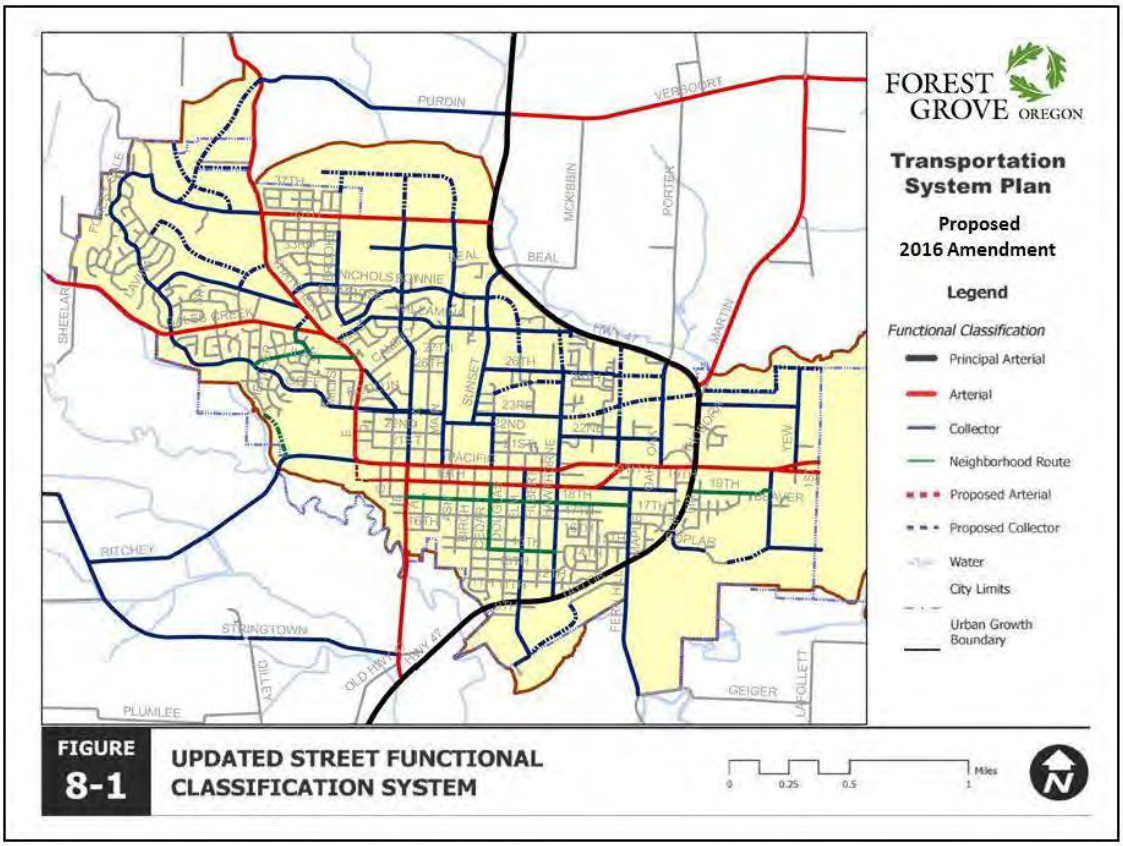
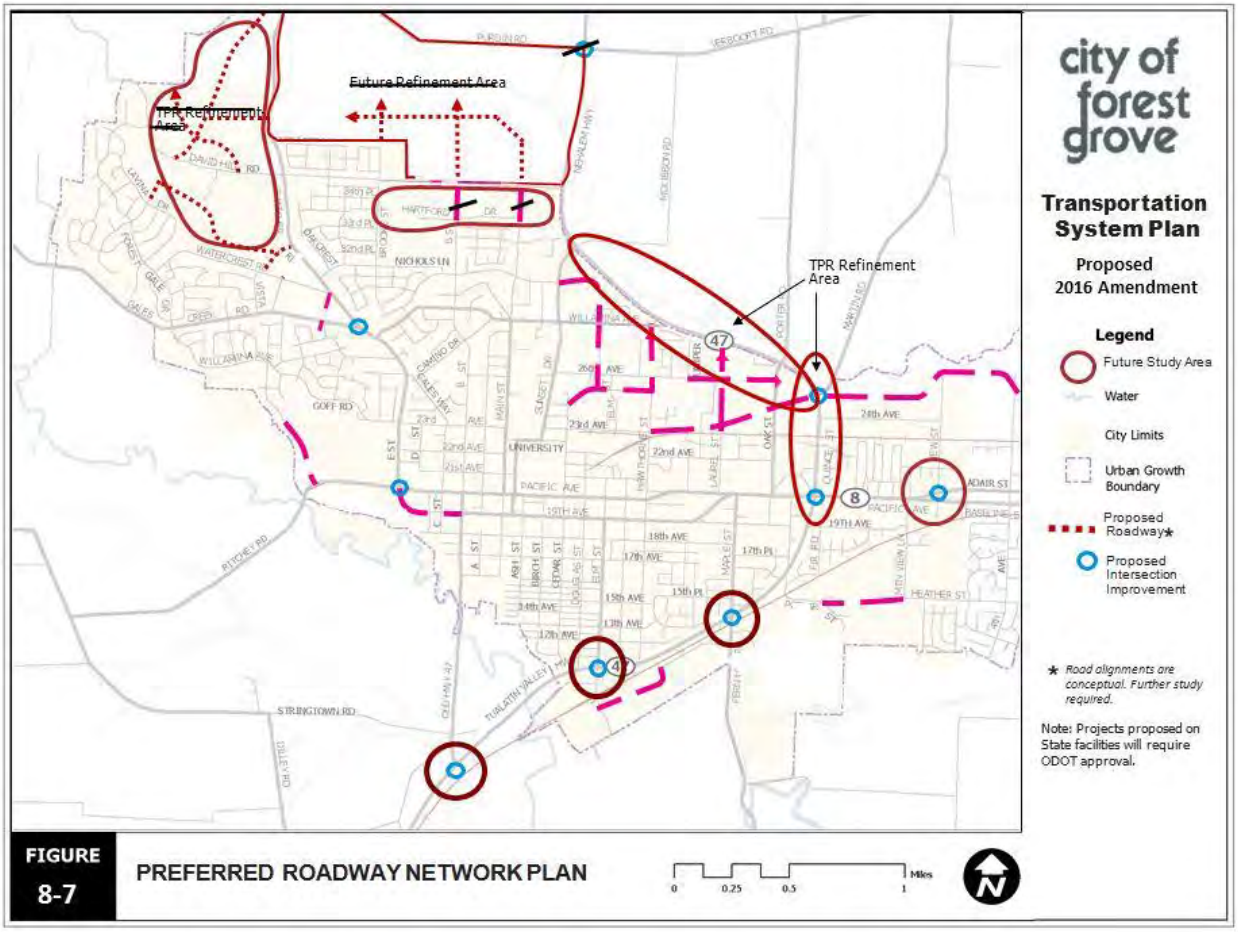
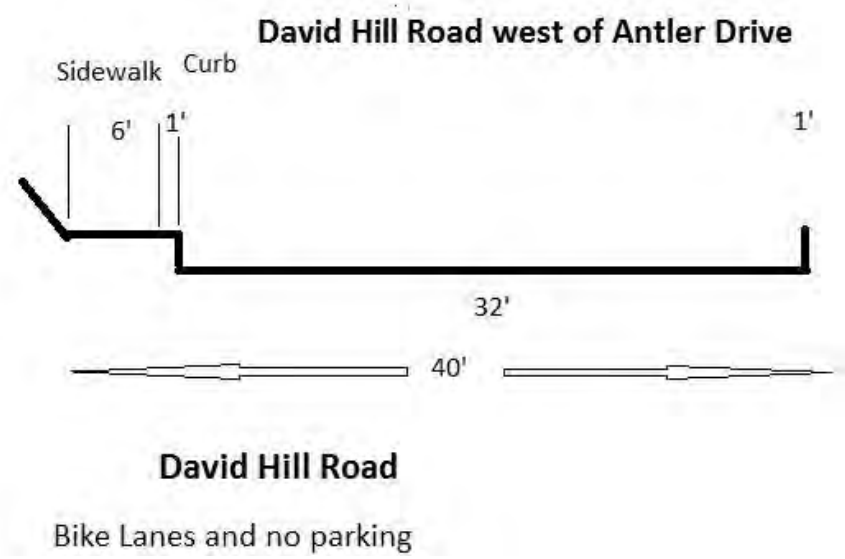


Figure 8-7: Preferred Roadway Network Plan



Proposed David Hill Road Cross-Section (Add to TSP Section 8-3)



Amend TSP Table 8-3: Roadway Projects and Programs

Recommended Street Projects

No.	Street Name	Project Limits	Description	Estimated Cost
1	Road 1 (Vista Drive Extension)	Watercrest Road to Thatcher Road	Construct new north-south 1,050 foot urban collector street	$1,000,300
2	Road 2	From Vista Drive Extension west 3,200 feet	Construct new east-west urban collector street	$4,246,000
3	Road 3 (Valley Crest Extension)	From terminus of Valley Crest Way north to Road 2	Construct new 600-foot urban collector street	$787,200
4	Road 4	David Hill Road north to Purdin Road	Construct new 4,700 foot urban collector street	$6,409,200
5	Road 5 (Plum Hill Improvement)	Existing Plum Hill Lane (privately-owned) to Road 4	Improve Plum Hill Lane to urban collector standards	$1,212,200
6	Road 6	David Hill Road to urban growth boundary	Construct new 2,300 foot urban collector street	$2,391,000
7	Road 7 (Brooke Street Extension)	Brooke Street to David Hill Road	Construct new 5,500 foot urban collector street	$4,766,200
8	Road 8 (B Street Extension)	David Hill Road to Brooke Street	Construct new 1,750 foot urban collector street	$1,583,700
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Full improvements to Council Creek crossing (short-term)	$1,454,000
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Half street reconstruction between David Hill Road to Purdin Road excluding Council Creek crossing (long-term)	$2,437,500
10	Road 10 (David Hill Improvement)	Thatcher Road to urban growth boundary	Full street reconstruction for 5,100 feet to urban collector street standards	$3,943,500
			TOTAL ESTIMATED COST	$30,230,800

Amend TSP Section 8.9.2 Future Study Areas

~~*David Hill Study Area*~~

~~The northwestern portion of the City, in the vicinity of David Hill Road, also includes transportation system challenges that require further study. These challenges relate both to the long-term need to improve David Hill Road to an urban section (portions of this road are currently narrow and winding with minimal shoulders), to connect David Hill Road to Highway 47, and to provide a system of local streets serving the expected residential and mixed use development in this area. Topography and the need to preserve vegetative corridors must also be considered. Identification of this study area including a commitment by the City to evaluate local circulation options is necessary to comply with the requirements of the Transportation Planning Rule (TPR) – hence its identification as a TPR Refinement Area. Compliance with the Regional Transportation Plan (RTP) and Regional Transportation Functional Plan (RTFP) will also require evaluation of local circulation options in this study.~~

~~*Northern Urban Reserve Area*~~

~~While this area is currently outside of the Forest Grove Urban Growth Boundary (UGB), it lies immediately north of existing development, including the future alignment of David Hill Road between that development and Highway 47. Evaluation of potential concept level local circulation options in this area is necessary to ensure that the proposed David Hill Road improvements and the recommended extensions of B and Main Streets to David Hill Road can be accommodated further north when the area is developed in the future. Additionally, identification of a backbone local circulation system will benefit the orderly development of the area in the future.~~

Implementation Actions to Address Post Adoption

Full implementation of the recommendations contained in the Westside Plan requires amendment to several infrastructure facility plans including:

- Water System Master Plan;
- Sanitary Sewer Master Plan; and
- Storm Water/Drainage Master Plan

These plans will be updated when the facility master plans are updated by the Engineering Division.

Appendix

A. Public Involvement & Stakeholder Summary Report
B. Land Use Map
C. Natural Resources Overview Report
D. Infrastructure Overview Report
E. Transportation Baseline Conditions Memo
F. Traffic Analysis
G. Geological and Geotechnical Assessment Report
H. Water, Sewer and Stormwater Infrastructure Analysis
I. Infrastructure Funding Approach

Exhibit B

Westside Refinement Plan and Accompanying Implementation Measures Findings and Facts Relied Upon (File No. 311-17-00013-PLNG)

Section 1: Adoption Process

Legislative (Type IV) Land Use Decisions

Finding: Article 1 of the Forest Grove Development Code classifies land use reviews into four categories: administrative (Type I), limited land use decisions (Type II), quasi-judicial (Type III), and legislative (Type IV). Type IV decisions are those decisions that require discretion and either impact a large area or affect policy. Adoption of the Westside Refinement Plan and accompanying Comprehensive Plan Map, Zoning Map, Development Code and Transportation System Plan amendments are classified as legislative (Type IV) land use decisions since they impact a large area and affect policy. The Westside Refinement Plan and accompanying amendments affect approximately 591.8 gross acres which represents approximately 14.2% of the area within the portion of the urban growth boundary Forest Grove's has planning responsibility over. In addition, the Westside Refinement Plan includes policy direction guiding land use decisions, public facilities, transportation, natural resources and options for funding needed infrastructure. Given these facts, the appropriate adoption process for the Westside Refinement Plan and accompanying amendments is a Type IV legislative approval process.

Finding: Forest Grove Development Code §10.1.735 states that legislative decisions include brief and concise findings of fact and conclusions. The findings shall set forth the criteria and standards considered relevant to the decision, state the facts relied upon and briefly indicate how those facts support the decision. The criteria and standards considered relevant include local Comprehensive Plan policies, Regional Planning Policies and the Statewide Land Use Planning Goals. This document demonstrates compliance with the applicable criteria fulfills this requirement.

Finding: Adoption of the Westside Refinement Plan and accompanying amendments to the Comprehensive Plan Map, Zoning Map, Development Code and Transportation System Plan relies on the data and analysis contained in the following documents as generally described below:

- Westside Transportation Baseline Report, January 2015, SCJ Alliance
- Westside Natural Resources Overview, January 2015, SCJ Alliance
- Westside Infrastructure Overview, December 2014, SCJ Alliance

- Geological and Geotechnical Assessment Report, Westside Planning Project, February 2015, PBS Engineering + Environmental
- Revised Final Westside Water, Sewer, and Stormwater Infrastructure Report, June 24, 2016
- Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative, March 8, 2017, SCJ Alliance
- Infrastructure Funding Approach Report, December 2016, FCS Group.

In addition, the recommendations are based on comments received during Community Planning Meetings held on April 20, 2015, May 20, 2015 and March 2, 2017, Planning Commission work sessions held on October 6, 204, July 6, 2015, May 2, 2016 and February 6, 2017 and City Council work sessions held on November 14, 2016 and December 12, 2016. The Planning Commission and City Council meeting minutes are on file at the City Recorder's office.

Section 2: Westside Refinement Plan

Oregon Revised Statutes §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries. In contrast to a comprehensive plan a refinement plan is more detailed and applies to specific geographic area. A refinement plan must establish minimum and maximum densities for residential land uses, establish minimum and maximum floor area ratios or site coverage requirements for nonresidential uses, be based on a planning process meeting statewide planning goals, and include land use regulations to implement the plan. Section 2 of this document describes how the Westside Refinement Plan complies with the ORS §197.200 requirements, the Statewide Land Use Planning Goals, the Metro Urban Growth Management Functional Plan (UGMFP) and Metro Regional Transportation Functional Plan (RTFP).

Oregon Revised Statutes (ORS) §197.200

<u>Under ORS §197.200(2), a refinement plan applies to a specific geographic area.</u>

<u>Finding ORS §197.200(2)</u>: The Westside Refinement Plan applies to the area within the urban growth boundary generally north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road between Highway 47 and east of Thatcher Road. Since the refinement plan applies to the specific area identified above the Westside Refinement Plan complies with ORS §197.200(2).

<u>ORS §197.200(2)(a) states a refinement plan must establish density ranges, including minimum and maximum density for residential land uses.</u>

<u>Finding ORS 197.200(2)(a)</u>: Chapter 4 of the Westside Refinement Plan includes a land use concept for the area north of Watercrest Road and west of Thatcher Road and

ORS §197.200(2)(b) states a refinement plan establish minimum and maximum floor area ratios or site coverage requirements for nonresidential uses.

Finding ORS 197.200(2)(b): The Westside Refinement Plan identifies locations for nonresidential uses including an elementary school, neighborhood park and possible fire station. The Refinement Plan also identifies areas for mixed-use development including residential and commercial and office uses. The Forest Grove Development Code only establishes floor area ratios for nonresidential uses in the City's Town Center zones (Town Center Core and Town Center Transition). Although the Forest Grove Development Code does not establish specific minimum and maximum floor areas for zoning designations other than Town Center zones the intensity of development is established by maximum height requirements, parking standards for nonresidential uses and buffer yard provisions. The height requirements are established by Development Code §10.3.330 (Table 3-11). Parking standards are established by Development Code §10.8.515 (Table 8-5). Buffer yard requirements are established by Development Code §10.8.420. Since the Westside Refinement Plan and accompanying Comprehensive Plan Map and Zoning Map amendments establishes development standards for nonresidential uses in the planning area, including building height, parking requirements and buffer yard requirements, the intent of ORS §197.200(2)(b) is met.

ORS §197.200(2)(c) states a refinement plan must be based on a planning process meeting statewide planning goals.

Finding ORS §197.200(2)(c): An extensive planning process was used for the Westside Refinement Plan. The planning process was reviewed by the City's Committee for Citizen Involvement on August 20, 2013. The planning process included a community involvement effort with community meetings held on April 20, 2015, May 20, 2015 and March 2, 2017. Sixteen stakeholder interviews were also conducted in November 2014. In addition, four work sessions were held with the Planning Commission and two work sessions were held with the City Council during the planning process. These outreach efforts are consistent with Statewide Planning Goal 1 (Citizen Involvement). Goal 1 requires a citizen involvement process that provides the opportunity for citizens to be involved in all phases of the planning process including influencing plans and policies. The public involvement process resulted in changes to the initial land use concept developed for the Westside Refinement planning area.

In addition to Goal 1, the Westside Refinement Plan addresses other statewide planning goals including:

- Goal 2: Land Use Planning;
- Goal 5: Natural Resources;
- Goal 8: Recreational Needs;
- Goal 10: Housing;
- Goal 11: Public Facilities and Services;
- Goal 12: Transportation; and
- Goal 14: Urbanization

The Westside Refinement Plan and supporting technical memoranda and reports provide detailed information as to how these goals identified above were considered. The technical memoranda and reports relied upon include:

- Westside Transportation Baseline Report, January 2015, SCJ Alliance
- Westside Natural Resources Overview, January 2015, SCJ Alliance
- Westside Infrastructure Overview, December 2014, SCJ Alliance
- Geological and Geotechnical Assessment Report, Westside Planning Project, February 2015, PBS Engineering + Environmental
- Revised Final Westside Water, Sewer, and Stormwater Infrastructure Report, June 24, 2016
- Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative, March 8, 2017, SCJ Alliance

Additional detail describing compliance with Statewide Planning Goals is provided in the State Planning Policy Consistency section below. Since the planning process used to development the Westside Refinement Plan was based on the Statewide Planning Goals ORS 197.200(c) is met.

ORS 197.200(2)(d) states that a refinement plan must include land use regulations to implement the plan.

Finding ORS 197.200(2)(d): The Westside Refinement Plan, and accompany implementation measures, include specific regulations to implement aspects of the plan. This includes proposed amendments to Development Code §10.8.610(M) pertaining to road grades, §10.8.310 pertaining to required geotechnical and engineering requirements for development on sites with slopes greater than 10%, and §10.8.610 (Table 8-8) pertaining to street standards for the David Hill Road cross-section west of Thatcher Road. In addition to the Development Code amendments the accompanying implementation measures also include amendments to the Forest Grove Comprehensive Plan Map to establish land use designations in the area added to the urban growth boundary in 2014 and the Transportation System Plan to establish a conceptual backbone collector street network. Together, these regulations implement the Westside Refinement Plan. Therefore, the requirements of ORS §197.200(2)(d) are met.

State Planning Policy Consistency

As noted above, the planning process used for the Westside Refinement Plan and accompanying amendments was based on the Statewide Planning Goals. This section addresses how the Statewide Planning Goals and other applicable state planning policies were complied with.

Finding: The Westside Refinement Plan addressed the following Statewide Planning Goals:

Land Use Planning Goal 1: Citizen Involvement
Land Use Planning Goal 2: Land Use Planning
Land Use Planning Goal 5: Natural Resources
Land Use Planning Goal 8: Recreational Needs
Land Use Planning Goal 10: Housing
Land Use Planning Goal 11: Public Facilities and Services
Land Use Planning Goal 12: Transportation (Transportation Planning Rule)
Land Use Planning Goal 14: Urbanization

Findings for each of the Statewide Planning Goals listed above are presented below.

Goal 1 - Citizen Involvement - Statewide Land Use Planning Goal 1 requires that local citizen involvement programs incorporate the following components:

- ✓ *Provide for widespread citizen involvement;*
- ✓ *Assure effective two way communication with citizens;*
- ✓ *Provide the opportunity for citizens to be involved in all phases of the planning process;*
- ✓ *Assure that technical information is available in an understandable form;*
- ✓ *Assure that citizens will receive a response from policy-makers; and*
- ✓ *Insure funding for the citizen involvement program*

Finding Goal 1: Opportunities for citizen input were provided during the course of this project. The public review process included placing all documents for review on the City's website. In addition, two planning charrettes were held on April 20, 2015 and May 20, 2015. Approximately 30 persons attended and participated during each planning charrette. A community open house was also held on March 2, 2017. Approximately 25 people attended the open house. For additional public input, Planning Commission work sessions were held on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017. Work sessions were also held with the City Council on November 14, 2016 and December 12, 2016.

The land use concept was revised several times in response to community input. In the end, a general consensus was reached which is reflected in the Plan. Details of the citizen involvement program are described in Chapter 3 (Citizen Participation).

Goal 2 - Land Use Planning – Goal 2 describes the basic procedures of Oregon's statewide planning program. It requires that land use decisions be made in accordance with a comprehensive plan. Goal 2 also requires that implementation ordinances be put in place to put the plan's policies into effect.

Finding Goal 2: The Westside Refinement Plan was developed in accordance with the goals and policies of the Forest Grove Comprehensive Plan. This includes consideration of the following Comprehensive Plan elements: Citizen Involvement, Community Sustainability, Land Use, Housing, Public Facilities and Community Services, Education and School Facilities, Natural Resources and Hazards, Transportation and Urbanization. Adoption of the Westside Refinement Plan includes

accompanying implementation measures to put the Westside Refinement Plan policies into effect. The amendments include amending the Forest Grove Comprehensive Plan Map to implement a land use concept for the area north of David Hill Road between Thatcher Road and Highway 47, amending the zoning map, amending the Transportation System Plan to establish a conceptual collector street network in the planning area and amending the Development Code to establish requirements for geotechnical and engineering analysis in areas with slope greater than 10% and allowing street grades up to 15% on collector streets for distances no greater than 250 feet.

Goal 4 - Forest Lands – This goal requires an inventory of forest lands and the adoption of policies and ordinances to conserve forest lands for forest uses.

Finding Goal 4: The project consultant, SCJ Alliance, prepared a natural resources assessment for the Westside Refinement Plan area. This assessment is summarized in the Forest Grove Westside Planning Project, Natural Resources Overview report dated January 2015. The natural resource assessment is included in the technical appendix and is summarized in Chapter 5 of the Westside Refinement Plan. Article 5 of the Development Code requires review of potential impacts to natural resources during the development review process. Specifically, §10.5.130 addresses trees on developable land prior to and during development. Under this section a permit is required for removal or major pruning for trees six inches or greater in diameter or Oregon white oak trees three inches or greater. In addition, a tree protection plan may be required. These provisions ensure that Goal 4 resources are considered to conserve forest lands.

Goal 5 - Natural Resources – This goal focuses on scenic and historic areas, and open spaces. Goal 5 covers more than a dozen natural and cultural resources such as wildlife habitats and wetlands. Goal 5 guidelines (OAR 660-015-000(5)) encourage local governments to adopt natural resource protection programs and conserve scenic and historic areas and open space. Resources to inventory include riparian corridors, wetlands, wildlife habitat, federal wild and scenic rivers, state scenic waterways, groundwater resources, approved Oregon recreation trails, natural areas, wilderness areas, mineral and aggregate resources, energy sources and cultural areas.

Finding Goal 5: The Natural Resources Overview report dated January 2015 includes a Goal 5 summary. The report indicates the following Goal 5 resources do not exist or are not currently designated in the Westside Refinement Plan area: Oregon scenic waterways and federal wild and scenic rivers, designated natural area, designated wilderness area and energy sources. No local rivers are designated as wild and/or scenic in the Forest Grove area. The nearest designated natural area according to the Oregon State Register is Banks Swamp located 5.5 miles north of Forest Grove. The nearest designated wilderness areas are located in the Cascade Range and along the Oregon coastline.

The following Goal 5 resources do exist in or near the Westside Refinement Plan area: riparian corridors (Council Creek system), wetlands, wildlife habitat, groundwater resources, Oregon recreation trails, mineral and aggregate resources and cultural

areas. These resources are documented in the Natural Resources Overview report. The Natural Resources Overview report identifies potential ecological protection and enhancement opportunities in the Westside planning area. Potential opportunities are included in the Westside Refinement Plan (Chapter 5).

Goal 7 - Areas Subject to Natural Hazards – Goal 7 deals with development in places subject to natural hazards such as landslides. It requires that local jurisdictions apply appropriate safeguards when planning for development in areas subject to natural hazards.

Finding Goal 7: The David Hill area has locations that are subject to natural hazards. This includes steeply sloped area north of David Hill Road and west of Thatcher Road and the presence of a historic landslide area west of Thatcher Road and south of David Hill Road. These areas are documented in the Geological and Geotechnical Assessment Report, dated February 2015, prepared by PBS Engineering + Environmental. The results of this analysis are summarized in the Westside Refinement Plan (Chapter 7 – Natural Hazards). The Geotechnical Report provides the basis for proposed amendments to the Forest Grove Development Code to require a geotechnical and engineering analysis if development affects property with a cross-slope of 10% slope or more. Adoption of this Development Code amendment ensures that appropriate safeguards are in place when planning for development in areas subject to natural hazards. Other safeguards include compliance with Oregon Building Code requirements and the provisions of Development Code Article 8 §10.8.300 et. seq. (Hazards and Resources).

Goal 8 - Recreational Needs – This goal calls for each community to evaluate its recreational areas and facilities and the projected demand for the services provided.

Finding Goal 8: The land use concept for the Westside area included consideration of the recreational needs of residents as the area develops. The recommended land use concepts includes a site for a six- to ten-acre neighborhood park in the north of David Hill Road in the new urban growth boundary area. The neighborhood park concept has been adopted as part of the updated to the Forest Grove Parks, Recreation and Open Space Master Plan. In addition, the Westside Refinement Plan and Parks, Recreation and Open Space Master Plan identify improvements at Thatcher Park that will serve the immediate area and larger community. Specific recommendations for parks, recreation and open space are described in the Westside Refinement Plan including Chapter 6 (Recreational, Cultural and Open Space Resources) and Chapter 11 (Other City Services).

Goal 9 - Economic Development – This goal addresses economic activity including business creation, retention and employment. Goal 9 calls for local jurisdictions to project future commercial and industrial land needs and plan and zone enough land to meet those needs.

Finding Goal 9: The Westside Refinement Plan and accompanying implementation measures addresses Goal 9. Goal 9 is addressed by identifying areas for commerce to

serve the developing residential areas. The recommended land use concept includes two areas north of David Hill Road identified as NMU (Neighborhood Mixed Use). These areas are described in Chapter 4 (Land Use) and included as part of the proposed amendments to the Forest Grove Comprehensive Plan map. The NMU areas allow for limited retail and other commercial/office uses intended to serve nearby neighborhoods.

Goal 10 - Housing – Goal 10 requires that cities plan for and accommodate needed housing types, such as single family residential, multifamily and manufactured housing. Goal 10 requires each city to inventory its buildable residential land needs, project future needs, and plan and zone enough buildable land to meet those needs.

Finding Goal 10: The Westside Refinement plan and accompanying implementation measures addresses Goal 10. The land use concept for the Westside Refinement Plan area identifies approximately 573 gross acres of land for housing. This land is identified for a variety of residential densities ranging from one-unit per acre to twelve units per acre. The recommended land use concept described in the Westside Refinement Plan area and accompanying implementation measures will support a variety of housing types based on the permissible densities. Housing types include large lot single family detached residences, small lot single family detached, and attached dwellings including flats and townhouses. The land use concept for the Westside Refinement Plan area is expected to yield approximately 2,000 dwellings based on the estimated developable land area and target densities identified in the Westside Refinement Plan. These units are expected to help meet housing needs over the next twenty years as required by the state land use planning law.

The City's Economic Opportunities Analysis prepared for the Comprehensive Plan Update identified estimated housing needs for the Year 2028 compared to the current supply by sales and rental price. This is the best available data the City has. The EOA shows the following housing need:

Ownership			
Price Range	Estimated Current Need	Estimated Current Supply	Unmet (Need) or Surplus
$0 to $50,000	211	416	205
$50,000 to $70,000	135	156	21
$70,000 to $90,000	137	156	18
$90,000 to $120,000	143	157	14
$120,000 to $160,000	432	390	(42)
$160,000 to $230,000	701	1,462	762
$230,000 to $350,000	1,085	1,027	(58)
$350,000 to $460,000	779	315	(464)
$460,000 to $690,000	656	147	(510)
$690,000+	195	52	(143)

It is believed that the units at the lowest end of the price range are manufactured homes. The City has approximately. Article 5 (§10.5.315(A) and (§10.5.300(A)) of the Forest Grove Development Code indicates that manufactured home parks are allowed on sites four acres or larger in the R-10, R-7, R-5, RML and RMH zoning districts

subject to conditional use review and site development plan approval. Nothing in the Westside Refinement Plan and accompanying implementation measures would change these provisions.

As identified in Chapter 4 of the Westside Refinement Plan, the planning area could accommodate approximately 1,950 housing units. The unmet need shown on the table above totals 1,217 housing units. It is expected the Westside Planning Area will accommodate the estimated housing need. Homes at the highest end of the price range ($690,000 or more) would likely be met by development in areas designated as Suburban Residential or C-Low/R-10. The unmet need in the $120,000 to $160,000 price range could be met in the Neighborhood Mixed-Use (NMU) areas identified by the land use concept described in the Westside Refinement Plan. The need shown for the other price ranges could be met in the R-10, R-7 areas identified in the Westside land use concept.

The table below show the estimated need for rental units for the Year 2028 compared with the current supply.

Rental			
Rent	Estimated Current Need	Estimated Current Supply	Unmet (Need) or Surplus
$0 - $250	469	40	(429)
$250 - $375	289	138	(151)
$375 - $500	240	163	(77)
$500 - $625	271	933	662
$625 - $875	396	1,163	767
$875 - $1,250	497	642	145
$1,250 - $1,875	601	330	(271)
$1,875 - $2,500	133	82	(51)
$2,500 - $3,750	48	0	(48)
$3,750+	0	0	0

Meeting the unmet need for housing at the lowest end of the rental price range will be a challenge. Rents less than $500 per month are well below the market rate for apartments and are not constructed without significant public subsidy by nonprofit developers and public agencies. Although the need for low cost rental units presents a challenge it is possible that privately constructed accessory dwelling units could help meet some of this need. Article 7 of the Development Code (§10.7.005) indicates that accessory dwelling units are allowed in conjunction with a single family dwelling in any zone that allows residential uses. Accessory dwelling units may take the form of stand-alone dwellings or conversion of space within an existing home. Accessory dwellings may be a maximum of 720 square feet or 30% of the primary dwelling's gross floor area (§10.7.015(C)).

Rental units in the $1,250 to $1,875 price range could be partially met in the area identified as NMU (Neighborhood Mixed Use). The Westside Refinement Plan indicates an estimated 140 units are possible in the NMU area. Rental units at the highest end of the rental range would likely be accommodated single family detached dwellings placed on the market as rental units.

The Westside Refinement Plan area will not address the entire unmet need for rental housing in the community. The plan, however, provides opportunities for rental housing across the rental spectrum consistent with Goal 10. The need not addressed in the Westside area could be accommodated in other areas of the City including the Town Center and along the Pacific Avenue/19th Avenue commercial corridor. Both areas allow for a variety of housing types and the buildable lands inventory prepared for the Comprehensive Plan update indicates sufficient development capacity exists (Order 2014-02 and Order 2014-03).

Based on the facts and findings presented above the Westside Refinement Plan and accompanying implementation measures are deemed consistent with the intent of Statewide Planning Goal 10 to encourage the availability of adequate numbers of needed housing units at price ranges and rent levels which are commensurate with the financial capabilities of Oregon households and allow for flexibility of housing location, type and density.

Goal 11 - Public Facilities and Services – Goal 11 calls for efficient planning of public services such as sewers, water, law enforcement, and fire protection. The goal's central tenant is that public services should be planned in accordance with a community's needs and capacities rather than be forced to respond to development as it occurs.

Finding Goal 11: The Westside Refinement Plan addresses Goal 11 by identified the needed public facilities and services required to serve development. This includes the backbone collector street network, sanitary sewer lines, stormwater facilities, water facilities and parks. These needs are identified in the Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis and Westside Planning Area Funding Approach, dated December 2016. These documents and the analysis contained within provide the basis supporting the Westside Refinement Plan land use concept and accompanying implementation measures.

Goal 12 - Transportation - Goal 12 addresses the transportation system including roads, sidewalks, multiuse trails and movement of goods.

Finding Goal 12: The Westside Refinement Plan addresses Goal 12. The Refinement Plan and accompanying amendments identify a backbone transportation network taking into account recommended land uses and natural features including topographic constraints. The recommended transportation network for the Westside area is described in detail in Chapter 8 of the Refinement Plan. A traffic analysis was prepared to assess potential impacts on operation of the transportation system based on the recommended land use concept. The traffic analysis serves as the basis for preparing an analysis demonstrating compliance with the Transportation Planning Rule (OAR 660-012-060). The traffic analysis shows the land use concept will have a potential significant impact on the transportation system which will be mitigated as explained below.

Transportation Planning Rule (OAR 660-012-060)

Both Statewide Land Use Planning Goal 12 and the Metro Regional Transportation Functional Plan require local government consider impacts on transportation facilities when an amendment to an acknowledged comprehensive plan may significantly impact a transportation facility. When an amendment to an acknowledged comprehensive plan would significantly impact an existing or planned transportation facility the local government must put in place measures to assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility.

The proposed Comprehensive Plan Map amendments for the area north of David Hill Road added to the urban growth boundary in 2014 will likely significantly impact the Highway 47 intersections with David Hill Road and Purdin Road/Verboort Road. The reason for this is the area was not addressed in the traffic analysis done for the 2014 update of the Forest Grove Transportation System Plan since the area was not within the urban growth boundary at that time.

The Westside Refinement Plan must comply with the Transportation Planning Rule:

(1) Amendments to functional plans, acknowledged comprehensive plans, and land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards (e.g. level of service, volume to capacity ratio, etc.) of the facility. This shall be accomplished by either:

a) Limiting allowed land uses to be consistent with the planned function, capacity, and performance standards of the transportation facility;
b) Amending the TSP to provide transportation facilities adequate to support the proposed land uses consistent with the requirements of this division;
c) Altering land use designations, densities, or design requirements to reduce demand for automobile travel, and meet travel needs through other modes; or
d) Amending the TSP to modify the planned function, capacity and performance standards, as needed, to accept greater motor vehicle congestion to promote mixed use, pedestrian friendly development where multimodal travel choices are provided.

(2) A plan or land use regulation amendment significantly affects a transportation facility if it:

a) Changes the functional classification of an existing or planned transportation facility;
b) Changes standards implementing a functional classification system;
c) Allows types or levels of land uses which would result in levels of travel or access which are inconsistent with the functional classification of a transportation facility;

d) Would reduce the performance standards of the facility below the minimum acceptable level identified in the TSP.

Findings:

1. Adoption of the Westside Refinement Plan will not result in changing the functional classification of an existing or planned transportation facility. No changes to functional classifications are proposed.

2. Adoption of the Westside Refinement Plan will not result in changes to standards implementing a functional classification system. The functional classification system is established by the State Highway Plan, Regional Transportation Plan, Washington County Transportation System Plan and Forest Grove Transportation System Plan. The Westside Refinement Plan does not contain any recommendations to change standards in place pertaining to implementing any of these functional classification systems.

3. The Westside Plan recommends land use designations implemented through the Comprehensive Plan, Official Zoning Map and Development Code. The Oregon Highway Plan, Regional Transportation Plan, Washington County Transportation System Plan and Forest Grove Transportation System Plan establish the functional classification of transportation facilities. The Westside planning area is served by Highway 47, David Hill Road, and Thatcher Road. The table below shows the functional classifications for these facilities.

Facility	Forest Grove TSP	Washington County TSP	Regional Transportation Plan
Highway 47	Principal Arterial	Principal Arterial	Principal Arterial
David Hill Road (east)	Arterial	N/A	Future Minor Arterial
David Hill Road (west)	Collector	N/A	Future Minor Arterial
Thatcher Road	Arterial	Collector	Minor Arterial

The recommended land use designations identified in the Westside Plan are consistent with the functional classifications

To ensure there will not be a significant effect on state highway facilities ODOT recommends the following:

> "Unless authorized by ODOT in writing, no approvals of development shall be permitted by the city in the area potentially impacting operation of Highway 47 until such time as the mitigations listed below have been adopted into the City's Transportation System Plan Financially Constrained project list:
>
> 1. OR 47/David Hill Road Intersection – Add an additional second circulating lane to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.

2. OR 47/Purdin Road/Verboort Road Intersection – Add a northbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection."

Goal 14 - Urbanization – This goal requires cities to estimate future growth and needs for land and then plan and zone enough land to meet those needs. Goal 14 also establishes criteria to be applied when undeveloped land within an urban growth boundary is to be converted to urban uses.

Finding Goal 14: The Westside Refinement Plan identifies a land use concept to guide the conversion of undeveloped land to urban uses. The land use concept is described in Chapter 4 (Land Use) of the Westside Refinement Plan

Regional Planning Consistency

Metro Urban Growth Management Functional Plan (UGMFP)

Title 1: Housing Capacity

Finding UGMFP Title 1: §3.07.110 of the Urban Growth Management Plan states the Metro Regional Framework Plan calls for a compact urban form and a "fair-share" approach to meeting regional housing needs. Section 3.07.110 goes on to state, "It is the purpose of Title 1 to accomplish these policies by requiring each city and county to maintain or increase its housing capacity." Implementation of the Westside Refinement Plan will increase housing capacity within the urban growth boundary by an estimated 1,256 housing units. This is largely the result of designating the area north of David Hill Road between Highway 47 and Thatcher Road from future development for residential and mixed-use development. Estimated housing capacity is based on the identified land use concept and land use analysis contained in the Westside Refinement Plan. The land use analysis identifies the gross acreage by zoning designation, estimated developable amount of land area to yield net acres. The target density identified on Table 3-3 in §10.3.130 of the Forest Grove Development Code was applied to the net acreage to yield a dwelling unit estimate. Since adoption and implementation of the Westside Refinement Plan will increase the City's housing capacity the Plan is consistent and complies with §3.07.110 et. seq. of the Metro Urban Growth Management Plan.

Title 11: Planning for New Residential Areas

Finding UGMFP Title 11 (§3.07.1110 Planning for Areas Designated Urban Reserve): §3.07.1110 of the Urban Growth Management Functional Plan addresses planning for areas designated urban reserve. This section of the Urban Growth Management Plan does not apply to the Westside Refinement Plan and accompanying implementation measures since the area affected by the Westside Refinement Plan is not located within an urban reserve area. The land north of David Hill Road, west of Thatcher Road,

south of Council Creek and west of Highway 47 was previously designated as urban reserve 7B. This area was added to the urban growth boundary by the Oregon Legislature in 2014 as part of House Bill 4078. Therefore, this section of Title 11 does not apply.

Finding UGMFP Title 11 (§3.07.1120 Planning for Areas Added to the UGB):
§3.07.1120 addresses planning for areas added to the urban growth boundary. The area north of David Hill Road, west of Thatcher Road, south of Council Creek and west of Highway 47 was added to the urban growth boundary by the Oregon Legislature in 2014 as part of House Bill 4078. Although this section of Title 11 does not technically apply since the area was added to the urban growth boundary by Legislative rather than Metro Council action the following findings demonstrate how the Westside Refinement Plan and accompanying implementation measures comply with UGMFP §3.07.1120:

Finding §3.07.1120 (a): This section of the UGMP states "The county or city responsible for comprehensive planning of an area, as specified by the intergovernmental agreement adopted pursuant to section 3.07.1110(C)(7) or the ordinance that added the area to the UGB, shall adopt comprehensive plan provisions and land use regulations for the area to address the requirements of subsection (c) by the date specified by the ordinance or by section 3.071455(b)(4) of this chapter." The Westside Refinement Plan includes recommendations for amending the City of Forest Grove Comprehensive Plan Map to assign plan designations for the area added to the urban growth boundary. Section 3: Comprehensive Plan Amendments includes findings for the Comprehensive Plan Map amendments. Upon the effective date of adoption of the ordinance amending the Comprehensive Plan Map consistent the Westside Refinement Plan this UGMFP requirement will be met.

Finding §3.07.1120(b): This section of the UGMFP states "If the concept plan developed for the area pursuant to section 3.07.1110 assigns planning responsibility to more than one city or county, the responsible local governments shall provide for concurrent consideration and adoption of proposed comprehensive plan provisions unless the ordinance adding the area to the UGB provides otherwise." The entire area added to the urban growth boundary is entirely within the City of Forest Grove planning area and will be entirely within the City of Forest Grove upon annexation. Therefore, this section does not apply.

Finding §3.07.1120 (c)(1): This section of the UGMFP states "Comprehensive plan provisions for the area shall include:

1. Specific plan designation boundaries derived from and generally consistent with the boundaries of design type designations assigned by the Metro Council in the ordinance adding the area to the UGB." The area added the urban growth boundary was done through action by the Oregon Legislature as part of House Bill 4078. As such, the Metro Council did not adopt an ordinance establishing boundaries for land use designations. Therefore, §3.07.1120(c)(1) of the UGMFP does not apply to adoption of the Westside Refinement Plan and accompanying implementation measures.

Finding §3.07.1120(c)(2): This section of the UGMFP states: comprehensive plan provisions for the area shall include "Provision for annexation to a city and to any necessary service districts prior to, or simultaneously with, application of city land use regulations intended to comply with this subsection." The area added to the urban growth boundary is adjacent to the City of Forest Grove and within the City's planning area. Therefore this area will be subject to the Forest Grove Comprehensive Plan. Forest Grove Comprehensive Plan Urbanization Policy 2 states "All lands within the urban growth boundary shall be assigned priorities for urban development. Priorities shall be based on the City's ability to provide urban services and the orderly and efficient timing of service extension. These priorities shall be the basis for making decisions on all development proposals and requests for annexation." Comprehensive Plan Urbanization Policy 5 states "Sewer and water utilities shall not be extended beyond the City's corporate limits and shall be provided only after annexation. These Comprehensive Plan policies demonstrate that provisions are in place requiring annexation prior to development of land within the City's planning area. Therefore, the intent of §3.07.1120(c)(2) is met.

Finding §3.07.1120(c)(3). The section of the UGMFP states: comprehensive plan provisions for the area shall include "Provisions that ensure zoned capacity for the number and types of housing units, if any, specified by the Metro Council pursuant to section 3.07.1455(b)(2) of this chapter. The Metro Council did not specify zoned housing capacity for the area added to the urban growth boundary the Oregon Legislature. However, the Forest Grove Comprehensive Plan (Land Use Policy 5) and Forest Grove Development Code (§10.3.130) establish target and minimum densities within residential zones. This ensures that zoned capacity is achieved consistent with §3.07.1120(c)(3). For the reason stated above, the intent of §3.07.1120(c)(3) is met.

Finding §3.07.1120(c)(4). This section of the UGMFP states: comprehensive plan provisions for the area shall include: "Provision for affordable housing consistent with Title 7 of this chapter if the comprehensive plan authorizes housing in any part of the area." The Westside Refinement Plan recommends housing in the area added to the urban growth boundary. Therefore, the Comprehensive Plan provisions for the new urban growth area must include provision for affordable housing consistent with UGMFP Title 7 (Housing Choice). The Plan designations include areas identified as NMU (Neighborhood Mixed Use) and RML (Residential Multiple Family Low). Both designations allow for attached single family dwellings, single family dwellings on lots as small as 3,500 square feet and multiple family dwellings. This compares to other residential Plan districts that establish average lot sizes of 5,000 square feet to 10,000 square feet. Regulations allowing for small lots in the new urban growth boundary area provide the option for homes at a variety of price points. This includes homes affordable for moderate income households. Promoting a variety of lot sizes in the new urban growth area is consistent with UGMFP Title 7 (§3.07.730) which requires that cities and counties within the Metro region ensure that their comprehensive plans and implementing ordinances include strategies to ensure a diverse range of housing types within their jurisdictional boundaries. Since the Westside Refinement Plan and accompanying Comprehensive Plan map amendment includes provisions for a variety

of housing types including housing that could be affordable to moderate income households this criterion is met.

Finding §3.07.1120(c)(5). This section of the UGMFP states: comprehensive plan provisions for the area shall include: "Provision for the amount of land and improvements needed, if any, for public school facilities sufficient to serve the area added to the UGB in coordination with affected school districts. This requirement includes consideration of any school facility plan prepared in accordance with ORS 195.110." The Westside Refinement Plan and accompanying Comprehensive Plan map amendment identifies a possible location for a new elementary school site in the new urban growth boundary area. The need for a new elementary school site was established when the Forest Grove Comprehensive Plan was updated in 2014. The school site is approximately 11.96 acres consistent with the Forest Grove School District's siting guidelines. The recommendation for a new elementary school site in the new urban growth area was considered and incorporated into the Forest Grove School District's Long Range Facility Plan study completed in April 2017. Since the Westside Refinement Plan and accompanying Comprehensive Plan Map amendment includes provisions for a new elementary school in the new urban growth boundary area this criterion is met.

Finding §3.07.1120(c)(6): This section of the UGMFP state: comprehensive plan provisions for the area shall include: "Provision for the amount of land and improvements needed, if any, for public park facilities sufficient to serve the area added to the UGB in coordination with affected park providers." The Westside Refinement Plan and accompanying Comprehensive Plan Map amendment identifies a location for a new neighborhood park in the new urban growth boundary area. The park site is approximately six acres and meets the park siting guidelines contained in the Forest Grove Parks, Recreation, and Open Space Master Plan updated in 2016. The new neighborhood park is also identified on the park capital improvement project list contained in the Parks, Recreation and Open Space Mater Plan. Since the Westside Refinement Plan and accompanying Comprehensive Plan Map amendment includes provisions for a new neighborhood park this criterion is met.

Finding §3.07.1120(c)(7): This section of the UGMFP states: comprehensive plan provisions for the area shall include a conceptual street plan that identifies internal street connections and connections to adjacent urban areas to improve local access and improve the integrity of the regional street system. For areas that allow residential or mixed-use development, the plan shall meet the standards for street connections in the Regional Transportation Functional Plan. The Westside Refinement Plan and accompanying Transportation System Plan amendments includes a conceptual collector street plan that identifies internal street connections to adjacent urban area to improve local access and improve the integrity of the regional street system. The street connections are described in detail in the June 24, 2016, infrastructure memo prepared by SCJ Alliance. The collector street connections are space within ½ mile which meets the requirement for collector street spacing in the Regional Transportation Plan as implemented by the Regional Transportation Functional Plan. Since the Westside Refinement Plan and accompanying Transportation System Plan amendments include

a conceptual collector street network complying with the Regional Transportation Functional Plan this criterion is met.

Finding §3.07.1120(c)(8): This section of the UGMFP states: comprehensive plan provisions for the area shall include "Provision for the financing of local and state public facilities and services." An infrastructure needs assessment and funding approach were prepared for the Westside Refinement Plan. The findings and analysis are documented in the Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis dated June 24, 2016 and Westside Planning Area Funding Approach document dated December 2016. The Forest Grove Comprehensive Plan also contains policies for provision of infrastructure and funding infrastructure. These Comprehensive Plan policies apply to development in the new urban growth boundary area.

Finding §3.07.1120(c)(9): This section of the UGMFP states: comprehensive plan provisions for the area shall include: "A strategy for protection of the capacity and function of state highway interchanges, including existing and planned interchanges and planned improvements to interchanges." The Westside planning area does not include any state highway interchanges including existing and planned interchanges. Therefore, this requirement is not applicable.

Metro Regional Transportation Functional Plan

The Regional Transportation Functional Plan (RTFP) implements the goals and objectives on Section 2.3 of the Regional Transportation Plan and the polices of the Regional Transportation Plan. The Regional Transportation Functional Plan is intended to be consistent with federal law that applies to Metro in its role as a metropolitan planning organization, the Oregon Transportation Plan, and Statewide Planning Goal 12 (Transportation) including the Transportation Planning Rule.

Staff finds the Regional Transportation Functional Plan includes the following titles applicable to the Westside Refinement Plan:

Title 1: Transportation System Design; and

Title 5: Amendments to Comprehensive Plans.

This finding is based on the fact that the Westside Refinement Plan and accompanying Transportation System Plan amendments include a conceptual collector street network to serve future development in the planning area. The Westside Refinement Plan and accompanying implementation measures include amendments to the Forest Grove Comprehensive Plan Map. Therefore, Title 5 of the Regional Transportation Functional Plan also apply to adoption of the Westside Refinement Plan.

RTFP §3.08.1110: Street System Design

Section 3.08.1110(c) of the RTFP stipulates that a local TSP include to the extent practicable, a network of major arterial streets at one-mile spacing and minor-arterial or collector streets at half-mile spacing considering the following factors:

- Existing topography;
- Rail lines;
- Freeways;
- Pre-existing development;
- Leases, easements or covenants in place prior to May 1, 1995;
- Requirements of Title 3 and Title 13 of the Urban Growth Management Functional Plan;
- Arterial design concepts of in Table 2.6 and Figure 2.11 of the Regional Transportation Plan; and
- Best practices and designs as set forth in Green Streets: Innovative solutions for Stormwater, Street Crossings, Trees for Green Streets: An Illustrated Guide, Creating Livable Streets: Street Design Guidelines for 2040, and state or locally-adopted plans and best practices for protecting natural resources and natural areas.

Findings RTFP §3.08.1110(c): The Westside Refinement Plan includes a map showing the conceptual street network developable areas within the planning area. The conceptual street network includes a system of collectors roadways spaced at intervals that do not exceeding ½ mile. The collector street network follows contours to limit grades and required cut and fill. The collector street network also avoids natural resource areas including large stands of trees and streams. No streams are crossed by proposed streets.

The Forest Grove Transportation System Plan contains cross-sections for roadways based on roadway classification. The Forest Grove Development Code (Article 8, Table 8-8) establishes street standards by classification including setting minimum right-of-way widths and minimum roadway width. The minimum roadway width for a collector street is 66 feet. The minimum roadway width is 40 feet. Geometric cross-sections for the proposed roadways are identified in the Appendix to the June 24, 2016, Infrastructure Memo prepared by SCJ Alliance. The collector cross-section contained in the appendix shows a 66-foot right-of-way. This right-of-way includes two auto travel lanes as well as sidewalks and bicycle lanes on both sides of the street.

To limit environmental impacts, David Hill Road west of Thatcher Road has a modified cross-section. This cross-section has a 40-foot right-of-way with 32 feet of roadway and a 6-foot sidewalk on one side of the road.

The planning area includes three existing collector streets (Thatcher Road, David Hill Road and Gales Creek Road) and one existing Principal Arterial (Highway 47). The distance between Highway 47 and Thatcher Road is approximately 1.2 miles. To comply with the roadway spacing requirements of the RFTP additional roadways

between Highway 47 and Thatcher Road are necessary. The roadway concept included in Westside Refinement Plan shows the northerly extension of Main Street, B Street, and Brooke Street north of David Hill Road. The spacing between these roadways ranges from less than one quarter mile to one-third mile. These distances comply with the requirement that the distance between collector streets be no more than ½ mile.

West of Thatcher Road there are two east-west roadways proposed. One is located between Watercrest Road and David Hill Road. The conceptual location of this roadway meanders based on topography and avoids impacting Thatcher Park, Thatcher Woods and the property west of the park currently owned by the Forest Grove School District. This conceptual alignment is about 750 feet north of Watercrest Road south of Thatcher Park and about 500 feet south of David Hill Road at the western end of the road segment. These distances are less than ½ mile and comply with the requirement that the distance between collector streets be no more than ½ mile.

The Westside Refinement Plan proposes the improvement of Plum Lane as a public collector street. Plum Hill Lane is approximately 1/4 mile north of David Hill Road. This distance is less than ½ mile and complies with the RTFP requirement that collector roads be spaced no more than ½ mile apart.

The Westside Refinement Plan also includes a new north-south collector west of Thatcher Road. The conceptual alignment follows elevation contours to minimize grade and amount of required cut and fill. This roadway is approximately 0.43 miles west of Thatcher Road at the southern end and about 1/3 mile to the west of Thatcher Road at Plum Hill Lane. These distances are less than ½ mile and complies with the RTFP requirement that collector roads be space no more than ½ mile apart.

RTFP §3.08.1110(d): This section of the RTFP addresses local access and circulation and preservation of capacity on the region's arterial street system: "To improve local access and circulation, and preserve capacity on the region's arterial system, each city and county shall incorporate into its Transportation System Plan a conceptual map showing new streets for all contiguous areas of vacant and developable lots and parcels of five or more acres that are zoned to allow residential or mixed-use development. The map shall identify street connections to adjacent areas to promote a logical, direct and connected system of streets and should demonstrate opportunities to extend and connect new streets to existing streets, provide direct public right-of-way routes and limit closed-end street designs."

Findings §3.08.1110(d): The study area includes two arterial streets: Highway 47 and David Hill Road between Thatcher Road and Highway 47.

The majority of vacant and developable parcels in the Westside planning area are five acres or larger. The total number of parcels five acres or larger is 39. The Westside Refinement Plan includes a map showing new streets for contiguous areas of vacant and developable lots and parcels five acres or larger identified to allow residential or

mixed-use development. The map shows connections to adjacent areas to promote a logical, direct and connected system of streets.

RTFP 3.08.1110(3): If proposed residential or mixed-use development of five or more acres involves construction of a new street, the city and county regulations shall require the applicant to provide a site plan that:

- Is consistent with the conceptual new street map required by the Title 1 of the RTFP.

  Finding: The proposed conceptual new street map required by Title 1 is included in Chapter 1 of the Westside Refinement Plan. This map identifies the "backbone" collector street system. These street segments will be added to the roadway plan contained in the Transportation System Plan.

- Provides full street connections with spacing of no more than 530 feet between connections, except if prevented by barriers such as topography, rail lines, freeways, pre-existing development, leases, easements or covenants that existed prior to May 1, 1995, or by requirements of Titles 3 and 13 of the Urban Growth Management Functional Plan.

  Finding: The Forest Grove Transportation System Plan includes Goals, Policies and Performance Measures. Policy 2a states the City will develop a local and neighborhood street system with a preferred spacing of no more than 530 feet. Exceptions will be given where connections are prevented by topography or other environmental constraints. The specific spacing of local and neighborhood streets will be determined during the development review process. If necessary conditions of development approval will apply to ensure compliance with City policy.

- If streets must cross water features protected pursuant to Title 3 of the Urban Growth Management Functional Plan, provides a crossing every 800 to 1,200 feet unless habitat quality or the length of the crossing prevents a full street connection.

  Finding: The location and spacing of bike and pedestrian accessways will be determined during the development review process.

- If full street connection is prevented, provides bicycle and pedestrian accessways on public easements or rights-of-way spaced such that accessways are not more than 330 feet apart, unless not possible for the reasons identified above.

  Finding: Policy 2a states the City will develop a walkway route system with a preferred spacing of 300 feet between elements of the City pedestrian network. The specific spacing of pedestrian access points will be determined during the development review process. If necessary conditions of development approval will apply to ensure compliance with City policy.

- Provides for bike and pedestrian accessways that cross water features protected pursuant to Title 3 of the Urban Growth Management Functional Plan at an average of 530 feet between accessways unless habitat quality or the length of the crossing prevents a connection.

  Finding: The location and spacing of bike and pedestrian accessways will be determined during the development review process.

- If full street connection over water features protected pursuant to Title 3 of the Urban Growth Management Functional Plan cannot be constructed in centers as defined in Title 6 of the Urban Growth Management Functional Plan or Main Streets shown on the 2040 Growth Concept Map, or if spacing of full street connections exceeds 1,200 feet, provides bike and pedestrian crossings at an average of 530 feet between accessways unless habitat quality or the length of the crossing prevents a connection.

  Finding: The Westside Refinement Plan and accompanying implementation measures do not affect Centers and Main Streets as defined in Title 6 of the Urban Growth Management Function Plan or the 2040 Growth Concept Map. In addition, collector street connections over water features, including any protected pursuant to Title 3 of the Urban Growth Management Function Plan, are not necessary to serve development. Local street connections are also not expected to cross water features. Local street connections will be reviewed through the City's standard land use review and permitting process at time of application.

- Limits cul-de-sac designs or other closed-end street designs or circumstances in which barriers prevent full street extensions and limits the length of such streets to 200 feet and the number of dwellings along the street to more than 25.

  Finding: Article 8 of the Forest Grove Development Code (§10.8.610(K) limits a cul-de-sac to more than 200 feet in length providing access to no more than 20 dwellings.

- Provides street cross-sections showing dimensions of right-of-way improvements and posted or expected speed limits.

  Finding: The Forest Grove Transportation System Plan contains street cross-sections and dimension of right-of-way improvements by functional classification (§8.6.1 and Figures 8-2 through 8-6). The Forest Grove Transportation System Plan also identifies posted speed limits for street segments (Figure 3-7). This information will be updated as new street segments are constructed in the Westside planning area.

RTFP Section 3.08.1110(g): To protect the capacity, function and safe operation of existing and planned state highway interchanges, cities and counties shall to the extent feasible restrict driveway and street access in the vicinity of the ramp terminals.

Finding: This section is not applicable to the Westside Refinement Plan since existing or planned state highway interchange exists in the planning area.

Pedestrian System Design

Section A: City and County TSP shall include a pedestrian plan, with implementing land use regulations, for an interconnected network of pedestrian routes within and through the city or county. *Finding*: This section applies to the TSP and not a refinement plan. The pedestrian network for the Westside Planning area will follow the collector street system and Parks, Recreation, and Open Space Master Plan for off-street routes and connections. This also applies to the bicycle system.

RTFP §3.08.510 et. seq. addresses amendments to local comprehensive plans and transportation system plans. This section of the RTFP requires a city or county to consider certain strategies for State Transportation Planning Rule (OAR 660-012-0060) compliance as part of the amendment to a comprehensive plan or Transportation System Plan.

Finding (§3.08.510 et. seq.): The Westside Refinement Plan and accompanying implementation measures includes amendments to the Forest Grove Comprehensive Plan and Transportation System Plan. Therefore, Title 5 applies.

RTFP §3.08.510(A): When a city or county proposes to amend its comprehensive plan or its components, it shall consider the strategies of 3.08.220A as part of the analysis required by OAR 660-012-0060 [Transportation Planning Rule].

Finding §3.08.510(A): Accompanying adoption of the proposed Westside Refinement Plan are proposed amendments to the Forest Grove Comprehensive Plan and the Plan's components including the Forest Grove Transportation System Plan and Forest Grove Development Code. Since adoption of the Westside Refinement Plan includes amendment to the Comprehensive Plan and its components the City must consider the strategies of 3.08.220A as part of the analysis required by the Transportation Planning Rule. The findings below describe how the strategies were considered during preparation of the Westside Refinement Plan and proposed amendments to the Comprehensive Plan, Transportation System Plan and Development Code.

> §3.08.220(A): Each city and county shall consider the following strategies, in the order listed, to meet the transportation needs determined pursuant to section §3.08.210 and performance targets and standards pursuant to section §3.08.230. The city or county shall explain its choice of one or more of the strategies and why other strategies were not chosen:
>
> §3.08.220(A)(1). Transportation system management strategies, including localized transportation demand management, safety, operational and access management improvements.

Finding §3.08.220(A)(1): The conceptual roadway network incorporated into the Westside Refinement Plan considered safety, operational and access factors. The January 20, 2016, infrastructure technical memorandum identifies the assumptions used for conceptual roadway design. While the planning level street system considers intersection and driveway spacing requirements of relevant City and County standards as applicable, the final spacing of connection points will be reviewed during final design.

Analysis of 2035 PM Peak Hour Traffic Operations Analysis was conducted based on Westside Refinement Plan land use alternative, roadway improvements identified in the Transportation System Plan and conceptual roadway network for the Westside area. The traffic analysis identifies mitigation measures including measures to improve roadway operations.

§3.08.220(A)(2). Transit, bicycle and pedestrian system improvements;

Finding §3.08.220(A)(2): The proposed street network includes bicycle and pedestrian system improvements. The identified street cross-section for roadways in the planning area as described in the include sidewalks and bicycle lanes. This demonstrates compliance.

§3.08.220(A)(3). Traffic-calming designs and devices

Finding §3.08.220(A)(3): The Forest Grove Transportation System Plan in Chapter 8 (§8.5) addresses neighborhood traffic management. The Transportation System Plan defines neighborhood traffic management as traffic control devices used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic. The City uses a three step for addressing neighborhood traffic concerns. This process includes 1) use of a speed wagon to establish a baseline condition, 2) monitoring by neighborhood watch groups, and 3) police enforcement. Neighborhood traffic management applies to residential streets and not the collector street network which is intended to handle traffic at higher speeds and volumes than local residential streets.

§3.08.220(A)(4). Land use strategies in OAR 660-012-0035(2) to help achieve the thresholds and standards in Tables 3.08-1 and 3.08-2 or alternative thresholds and standards established pursuant to section 3.08.230.

Finding: §3.08.220(A)(4): The land use concept identified in the Westside Refinement Plan and accompanying comprehensive plan map and zoning map amendments attempts to balance the requirements of Urban Growth Management Plan Title 11 and the Transportation Planning Rule (OAR 660-012-0035(2). The Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative (10/26/15), dated March 8, 2017, prepared by SCJ Alliance identifies potential mitigation measures to ensure the thresholds and standards in Table 3.08-1 and 3.08-2 are met. Mitigation measures include adding an additional traffic lane to the round-about at Purdin/Verboort Road and

Highway 47 and David Hill Road and Highway 47. These intersections are the most impacted by the land uses proposed for the new urban growth boundary area north of David Hill Road between Highway 47 and Thatcher Road.

<u>§3.08.220(A)(5). Connectivity improvements to provide parallel arterials, collectors or local streets that include pedestrian and bicycle facilities, consistent with the connectivity standards in section 3.08.110 and design classifications in Table 2.6 of the RTP, in order to provide alternative routes and encourage walking, biking, and access to transit</u>.

<u>Finding §3.08.220(A)(5)</u>: The Westside Refinement Plan and accompanying Transportation System Plan amendments identify a backbone collector roadway network necessary to serve development. Connectivity with individual developments and the local street system will be reviewed as part of the City's standard land use review process. Developments will be required to comply with the street connectivity requirements described in Article 8 of the Forest Grove Development Code §10.8.100 et. seq., Access and Circulation; §10.8.610(F): Future Street Plan and Connections; §10.8.610(G): Street Alignment and Connections; 10.8.620, Sidewalks; §10.8.640, Bikeways; §10.8.905(B), Block Length and Perimeter; §10.8.905(C), Block Length Exceptions; and §10.8.905(D), Pedestrian Ways; to encourage walking, biking and access to transit as appropriate.

<u>§3.08.220(A)(6). Motor vehicle capacity improvements, consistent with the RTP Arterial and Throughway Design and Network Concepts in Table 2.6 and section 2.5.2 of the RTP, only upon a demonstration that other strategies in this subsection are not appropriate or cannot adequately address identified transportation needs</u>.

<u>Finding §3.08.220(A)(6)</u>: The Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative (10/26/15), March 8, 2017 identifies motor vehicle capacity improvements for the roundabout located at the Purdin Road/Verboort Road intersection with Highway 47 and the roundabout located at the David Hill Road intersection with Highway 47. The identified capacity improvements include adding an additional travel lane to the single lane roundabouts. These two capacity improvements are necessary to address identified traffic impacts associated with development in the area added to urban growth boundary by the Oregon Legislature in 2014. Development in this area was not anticipated when the when the City's most recent Transportation System Plan was adopted the area was expected to remain for agricultural and farm use during the planning period covered by the Transportation System Plan. The identified capacity improvements have been coordinated with the Oregon Department of Transportation. To ensure there will not be a significant effect on state highway facilities ODOT recommends the following:

> "Unless authorized by ODOT in writing, no approvals of development shall be permitted by the city in the area potentially impacting operation of

Highway 47 until such time as the mitigations listed below have been adopted into the City's Transportation System Plan Financially Constrained project list:

1. OR 47/David Hill Road Intersection – Add an additional second circulating lane to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.
2. OR 47/Purdin Road/Verboort Road Intersection – Add a northbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection."

RTFP §3.08.510(B): If a city or county proposes a transportation project that is not included in the RTP and will result in a significant increase in SOV capacity or exceeds the planned function or capacity of a facility designated in the RTP, it shall demonstrate consistency with the following in the its project analysis:

1. The strategies set forth in subsection 3.08.220A(1) through (5);

2. Complete street designs adopted pursuant to subsection 3.08.110A and as set forth in Creating Livable Streets: Street Design Guidelines for 2040 (2nd Edition, 2002) or similar resources consistent with regional street design policies.

3. Green street designs adopted pursuant to subsection 3.08.110A and as set forth in Green Streets: Innovative Solutions for Stormwater and Street Crossings (2002) and Trees for Green Streets: An Illustrated Guide (2002) or similar resources consistent with federal regulations for stream protection.

Finding §3.08.510(B): The Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative (10/26/15), dated March 8, 2017, identifies needed capacity improvements for the roundabouts located on Highway 47 and David Hill Road and Purdin Road/Verboort Road. The capacity improvements are on an ODOT facility (Highway 47). These two transportation projects are not included in the Regional Transportation Plan. These two projects will increase SOV capacity commensurate with expected development in the area north of David Hill Road added to the urban growth boundary in 2014. Based on the Revised 2035 PM Peak Hour Traffic Operations Analysis traffic will exceed the current design capacity of both roundabouts.

The findings section for RTFP §3.08.510(A) addresses the strategies set forth in subsection 3.08.220A(1) through (5). The project analysis contained in the Revised 2035 PM Peak Hour Traffic Operations Analysis, March 8, 2017, establishes the needed for capacity improvements to address traffic impacts associated with development in the Westside Refinement Plan area. Therefore, strategy 6, motor vehicle capacity improvements, is the selected strategy.

The identified capacity improvements affect a facility owned by ODOT (Highway 47). While the Forest Grove Development Code (Article 8, §10.8.605(D), Use of Pervious Surfaces, and §10.8.610(A), Street Improvements) addresses complete street designs and green street designs the design of the improvements must meet ODOT design standards for facility type in coordination with Washington County.

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Forest Grove Comprehensive Plan Consistency

The Forest Grove Comprehensive Plan is the City's coordinated policy document and map guiding the development of the City over a twenty year period. The Westside Refinement Plan and accompanying implementation measures addresses many elements of the Comprehensive Plan including:

- Citizen Involvement;
- Community Sustainability;
- Land Use;
- Housing;
- Public Facilities and Community Services;
- Education and School Facilities;
- Natural Resources and Natural Hazards;
- Urbanization; and
- Transportation

Finding Citizen Involvement: The citizen involvement program for the Westside Refinement Plan was reviewed by the City's Committee for Citizen Involvement. The citizen involvement program included stakeholder interviews, three community meetings during the course of the project and multiple work sessions with the Planning Commission and City Council. The citizen involvement program provided opportunities to influence preparation of the Westside Refinement Plan and accompanying implementation measures. Comments received during the citizen involvement process resulted in changes to the land use concept including identifying opportunities for non-residential land uses in the new area added to the urban growth boundary and recommending target residential densities throughout the planning area.

Finding Community Sustainability: Community sustainability is a cornerstone of the City's Vision Statement and has been an ongoing priority for the Forest Grove City Council. Chapter 3 of the Forest Grove Comprehensive Plan addresses community sustainability and is also reflected in the land use concept recommended for the Westside planning area.

A goal of the Forest Grove Comprehensive Plan is to create complete neighborhoods, through land use regulations, with housing, recreational opportunities, retail, services, and employment nearby and to promote transit supportive land uses. The land use concept described in Chapter 4 is based on the concept of complete neighborhoods by

identifying opportunities for mixed-use development near residential areas as well as locations for parks, schools and support services such as a new site for a fire station.

The list below shows other recommendations in the Westside Plan intended to advance community sustainability including:

- ✓ Riparian enhancement along stream corridors;
- ✓ Landslide stabilization by replanting deep rooted vegetation on hillsides;
- ✓ Development regulations to preserve views from low elevations to David Hill to promote cluster development;
- ✓ Promote voluntary conservation measures and integration of built and natural systems; and
- ✓ Integrate storm water management with natural systems to improve water quality and wildlife habitat opportunities;

Finding Land Use: Chapter 4 of the Forest Grove Comprehensive Plan addresses land use within the City's planning area – the area within the urban growth boundary adjacent to the Forest Grove city limits. The Westside Plan addresses a number of policies related to land use in the Comprehensive Plan including:

1. The City of Forest Grove will adopt a land use concept that promotes efficient use of land within the urban growth boundary.

3. The City of Forest Grove will support policies that encourage locating complementary land use in proximity to reduce demand on transportation systems [including use of transit] and improve the overall quality of life of the community.

The Chapter 4 of the Westside Plan identifies a land use concept accommodating a variety of land uses including residential and retail uses. A primary objective of the Plan is promoting long term community sustainability through private and public land use decisions. To this end the Plan strives to create complete neighborhoods. Complete neighborhoods are characterized by complementary land uses in proximity. This in turn reduces demands on the transportation system and supports cost-effective delivery of transportation services by reducing or eliminating the need to add capacity which is quite expensive.

Finding Housing: The Westside Refinement Plan identifies approximately 353 gross acres for housing. This represents approximately 60% of the entire planning area. The land use concept prepared for the Westside Refinement Plan area identifies a variety of residential Comprehensive Plan Map and zoning map designations providing opportunities for a variety of housing types. Designations include Suburban Residential (1 acre per dwelling), B-Standard (6.22 dwellings per net acre), C-Low (4.35 dwellings per net acre), (A-Medium 8.71 dwellings per net acre), Residential Multiple Family Low (12 dwellings per net acre), and Neighborhood Mixed Use (12 dwellings per net acre). Housing types allowed in the districts range from single family detached, duplexes, single family attached, manufactured homes on individual lots, and manufactured home parks on sites larger than four acres.

The Westside Refinement Plan addresses the Comprehensive Plan goals and policies in the following ways. Designation of land for residential development in the Westside Planning area ensures an adequate supply of developable land to support needed housing types and a complete community consistent with Housing Goal 1. Designation of areas for mixed use development is consistent with Comprehensive Plan Housing Goal 3: promote mixed-use development opportunities throughout the community. The land use concept for the new urban growth boundary area also promotes neighborhoods complete with residences, open spaces, schools, parks and shopping opportunities in close proximity consistent with Comprehensive Plan Housing Goal 6. By identifying areas for a variety of land uses the land use concept discourages stand-alone residential developments lacking support activities.

Finding Public Services and Community Services: An assessment of public services and community services needs was prepared to support recommendations included in the Westside Refinement Plan and accompanying implementation measures. The detailed findings are contained in the Revised Final Westside Water, Sewer, Stormwater and Infrastructure Analysis, dated June 24, 2016. The findings supporting the need for an elementary school are contained in the Education and School Facilities element of the Forest Grove Comprehensive Plan (2014). An assessment of school needs consistent with ORS 195.110 was prepared for the Comprehensive Plan updated completed in 2014. This assessment showed a need for an additional elementary school to serve growth. Findings supporting the need for a neighborhood park are contained in the Parks, Recreation and Open Space Master Plan updated in 2016.

Finding Education and School Facilities: The Comprehensive Plan identifies a need for a new elementary school to serve future growth. The Westside Refinement Plan land use concept and accompanying Comprehensive Plan Map amendments addresses this need by identifying a location for an elementary school in the area added to the urban growth boundary. The site is approximately 10 acres in area and is located north of David Hill Road near the future extension of B Street.

Finding Natural Resources and Natural Hazards: The Westside Refinement Plan addresses natural resources and natural hazards. The Refinement Plan contains a goal and several policies for natural resources and natural hazards including:

- Goal 1.1: Establish land use designations for the Westside planning area based on the physical limitations of the land.
    - Policy 1.1.1: Land use designations for the Westside planning area should be based on identified environmental constraints including steep slopes and mapped landslide areas.
    - Policy 1.2.1: The physical limitations of the land should be the basis for determining the density, location and type of development in the Westside planning area.
    - Policy 1.3.1: A mapped landslide area is identified in the area south of David Hill Road between Forest Drive and Antler Lane. Development within the mapped landslide area should be avoided.

- Policy 1.4.1: A geological and engineering assessment for development north of David Hill Road and west of Thatcher Road shall be required to ensure suitability of proposed development from an engineering perspective.

The basis for the goal and policies above is the information and analysis contained in the Natural Resources Baseline Report, January 2015 and Geological and Geotechnical Assessment Report Westside Planning Project, February 2015.

Finding Urbanization: The Westside Refinement Plan addresses the conversion of land from rural uses to urban uses within the planning area. The Refinement Plan includes a goal and policy for urbanization:

- Goal 2.1: Promote an orderly transition from rural to urban land uses within the urban growth boundary.
    - Policy 2.2.1: Establish land use designations in the Westside planning area to promote an orderly transition from rural to urban land use within the urban growth boundary.

Finding Transportation: Transportation is one of the most important improvements provided by public agencies. Transportation affects land values, economic competitiveness, and the environment. How the transportation network is planned affects overall quality of life and influences community character. Chapter 11 of the Forest Grove Comprehensive Plan addresses transportation needs in the City's planning area including the preferred pedestrian, bicycle and roadway networks as well as a funding approach for these needs. The Forest Grove Comprehensive Plan contains the following goals and policies related to transportation:

Goal 4: Design and construct transportation facilities in a manner that enhances the livability of Forest Grove.

The infrastructure analysis for the Westside identifies a robust transportation system based on a collector street system. This transportation backbone will improve connectivity for all modes of transportation including pedestrians, bicycles, and vehicles.

Policy 4.1: Maintain the livability of Forest Grove through proper location and design of transportation facilities.

The proposed collector street network and recommended standards for the Planning Area are based on the topographic constraints of the Westside area to minimize necessary cut-and-fill and to minimize street grades. The Forest Grove Development Code limits collector street grades to a maximum 12%. Although care was taken to minimize collector street grades there are portions of segments where street grade exceeds 12%. Care was taken to minimize the length of these segments. An amendment to the Development Code is recommended to address this issue and would provide authority to the City Engineer to approve collector street grades exceeding to 12%.

Goal 6: Establish and maintain a context sensitive set of transportation design and development regulations.

The proposed street network and recommended standards for the Planning Area are context sensitive and take into account topographic constraints of the area to minimize cut-and-fill and grades. The recommended street network is based on strategically placed collector roads providing needed circulation and access.

Policy 6.1: Streets should be designed to support their intended users.

The recommended street network is based on collector roads supporting autos, bicycles and pedestrians.

Policy 6.4: Promote context sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

The proposed street network for the Westside Planning Area is context sensitive and takes into account topographic constraints of the area to minimize cut-and-fill and grades. The recommended street network is based on strategically placed collector roads providing circulation and access as shown on the map below. The white lines show conceptual locations of collector roads. The orange shaded street segments are those with a slope exceeding 12%. This is significant since the Forest Grove Development Code limits grades for collector streets to 12%. An amendment to the Development Code is recommended to address this issue and would provide authority to the City Engineer to approve collector street grades exceeding to 12%.

Section 3: Comprehensive Plan Map Amendments

The Westside Refinement Plan recommends amendments to the Forest Grove Comprehensive Plan Map to implement the land use concept contained in the Refinement Plan. The majority of amendments are required to establish City Comprehensive Plan designations in the area north of David Hill Road added to the urban growth boundary by the Oregon Legislature in 2014 by HB 4078. Since this area was recently added to the urban growth boundary City Comprehensive Plan Map land use designations for this area do not exist.

Finding: Title 11 of the Metro Urban Growth Management Plan requires adoption of City Comprehensive Plan designations in areas added to the urban growth boundary. The following Comprehensive Plan Amendments pertain to the new urban growth boundary area:

From	To	Gross Acres
Future Development-20 acre min.	**A-Medium**	99.90
Future Development-20 acre min.	**B-Standard**	110.98
Future Development-20 acre min.	**Neighborhood Mixed Use**	25.10

Future Development-20 acre min.	**Institutional**	29.13

Additional Comprehensive Plan Map amendments include:

From	To	Gross Acres
Neighborhood Mixed Use	**RML or C-Low**	20.62
B-Standard	**C-Low**	36.96
C-Low	**Suburban Residential**	7.13
Suburban Residential	**C-Low**	13.58

The Comprehensive Plan contains decision considerations for amendments to the Plan. These considerations include:

- Consistency with applicable Comprehensive Plan policies;
- Consistency with the Metro Regional Framework Plan;
- Consistency with the Metro Urban Growth Management Functional Plan or Regional Transportation Functional Plan as applicable; and
- Consistency with the Oregon Statewide Land Use Planning Goals

These considerations are addressed below.

Finding Consistency with Comprehensive Plan Policies:

Comprehensive Plan General Land Use Policy 8 states: "Land designated for single family attached and multifamily shall be distributed throughout the city taking into consideration availability of public services, topography and environmental constraints. Preferred locations for medium and higher density residential development includes areas within walking distance of schools, parks, commercial areas or existing/planned transit service." The land use concept for the Westside Refinement Plan area identifies locations for single family residential and multifamily development. Approximately 529 gross acres are identified by the land use concept for single family residential development. Under Development Code §10.3.120 (Table 3-2, footnote 5), for subdivisions of 20 lots or more, 8% of the lots may be developed as duplex or single family attached lots. An increase of up to a maximum of 20% may be approved by the Community Development Director if the criteria for incentive density in §10.3.130(E) are met. In addition to the areas identified for single family residential development, approximately 11 acres have been identified for low density multifamily development with an additional 33 acres identified for neighborhood mixed use. Single family attached and multifamily units are allowed in these zones. The land use concept for the Westside Refinement Plan area is consistent with Policy 8 since the land use concept provides for single family attached and multifamily units through the planning area and therefore throughout the City as well.

The land use designations for the Westside Refinement Plan area are based on availability of public services, topography and environmental constraints. Public service needs to support the land use concept are based on information and analysis contained

in the Forest Grove Westside Planning Project Infrastructure Overview report, December 2014, Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis memo, June 24, 2016 and the Funding Approach Report, December 2016. Proposed development densities are based on topography including slope. An example is the area designated as Suburban Residential which has a target density of one unit per acre. The density reflects the slopes in this area which are 20% or more in some areas.

Comprehensive Plan Commercial Land Use Objective 1 states: "Distribute commercial activity throughout the city to serve existing and planned residential or employment areas." In addition, Commercial Land Use Objective 3 state: Land designated for commercial use shall have a slope of 5% or less, space to accommodate a variety of services and have availability of full urban services.

Commercial Land Use Objective 4 states: "Land designated for commercial use must be suitable for development taking into account environmental constraints and topography, have direct access to arterial or collector streets, be accessible to employment, residential or recreational areas that are within walking distance (generally ½ mile) and be designated to act as a focal point for surrounding neighborhoods." The areas designated for commercial development in the Westside Refinement Plan area are shown as NMU (Neighborhood Mixed Use) on the map showing proposed Comprehensive Plan map amendments. These locations are adjacent to collector or arterial streets (David Hill Road, Thatcher Road, future B Street extension and future Main Street extension. The sites are relatively flat with slopes less than 5%. The NMU area west of Thatcher Road and north of David Hill Road is adjacent to a vegetative corridor and serves as the boundary between the mixed use and single family residential land use designations. Development within this area must avoid impacting the vegetative corridor and will be subject to the development standards contained in Article 5 of the Forest Grove Development Code pertaining to natural resource areas. Potential impacts will be assessed as part of the standard development review process.

Commercial Land Use Objective 12 states: "The Comprehensive Plan Map and corresponding zoning standards shall provide for commercial development opportunities serving newly developed areas of the City." The Westside Refinement Plan area is a newly developing area of the City. Therefore, this objective applies. The land use concept and accompanying Comprehensive Plan Map amendments provide opportunities for commercial development in the Westside planning area. Opportunities for commercial development is provided in the area identified as NMU (Neighborhood Mixed Use).

Housing Goal 3 states: "Promote mixed-use development opportunities throughout the community." The land use concept and accompanying Comprehensive Plan map amendments promote mixed-use development opportunities in the Westside planning area. These areas are identified as NMU (Neighborhood Mixed Use) on land use concept map.

Housing Goal 6 states: "Promote neighborhoods complete with residences, open space, schools, parks, and shopping opportunities within close proximity to each other. Avoid stand-alone residential development lacking support activities." The land use concept for the Westside planning area and accompanying Comprehensive Plan map amendments promotes neighborhoods complete with residences, open space, schools, parks, and shopping areas in close proximity. The land use concept includes approximately 540 acres for residential development. Two areas totaling approximately 33 acres are identified for mixed use development including commercial uses. One area is located at the northwest quadrant of David Hill Road and Thatcher Road. This area will serve neighborhoods on David Hill. The second area is located north of David Hill Road between the future extension of B Street and future extension of Main Street. This area will primarily serve the area added to the urban growth boundary in 2014. In addition to the mixed-use areas the land use concept includes a location for a new six acre neighborhood park north of David Hill Road and west of the future extension of B Street. A ten acre site for a new elementary school is also identified north of David Hill Road and west of the future extension of B Street. These uses are intended to serve nearby residential areas promoting complete neighborhoods with a variety of land uses in proximity.

The Land Use and Housing elements of the Comprehensive Plan establish land use location criteria for residential and nonresidential uses. The location criteria are shown below.

Land Use	Description	Criteria for Allocation
Medium Density Residential	Up to 12 units per net acre	Hazard free location suitable for home sites
		10% or less slope
		Location bounded but not penetrated by major arterials or railroads
		Convenient driving distance to schools and neighborhood commercial
		Availability of full urban services
Low Density Residential	4.35 to 8.71 units per acre	Hazard free location suitable for home sites
		Consideration of density related to building limitation (slope, soil, geology).
		20% or less slope
		Location bounded but not penetrated by arterials or railroads
		Convenient driving distance to schools and neighborhood commercial
		Availability of full urban services
Mixed Use		Areas where a mixture of residential, office and retail uses are appropriate to create complete neighborhoods or provide needed services and housing.
		Sites tend to be 10 acres in area or less.

The land use concept and accompanying Comprehensive Plan Map and Zoning Map amendments comply with the land use location criteria shown above. The area identified medium density residential (RML) have no identified hazards are generally flat with slopes less than 5%. In addition the RML area is bounded by but not penetrated by major arterial roads and have convenient diving access to commercial areas including downtown Forest Grove and the Pacific Avenue/19th Avenue corridor via Highway 47, B Street, Main Street and Thatcher Road. Full urban services will be provided as sites develop. Services needs will be evaluated through the standard development review process.

The location criteria for low density residential includes hazard free locations suitable for home sites, consideration of density based on slopes, soils and geology, 20% or less slope, locations bounded by but not penetrated by arterials or railroads, convenient driving distance to schools and neighborhood commercial areas, and availability of full

urban services. The land use concept for the Westside area considered these location factors and the concept generally complies. Since all areas within the urban growth boundary must have a Comprehensive Plan Map designation some areas identified for low density residential include specific areas with identified hazards. This includes a historic landslide area south of David Hill Road and west of Thatcher Road and areas with slopes above 20%. The recommended development density for the Westside area considers theses hazards with the lowest density assigned to areas most susceptible to potential hazards. To further address development in areas with potential hazards the Westside Refinement includes policies to require geotechnical and engineering analysis in all locations with more than 10% slope. The Westside Refinement Plan also includes policies to encourage clustering development to avoid possible hazard areas.

The areas identified for low density residential are not penetrated by arterial roads since the only arterial roads in the Westside Refinement Plan area are David Hill Road west of Thatcher Road and Highway 47. Both of these roads are at the periphery of the Westside planning area.

The areas identified for low density residential development are within convenient driving distance of commercial areas and schools. Both the David Hill area and new urban growth boundary areas are approximately two miles from downtown Forest Grove and Pacific Avenue/19th Avenue commercial corridor. In addition, both the David Hill and new urban growth boundary areas are less than less than two miles from Forest Grove High School. This is a convenient driving distance.

The two areas identified for mixed use development are located in areas appropriate for serving nearby residential areas. One mixed use area is located at the intersection of David Hill Road and Thatcher Road. Both David Hill Road and Thatcher Road are classified as collector streets providing good access to nearby residential areas. In addition this mixed use area is located near Thatcher Park which is a centrally located gathering area for community residents.

The other mixed use area is located on David Hill Road between B Street and Main Street. This area located approximately ½ mile from Forest Grove High School and less than two miles from the Pacific Avenue/19th Avenue commercial corridor. This is within convenient driving distance.

The mixed use located near David Hill Road and Thatcher Road is approximately 9 acres. The mixed use area north of David Hill Road between B Street and Main Street is approximately 25 acres. This mixed-use area is larger than ten acres because it has frontage on both the future extension of B Street and the future extension of Main Street. Although this area is larger than 10 acres it is expected that less than half of the area will to develop with non-residential uses. Identifying an area larger than 10 acres provides flexibility with respect to the location of uses including commercial activities.

Section 4: Zoning Map Amendments

Development Code §10.2.770 identifies criteria that must be met for approval of a zoning map amendment.

A. The zone change is consistent with the Comprehensive Plan Map.
B. The zone change is consistent with relevant goals and policies of the Comprehensive Plan, as identified by the Director.
C. The site is suitable for the proposed zone and there is a lack of appropriately designated alternative sites within the vicinity. The size of the vicinity will be determined on a case-by-case basis since the impacts of a proposed zone and its uses vary. The factors to be considered in determining suitability are parcel size and location.
D. The zone change is consistent with the adopted Transportation System Plan. Development allowed by the zone change will not substantially impact the functional classification or operation of transportation facilities or reduce the level of service of transportation facilities below minimum acceptable level identified in the Transportation System Plan. To ensure proper review and mitigation, a traffic impact study may be required for the proposed zone change if it may impact transportation facilities.
E. Public facilities and services for water supply, sanitary waste disposal, stormwater disposal, and police and fire protection are capable of supporting the uses allowed by the zone. Adequacy of services is based in the project service demands of the site and the ability of the public services to accommodate those demands.
F. Establishment of a zone district is not subject to the meeting of conditions.

Findings for §10.2.770 Criterion A: The zoning map amendments are consistent with the current Comprehensive Plan map and the proposed Comprehensive Plan described in Section 3 above.

Section 5: Development Code Text Amendments

Finding: An implementation measure accompanying adoption of the Westside Refinement Plan affects the Forest Grove Development Code. Proposed amendments to the Development Code include requiring a geological and engineering assessment in areas with slopes over 10% (Development Code §10.8.310), adding specific street cross-section dimensions for David Hill Road west of Thatcher Road and other collector roadways in steeply sloped areas (Development Code §10.8.610), and allowing grades of up to 15% on collector streets (Development Code §10.8.610). Adoption of an amendment to the Development requires findings demonstrating the amendments meet the review criteria of Development Code §10.2.630:

A. The text amendment is consistent with the relevant goals and policies of the Forest Grove Comprehensive Plan;
B. The text amendment is consistent with relevant statewide and regional planning goals programs and rules.

Findings for §10.2.630 Criterion A:

Finding Amendment #1 to Development Code §10.8.310:

The amendment to Development Code §10.8.310 is consistent with the following Comprehensive Plan policy:

- Natural Resources and Natural Hazards Policy 2: Those involved in development will be required to address hazard conditions by the inclusion of basic environmental data (i.e. soil type, elevation of floodplain geologic limitation, etc.) and related design and engineering solutions in the submittal requirements for the development.

- Natural Resources and Natural Hazards Policy 3: Adopt as a provision in both the zoning and subdivision ordinances that an environmental report be prepared and certified by a qualified engineer for all development proposals in areas having natural physical hazards and/or limitations.

The amendment to Development Code §10.8.310 will change the requirement for providing geological information and studies for hazards on development sites having slopes 20% or more to require such information on development sites having slopes 10% or more. The justification for this amendment is contained in the *Geological and Geotechnical Assessment Report Westside Planning Project, February 2015,* prepared by PBS Engineering + Environmental. The amendment will also require the required geological and engineering assessment must be prepared by a certified engineering geologist registered under the provisions of ORS 672.505 and 672.705 and a geotechnical engineer under the provisions of ORS 672.002 to 672.325.

Finding Amendment #2 to Development Code §10.8.610:

The amendment to Development Code §10.8.610 increase the permissible grade for collector streets from 12% to 15% for a distance no greater than 250 feet. This amendment is consistent with the following Comprehensive Plan goals and policies:

- Transportation Goal 6: Establish and maintain a context sensitive set of transportation design and development regulations.
- Transportation Policy 6.4: Promote context sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

The justification for this amendment is contained in the *Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis, June 24, 2016*, prepared by SCJ Alliance. The amendment meets the Comprehensive Plan goals and policies identified above since the amendment reflects the context of the Westside area primarily topography. Revising this standard will allow for collector street segments requiring less cut-and-fill reducing environmental impacts as described in the June 24, 2016 memo.

Finding Amendment #3 to Development Code §10.8.603:

The amendment to Development Code §10.8.603 will add revised dimensions for the collector street cross-section for David Hill Road west of Thatcher Road (40 feet of right-of-way and 32 feet of pavement). This amendment is consistent with the following Comprehensive Plan goals and policies:

- Transportation Goal 6: Establish and maintain a context sensitive set of transportation design and development regulations.
- Transportation Policy 6.4: Promote context sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.
- Transportation Policy 6.4.1: Amend street design standards to allow for design exceptions for various street elements (e.g. reduced lane widths, methods and materials for provisions of sidewalks, etc.) to fit constrained settings or unusual applications.

The justification for this amendment is contained in the *Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis, June 24, 2016*, prepared by SCJ Alliance and responds to the topography along David Hill Road west of Thatcher Road and environmental constraints including a stream and historic landslide area.

Findings for §10.2.630 Criterion B:

Finding Amendment #1 to Development Code §10.8.310:

The amendment to Development Code §10.8.310 will require geotechnical and engineering analysis for development sites having 10% slope or more. The requirement has been sites with more than 20% slope. This amendment addresses the following Statewide Land Use Planning Goals:

- Statewide Planning Goal 2: Land Use Planning: To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.
- Statewide Planning Goal 7: Natural Hazards: To protect people and property from natural hazards.

The amendment also addresses the following regional planning requirements contained in the Metro Regional Framework Plan

- Chapter 5 – Regional Natural Hazards
    - Policy 5.3.1: Encourage local governments to adopt landslide mitigation measures including (d) Pre-development geotechnical studies.

The proposed amendment to Development Code §10.8.310 revises the land use planning policy framework to require geotechnical and engineering analysis in areas not

previously covered by the Development Code (areas between 10% and 20% slope). The factual basis for supporting this change is contained in the *Geological and Geotechnical Assessment Report Westside Planning Project, February 2015,* prepared by PBS Engineering + Environmental.

Development Code §10.8.310 addresses requirements for development in areas of the City with steep slopes. Previously steep slopes were defined to mean 20% slope or more. The *Geological and Geotechnical Assessment Report Westside Planning Project, February 2015,* report shows that natural hazards may exist in areas with less slope. Such hazards include adverse soils, slope stability and seismic hazards (liquefaction, lateral spreading, earthquake induced landslide). The geological assessment summarized in the report noted above documents where these physical characteristics are likely to exist. The revision to Development Code §10.8.301 is intended to ensure these characteristics are addressed in the land development review and approval process in areas with slopes above 10% to protect persons and property.

Finding Amendment #2 to Development Code §10.8.610:

The amendment to the Development Code is consistent with the following Statewide and Regional Planning Goals, Programs and Rules:

- Statewide Planning Goal 12: Transportation – Goal 12 pertains to local Transportation System Plans. The amendment addresses and implements Transportation Plan policies which promote context sensitive design. The justification for this amendment is contained in the *Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis, June 24, 2016*, prepared by SCJ Alliance.
- Metro Regional Transportation Functional Plan (Title 1: Transportation System Design.

The Forest Grove Transportation System Plan in Chapter 2 contains goals, policies and performance measures pertaining to the transportation system including promoting a context sensitive street network. The amendment to Development Code §10.8.610 addresses the Transportation System Plan and therefore Statewide Planning Goal 12.

Finding Amendment #3 to Development Code §10.8.603:

Amendment #3 is consistent with the following Statewide and Regional Planning Goals, Programs and Rules:

- Statewide Planning Goal 12: Transportation – Goal 12 pertains to local Transportation System Plans. The amendment addresses and implements Transportation Plan policies which promote context sensitive design. The justification for this amendment is contained in the *Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis, June 24, 2016*, prepared by SCJ Alliance. Justification includes the characteristics of the David Hill

corridor west of Thatcher Road such as a stream located directly south of the road, historic landslide area south of the road and grade above 5%.

- Metro Regional Transportation Functional Plan (Title 1: Transportation System Design). Title 1 requires city and counties allow for complete street designs including travel lanes, sidewalks and bike lanes. The revised cross-section for David Hill Road includes two travel lanes and a sidewalk on one side. Given the constraints present bicycle travel could be accommodated on a separate pathway near the stream corridor. The Parks, Recreation and Open Space Master Plan on Map 2 shows a proposed multi-use trail along David Hill Road including the section west of Thatcher Road.

The Forest Grove Transportation System Plan in Chapter 2 contains goals, policies and performance measures pertaining to the transportation system including promoting a context sensitive street network. The amendment to Development Code §10.8.610 addresses the Transportation System Plan and therefore Statewide Planning Goal 12.

Planning Commission Findings and Decision Number 2017-09
Recommendation to Adopt Westside Refinement Plan and Accompanying Implementation Measures
File Number 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan complies with the provisions of ORS §197.200 and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the Westside Refinement Plan addresses the requirements of Metro Urban Growth Management Function Title 11 (Planning for New Residential Areas) and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the following background documents were prepared and provide the factual basis supporting the Westside Refinement Plan:

- Westside Infrastructure Overview, December 2014;
- Westside Transportation Baseline Report, January 2015;
- Westside Natural Resources Overview, January 2015;
- Geological and Geotechnical Assessment Report, February 2015;
- Revised Final Westside Water, Sewer, and Stormwater Infrastructure Report, June 2016;
- Infrastructure Funding Approach Report, December 2016; and
- Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative, March 2017; and

WHEREAS, the Westside Refinement Plan provided opportunities for community participation to influence preparation of recommendations; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan and accompany implementation measures; and

WHEREAS, the proposed implementation measures include proposed amendments to the Forest Grove Comprehensive Plan Map, Forest Grove Zoning Map, Forest Grove Development Code and Forest Grove Transportation System Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017, and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council.

NOW THEREFORE, The Planning Commission does hereby recommend City Council approve the Westside Refinement Plan and accompanying implementation measures, with modification, making the following specific findings in support of this decision:

Section 1: The Planning Commission adopts by reference the findings attached as Attachment B to the staff report prepared for the May 15, 2017 public hearing.

Section 2: The Planning Commission approves the following modifications to the Westside Refinement Plan and accompanying implementation measures:

A. Modify the proposed Zoning Map to apply the Neighborhood Mixed Use zone to the Nixon Property (Washington County Map and Tax Lot Number 1N4260002602) consistent with the current Comprehensive Plan designation which is also Neighborhood Mixed Use. Apply the provisions of Mixed Use Area 1 – David Hill shown on Table 4-2 of Development Code §10.4.315(F) to the Nixon property to provide the opportunity for a maximum of 15,000 square feet of commercial/institutional space for uses shown on Table 3-10 of Development Code §10.3.320. In support of this recommendation the Planning Commission makes the following finding: Applying the Neighborhood Mixed Use zone to the Nixon Property implements the Forest Grove Comprehensive Plan designation which is also Neighborhood Mixed Use and this action makes the zoning and Comprehensive Plan designation consistent. In addition, applying the Neighborhood Mixed Use zoning designation to the Nixon property will provide an opportunity to establish a complete neighborhood in the area with a variety uses in proximity consistent with Comprehensive Plan Sustainability Goal 8 which state: "Create complete neighborhoods, through land use regulation, with housing, recreational opportunities, retail, services and employment nearby." Furthermore, applying the NMU zoning designation to the Nixon Property will provide flexibility in site design, housing types and density.

B. Retain the Suburban Residential zone above the 440 foot contour elevation. In support of this recommendation the Planning Commission makes the following finding: The Suburban Residential zone was created to establish a land use designation allowing for one acre lots due to topography and inherent difficulty of providing sanitary sewer and

water infrastructure. The large lots are intended to accommodate wells and septic systems on large lots and retaining the SR designation will achieve this objective.

C. Modify Table 4-2 of Development Code §10.4.315(F) to add Area 4 - East David Hill Road establishing a maximum square footage of 150,000 square feet of commercial/institutional space for uses shown on Table 3-10 of Development Code §10.3.320. To support this recommendation the Planning Commission makes the following finding: The Neighborhood Mixed Use zone is intended to allow a variety of land uses in proximity to establish complete neighborhoods consistent with Comprehensive Plan Sustainability Goal 8 which state "Create complete neighborhoods, through land use regulation, with housing, recreational opportunities, retail, services and employment nearby." The Planning Commission recommendation does not require a minimum amount of commercial development and is intended to provide flexibility to respond to market demands and needs.

D. Include a Policy Statement in the Westside Refinement Plan recognizing the Westside planning area includes three subareas:

1. The area above the 440 foot contour elevation;
2. The area west of Thatcher Road below the 400 foot contour elevation; and
3. The area north of David Hill Road, east of Thatcher Road and west of Highway 47.

To support this recommendation the Planning Commission makes the following finding: The Westside Planning Area is characterized by distinct areas based on elevation, topography, and ability to provide cost-effective public infrastructure. The area east of Thatcher Road is flat and public infrastructure in nearby allowing for extension in the near-term. The area west of Thatcher Road has the highest elevations in the urban growth boundary, is relatively steep, and has a variety of environmental constraints including adverse soils and a historic landslide area. Public infrastructure is lacking and extension of necessary infrastructure is costly as reflected in the Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis, June 24, 2016 and Funding Approach Report, December 2016. These factors identified above distinguish the subareas and provide the basis for the Planning Commission recommendation to address infrastructure needs on a subarea basis.

E. Include a Policy Statement and Action Item in the Westside Refinement Plan stating the water system for the area above the 440 foot contour elevation requires a slow, careful, long-term approach for addressing water needs. To support this recommendation the Planning Commission makes the following finding: The area above the 440 foot contour elevation cannot currently be served by the municipal water system due to the elevation of the current water reservoir on David Hill. A new reservoir is required at a higher elevation to ensure adequate water pressure and provide additional storage as described in the Revised Final Westside, Water, Sewer and Stormwater Infrastructure Analysis, June 24, 2016. The Planning Commission recommends a slow, careful and long-term approach to addressing water needs to ensure needs are considered comprehensively and to minimize costs associated with improving the system.

F. Add a Policy Statement and Action Item to the Westside Refinement Plan to recognize that the street system should follow contours when designed and engineered. To support this recommendation the Planning Commission makes the following finding: The proposed Westside Refinement Plan identifies as a goal in Chapter 13 – Policy Direction to "Establish a context sensitive street network addressing the characteristics

of the Westside Planning Area (Goal 8.1). This goal recognizes the David Hill area is characterized by steep slopes as documented in the Geological and Geotechnical Assessment Report, February 2015, prepared by PBS Engineering and Environmental. A context sensitive approach is recommend to minimize environmental disturbance including cut-and-fill and potential visual impacts. For this reason, the Planning Commission recommends that roads follow contours when designed and engineered.

G. Add a Policy Statement and Action Item to the Westside Refinement Plan to evaluate Septic Tank Effluent Gravity (STEP) and Septic Tank Effluent Pump (STEP) sewerage treatment approaches as a potential cost-effect strategy for addressing sewerage needs in the area west of Thatcher Road:

> Policy 7.5.1: Through the next update of the City of Forest Grove Wastewater Management Plan evaluate the feasibility of implementing sanitary sewer systems such as Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) in the Westside planning area.
>
> > Action 7.5.1: Initiate discussions with Clean Water Services to evaluate the feasibility of implementing sanitary sewer systems such as Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) in the Westside planning area.

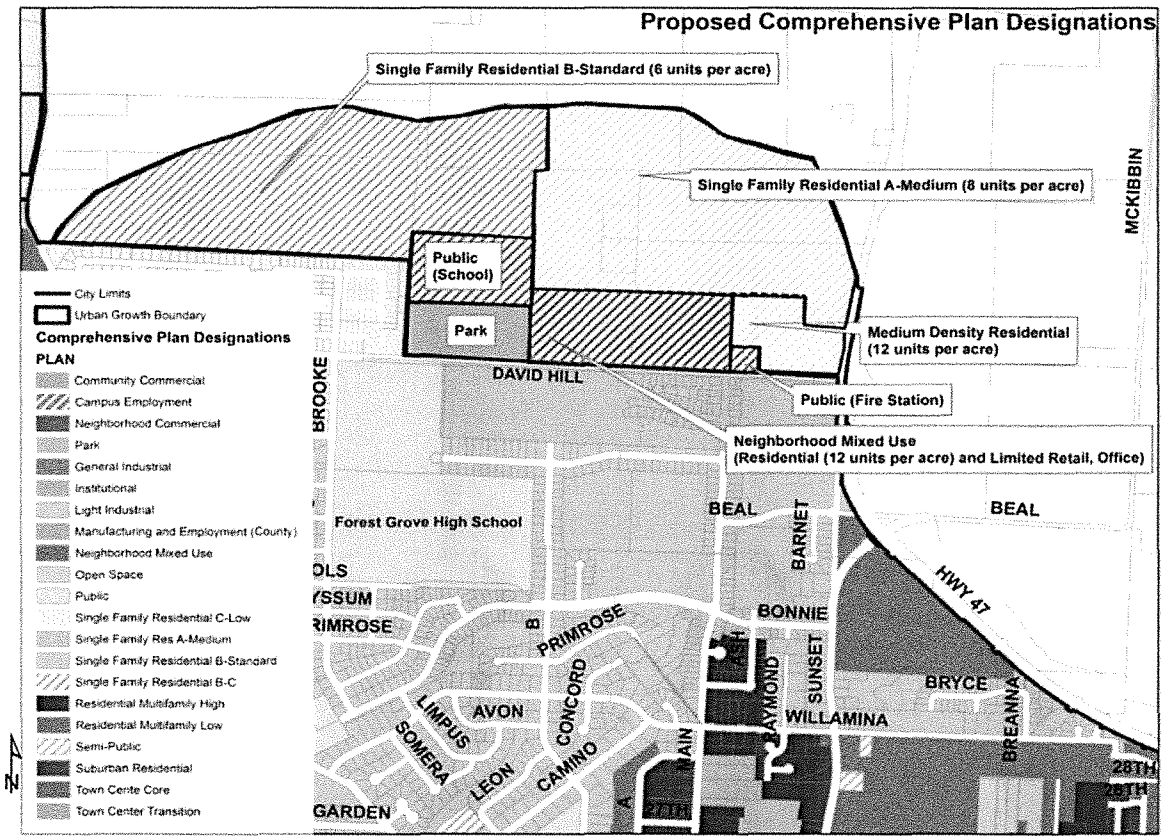
To support this recommendation the Planning Commission makes the following finding: Testimony was provided to the Planning Commission on May 15, 2017, May 30, 2017 and June 5, 2017 regarding the use of Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) systems as a lower cost solution for addressing sanitary sewerage needs compared to the traditional method of conveyance to a treatment plant. The Planning Commission endorses further evaluation of such systems to determine if it is a feasible way to address sanitary sewerage needs in the David Hill area.

H. Add to the proposed Transportation System Plan amendments evaluation of an east-west collector street in the general vicinity of Plum Hill Lane. To support this recommendation the Planning Commission makes the following finding: The Planning Commission received testimony on June 5, 2017, recommending that an alternative to improving Plum Hill Lane as an east-west collector street be considered. The Planning Commission endorses evaluating an alternative east-west collector street in the vicinity of Plum Hill Lane during the next update to the Transportation System Plan due to the steep grade of Plum Hill Lane near its intersection with Thatcher Road.

Section 3: The Planning Commission recommends approval of the following amendments to the Comprehensive Plan Map for the new urban growth boundary area north of David Hill Road, west of Highway 47 and east of Thatcher Road. No Comprehensive Plan Map amendments are recommended for the area west of Thatcher Road.

From	To	Gross Acres
Washington County Future Development-20 acre min.	**A-Medium (8.95 dwellings/net acre)**	86.18
Washington County Future Development-20 acre min.	**B-Standard (6.22 dwellings per net acre)**	98.62
Washington County Future Development-20 acre min.	**Medium Density Residential (12 dwellings per net acre)**	10.82
Washington County Future Development-20 acre min.	**Neighborhood Mixed Use (12 dwellings per net acre)**	24.63

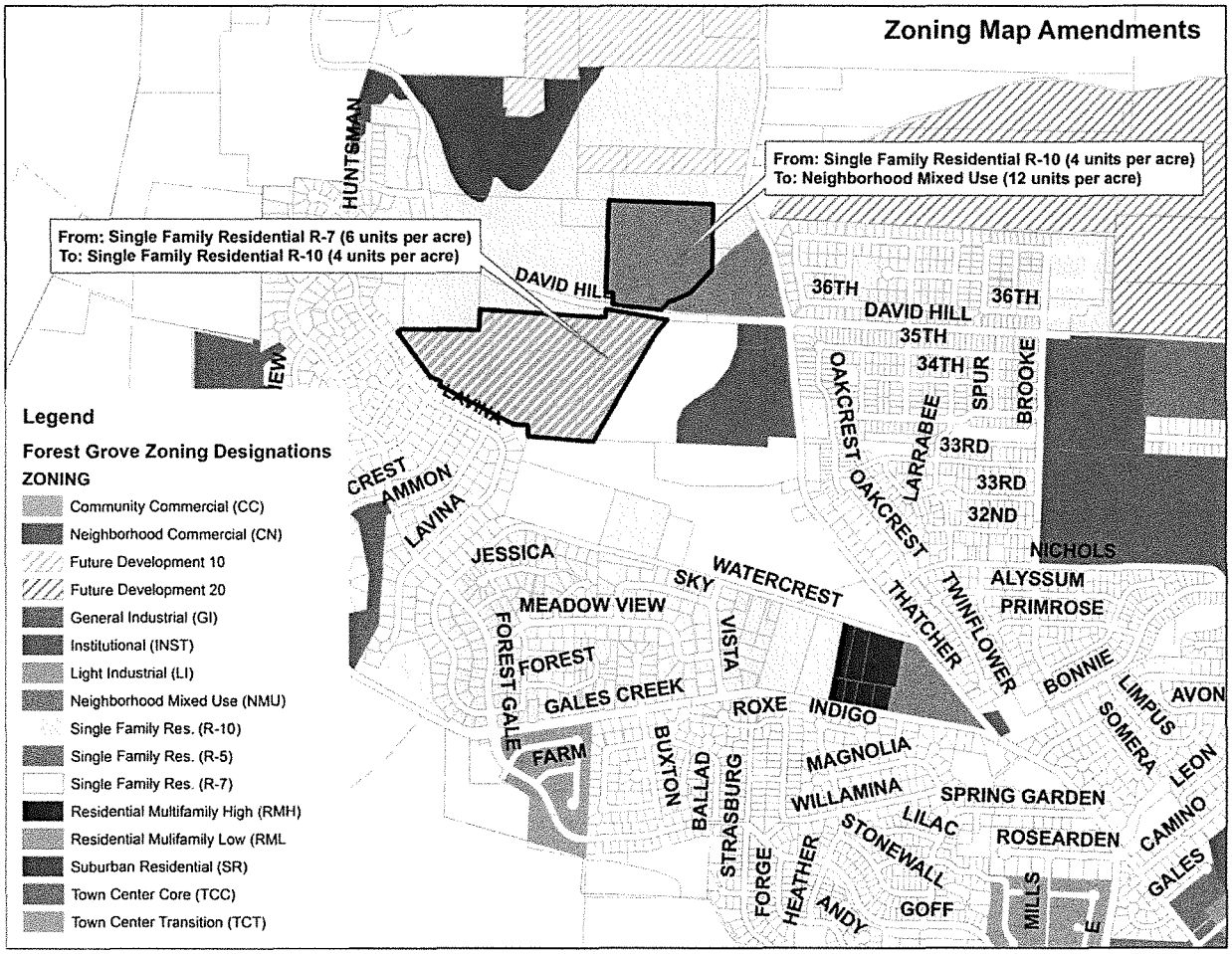
Washington County Future Development-20 acre min.	**Public (School)**	10.00
Washington County Future Development-20 acre min.	**Public (Fire Station)**	2.40
Washington County Future Development-20 acre min.	**Park**	6.00



The findings supporting the recommended Comprehensive Plan Map amendments are contained in Attachment B to the May 15, 2017 staff report and are incorporated by herein by reference.

Section 4: The Planning Commission recommends the following amendments to the Zoning Map for the area west of Thatcher Road. No zoning map amendments are recommended for the new urban growth boundary area north of David Hill Road, west of Highway 47 and east of Thatcher Road.

From	To	Gross Acres
R-7 (6.22 dwellings per net acre)	**R-10 (4.35 dwellings per net acre)**	36.96
R-10	**NMU (Neighborhood Mixed Use)**	20.67



The Planning Commission recommends the change from R-7 zoning to R-10 for a portion of the area south of David Hill Road to reflect constraints to development documented in the Geological and Geotechnical Report, February 2015, prepared by PBS Engineering and Environmental.

The Planning Commission recommends the change from R-10 to NMU for the Nixon Property (Washington County Map and Tax Lot Number 1N4260002602) in order to zone the property consistent with the corresponding NMU designation shown on the Comprehensive Plan Map.

Section 5: The Planning Commission recommends the following amendment to the Forest Grove Development Code to implement the Westside Refinement Plan:

§10.4.315(F) TABLE 4-2: Commercial/Institutional Uses within the Village Center

NMU Zoned Area	Minimum Square Footage	Maximum Square Footage
Area 1 - David Hill/Nixon	None	15,000 SF Gross Floor Area
Area 2 - Gales Creek	None	25,000 SF Gross Floor Area
Area 3 - Davidson	25,000 SF Gross Floor Area	130,000 SF Gross Floor Area[1]
Area 4 – East David Hill Rd.	None	150,000 SF Gross Floor Area[2]

§10.8.610(M) Grades and Curves – Grades shall not exceed 10% on arterials, ~~12%~~ **15%** on collector streets for distances of no greater than 250 feet, or any other street (except that local or residential access streets may have concrete segments with grades of up to 15% for distances of no greater than 250 feet), and:

§10.8.310 (Hazard Areas)

2. For development sites having slopes of ~~20%~~ **10%** or more, the following requirements shall be met. To ensure compliance with the provisions of this ordinance, prior to the issuance of a building permit for the construction of any new building[3] within the city, and prior to any grading, excavation or filling or other site modification within areas having a slope of ~~20%~~ **10%** or greater, there shall be submitted to the Community Development Department for review and approval, or approval with modifications:

    a. A site plan (showing any grading, excavating or filling) drawn to scale of the entire property developed and of the proposed construction;

    b. The submission of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist who is a registered geologist certified in the specialty of Engineering Geology under provisions of ORS 672.505 to 672.705 **and a Geotechnical Engineer under provisions of ORS 672.002 to 672.325**. The assessment and report shall address the entire site and meet the following requirements:

        i. The geological **and engineering** assessment shall include information and data regarding the nature, distribution of underlying geology, and the physical and chemical properties of existing soils; an opinion as to stability of the site, and conclusions regarding the effect of geo-logic conditions on the proposed development.

The findings supporting the recommended amendments to the Development Code are contained in Attachment B to the staff report for the May 15, 2017, Planning Commission public hearing.

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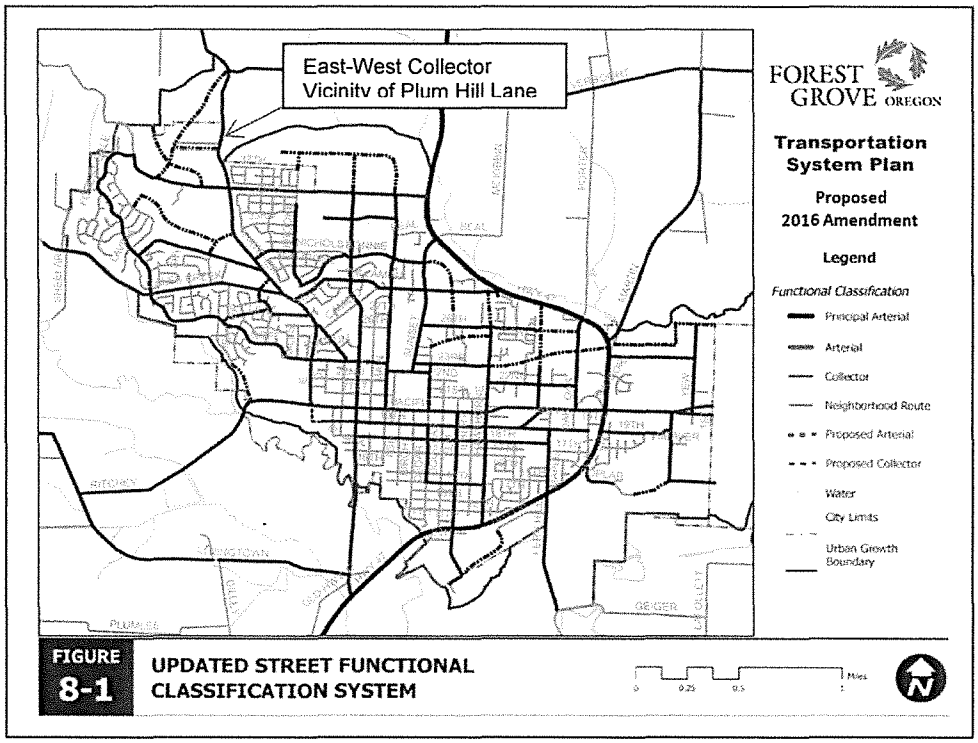
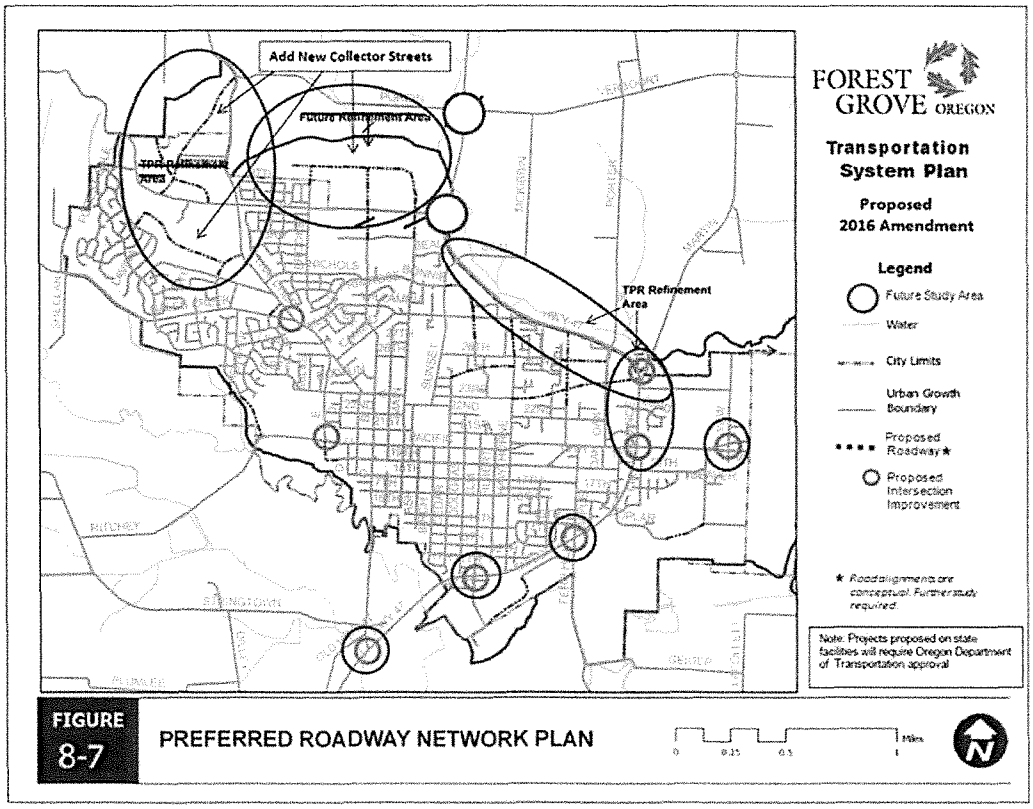
[1] Maximum building footprint is 50,000 square feet.
[2] Maximum building footprint is 50,000 square feet.
[3] Building: That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

Section 6: The Planning Commission recommends the following amendments to the Forest Grove Transportation System Plan to implement the Westside Refinement Plan:

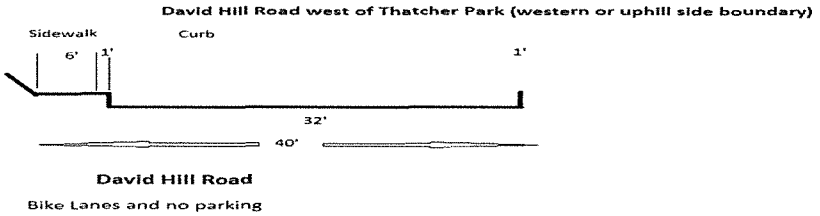
Recommended amendments to Transportation System Plan Figure 8-1



Recommended amendments to the Transportation System Plan Figure 8-7



Recommended revised cross-section for David Hill Road west of Thatcher Road:



Recommended amendments to the Transportation System Plan project tables to add needed mitigation to the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Roads required for compliance with the Oregon Transportation Planning Rule (OAR 660-012-0060). The Planning Commission finds the mitigation projects are needed due to anticipated traffic generation from growth in the new urban growth boundary area north of David Hill Road west of Highway 47 and east of Thatcher Road. The Planning Commission also finds that traffic volumes from the David Hill Road area have been accounted for in the TSP and therefore, do not have a significant effect on transportation facilities for purposes of Transportation Planning Rule Compliance (OAR 660-012-0060(9)). The proposed mitigation measure for the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Road will be recommended by the City for addition to the Metro Regional Transportation Plan to be updated in 2018.

Roadway Projects (TSP Table 8-3)

No.	Name	Description	Purpose	Metro Project ID*	Total Cost ($Million)
1	David Hill Road / Hwy. 47 Intersection Capacity Improvements ~~Extension~~	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing east terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.	~~Improve connectivity and balance circulation.~~ Improve operational deficiencies to ensure mobility standards are met.	10772	~~$13.61~~ $2.5
~~2~~	~~Highway 47 / Pacific Avenue Intersection Improvements *~~	~~Additional channelization, crosswalk, and traffic signal modification at intersection. Specific improvements may be modified at a future date.~~	~~Improve access and mobility. Improve substandard turn radius and pedestrian crossing.~~	~~10780a~~	~~$1.3~~
13	Hwy 47 and Purdin Road Intersection Improvements *	~~Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin and Verboort Roads~~ Add a northbound right turn slip lane on the south leg of the roundabout and a southbound right turn slip	Improve operational deficiencies to ensure mobility standards are met.	10780f	~~$3.17~~ $4.0

	lane on the south leg of the roundabout to the overall roundabout intersection.	
TOTAL		~~$122.44~~ $110.86

Notes: * Projects will require ODOT approval. Inclusion of a project in this table does not obligate or imply the obligation of funds for any specific project.

Forest Grove Financially Constrained Project List (TSP Table 1-2)

#	Name	Description	Jurisdiction Owner/ Operator	Metro Project ID	RTP Financially Constrained	Total Cost	Non-City Funds	City Funds	Project Timing
1	David Hill Road ~~Extension /~~ Hwy. 47 Intersection Capacity Improvements	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.	~~City~~ ODOT & County	10772	Add[4]	~~$13.61 **~~ $2.5 **/***	~~$13.61~~ $2.50	$0.0	~~0-5 years~~ 6-10 years
~~5~~	~~Highway 47 / Pacific Avenue Intersection Improvements*~~	~~Additional channelization, crosswalk, and traffic signal modification at intersection. Specific improvements may be~~	~~ODOT~~	~~10780a~~	~~Yes~~	~~$1.3 **~~	~~$0.8~~	~~$0.5~~	~~0-5 years~~

[4] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

		~~modified at a future date.~~							
						TOTAL:		$35.6M	

Source: City of Forest Grove. Estimated share of city cost provided by City of Forest Grove.
Notes: **PROJECT PRIORITIES ARE BASED ON ANTICIPATED PROJECT TIMING**
*Project will require ODOT approval. Inclusion of a project on an ODOT facility in this table does not obligate or imply the obligation of funds for any specific project.
**Partially or fully funded by jurisdictional agency (i.e. TriMet, ODOT, Washington County, Metro or other).
***Partially or fully funded by private development exactions.

Forest Grove Financially Constrained Project List (TSP Table 10-3)

#	Name	Description	Jurisdiction Owner/ Operator	Metro Project ID	RTP Financially Constrained	Total Cost	Non-City Funds	City Funds	Project Timing
1	David Hill Road / Hwy. 47 Intersection Capacity Improvements ~~Extension~~	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.	City	10772	Add[5]	~~$13.61 **~~ $2.5 **/***	~~$13.61~~ $2.50	$0.0	~~0-5 years~~ 6-10 years
16	Highway 47 / Purdin Road Intersection Improvements*	~~Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin Road and Verboort Rd.~~ Add a northbound right turn slip lane on the south leg of the roundabout and southbound right turn lane on the south leg of the roundabout to the overall roundabout intersection.	ODOT & County	10780f	~~No~~ Add[6]	~~$3.32 **~~ $4.0 **/***	~~$3.32~~ $4.0	$0.0	6-10 Years
								$35.6M	

[5] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

[6] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

Source: City of Forest Grove. Estimated share of city cost provided by City of Forest Grove.
Notes: **PROJECT PRIORITIES ARE BASED ON ANTICIPATED PROJECT TIMING**

*Project will require ODOT approval. Inclusion of a project in this table does not obligate or imply the obligation of funds for any specific project.

**Partially or fully funded by jurisdictional agency (i.e. TriMet, ODOT, Washington County, Metro or other).
***Partially or fully funded by private development exactions.

Tom Beck, Chair

6/19/17
Date

urbsworks

Date 14_1219 **| Subject** Forest Grove Westside Planning

To Anne Sylvester, SCJ Alliance **| From** Marcy McInelly | **Copy** Joseph Readdy

Stakeholder Assessment Summary: Interviews

In early November 2014, we received a list of 23 names from Jon Holan. Some of these had phone and/or email contact information, and we were able to collect additional contact info from the web. In addition, a few additional people contacted us directly or their contact information was forwarded during the interview process.

Between November 11th and December 9th, we were able to conduct **a total of 16 interviews**. Below is a summary of the interviews by area and subarea.

Thirteen of the 23 original contacts were identified as particularly important for interviewing; we were able to interview all but three of those.

Interview summary by Area /Subarea

Area	Subarea	Contacts	Interviews conducted
David Hill	David Hill Corner	1	1
	David Hill Central	2	2
	Mixed-Use Area	2	1
	Plum Hill Lane	2	1
	North David Hill Area	3	2
	Valley Crest	2	1
	Thatcher Road	2	1
Purdin Road		6	4
Other (no specific area / at large)		6	3
Totals		**26**	**16**

Interviews

Interviewees were asked whether they lived, worked, rented and/or owned property in their subarea. In addition, they were asked:

- Based upon your connection to the area, what are the most critical issues that we should consider in this planning effort?
- Based upon your connection to the area, what would you like to see improved or changed?
- Based upon your connection to the area, what should we be careful to preserve?
- Based upon your connection to the area, what would represent a “win” for you?
- Based upon our conversation, how would you like to be involved in the design charrette?
- What is the best way to communicate with you about the planning process?

Summary of feedback

The following table summarizes the comment received.

Theme	Comments
Background and history of project	• Angry about incorporation into the City of Forest Grove • Poor communication from Metro and Forest Grove; to date still no official notification from the city regarding the UGB expansion • UGB as part of the "grand bargain" without property owner involvement or consultation. • UGB expansion not considered in any planning effort
Questions about the process	• Respect people's rights • Concerned about process and outcome being predetermined
Concerns about change generally	• There should be no changes, no improvements; it should stay the same • Concerned about traffic, congestion, and noise from construction • Change will come
Concerns about infrastructure and costs	• Long term planning. If a road is designed to be built in 2016 it should be planned for the flexibility to serve/expand to 2040 needs. • New development needs new infrastructure; new streets and roads for new development • Development should pay for new infrastructure • Concerned about increased assessment and taxes • New infrastructure should take into account stormwater capacity • City should contribute to the cost of infrastructure • Change is needed, especially to improve street design and street safety • David Hill: The area needs improved infrastructure, particularly water and sewer service (water is currently provided by a private well)
Land use, zoning, character of development	• Single-family, not multi-dwelling; no 4-5 story apartments • No zoning change; no density increases beyond current zoning • 7,500 square foot lots, minimum • Provide a range of housing types and affordability • More density can mean possible preservation of historic elements • Farmland should remain farmland; density should be limited to cities • Protect open space; keep the area rural in character; preserve wildlife • Preserve views • Preserve livability • Preserve green space and watersheds • Preserve sense of openness • Use Jones Farm as a model for development which preserves natural features • Preserve farmland and agricultural uses • Preserve wooded area next to the Park • Preserve the Westside/ Thatcher open space • Purdin Road: Buffer existing homes from pressures of new development • Purdin Road: Not appropriate for industrial development

Concerns and comments about mixed use area	• Opposes mixed-use • Favors designation of mixed-use area • Provide some neighborhood-serving retail and services • Make a heart of this neighborhood that doesn't take away from downtown
Transportation, streets, trails and general connectivity	• Highway 47 is becoming more dangerous, speeds are too high and there are more log trucks • Roundabouts on Hwy 47 may help • Excessive speeds on local roads • Traffic conflicts resulting from increase in posted speed from 30mph to 40mph make it difficult for residents to exit existing driveways; several near accidents • Concerns about street character • Proper street tree selection (columnar to protect viewsheds) • Improve transportation connections • Street design needs improvement; roundabouts help • Street safety is very important: Traffic at Fire Station and at intersections of major roads • Street safety is important at access to the Park from David Hill Road and from adjacent residential development • Complete the multi-use path loop around Forest Grove • Make this area an integral part of Forest Grove; improve connectivity, build a complete street and trail network • Build a network of walkable streets with sidewalks that connect people to their daily destinations • Transportation (distance from Highway 26) is a critical issue • Design some streets as "dead ends" with walk/ bike connections to trailheads and park lands
Other	• Purdin Road area: Needs better designation. Purdin Road label is misleading • Signage is a critical issue for the area (David Hill) • Build a new swim facility w/ 50-meter pool for training and water safety instruction

Desired Outcomes

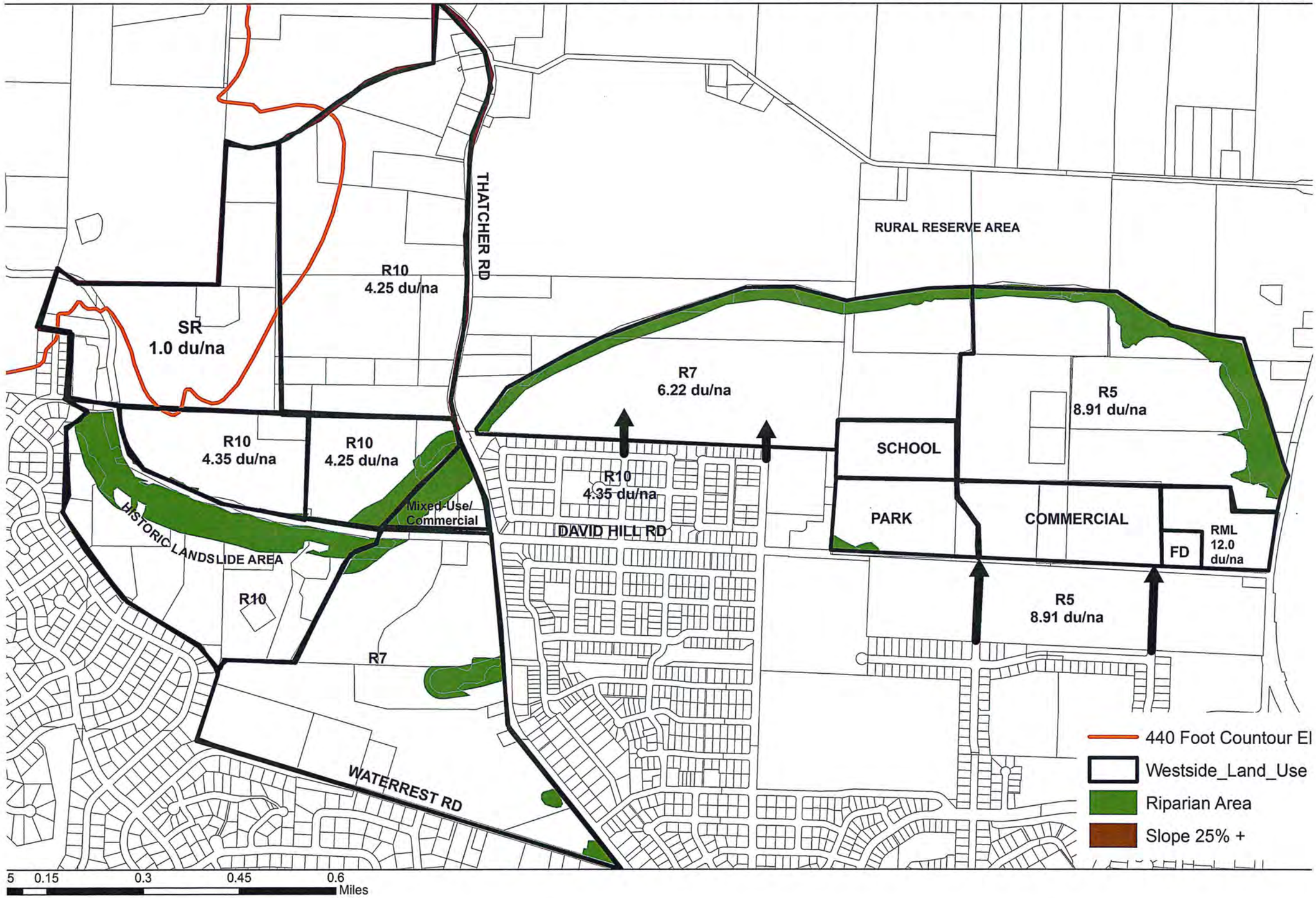
In response to the question, "Based upon your connection to the area, what would represent a 'win' for you?" interviewees said development in the Purdin Road and David Hill areas should:

- Preserve sense of community and keep it accessible to lower-income families
- Make Forest Grove a regional destination with a small-town feel
- More destinations in downtown for entertainment and dining
- New single-dwelling residential development with density. No multi-dwelling residential. Home for the new Intel and Nike workers.
- Sense of Community
- Smart Growth; walkable mixed-use development
- Walkable mixed-use development; a complete community with services for activities of daily living.

- Development here when it is “time;” after infill in all other parts of Forest Grove has occurred; minimize development of greenfields
- Develop hillsides before farmland; make hillside development sensitive to natural context
- Make Forest Grove into the Boulder, Colorado of the Portland metro region
- Equity, Improve housing, schools, industry
- More local business, with more restaurant choices.
- Bicycling
- Co-housing
- Preserve natural areas and keep nature in mind
- A neighborhood on the edge that contributes to the City
- Growth should provide economic development and support for Forest Grove economy; make this neighborhood accessible to and connected with downtown so new residents shop there, not in Hillsboro

WESTSIDE PLANNING PROJECT
PLANNING COMMISSION DIRECTION

FOREST GROVE



Forest Grove

Westside Planning Project

David Hill & Gales Creek Road Area
Purdin Road Area
Elm Street Area

Natural Resources Overview

January 2015

SCJ ALLIANCE
CONSULTING SERVICES

Forest Grove Westside Planning Project
Natural Resources Overview

Project Information

Project:	Forest Grove Westside Planning Project Natural Resources Overview
Prepared for:	**City of Forest Grove** Jon Holan, Community Development Director

Reviewing Agency

Jurisdiction:	City of Forest Grove Washington County

Project Representative

Prepared by:	**SCJ Alliance** 315 W. Mill Plain Boulevard, Suite 208 Vancouver, WA 98660 360.352.1465 scjalliance.com
Contact:	Lisa Palazzi, PWS, CPSS

Project Reference:	SCJ # 742.01

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1. EXECUTIVE SUMMARY

This report provides a planning level assessment and description of natural resources within and near the City of Forest Grove – but specifically targeting three areas proposed for future urban development: the David Hill and Gales Creek Road area (DHG)[1], the Purdin Road UGB (PR), and the Elm Street UGB (ES). These three areas are being assessed to address and resolve land use and infrastructure needs to guide future development.

The DHG planning area is located northwest of the City, and includes steep slopes, seasonal drainage ravines and landslide hazard areas that create unique challenges for road building and development. PR planning area is located north of the City (east of the DHB planning area), and is relatively flat, but with fine-textured floodplain soils, and is bordered by riparian areas to the north and south. The ES planning area is located south of the City, and is also relatively flat, located on a low terrace, about 10 to 15 feet higher than the adjacent Tualatin River floodplain. Current land use in the DHG area is a combination of agriculture, forest land and single-family development. Current land use in the PR and ES areas is primarily agriculture.

This report is intended to provide project planners with a hydrological and ecological baseline assessment, which will inform and support planning and development decisions in the Westside Planning areas. The information gathered is based only on paper research – a compilation of information already documented, but organized to provide context and to support an informed decision-making and planning process for the City. The review focuses on State Planning Goal 5 resources including: Riparian corridors; Wetlands; Wildlife Habitat; Groundwater Resources; Oregon Recreation Trails; Mineral and Aggregate Resources; Cultural areas. The following other Goal 5 resources do not occur in the Forest Grove study area, and therefore are not discussed in the report: Oregon Scenic Waterways and Federal Wild and Scenic Rivers; Designated Natural Areas; Wilderness Areas; Energy Sources.

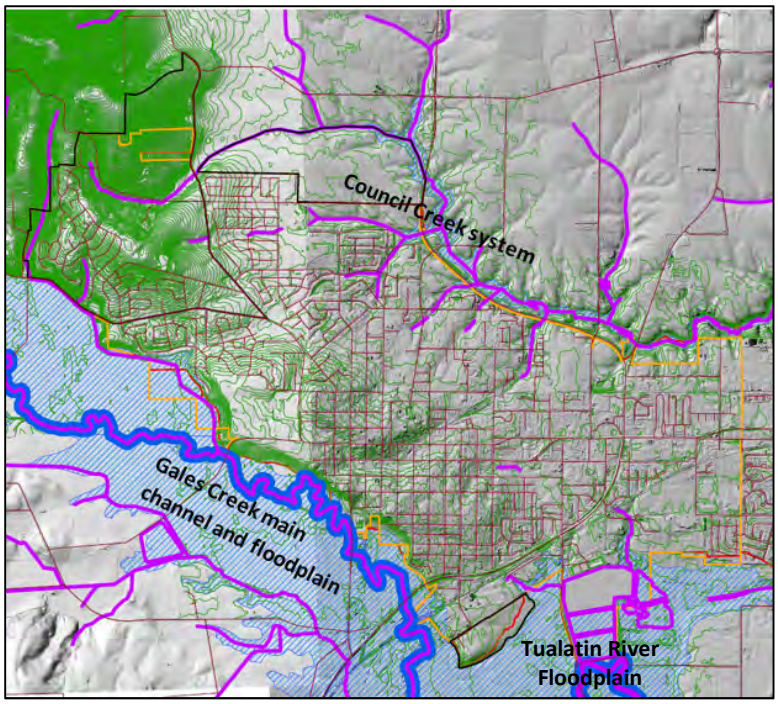


Figure 1. Gales Creek and Tualatin River Floodplains

The Gales Creek/ Tualatin River floodplain area (along the southwest perimeter of Forest Grove, see **Figure 1**) is a key natural resource feature within the greater Forest Grove study area, containing agriculture, riparian corridors, wetlands and critical salmonid habitat.

[1] It should be noted that the primary focus of this planning area is on David Hill in the area north of Watercrest Road – partially outside of the current City Limits but within the UGB. The Gales Creek area to the south of Watercrest is included primarily to address issues related to context and connectivity.

Headwater tributaries of Council Creek (**Figure 2**), run along and within the northern side of Forest Grove. The main channel of Council Creek runs north/south along the highway to the east, forming the eastern boundary of the Purdin Road Planning area. An unnamed tributary flows east/west along the north side of the PR planning area. The channel for this tributary has been physically modified. These headwater streams form a small, but locally important drainage system, flowing in ditches between and within farm fields and through neighborhoods, creating opportunities for interconnected walking trails and wildlife habitat corridors within the City. Council Creek and Gales Creek systems flow south and southeast respectfully, eventually merging with the Tualatin River south and southeast of Forest Grove.

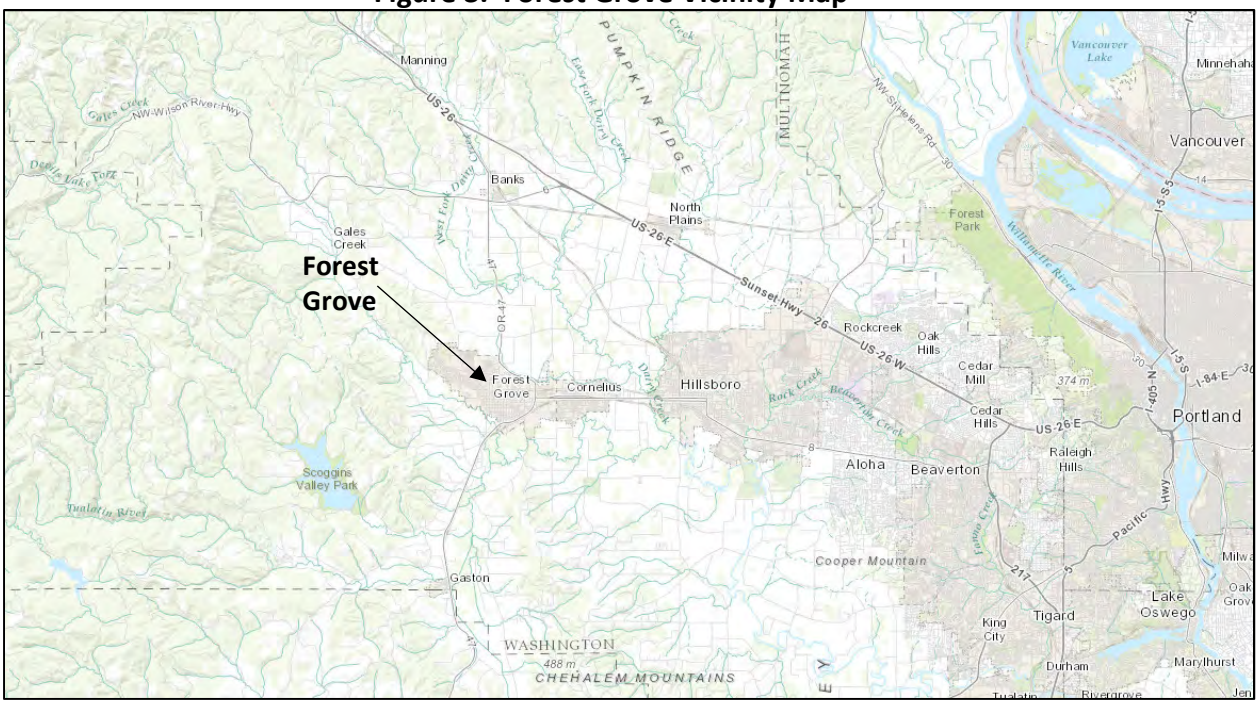
Figure 2. Portion of Northern Planning Areas (David Hill and Gales Creek Road; Purdin Road) and Side Tributary Headwaters of Council Creek

2. INTRODUCTION

2.1 Natural Resources Overview

This report provides a description of natural features and conditions in the Forest Grove area (see **Figure 3** for a vicinity map) that have potential to affect natural resource management as well as planning and design for infrastructure and land use. This is a summary report, and intended to provide a general context of existing conditions in three perimeter urban expansion areas north and south of Forest Grove.

Figure 3. Forest Grove Vicinity Map



The City of Forest Grove is situated in the Tualatin River Watershed, at the western edge of the Portland metropolitan area, where surface terrain transitions from broad, flat alluvial valley floors of the Willamette Valley Ecoregion to the basalt foothills of the Coast Range Ecoregion. It is bordered to the south by the Gales Creek sub-basin, and to the north by the Council Creek system – a tributary at the lower end of the greater Dairy Creek sub-basin. The three perimeter areas that Forest Grove has targeted for expansion and urban development are: the David Hill and Gales Creek Road planning area (DHG); the Purdin Road planning area (PR); and Elm Street planning area (ES).

The DHG planning area is northwest of the City, with the northern portion in the Council Creek sub-basin and the southwestern portion in the Gales Creek basin. DHG planning area includes steep slopes, seasonal drainage ravines and landslide hazard areas that create unique challenges for road building and development. PR planning area is located north of the City, in the Council Creek sub-basin, directly east of the DHB planning area. The PR planning area is relatively flat, but with fine-textured floodplain soils, and is bordered by riparian areas to the north and south. The ES planning area is located south of the City, in the Gales Creek basin. ES is relatively flat, on a low terrace adjacent to and 10 to 15 feet higher than the adjacent Tualatin River floodplain.

Under Oregon State Planning Goal 5 guidelines (OAR 660-015-0000[5]), local governments are encouraged to adopt programs designed to protect natural resources as well as to conserve scenic and historic areas and open space. Local governments and state agencies are also encouraged to maintain current inventories for Historic Resources, Open Spaces and Scenic Views and Sites. Forest Grove has already implemented several programs designed to carry out certain aspects of this work.

Goal 5 (adopted in 1982 and updated in 1996) provides a five-step planning process:

1. Inventory local occurrences of resources listed in Goal 5, and decide which ones are important.
2. Identify potential land uses on or near each resource site and any conflicts that might result.
3. Analyze economic, social, environmental, and energy (ESEE) consequences of such conflicts.
4. Decide whether the resource should be fully or partially protected, and justify the decision.
5. Adopt measures such as zoning to put that policy into effect

Under Goal 5 guidance, the following resources are to be inventoried:

a. Riparian corridors, including water and riparian areas and fish habitat;
b. Wetlands;
c. Wildlife Habitat;
d. Federal Wild and Scenic Rivers;
e. State Scenic Waterways;
f. Groundwater Resources;
g. Approved Oregon Recreation Trails;
h. Natural Areas;
i. Wilderness Areas;
j. Mineral and Aggregate Resources;
k. Energy sources;
l. Cultural areas.

In addition, local governments and state agencies are encouraged to maintain current inventories of the following resources:

a. Historic Resources;
b. Open Space;
c. Scenic Views and Sites.

GUIDELINES FOR GOAL 5 (http://www.oregon.gov/LCD/docs/goals/goal5.pdf)

A. PLANNING

1. *The need for open space in the planning area should be determined, and standards developed for the amount, distribution, and type of open space.*
2. *Criteria should be developed and utilized to determine what uses are consistent with open space values and to evaluate the effect of converting open space lands to inconsistent uses. The maintenance and development of open space in urban areas should be encouraged.*
3. *Natural resources and required sites for the generation of energy (i.e. natural gas, oil, coal, hydro, geothermal, uranium, solar and others) should be conserved and protected; reservoir sites should be identified and protected against irreversible loss.*
4. *Plans providing for open space, scenic and historic areas and natural resources should consider as a major determinant the carrying capacity of the air, land and water resources of the planning*

area. The land conservation and development actions provided for by such plans should not exceed the carrying capacity of such resources.

5. *The National Register of Historic Places and the recommendations of the State Advisory Committee on Historic Preservation should be utilized in designating historic sites.*
6. *In conjunction with the inventory of mineral and aggregate resources, sites for removal and processing of such resources should be identified and protected.*
7. *As a general rule, plans should prohibit outdoor advertising signs except in commercial or industrial zones. Plans should not provide for the reclassification of land for the purpose of accommodating an outdoor advertising sign. The term "outdoor advertising sign" has the meaning set forth in ORS 377.710(23).*

3. METHODS

3.1 Resource Information and Mapping Resources Reviewed

The following resource information and data sources were consulted in the preparation of this report. Additional materials are listed in the attached List of References.

- Oregon Department of Land Conservation and Development GOAL 5 regulations (OAR 660-015-0000(5) and guidelines were reviewed to ensure that this report provided adequate discussion on GOAL 5 resource assessment requirements. http://www.oregon.gov/LCD/docs/goals/goal5.pdf
- Oregon Dept. of Fish & Wildlife (http://www.dfw.state.or.us/) Oregon Plan for Salmon & Watersheds (http://www.oregon.gov/OPSW/pages/index.aspx)
- GIS mapping layers provided by PBS Engineering and Environmental (who also provided the project Geological and Geotechnical Assessment Report)
- City of Forest Grove website (http://www.forestgrove-or.gov/) for information on various parks, trails and related systems.
- The Oregon State Department of Environmental Quality, Drinking Water Program, which provides information on the Forest Grove water supply system: (http://www.deq.state.or.us/wq/dwp/docs/swasummary/pws00305.pdf)
- The Tualatin River Water Shed Council website provides several resource maps as well as excellent description of the Tualatin Basin watershed (http://trwc.org/tualatin-basin-information/)
- Washington County NRCS Soil Survey (online version: WEB Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx)
- National Wetland Inventory Mapper (http://www.fws.gov/wetlands/data/mapper.HTML)
- Google Earth historic timeline aerial photos of the project areas

4. FINDINGS

4.1 Goal 5 Summary

Goal 5 guidelines (OAR 660-015-0000[5]) encourage local governments to adopt natural resource protection programs and to conserve scenic and historic areas and open space. The following resources are to be inventoried: Riparian corridors; Wetlands; Wildlife Habitat; Federal Wild and Scenic Rivers; State Scenic Waterways; Groundwater Resources; Approved Oregon Recreation Trails; Natural Areas; Wilderness Areas; Mineral and Aggregate Resources; Energy sources; Cultural areas.

The following Goal 5 Resources **do not exist or are not currently designated** in the Forest Grove Planning Areas, and therefore, are not discussed below:

- **Oregon Scenic Waterways and Federal Wild and Scenic Rivers**: No local rivers are designated as wild and/or scenic in the Forest Grove area.
- **Natural Areas**: The nearest designated Natural Area, per the Oregon State Register is Banks Swamp, 5.5 miles north of Forest Grove.
- **Wilderness Areas**: No wilderness areas are located near Forest Grove Planning Area; they occur in the Cascade Range (about 80 miles east) and along the Oregon Coastline (about 40 mile west).
- **Energy Sources**: This is predominantly focused on large-scale wind, geothermal or water energy facilities, although may also control issues along powerline transmission corridors. No new energy facility sites are located in or near Forest Grove.

The following Goal 5 resources **do exist** in or near the Forest Grove Planning Areas, and will be characterized below:

- Riparian corridors;
- Wetlands;
- Wildlife Habitat;
- Groundwater Resources;
- Oregon Recreation Trails;
- Mineral and Aggregate Resources;
- Cultural areas.

4.2 Planning Areas: David Hill and Gales Creek Road; Purdin Road; and Elm Street

The City of Forest Grove is situated in the greater Tualatin River Drainage Basin (**Figure 4**), which forms the foundation for surface and subsurface hydrologic systems in the Westside Planning Areas. The basin headwaters emanate from the Coast Range foothills, dominated by a basalt bedrock foundation. Lower elevation portions of the basin flow through Willamette Valley floodplains. Forest Grove is situated at the transition between those two geologic and ecologic regional systems. The City is bordered to the south by the Gales Creek sub-basin, and to the north by the Council Creek system – a tributary at the lower end of the greater Dairy Creek sub-basin (described in more detail below). The confluence of these sub-basins with the main channel of the Tualatin River is located directly south of the City.

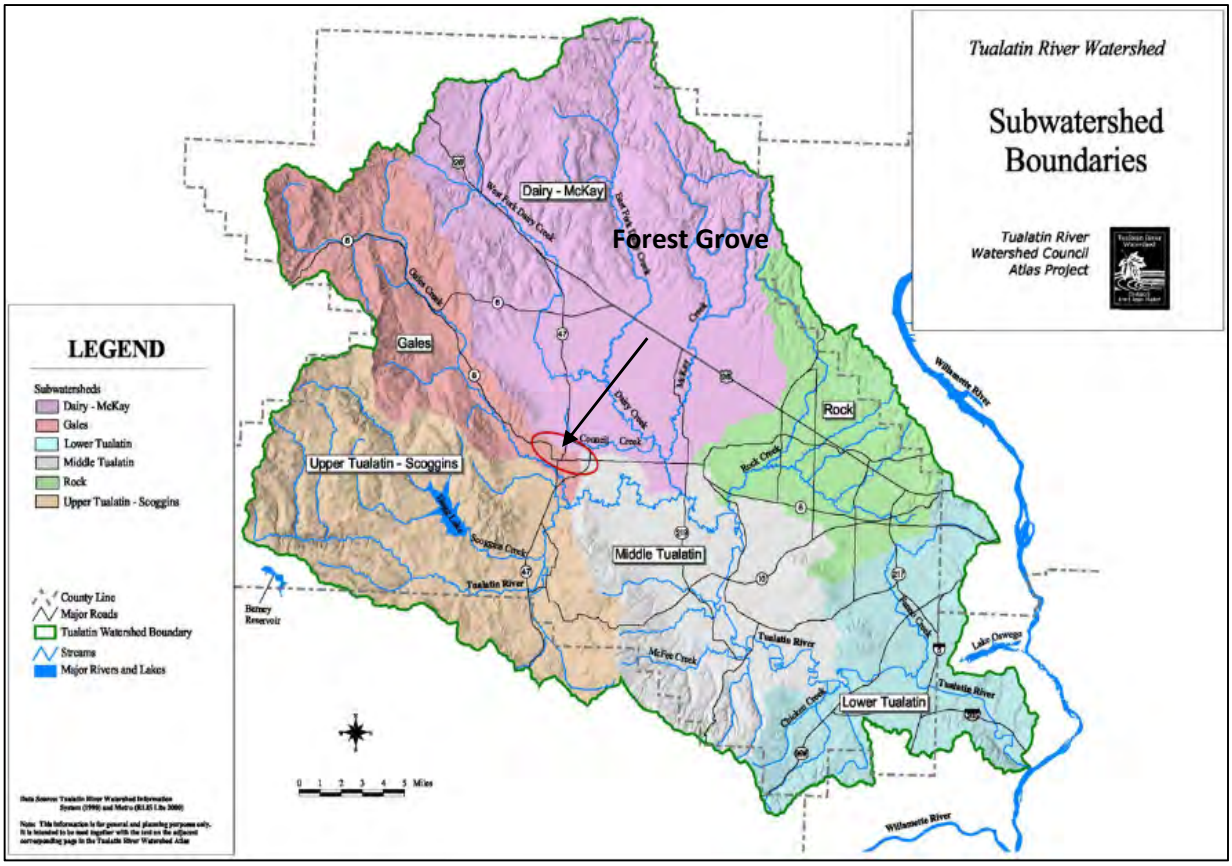


Figure 4. Tualatin Basin (Figure borrowed from Tualatin River Watershed Council map gallery) http://trwc.org/tualatin-basin-information/)

4.2.1 Planning Areas Descriptions

As described previously, three perimeter areas are targeted for expansion and urban development: the David Hill planning area (including the Gales Creek area for context and connectivity); the Purdin Road planning area; and Elm Street planning area. The David Hills and Gales Creek Road (DHG) and Purdin Road (PR) planning areas are located northwest of the City (**Figure 5**).

The DHG planning area is located in foothills northwest of the City and includes areas with steep slopes, seasonal drainage ravines and landslide hazard slopes, which create unique challenges for road building and development. The southern majority of the DHG is within the Forest Grove City limit, and includes densely developed neighborhoods, as well as

Figure 5. David Hill / Gales Creek Road Area and Purdin Road UGB Area

undeveloped agricultural lands and areas managed as forest land/ tree farms (**Figure 6**, Existing Vegetation). The northern end of DHG is outside of the City, bounded to the east by NW Thatcher Road, but within the Urban Growth boundary. It is currently managed as agricultural and forest land with scattered single-family homes. The southwestern portion of DHG (dense neighborhood area) drains to the Gales Creek basin floodplain; the northern portion of DHG drains to the Council Creek system.

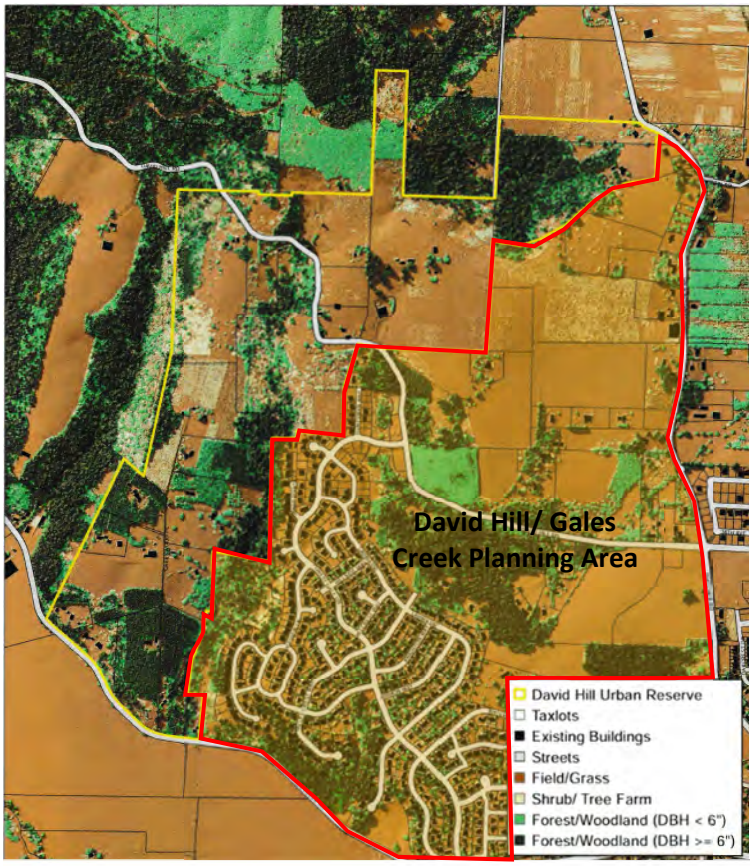


Figure 6. Existing Vegetation and Land Use in the David Creek and Gales Creek Planning Area (adapted from Vista Planning David Hill Study Base Map 12)

The PR planning area, located east of DHG (**Figure 5**), lies entirely within the Council Creek sub-basin, in the headwaters of Council Creek. The PR is on a relatively flat valley floor that is currently farmed and has fine-textured floodplain soils, potentially shallow groundwater, and is bordered by riparian areas to the north and south – headwater tributaries of Council Creek. Lands adjacent to the south (within the City) are agricultural (including an incised ditch – tributary to Council Creek); lands to the southwest are residential, including the Forest Grove High School complex, and the east side of the parcel is bounded by the Nehalem Highway (Oregon Highway 47).

The ES planning area is located south of the City (**Figure 7**). It is relatively flat, situated on a low terrace adjacent to and approximately 10 to 15 feet higher than the adjacent Gales Creek/ Tualatin River floodplain. It is currently farmed, but is directly adjacent to industrial lands and a bus barn, as well as one of the City's premiere Historic Landmarks (the Alvin T. Smith House), and is ¼ mile from the Fernhill Wetland Trail system.

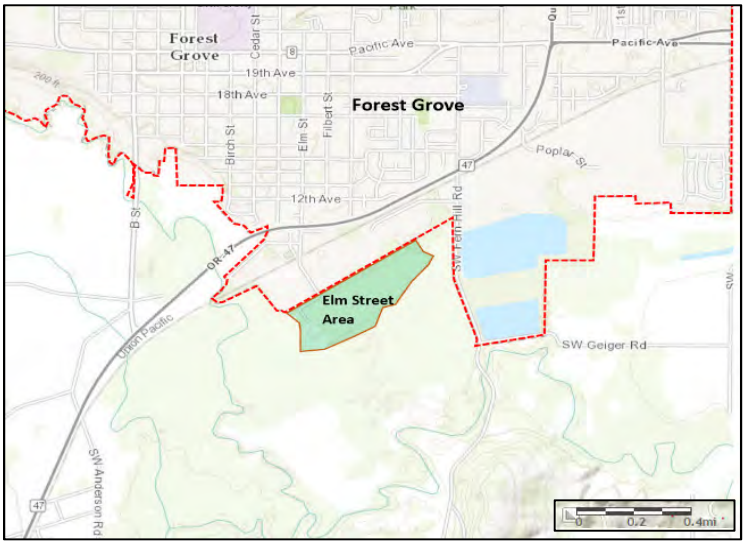


Figure 7. Elm Street UGB Area

4.3 Riparian Corridors, Wetlands, Wildlife Habitat Resources

Forest Grove lies in the central portion of the greater Tualatin River watershed, which covers over 700 miles and lays southwest of the Portland Metropolitan Area. The watershed initiates in the Oregon Coast Range and extends approximately 83 miles southeast where it merges into the Willamette River system. Forest Grove is situated between the Gales Creek Sub-basin and the Council Creek drainage system, a tributary in the lower portion of the Dairy-McKay sub-basin.

There are six major sub-basins in the Tualatin watershed. Gales Creek is the central drainage within the Gales Creek sub-basin (78 square miles) -- the smallest and central of the three headwater sub-basins forming the western portion of the watershed. Council Creek is a side tributary within the Dairy/ McKay sub-basin to the north – the largest of the three western headwater sub-basins.

Gales Creek System: The upper (western) portion of the Gales Creek sub-basin is mostly in private or state forest land ownership; the lower (eastern) portion of the basin is dominated by privately owned, irrigated croplands on the Gales Creek floodplain, but also includes some potentially active rock quarries and/or gravel mining areas. As shown in **Figure 8**, Gales Creek is a major riparian corridor system, containing floodplains, wetlands, wildlife habitat and critical salmonid (steelhead) habitat. In the lower

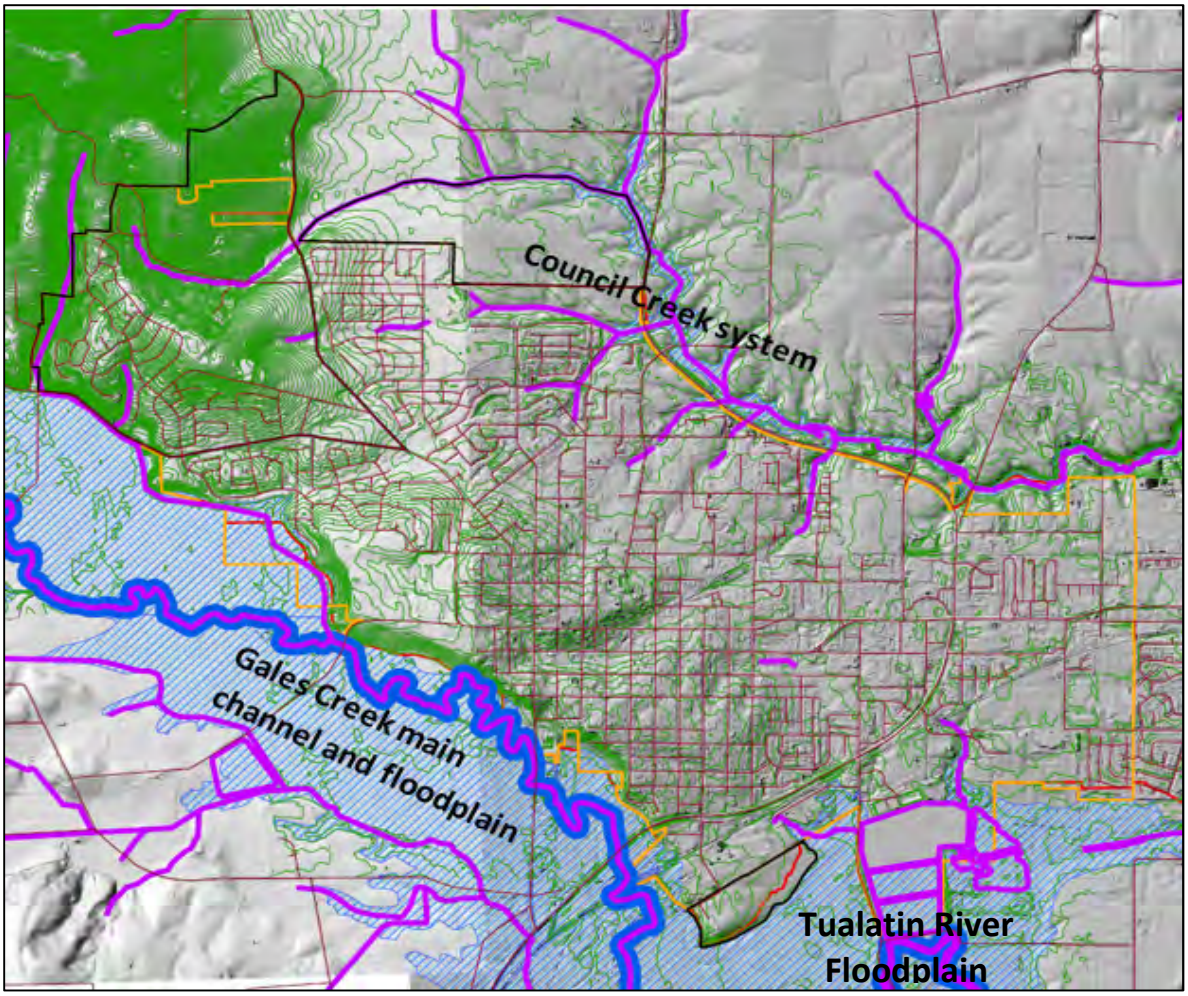


Figure 8. Gales Creek and Council Creek Drainage Systems and Tualatin/Gales Creek Floodplains

reaches near Forest Grove planning areas, the broad floodplain adjacent to the creek is densely farmed, greatly reducing riparian, wetland and wildlife habitat functions.

The riparian corridor in the area southwest of the DHG planning area meanders in an incised channel between farm fields. Total width of the vegetated (trees and shrubs) riparian corridor ranges between about 80 to 250 feet, with the Gales Creek main flow channel being about 30 feet in width. Wetlands in this area are mostly farmed, ditched, and drained to varying degrees. Farther downstream outside of City boundaries, the Gales Creek system merges with the Tualatin River, and associated wetland areas are more expansive. This is in the vicinity of the Fernhill Wetlands area, an important local wetland and wildlife open space area (discussed in more detail below).

In particular, anadromous and resident fish habitat in the farmed portions of Gales Creek is poor due to lack of large woody debris, lack of clean spawning gravels, lack of rearing and overwintering habitat (side channels) and high water temperatures (from lack of stream-side vegetation). In some areas, the creek bed is apparently dredged to reduce flooding or to mine gravel. Coho and steelhead, as well as other resident fish are documented as being present in this system, and Gales Creek is designated as Critical Steelhead Habitat by the State of Oregon.

Council Creek System: The upper tributary reaches of Council Creek (also shown in **Figure 8**) which receive drainage from the DHG and PR planning areas are controlled headwater systems, either meandering through densely developed neighborhoods or flowing in linear ditches directly adjacent to or through farmed lands. There is no documentation of resident fish presence in these upper reaches of Council Creek, and minimal information is available documenting water quality in the system. However, streams that drain urban areas and roadways typically have comparatively poor water quality.

The headwater portions of the Council Creek drainage system are steep sided with minimal wetland acreage (in the foothills to the west) or flow in drainage ditches through flat farmland – narrow, linear and simple systems with grassed banks, less than 15 feet wide. A seasonal groundwater table is expected to persist within six feet of the surface during wet months in the flat farmland areas, although depth to water will be affected by the depth of the adjacent ditches, as well as presence of potential tile drain systems installed for farming. Farther downstream, near the east end of the PR planning area, the stream system widens and has associated floodplain and wetlands. In the lower elevation stream reaches that parallel the Nehalem Highway (SR 47), there are several large riparian wetland systems, ranging from 200 to 700 feet in width. These larger Council Creek riparian wetland systems are typically surrounded by farmland or roadways, but still provide a refuge for wildlife as well as provide for flood storage and water quality treatment.

Wetland Inventory: A Shapiro & Associates Wetland Inventory was carried out in the Forest Grove area in 1993. That mapping was intended to replace and update the National Wetlands Inventory mapping – the only wetland mapping information available at that time (aside from NRCS Soil Survey mapping). The **Figure 9** wetland map shows currently defined wetland areas that were identified during that inventory project. However, the Shapiro inventory did not cover urban portions of the proposed planning areas, as they were outside of the City boundary. In addition, hydrology may have changed over time with development, and regulations and guidance for delineating and classifying wetlands has been updated several times since 1993. For these reasons, additional, not yet identified, jurisdictional wetlands may exist in the planning areas.

Clean Water Services manages and operates the Forest Grove wastewater treatment facility, located about ¼ mile east of the ES planning area. While the primary mission of CWS is focused on water quality, it has a strong engagement with habitat preservation and enhancement. The facility uses an extensive constructed complex of wetlands to provide tertiary wastewater treatment prior to release

into the Tualatin River about one mile downstream of the confluence with Gales Creek. The Fernhill Wetlands area surrounding the CWS facility has an extensive public trail system and provides habitat and refuge for a wide variety of resident and migratory birds, as well as amphibians and small mammals.

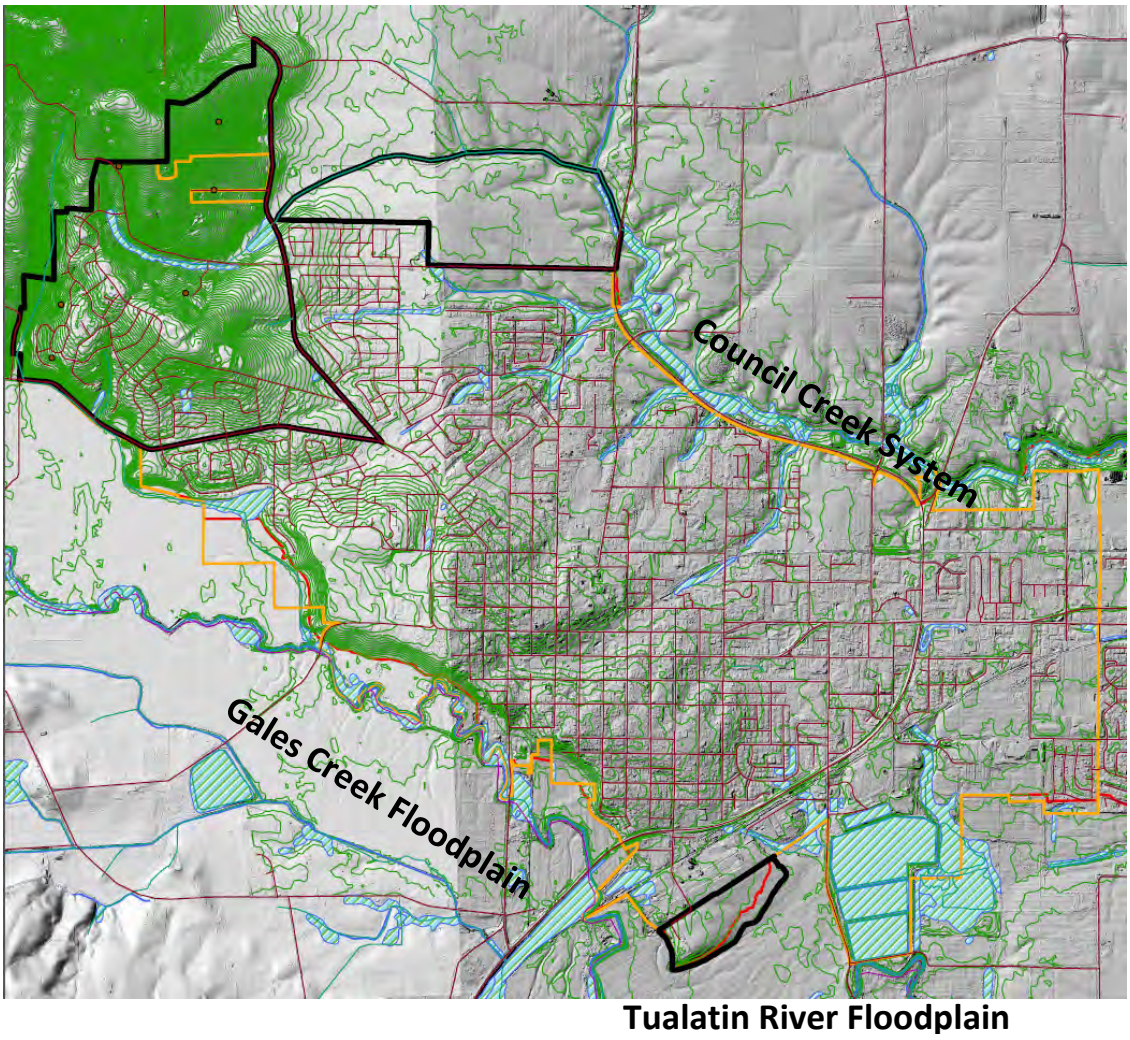


Figure 9. Wetlands Mapped in the Gales Creek and Council Creek Sub-basins (adapted from PBS Environmental GIS maps)

4.4 Regulations: Wetlands, Streams, Water Bodies, Wildlife Habitat

4.4.1 Federal Regulations

All mapped streams, wetlands and associated ponds are potentially regulated by the U.S. Army Corps of Engineers (ACOE) and U.S. Environmental Protection Agency (EPA) under Sections 404 and 401 of the Clean Water Act. Under certain circumstances, the ACOE may not take jurisdiction over isolated wetlands and small ponds (with no surface water connection to streams). All jurisdictional wetlands are also regulated by the Oregon Department of State Lands (DSL).

Some federal regulations defining wetland characteristics and delineation techniques have changed since 1993, but the changes should not significantly affect results of the original generalized inventory. Current state and federal laws provide an up-to-date definition of a wetland, as well as standard processes and methodology used to determine whether a wetland is present, and may be applied on a site specific basis if more detailed information is needed.

4.4.2 State and Local Regulations

The Goal 5 Administrative Rule requires local governments to conduct and adopt a local wetlands inventory, as well as adopt a list of locally significant wetlands (per rules described in ORS 197.279(3)(b)). The 1993 wetland inventory has been reviewed by DSL, and found to be adequate for planning purposes (personal communication, City of Forest Grove). However, as the inventory is generalized, a site specific assessment involving more detailed analysis may be needed when development is proposed. Jurisdictional wetlands not yet identified or inventoried would still be regulated under state and federal law. Under Goal 5, the city is also encouraged to develop land use codes protecting streams, water bodies, and wetland resources. Avoidance of impacts is first priority. Unavoidable impacts to these resources typically require mitigation.

Since 1990, Clean Water Services (CWS) has partnered with local jurisdictions to manage surface water systems -- such as streams, wetlands, floodplains, and their associated buffers -- in urbanized areas within the Tualatin River Basin. CWS implements county-wide regulations that define protection standards for these surface water systems (Design and Construction Standards, R&O 07-20, Chapter 3, Sensitive Areas and Vegetated Corridors). CWS is responsible for surface water management that will meet National Pollutant Discharge Elimination System (NPDES) stormwater permit requirements as well as implementation of stream and stream buffer protection strategies (design and construction standards) that are typically adopted and sometimes expanded by local jurisdictions, such as Forest Grove. A 2005 CWS program (Healthy Streams Plan) expanded CWS efforts to include surface water protection standards in non-urban areas.

Forest Grove implements the CWS surface water protection standards specific to protection of streams, wetlands and buffers, which include provisions for maintain and restoring vegetated corridors along streams and around wetlands. CWS regulations define standard buffer widths for wetlands and streams in Table 3.1 from Section 3.03 in R&O 07-20 (**Figure 10**), but also provide additional guidance describing when those standard buffer widths may be reduced or expanded. The purpose of these regulations is to protect water quality, but they correlate greatly with habitat preservation and enhancement benefits.

The City of Forest Grove Development Code (Chapter 10, Article 5, Section 10.5.000-10.5.515) references the CWS Design and Construction Standards, Chapter 3 regulations, but also provides additional guidance regarding local Natural Resource Areas (NRAs) protections standards, including allowable disturbance areas in relation to the Class of the defined Natural Resource Area and mitigation required if NRAs are impacted.

TABLE 3-1
Vegetated Corridor Widths Adjacent to the Sensitive Area
Where Activity is Not Redevelopment

Sensitive Area Type	Width Slope <25%	Width Slope ≥25%
Existing or created wetlands:		
< 0.5 acres and isolated*	25 ft	Variable from 25-200 ft.
<0.5 acres and not isolated*	50 ft.	Variable from 50-200 ft.
≥ 0.5 acres	50 ft.	Variable from 50-200 ft.
Natural lakes, ponds, and in-stream impoundments	50 ft.	Variable from 50-200 ft.
Springs:		
Intermittent flow	0	15 ft.
Perennial flow	50 ft.	Variable from 50-200 ft.
Intermittent Streams draining:		
< 10 acres	0	0
≥10 to <50 acres	15 ft.	Variable from 50-200 ft.
≥50 to <100 acres	25 ft.	Variable from 50-200 ft.
≥100 acres	50 ft.	Variable from 50-200 ft.
Perennial Streams:		
Other than Tualatin River	50 ft.	Variable from 50-200 ft.
Tualatin River	125 ft.	Variable from 125-200 ft.

*See definition of Isolated Wetland in Chapter 1.

Figure 10. Table 3-1 from Chapter 3 of R&O 07-20 – Sensitive Areas and Vegetated Corridors Protection Regulations

4.5 Groundwater Resources

The Forest Grove drinking water system is supplied by five surface water intakes located on Clear, Roaring, Smith, Deep and Thomas Creeks – tributaries of Gales Creek – located about eight miles upstream of Forest Grove (**Figure 11**). The City of Forest Grove treats the water in a conventional

water treatment plant that uses a rapid sand filtration system. Forest Grove conducts all water quality tests and data collection as required by law, and limits logging and related activities in the water supply watershed.

Gales Creek is listed in Oregon as a 303d water ("*waters where required pollution control s are not sufficient to attain or maintain applicable water quality standards*"), with its water quality impairment caused by clear-cut forests and landslides, but also by over-application or improper handling of pesticides or fertilizers, and proximity to surface waters that may contain elevated levels of fecal coliform or sediment. The 303d listing is only applied to the main channel of Gales Creek. However, Gales Creek water quality is potentially significant to Forest Grove since the City has water rights to withdraw water from the main channel. The City currently does not withdraw water from the creek but may do so in the foreseeable future. Any water taken from Gales Creek main channel would be diverted to the Joint Water Commission water treatment facility located on Fern Hill before entering into the City's water system.

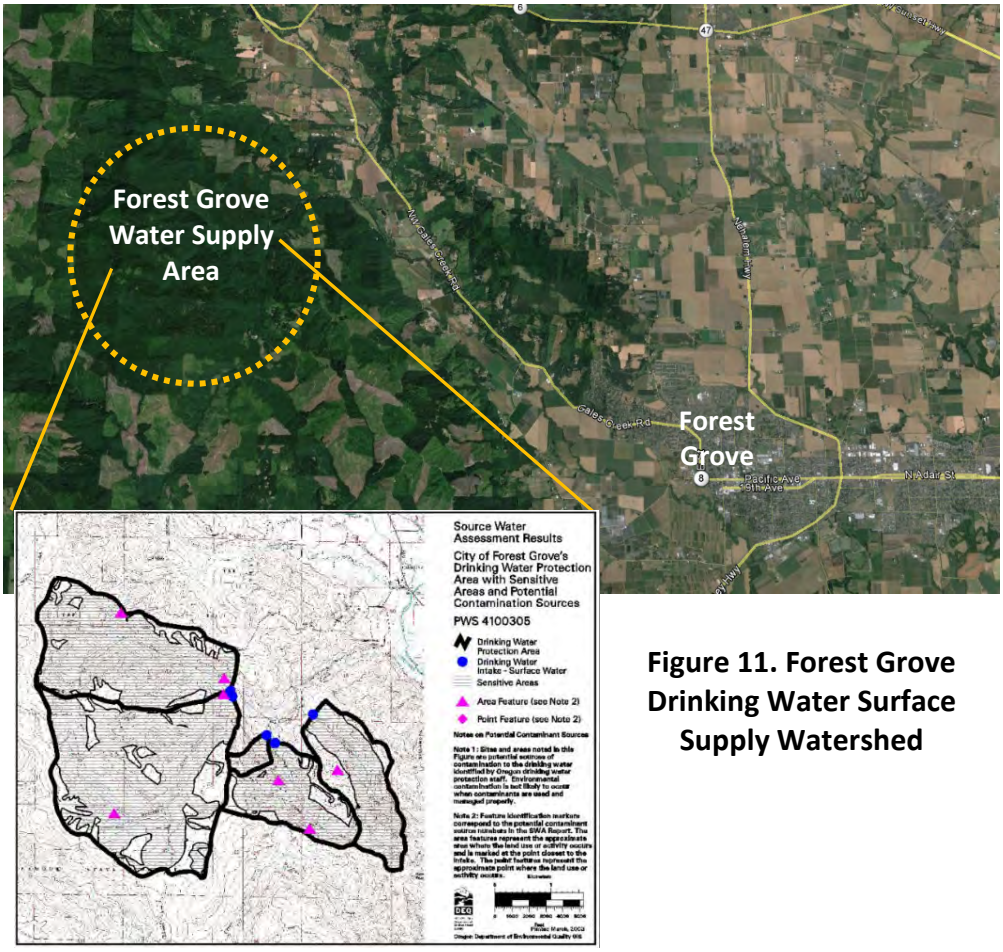


Figure 11. Forest Grove Drinking Water Surface Supply Watershed

In addition to the City's surface drinking water system, there are dozens of wells along both Gales Creek and Council Creek systems (**Figure 12**). Many are irrigation wells, but some serve as a drinking water supply, mostly outside of City limits. Goal 5 requires protection for certain critical groundwater areas, but none of the planning area is currently designated as a critical groundwater supply area.

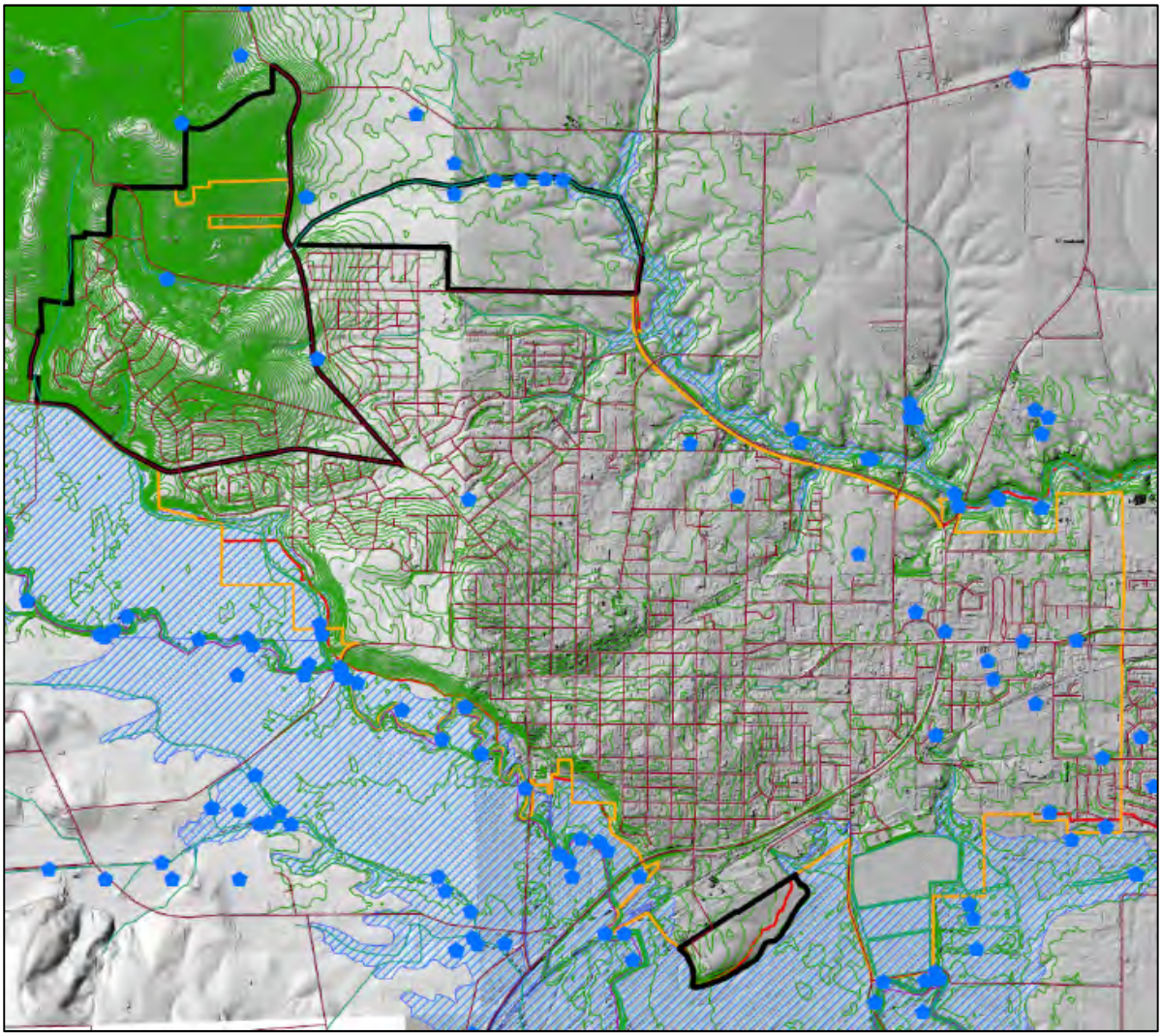


Figure 12. Documented Wells and Water Rights (blue dots) in the Forest Grove Vicinity (adapted from PBS Environmental GIS map layers)

4.6 Designated Oregon Recreation Trails Resources

There are several local and regional trail systems in and around the Forest Grove area. The 30-mile long Tualatin Valley Scenic Bikeway (Oregon's 10th designated scenic bikeway) starts near Hillsboro and meanders through the valley and Forest Grove, ending at Banks, north of Forest Grove. In addition, a Council Creek *Regional Trail System Master Plan* is under way and is intended to ultimately provide an additional 15 miles of public trails between Banks, Forest Grove and Hillsboro (**Figure 13**). Forest Grove also maintains other trail systems within the City, as well as public trails in the Fernhill Wetlands complex to the south.

Based on a 2007 *Community Trails Master Plan* that incorporates ideas about connecting to Metro regional trails systems, Forest Grove is in the process of planning, developing and implementing a system of community-wide trails designed to "*promote a sense of community, build physical connections, serve all ages and abilities, contribute to a strong local economy and establish partnerships*." Plans include connecting to County trails planned along Gales Creek, as well as

consideration of other ideas for additional regional trail links suggested by community members, such as:

- A link to Hagg Lake along Carpenter Creek
- A loop around Fernhill Wetland, through Cornelius and along Council Creek to the north
- A link to Gaston and points south along the railroad grade

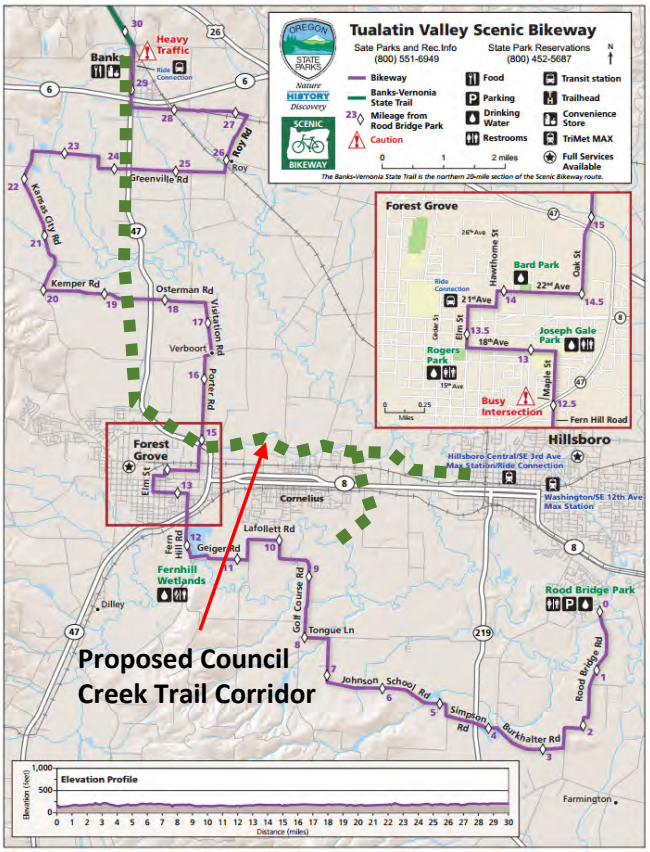


Figure 13. Tualatin Valley Bikeway (Existing) and Proposed Council Creek Regional Trail Corridor

4.7 Open Space Resources

The City is just beginning a process to update its Parks and Recreation Master Plan. Forest Grove currently has over 350 acres of Park Land and Open Space within City Limits (see **Figure 14**), and access to additional acreage in park and open space areas immediately surrounding the City. Of the fourteen parks, eleven have ball fields and or playground equipment; many also have picnic and barbeque areas as well as walking trails. In addition, there is an aquatic center and skateboard park outside of the study area, and an off-leash dog area adjacent to Thatcher Park within the study area. The City also manages the Fernhill Wetland park/trail system in the Clean Water Services property located at the southeast end of the City.

To expand and connect Open Space, Parks and Trails systems, the City has developed cooperative relationships with several regional organizations and agencies outside of the City – such as the Intertwine Alliance (http://theintertwine.org/partners), Metro and Washington County Parks. For example, the Forest Grove Parks Department sponsors cleanup activities at Hagg Lake, a Washington County Parks Department recreation area located about 5 miles south of Forest Grove.

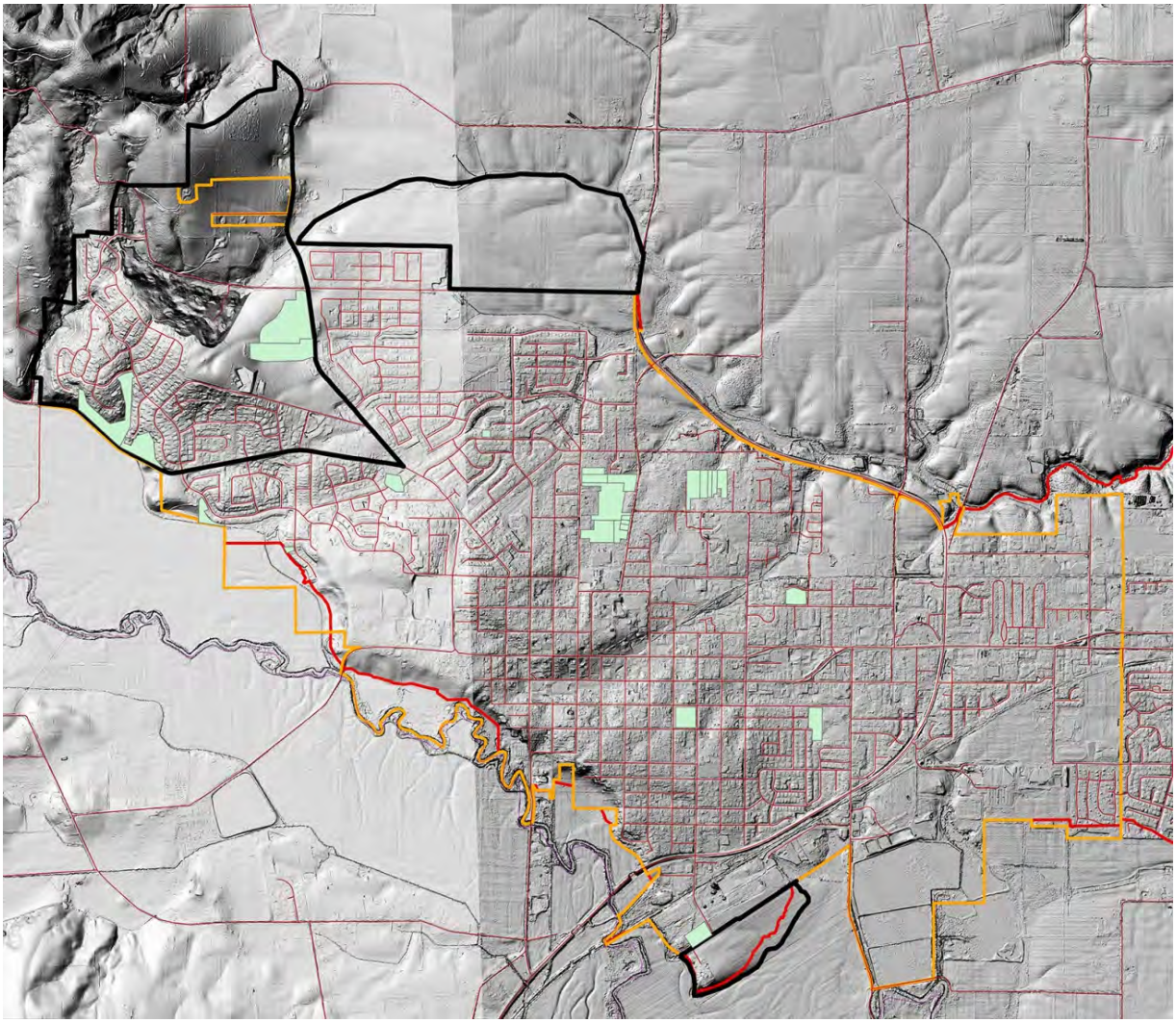


Figure 14. Parks in and near Forest Grove

4.8 Mineral and Aggregate Resources

Although dredging activities are described as occurring throughout the Gales Creek basin, we could find record of only two local mines (per Oregon Department of Geology and Mineral Industries) – one for sand and gravel and one for industrial mineral clays. DOGAMI records indicated that both of these possible mines are located on the Gales Creek floodplain southwest of Forest Grove (outside of the City Limits) and are shown in **Figure 15**. According to City staff, it appears that these two old mines are not currently active and there are no traces of old mining activities. One mine is described as a "past producer", being run by Forest Grove Clay Products Co. which is listed as a brick manufacturer in a July 13, 1920 publication labeled "Brick and Clay Record, Volume 57". Both are described as surface mines.

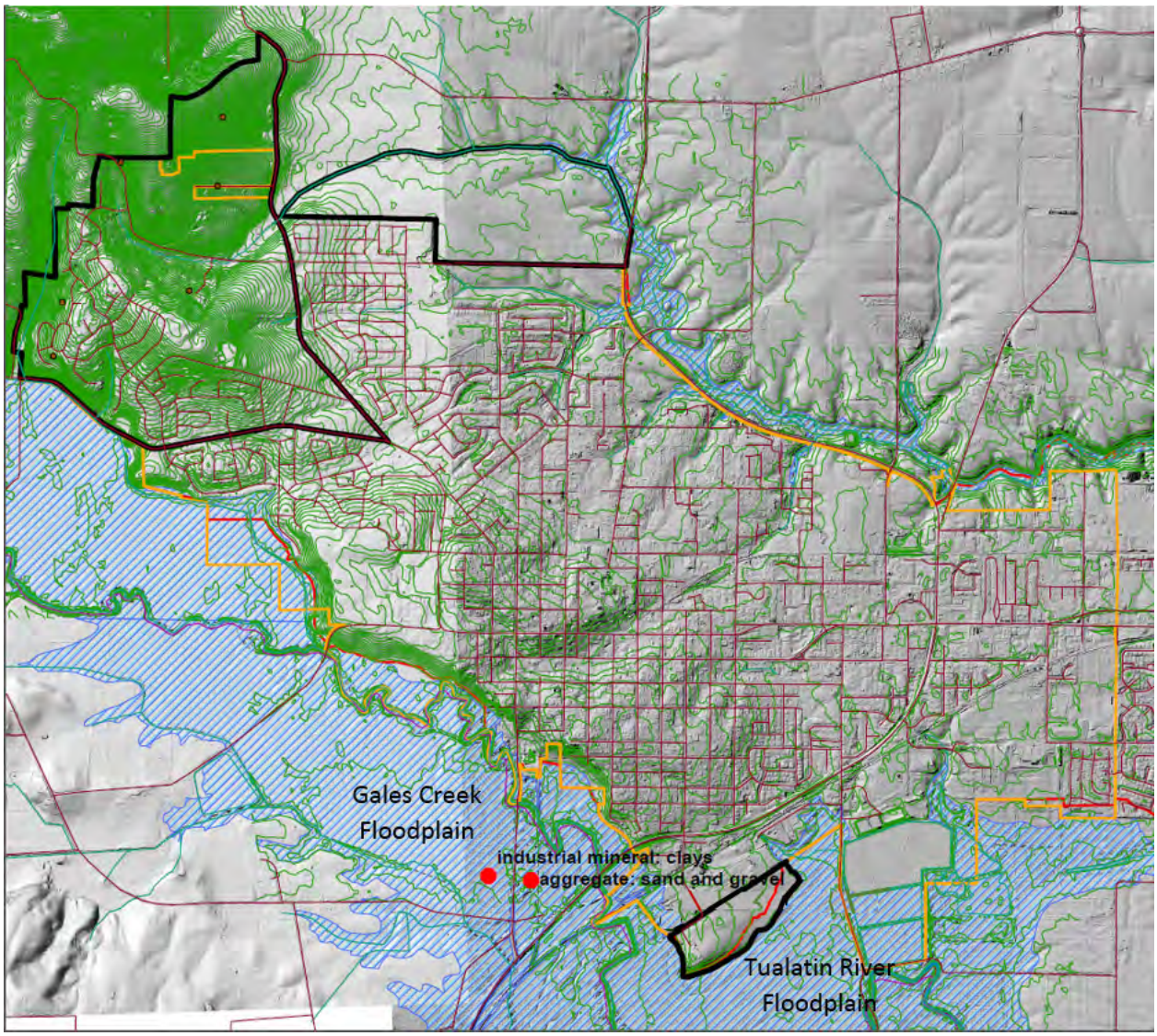


Figure 15. Mineral and Gravel Extraction Areas on the Gales Creek Floodplain near Forest Grove (adapted from PBS Environmental GIS maps)

4.9 Cultural Area Resources

Forest Grove has an Historic Landmarks Board responsible for protecting and preserving historic districts in the City and finding a balance with allowing responsible development in and near the historic districts. Forest Grove adopted a Historic Landmarks Ordinance in 1980. There are currently 84 individual structures on the Forest Grove Register of Historic and Cultural Landmarks and five different Historic Districts -- one undesignated District (Historic Downtown) with 21 “significant historic building”; three Districts designated as National Historic Districts, and one District (Pacific University campus) with eight buildings on the Forest Grove Register, and one on the National Register.

Forest Grove's founders were missionaries, and Missionary Alvin Thompson Smith’s home was built in 1854 (shown in **Figure 16**) and is located directly adjacent to the ES site on a 1.84 acre property. This

building is on the National Register and is currently preserved and managed by Friends of Historic Forest Grove (a volunteer non-profit organization).

The Friends of Historic Forest Grove purchased the 1.84 acre parcel along with two additional 3.38 acres parcels, totaling 5.22 acres (acreages according to Washington County Assessor data). The City recently purchased 3.20 acres of this land while the Friends will retain ownership of the remaining 2.02 acres. The Comprehensive Plan designation and zone district for the entire 5.22 acre site has been changed from "General Industrial" to "Institutional" (as of 2014) to reflect the future recreation and historic use of the site.

Figure 16. Location of Alvin T. Smith House Relative to Elm Street Planning Area

5. OPPORTUNITIES

This review of project area resources helps in developing a list of potential opportunities to protect and improve natural resource conditions in the Westside planning areas, as well as throughout Forest Grove. We note that Forest Grove had already developed several programs and processes that support the Goal 5 planning process.

5.1 Potential Ecological Protection and Enhancement Opportunities near the Planning Areas

5.1.1 DHG and PR Planning Areas Opprtunities

- Council Creek riparian area enhancement: planting a wider, naturally vegetated riparian corridor to provide room for a public trail system as well as improved wildlife habitat and water quality.
- Landslide stabilization on steep slopes by replanting with deep-rooted native vegetation
- Wider roads with bike lanes connected to existing regional and City trail systems

5.1.2 ES Planning Area Opportunities

- Fernhill Wetlands expansion to incorporate undeveloped wetlands and riparian areas adjacent to the Tualatin River
- Landscaping requirements for new development in ES with trail systems connecting to Fernhills Wetland trail systems
- Development of the adjacent Alvin T. Smith Historic Homesite into a new park or special events facility
- Redevelopment of existing adjacent industrial areas to incorporate perimeter vegetation to improve viewscapes from the AT Smith facility
- Installation of street trees along the roadway leading to the AT Smith facility
- Promote voluntary conservation measures and integration of built and natural systems

5.1.3 General Opportunities

- Update 1993 Forest Grove Wetland and Stream Inventory using current definitions and mapping processes as needed
- Blend storm water management with natural systems (using constructed wetlands adjacent to natural systems to improve water quality and wildlife habitat opportunities)
- Remove invasive plants throughout City riparian and wetland areas to minimize invasive growth, reduce and stream bank erosion and improve widllife habitat.
- Develop new connections and cooperative efforts between landowners and other government agencies.

References:

1. Oregon Department of Land Conservation and Development GUIDELINES FOR GOAL 5 (http://www.oregon.gov/LCD/docs/goals/goal5.pdf)

2. State of Oregon, Dept. of Geology and Mineral Industries: http://www.oregongeology.org/sub/milo/milo-washington.htm

3. Source Water Assessment Summary Brochure City of Forest Grove PWS # 4100305 (http://www.deq.state.or.us/wq/dwp/docs/swasummary/pws00305.pdf)

4. Forest Grove Website: (http://www.forestgrove-or.gov/)

- Council Creek Regional Trail System: (http://www.forestgrove-or.gov/images/stories/services/engineering/pdf/Brochure_Final.pdf)
- Fernhill Wetlands: http://www.forestgrove-or.gov/residents/fernhill-wetlands.html
- Forest Grove Parks: http://www.forestgrove-or.gov/visitors/nature-and-recreation.html
- Forest Grove Historic Districts: http://www.forestgrove-or.gov/city-hall/citizen-boards-commissions/historic-landmarks-board-historic-neighborhoods.html
- Forest Grove Community Trails Master Plan: http://www.forestgrove-or.gov/images/stories/services/parksandrec/pdf/forms/trailmasterplan.pdf

5. The Oregonian Articles:

- Forest Grove watershed lands provide water, timber revenues for the city (http://www.oregonlive.com/forest-grove/index.ssf/2013/10/forest_grove_watershed_lands_p.html)
- "Improvements at Fernhill Wetlands soothe the soul, invite public participation (guest opinion)" http://www.oregonlive.com/forest-grove/index.ssf/2014/02/improvements_at_fernhill_wetla.html

6. Tualatin River Watershed Council:

- Tualatin River Watershed Council Tualatin Basin Information (http://trwc.org/tualatin-basin-information/)
- Tualatin River Watershed Council Tualatin Basin Maps (http://trwc.org/tualatin-basin-information/maps/)
- Tualatin River Watershed Atlas publication, March 2001 (edited and assembled by Andree Pinnell) http://trwc.org/wp-content/uploads/2013/03/Watershed-Atlas.pdf
- Gales Creek Watershed Assessment Project, Tualatin River Watershed Council, 1998 (http://trwc.org/tualatin-basin-info/environmental-reports/gales-creek-reports/gales-creek-watershed-analysis/)

7. Oregon Plan for Salmon and Watersheds (Oregon.gov) (http://www.oregon.gov/OPSW/Pages/about_us.aspx)

8. Municipal Water Supplies from Forest Watersheds in Oregon: Fact Book and Catalog, by Paul W. Adams & Mark Taratoot Forest Engineering Department, Oregon State University, June 2001 http://water.oregonstate.edu/roundtables/download/Adams&Taratoot.pdf

9. **Hook and Bullet website, showing stream locations on a Google Earth basemap.** http://www.hookandbullet.com/googlemap.aspx?lat=45.5662231445313&lon=-123.2384414672852

10. National Wetland Inventory Mapper (http://www.fws.gov/wetlands/data/mapper.HTML)

11. NRCS Washington County Soil Survey (online version) (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

12. A.T. Smith House Historic Structures Report, Prepared for Friends of Historic Forest Grove by Historic Preservation Northwest, August 31, 2007 (http://www.historicforestgrove.org/PDFs/AT%20Smith%20HSR.pdf)

Forest Grove

Westside Planning Project

David Hill Area
Purdin Road UGB Area
Elm Street UGB Area

Infrastructure Overview

December 2014
Revised March 2015

SCJ ALLIANCE
CONSULTING SERVICES

Forest Grove Westside Planning Project
Infrastructure Overview

Project Information

Project:	Forest Grove Westside Planning Project Infrastructure Overview
Prepared for:	**City of Forest Grove** Jon Holan, Community Development Director

Reviewing Agency

Jurisdiction:	City of Forest Grove Washington County

Project Representative

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Project Reference:	SCJ # 742.01

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1. INTRODUCTION

This report provides a planning level assessment and description of existing sewer, stormwater and water utility infrastructure within and near the City of Forest Grove – but specifically targeting three areas proposed for future urban development: the David Hill / Gales Creek Road planning area (DH), the Purdin Road UGB (PR), and the Elm Street UGB (ES). The three planning areas are illustrated in Figure 1. These three areas are being assessed to address and resolve land use and infrastructure needs to guide future development.

The David Hill/Gales Creek planning area is located northwest of the City, and includes steep slopes, seasonal drainage ravines and landslide hazard areas that create unique challenges for road and utility infrastructure development. Most of DH is currently managed as agricultural land with scattered single-family homes. Generally south of Watercrest Road, the larger planning area includes densely developed neighborhoods. The northern end of the planning area is outside of the City, bounded to the east by NW Thatcher Road, but within the Urban Growth boundary. It should be noted that the primary focus in this planning area is on the area north of Watercrest Road. The Gales Creek area is included in Figure 1 primarily to address issues related to context and connectivity.

PR planning area is located north of the City (east of the DH planning area), on a relatively flat valley floor that is currently farmed and has fine-textured floodplain soils, potentially shallow groundwater, and is bordered by riparian areas to the north. Lands adjacent to the south (within the City) are agricultural; lands to the southwest are residential, including the Forest Grove High School complex, and the east side of the parcel is bounded by the Oregon Highway 47.

The ES planning area is located south of the City with regional access via Oregon Highway 47 to the north. It is currently farmed, but is directly adjacent to industrial lands and a bus barn, as well as one of the City's premiere Historic Landmarks (the Alvin T. Smith House), and is ¼ mile from the Fernhill Wetland Trail system.

2. FINDINGS

This report is intended to provide project planners with a baseline assessment of existing and planned water, sewer and stormwater utilities which will inform and support planning and development decisions in the Westside Planning areas. The information gathered is based on review of the following plans and documents:

- Sanitary Sewer Master Plan Update, Clean Services, March 2009
- Storm Drainage Master Plan, City of Forest Grove, November 2007
- City of Forest Grove Water Master Plan Update, HDR, August 2010.
- David Hill Urban Reserve Concept Plan, Vista Planning & Portland State University, June 2011
- West Basin Master Plan, 2013.
- Forest Grove Westside Plan Kick-off Meeting Minutes, October 30, 2014
- Forest Grove Comprehensive Pan, 2014

2.1 Sanitary Sewer Services

The City of Forest Grove operates a local sewer utility that feeds into the regional sanitary sewer system operated by Clean Water Services (District). The District provides wastewater collection and treatment to over a 122 square mile area in the Tualatin River watershed. The District operates four wastewater

treatment plants and 309 pump stations, working with twelve member cities. One wastewater treatment plant is located in southern Forest Grove east of Fern Hill Road and south of Highway 47. This facility serves the City of Forest Grove, the community of Gaston, and the City of Cornelius. Secondary treatment is provided using an activated sludge process followed by ultraviolet disinfection. This facility is connected to treatment facilities in Hillsboro and Rock Creek with all three being integrated in terms of operational requirements and responsibilities.

Clean Water Services updated the regional *Sanitary Sewer Master Plan* in 2009 (MP9), which is incorporated into the City of Forest Grove *Comprehensive Plan* by reference. The primary purpose of the MP9 was to assess the capacity of District's wastewater collection facilities, and to identify improvements that will extend service to areas anticipated to develop. The Purdin Road UGB area was included as a future growth area in the MP9. In 2013, the *West Basin Facilities Plan* (MP13) was prepared for the District to address specific improvement needs in Forest Grove, Hillsboro and other smaller communities in western Washington County. The Purdin Road UGB area was also included as a future growth area in the MP13 (and was assumed to develop with industrial uses), along with the David Hill Urban Reserve. The David Hill planning area under consideration as part of the Westside Planning Project was not included.

Existing sanitary sewer service facilities within the three planning areas and potential constraints that may affect future development are discussed in the sections below. See Figures 2, 3 and 4 for existing sewer line locations near the three areas.

2.1.1 David Hill Area

Existing Facilities

There is an existing 8 inch sewer line on the eastern side of the David Hill planning area (DH) on David Hill Road and an 8 inch line on Huntsman Street at the southwestern part of the hill and 8 inch lines all along the southern boundary. The area is currently being served by individual septic tank systems.

Planned Facilities

According to the *Forest Grove Sanitary Master Plan*, it is expected that two major trunk lines will ultimately serve development in the David Hill area. The first would be located on David Hill Road and the second would be located on Thatcher Road. The location where these two lines would meet is still under evaluation through the development process. The pipe on David Hill Road should be constructed deep enough so that the collection system can be extended to the south below a small ravine.

According to the Master Plan, a 15-inch pipe will be required between the existing collection system and the point of juncture of the two trunks with a required capacity of 1,100 gpm (gallons per minute).

The David Hill Road truck required pipe diameter is 12 inches, and the required capacity is 700 gpm. The Thatcher Road required pipe diameter is 12 inches, and the required capacity is 700 gpm.

Issues and Constraints

Based on review of the referenced plans and other documents, the following is a list of key issues that could affect future development in the David Hill area.

- The closest existing sewer line is located within the residential development along the southeastern border of DH. There is a stream corridor, Metro Title 3 water quality management areas, and a small ravine with steep slopes separating these lines from the majority of the planning area.

- Additional capacity may be needed depending on the nature of proposed development an anticipated water service demand. More research will need to be done as the refinement planning process continues.

2.1.2 Purdin Road UGB Area

Existing Facilities

There is an 8 inch sewer line that runs along Hartford Drive, both 8 and 12 inch lines running along 37th Avenue. Additional sewer lines to be considered as existing facilities are two proposed sewer mains at the intersections of Main Street/David Hill Road and A Street/David Hill Road. These are to be constructed as part of the Silverstone Subdivision. A second sewer main is to be constructed in David Hill Road from Highway 47 to existing development.

Issues and Constraints

Based on review of the referenced plans and other documents, the following is a list of key issues that could affect future development in the Purdin Road UGB area.

- It is anticipated that the Clean Water Services Council Creek sewer line has capacity to accommodate development in the planning area. Based on preferred land uses identified during the planning process, this conclusion will be confirmed. Review of the *West Basin Facility Plan* (2013) addresses issues with the alignment of the Council Creek trunk line (which is also intended to serve the community of Banks north of Forest Grove). This Plan does not show any further system improvements in the immediate area through 2035.
- CWS plans identify the need for a future North Forest Grove trunk line through the Purdin Road planning area. A specific alignment for this line will need to be discussed with CWS as site development concepts are developed. CWS plans also identify several proposed lateral lines within the Purdin Road planning area which have been revised through more recent planning and engineering design efforts associated with the Silverstone subdivision and the David Hill Road extension project.
- Consideration may need to be given to an optimal alignment of utilities through the Purdin Road planning area to accommodate physical and/or topographical constraints along Thatcher Road to establish connections with the David Hill planning area. An alignment could be located outside of the existing UGB, but then could not follow a street alignment.

2.1.3 Elm Street UGB Area

Existing Facilities

There is a 15 inch sewer line that runs along Taylor Road and an 8 inch line on Elm Street that dead ends about 275 feet short of the area.

Issues and Constraints

Based on review of the referenced plans and other documents, the following is a list of key issues that could affect future development in the Elm Street UGB area.

- Lack of depth of the sewer line serving the area. The property drops off heading south towards the Tualatin River. It is expected that this line will serve the northern half of the property but not the southern half. Options to service this area will need to be explored.

- Additional capacity may be needed depending on the nature of proposed development an anticipated water service demand. More research will need to be done as the refinement planning process continues.

2.2 Stormwater Services

The City of Forest Grove operates a local surface water management utility. They work together with Clean Water Service, (District). The District is the regional Stormwater Management utility for Urban Washington County. In cooperation with Washington County and the twelve cities in the District, they build maintain and enhance the public drainage system to meet quality regulations set for the Tualatin River drainage area by the Oregon Department of Environmental Quality. Prior to any subdivision approvals, the stormwater facilities for conveyance, detention and treatment must be installed. The operations and maintenance of the facilities are the responsibility of the City.

The City of Forest Grove has seven major stormwater basins. All three planning areas are located in the Tualatin River Watershed. David Hill Planning Area and Elm Street UGB area lie in the Gales Creek sub watershed and the Purdin Road area lies in the Dairy-McKay Creek sub watershed. The conveyance system in the city is composed of open drainage ways, ditch systems, gravity storm drainage pipelines, and 1 small pump station.

Based on the existing *Comprehensive Plan*, stormwater facilities should be designed to mitigate runoff conditions to accommodate future land development. These facilities should be co-located to complement other infrastructure facilities and to avoid conflict. The use of low impact design techniques to reduce stormwater runoff is encouraged. Collectively design and maintenance of an integrated water, stormwater and waste water system is encouraged to reduce pollution, minimize energy needs, maximize efficiency, and protect/restore ecological systems.

See Figures 5, 6, and 7 for existing stormwater line locations near the three planning areas.

2.2.1 David Hill Area

Existing Facilities

The David Hill Planning area contains no built stormwater management infrastructure. Typically stormwater flows downhill towards existing creeks. Stormwater from the southwestern portion of DH flows to the Gales Creek basin floodplain, and the northern portion of DH drains to the Council Creek system. Existing vegetation consists of forest, tree farms, and small agricultural and horticultural activities. The primary soil is Laurelwood silt which has very limited infiltration capabilities. Approximately 31 percent of the area contains steep slopes which could pose a risk for landslides and is not advisable for low impact development (LID) stormwater facilities. The David Hill area is not located within an existing floodplain.

Issues and Constraints

Primary issues and constraints to the establishment of stormwater management facilities in the David Hill planning area include:

- The presence of steep slopes throughout much of the planning area
- Low water infiltration soils

2.2.2 Purdin Road UGB Area

Existing Facilities

The Purdin Road planning area is located on relatively flat valley floor that is currently farmed and has fine-textures floodplain soils. The area is bordered by riparian habitat to the north and east and includes

the headwater tributaries of Council Creek. There is an existing housing subdivision located to the southwest that has an existing stormwater conveyance system. Along the south edge of the PR area, Silverstone Subdivision is proposing to install a stormwater conveyance system that will transfer stormwater from David Hill Road and Silverstone to the south. This stormwater system is also expected to convey a portion of the stormwater from the south PR area.

Issues and Constraints

There are issues for overland drainage of the area and some localized flooding occurs. Groundwater is potentially shallow. Flat topography does not promote positive flows.

2.2.3 Elm Street UGB Area

Existing Facilities

Existing stormwater facilities in the Elm Street area are limited with water generally flowing toward the Tualatin River. There is a stormwater manhole located about 620 feet away from the site on Elm Street. The site is relatively flat.

Issues and Constraints

Flat terrain does not promote positive flows. No other constraints to stormwater management related to development of this site are anticipated at this point.

2.3 Water Services

The City of Forest Grove belongs to the Joint Water Commission (JWC), a joint operation for the treatment, transmission, and storage of municipal and industrial water owned by the member agencies of the cities of Forest Grove, Hillsboro, and Beaverton, and the Tualatin Valley Water District.

JWC water is supplied to Forest Grove from the JWC Fern Hill Reservoirs through a 24” diameter transmission main (1/2 of the capacity is owned by City of Hillsboro). This water is controlled at a metering station located on 10th Ave near the Elm Street UGB.

Residents of Forest Grove also receive their water from a City-managed system. The City of Forest Grove has intake facilities within the Clear Creek watershed on Clear Creek, Roaring Creek, Thomas Creek, Deep Creek and Smith Creek. The City has a treatment plant that has a capacity of 3.7 million gallons per day (mgd). The filtered water is piped by gravity to the City’s 4.27 million gallon covered reservoir located adjacent to the water treatment plan. The city also has a 1.0 million gallon reservoir built in 1985, and located on David Hill Road within the DH planning area.

The City’s water distribution system has three pumping facilities:

- Raw water booster pump station along the transmission main to the City water treatment plan;
- David Hill pump station; and
- Watercrest pump station

The David Hill pump station was the primary means of moving water from the main (lower) pressure zone that encompasses much of the city, to the David Hill reservoir. The Watercrest pump station now feeds the David Hill reservoir and the Upper Pressure Zone that serves about 120 acres and nearly 600 connections in the northwestern portion of the City. The David Hill reservoir is now used as a back-up.

The City’s water distribution system includes pipes ranging in size up to 24-inches in diameter. Pipe types include cast iron, ductile iron, copper, steel, wrought iron, galvanized iron and polyvinyl chloride (PVC). Newer distribution pipes are largely ductile iron.

The City adopted a *Water Master Plan* in 2010 to evaluate water system facilities and to determine water supply requirements and system improvements needed to serve expected housing and employment growth in the city. This plan is based on population forecasts for the service area at the time the plan was prepared.
The City's *Water Master Plan* notes that the limiting supply factors for the City are the JWC transmission line's capacity of 6.1 mgd, and the 1.5 mgd reliable summertime capacity from the Clear Creek watershed. The City's current peak demand is approximately 6. 0 mgd with a forecasted demand expected to exceed the 7.6 mgd combined supply capacity by approximately 2023.

Existing water service facilities within the three planning areas and potential constraints that may affect future development are discussed in the sections below. See Figures 8, 9 and 10 for existing water line locations near and within the planning areas.

2.3.1 David Hill Area

Existing Facilities

While a 12-inch water line is currently provided along David Hill Road in the planning area, residents in the planning area typically rely on well water. The area is largely zoned/planned for single family residential with a mixed use area on the NW quadrant of David Hill Road and Thatcher Road established during the 2014 *Comprehensive Plan* update.

Issues and Constraints

Based on review of the referenced plans and other documents, the following is a list of key issues that could affect future development in the David Hill area.

- The City's existing water system can't supply water above an elevation of 440 feet above sea level with adequate pressure. DH has area that exceeds this elevation. At this time, the City is planning for the installation of a new reservoir that will be able to support service to this area.
- The City of Forest Grove *Water Master Plan Update* recommends building 1.0 million gallons of new storage at higher elevation to serve David Hill by 2045. This reservoir could also serve long-term (post 20-years) development in the Urban Reserve area to the west of the UGB. A reservoir elevation of 693 feet above sea level is identified. A pump station would be required to fill from Upper Pressure Zone (UPZ) and pressure reducing valves (PRV) would be needed to allow storage to serve UPZ.
- The *Water Master Plan* also includes the recommendation to add a new 10 inch pipe extending from the current pipe on David Hill Road, along this facility through the planning area. No water lines are currently planned to extend along Thatcher Road to the northern portion of the planning area or along Gales Creek Road to reach the southern edge of David Hill.
- There are water lines in the residential neighborhoods along the southeastern border of the David Hill planning area. There is a stream corridor, Metro Title 3 water quality management areas, and a small ravine with steep slopes separating the water main from the majority of the planning area.
- Prior to the 2014 update of the City's *Comprehensive Land Use Plan*, the David Hill area above the 440 foot contour assumed to develop at an average density of 1 dwelling unit per acre with well water service. The 2014 Comprehensive Land Use Plan continues the one unit

per acre density above the 440 foot contour. The 2014 Comprehensive Plan and underlying zoning calls for an average of 4 dwelling units per acre below the 440 foot contour. This added residential development may require new or expanded water serve facilities in the planning area. Additionally the urban reserve area to the west of David Hill has been identified for long-term development up to 20 dwelling units per acre.

2.3.2 Purdin Road UGB Area

Existing Facilities

According to the Forest Grove *Water Master Plan Update* existing water storage serving the Purdin Road UGB area includes 4.27 million gallons at the Forest Grove water treatment plant and 2.8 million gallons from the JWC Fern Hill Reservoir. Water demand for the future Purdin Road Area was modeled under a 2050 maximum day condition (including fire flow). An 8-inch diameter pipe extending from the intersection of B Street and Handford Drive was used in the model analysis. Demand at the end of the pipe was 229 gpm (0.33 mgd). There is also an 8-inch water pipe that runs along 37th Avenue immediately south of the planning area.

However, it should be noted that the *Water Master Plan* assumes the Purdin Road planning area would be much larger than the actual acreage recently admitted to the UGB. This area is largely agricultural with some residential and was brought into the UGB without preparation of a Concept Plan to identify appropriate land uses and infrastructure requirements.

Issues and Constraints

Based on review of the referenced plans and other documents, additional water service capacity may be needed in the Purdin Road UGB area, depending on the type of development envisioned and the level of demand anticipated. Land uses that may be considered could vary from residential to industrial which could have significantly different demand for water. More research will be needed as refinement plan options are developed.

2.3.3 Elm Street UGB Area

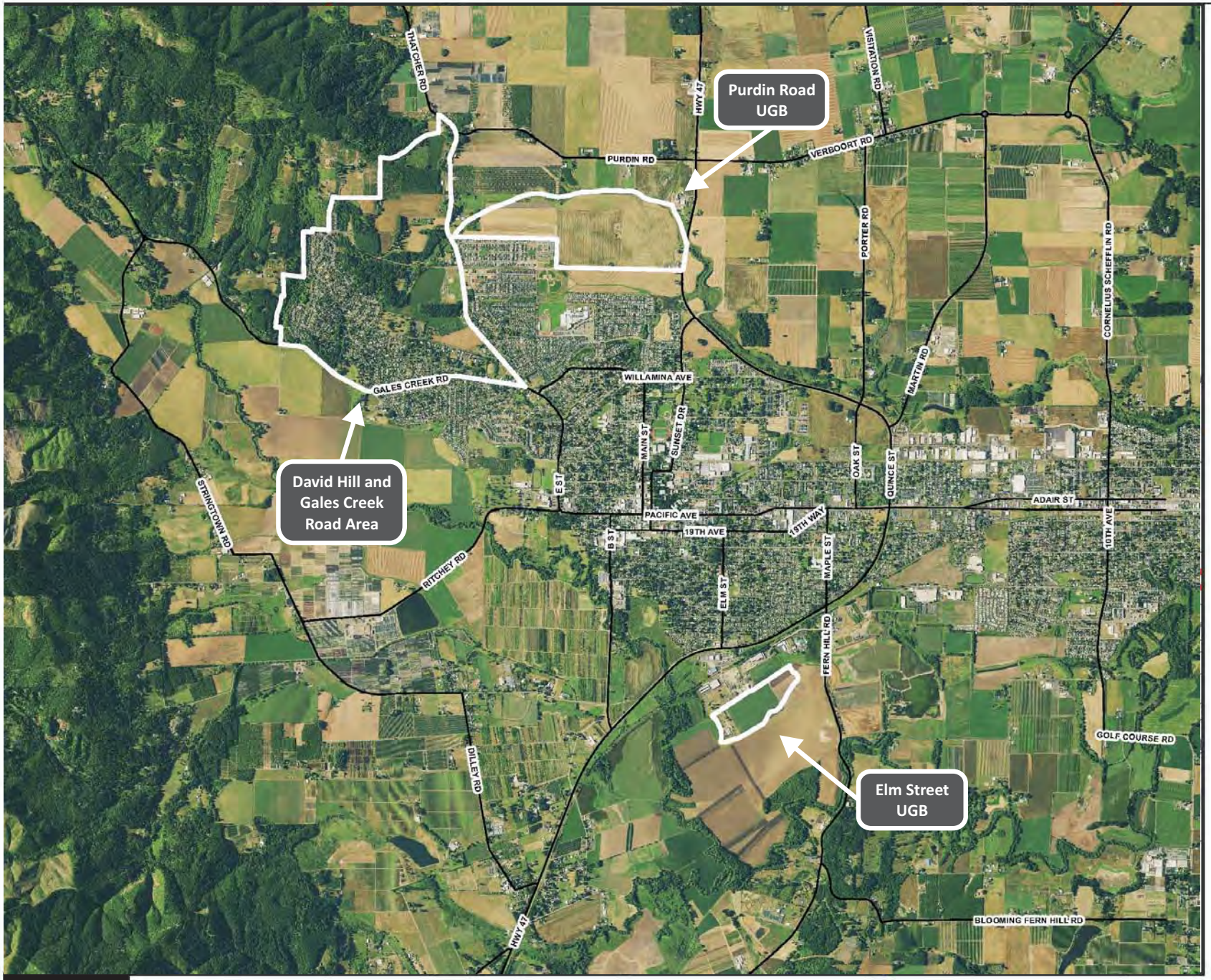
Existing Facilities

There is a 12 inch water pipe on Elm Street that dead ends about 275 feet short of the planning area.

Issues and Constraints

Based on review of the referenced plans and other documents, the following is a list of key issues that could affect future development in the Elm Street UGB area.

- There are questions about the best and least expensive means of connection to existing water services. Connections to the east to the Fern Hill Road vicinity may be difficult or circuitous due to existing development located to the north of the planning area.
- Additional capacity may be needed depending on the nature of proposed development an anticipated water service demand. More research will need to be done as the refinement planning process continues.



city of forest grove

Legend

- Arterial
- Westside Planning Areas

FIGURE 1

Westside Planning Area

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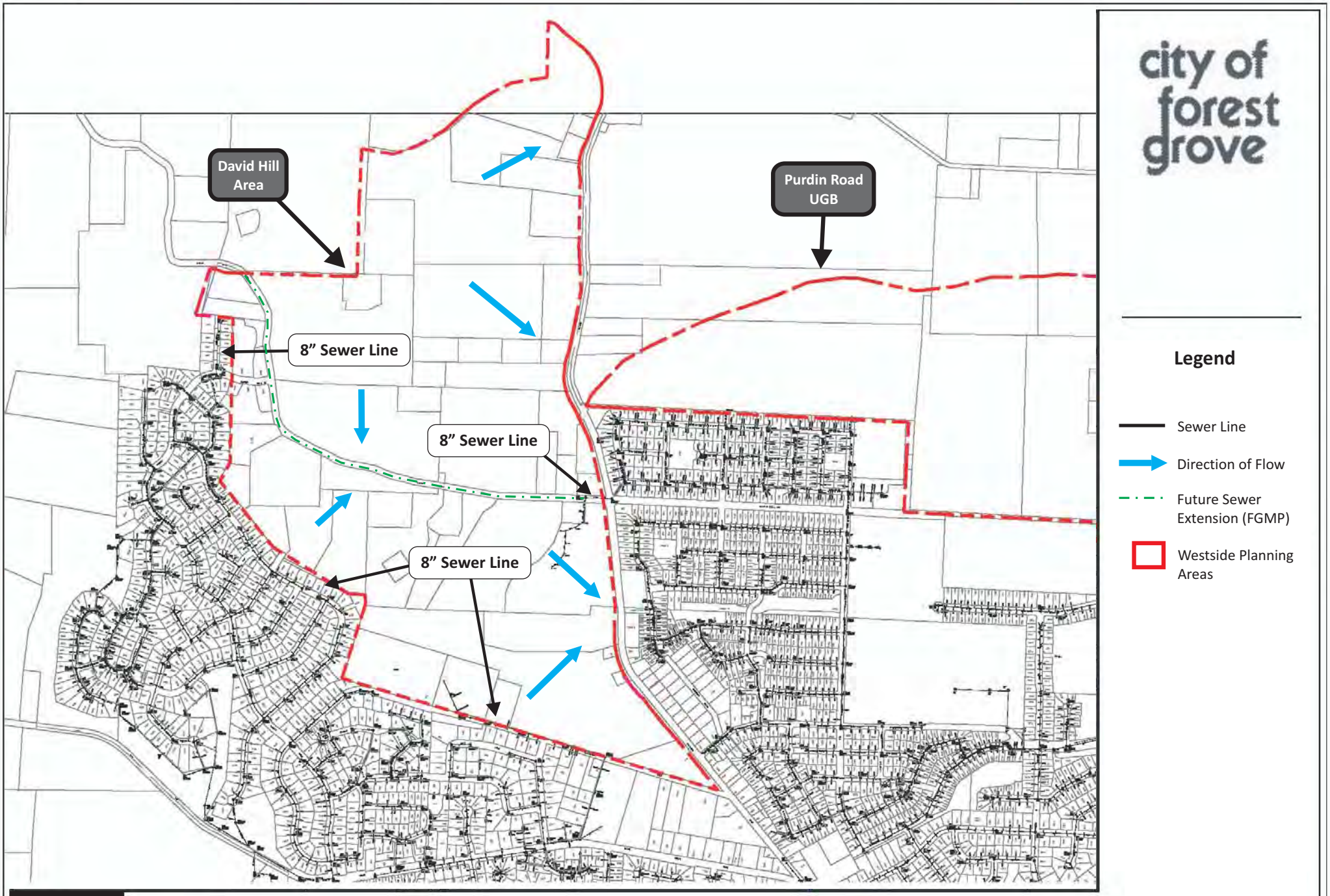


FIGURE 2

Existing Sewer - David Hill Area

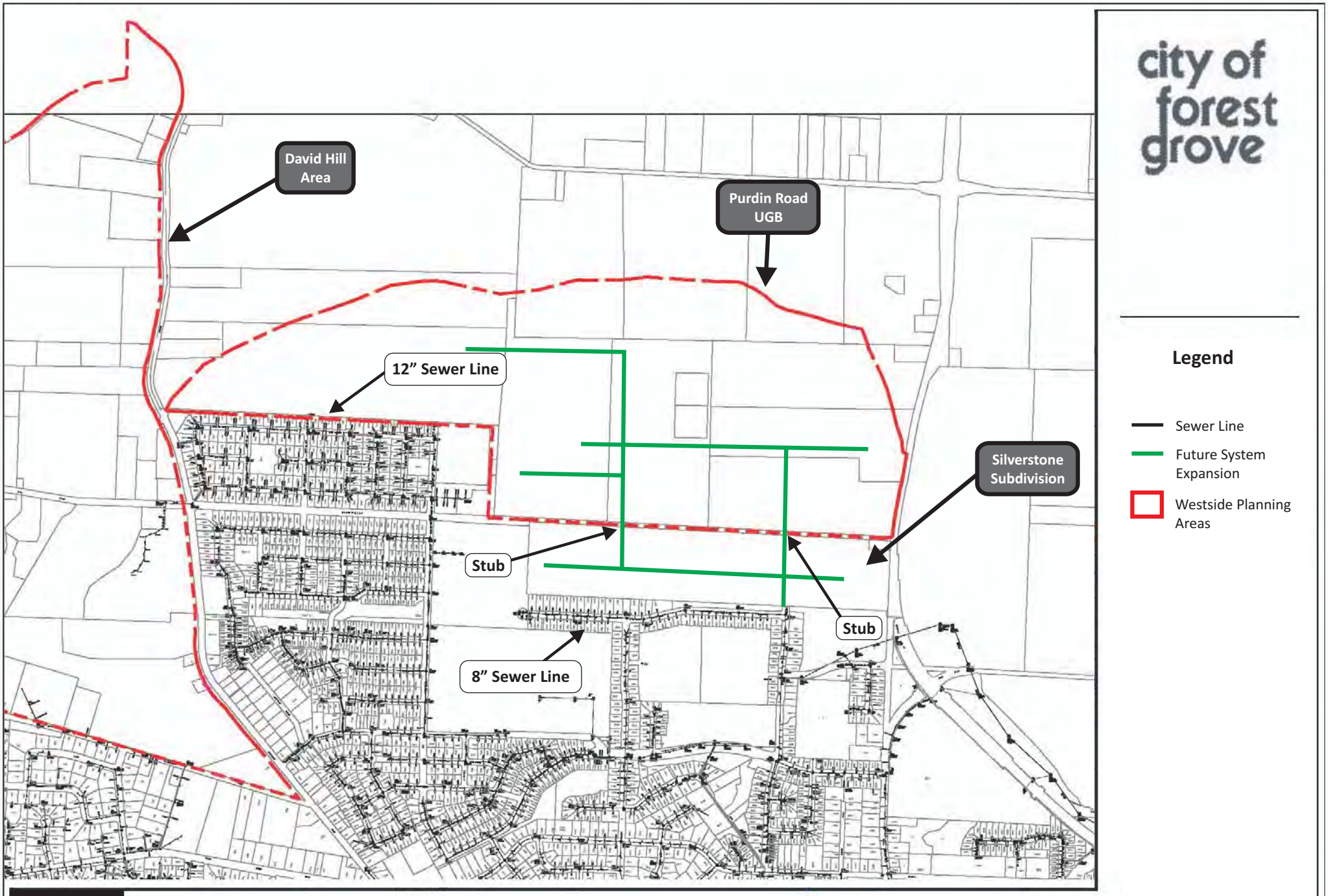
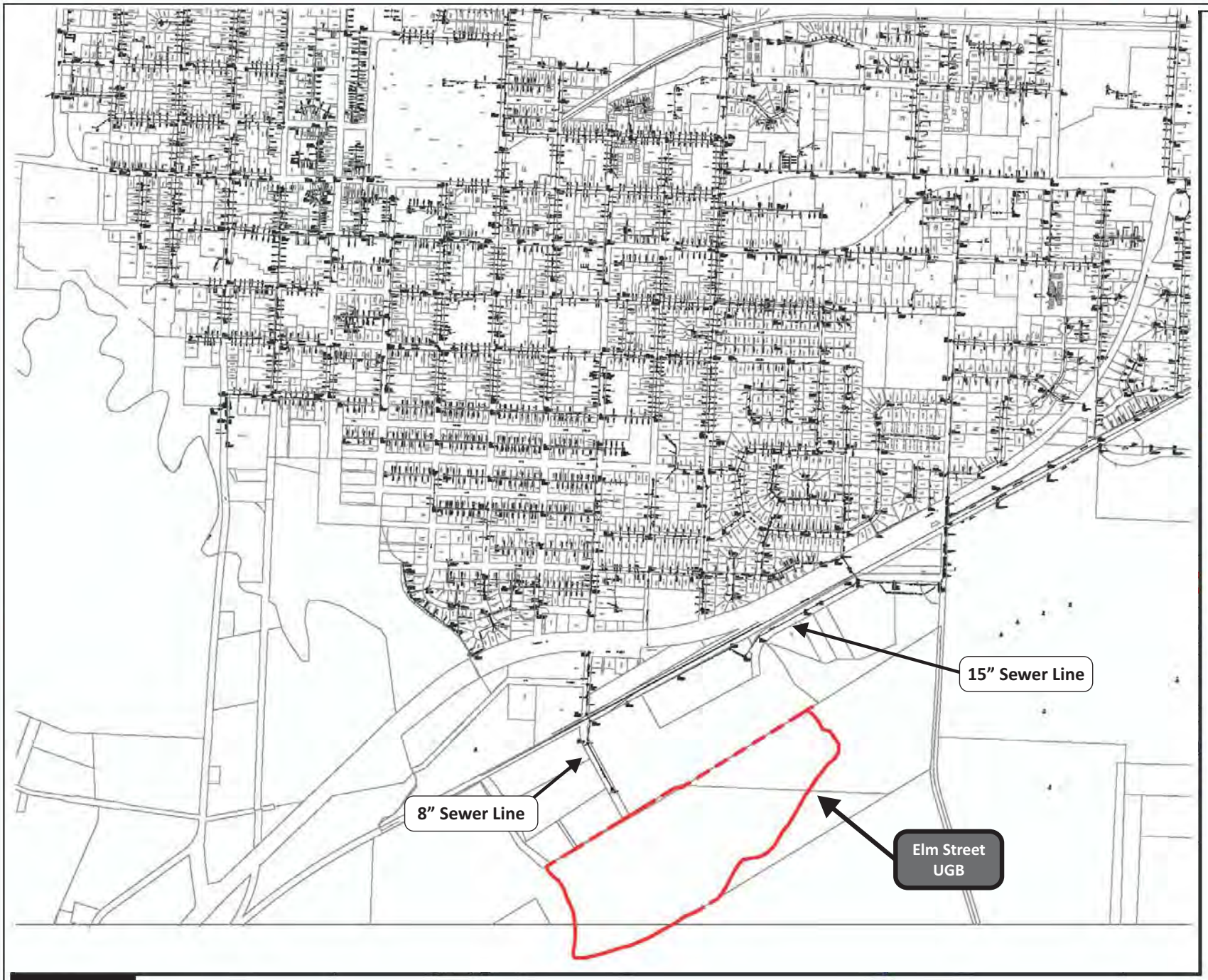


FIGURE 3

Existing Sewer - Purdin Road UGB



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Sewer Line

Westside Planning Areas

FIGURE 4

Existing Sewer - Elm Street UGB

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CONSULTING SERVICES

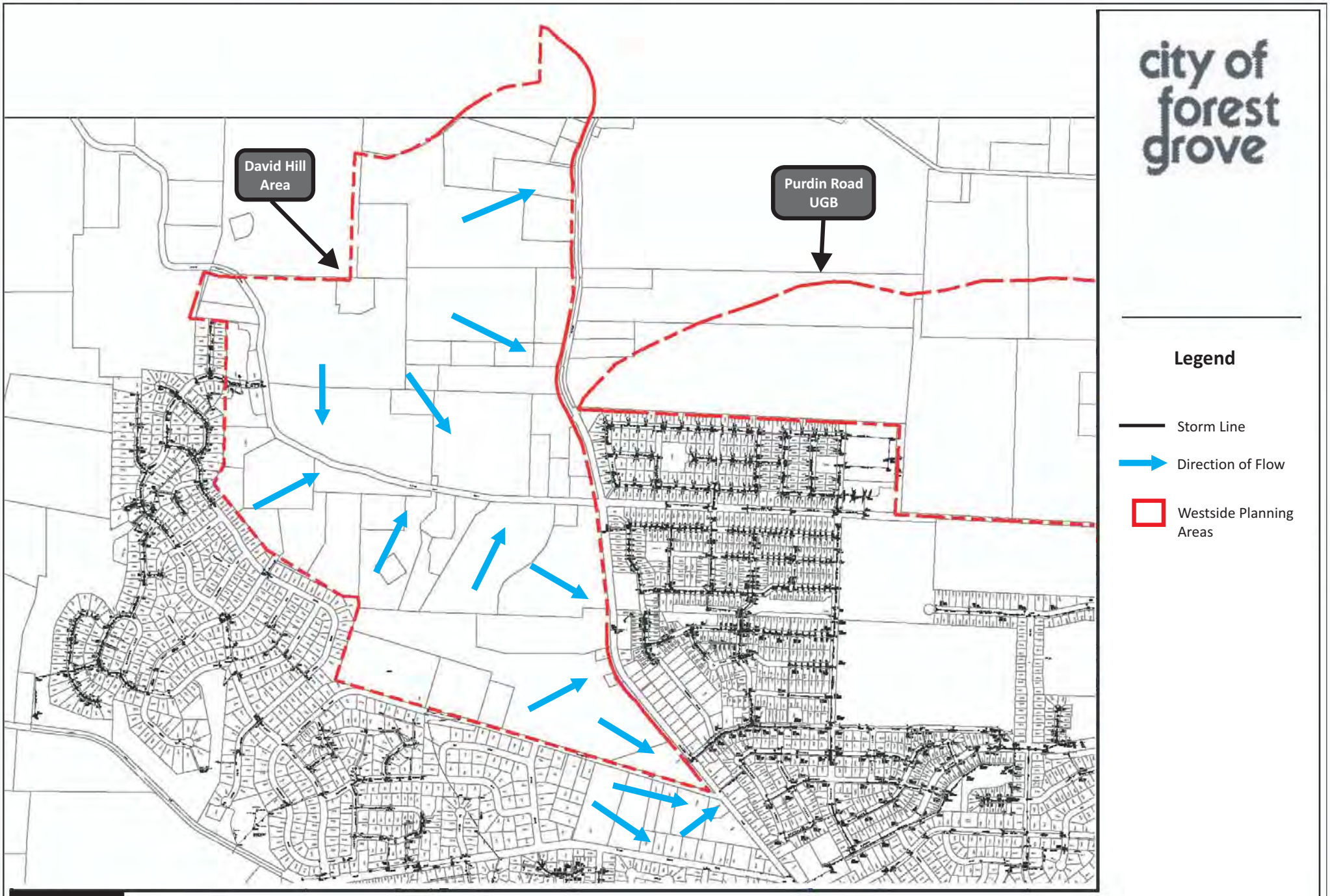


FIGURE 5

Existing Storm - David Hill Area

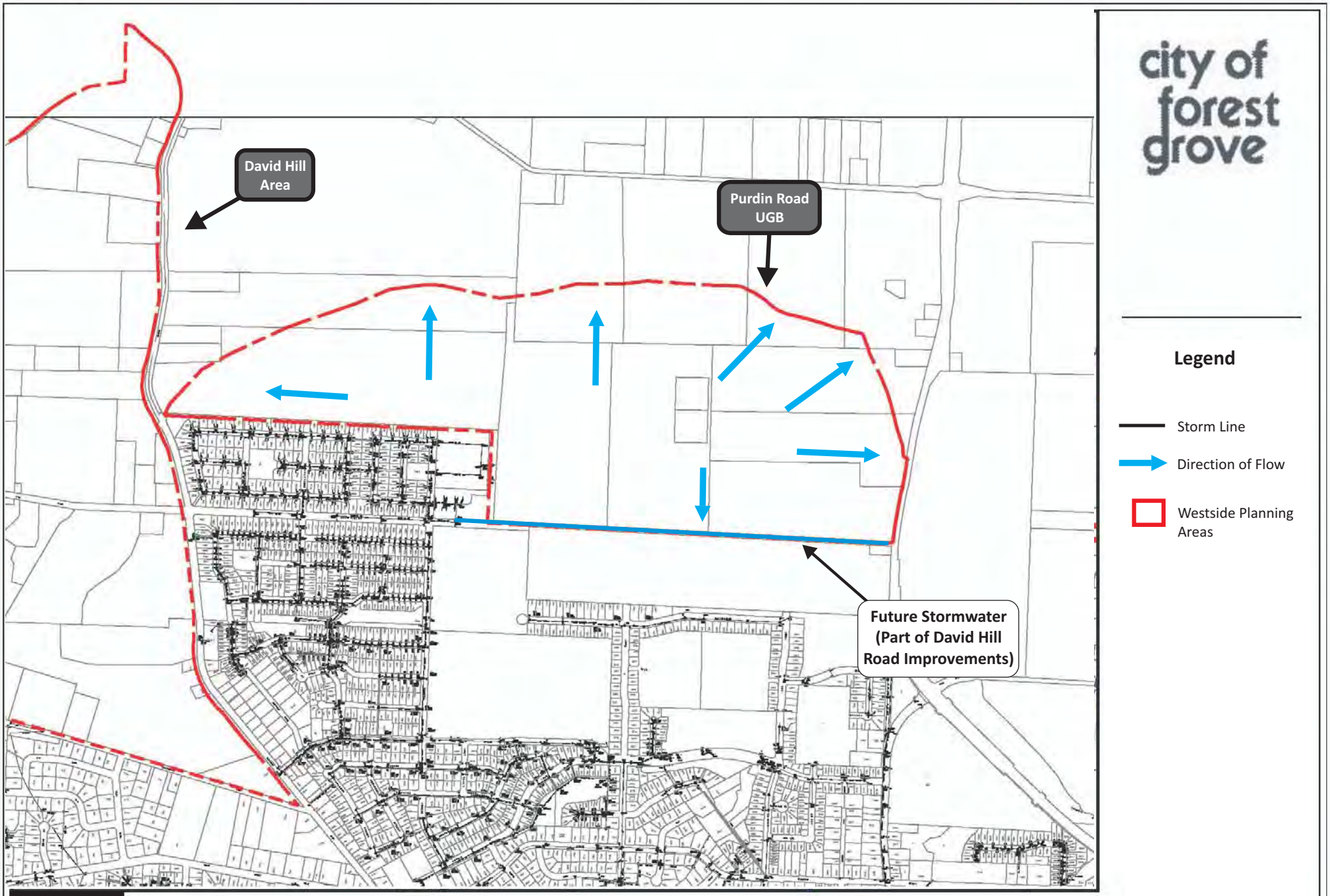
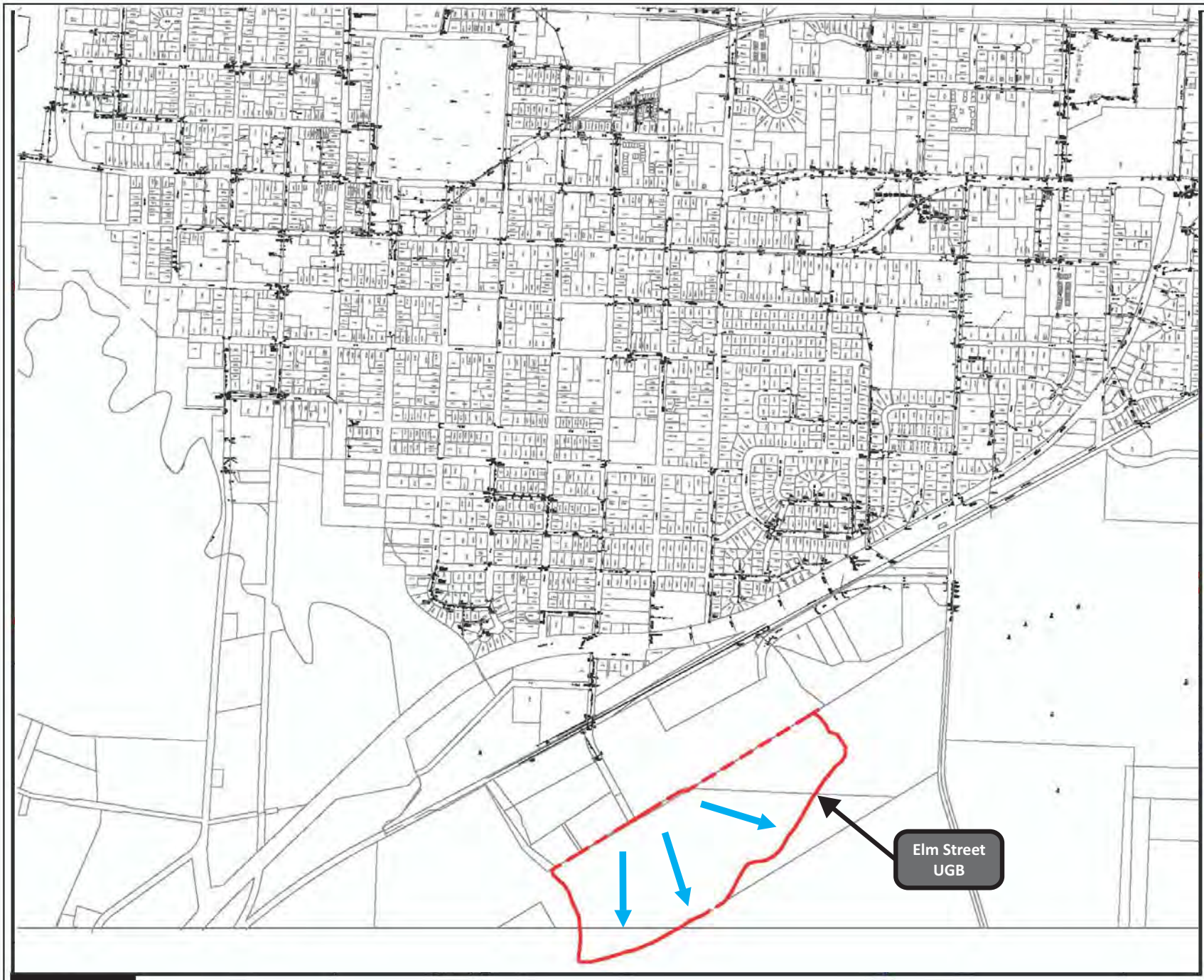


FIGURE 6

Existing Storm - Purdin Road UGB



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Legend

- Storm Line
- Direction of Flow
- Westside Planning Areas

FIGURE 7

Existing Storm - Elm Street UGB

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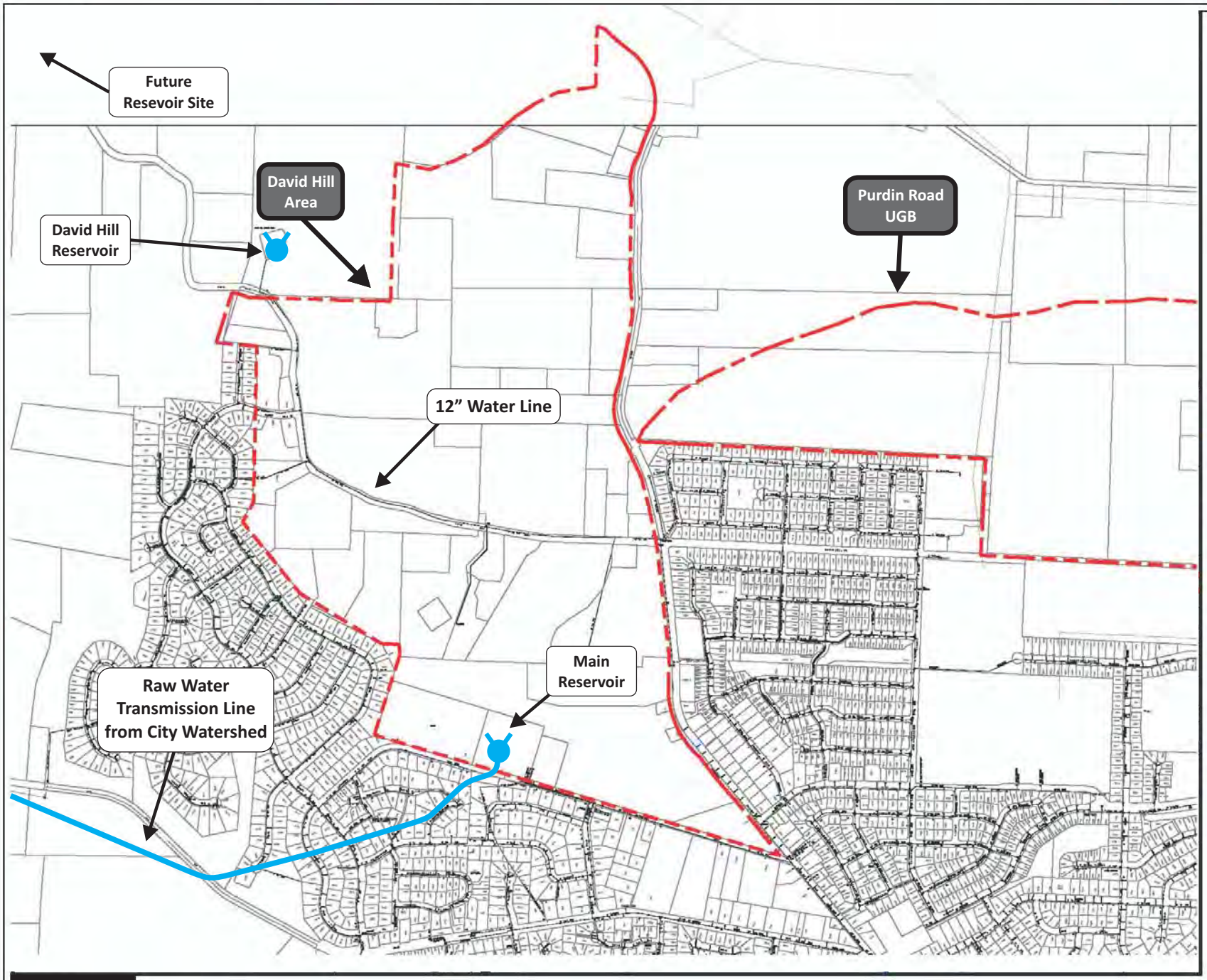

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Legend

- Water Line
- Westside Planning Areas
- Reservoir

FIGURE 8

Existing Water - David Hill Area

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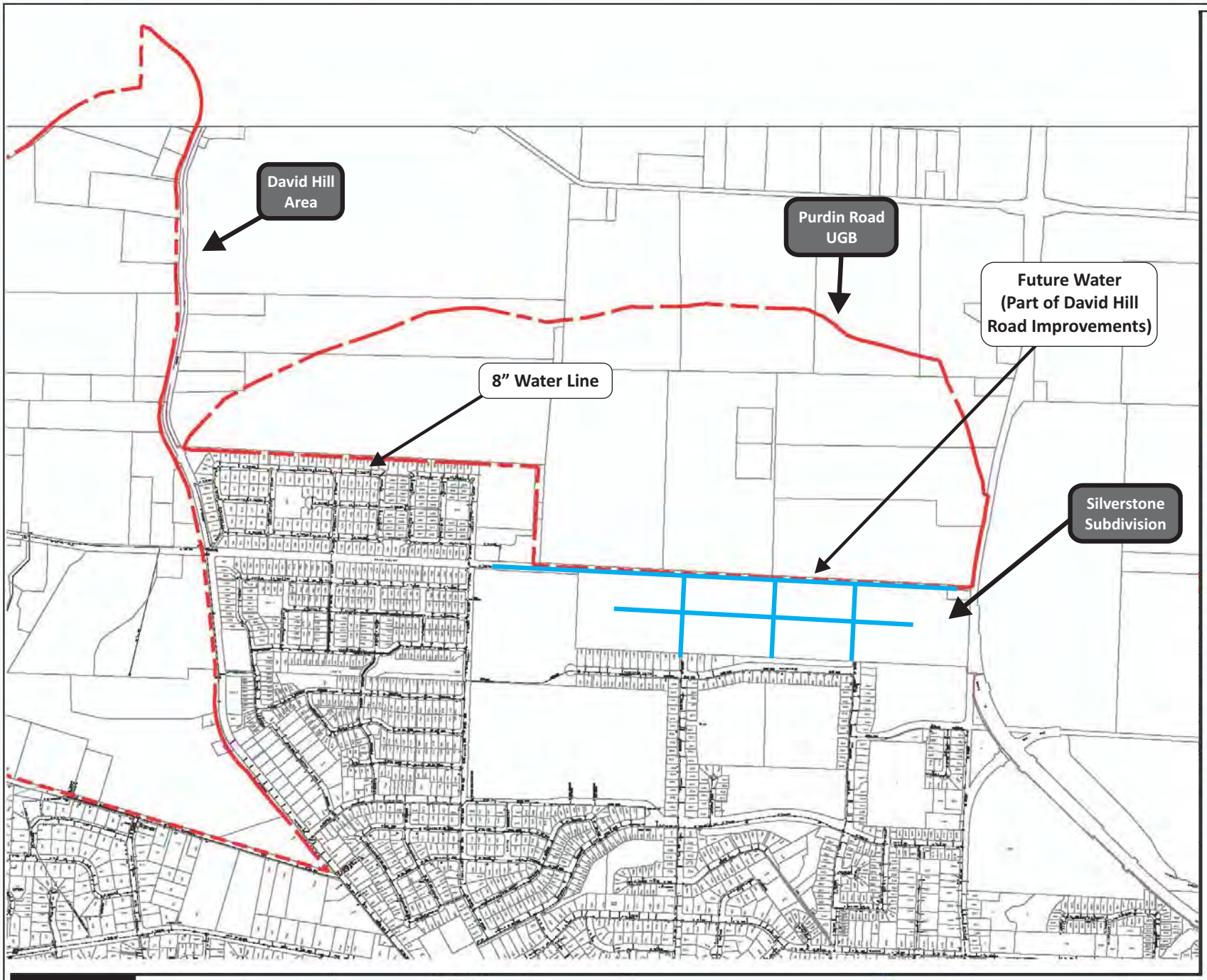

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Legend

- Water Line
- Westside Planning Areas

FIGURE 9

Existing Water - Purdin Road UGB

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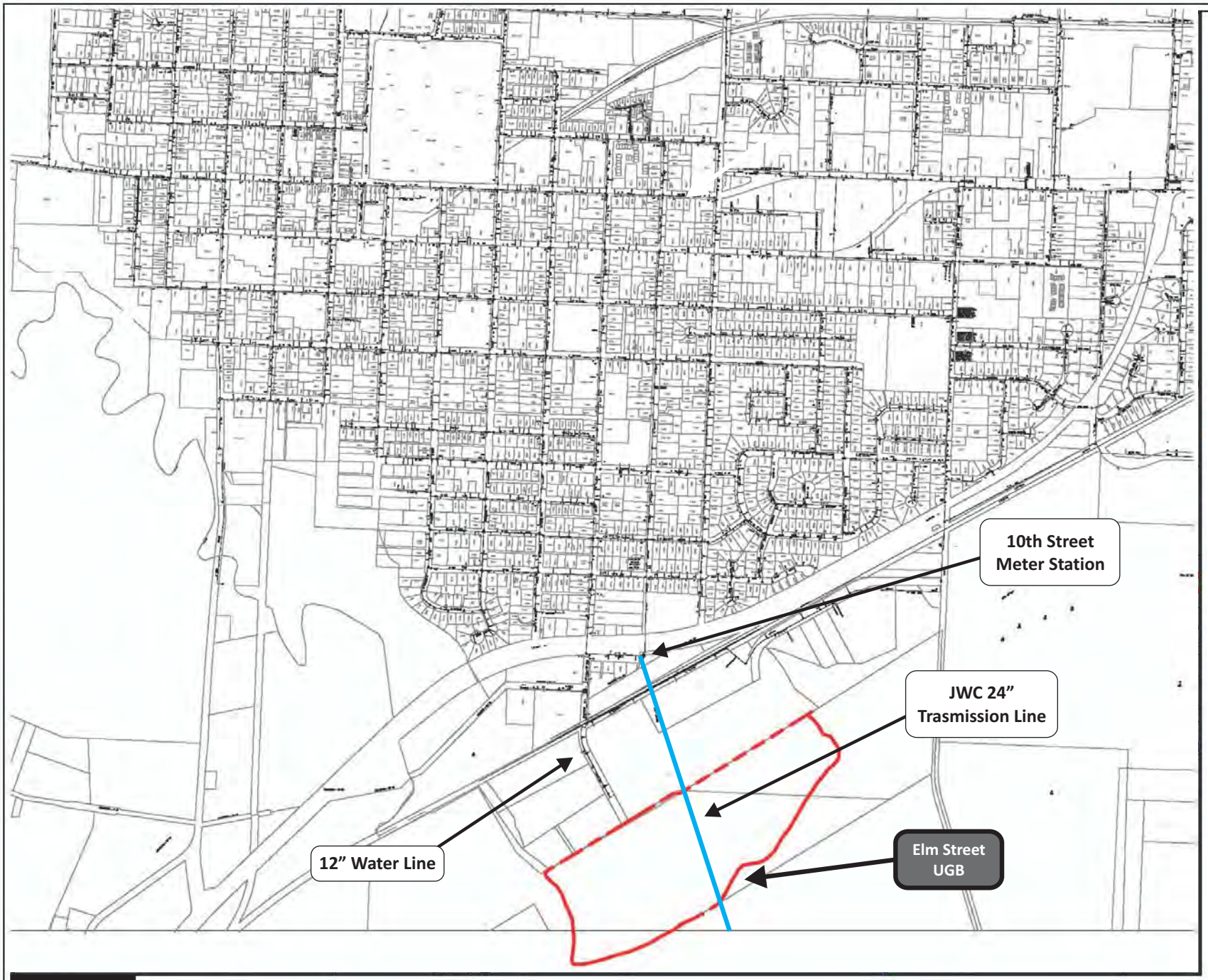

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Legend

- Water Line
- Westside Planning Areas

FIGURE 10

Existing Water - Elm Street UGB

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Forest Grove

Westside Planning Project

David Hill & Gales Creek Road Area
Purdin Road Area
Elm Street Area

Transportation Baseline Conditions

January, 2015

SCJ ALLIANCE
CONSULTING SERVICES

Forest Grove Westside Planning Project

Final Transportation Baseline Conditions Report

Project Information

Project:	Forest Grove Westside Planning Project Final Transportation Baseline Conditions Report
Prepared for:	**City of Forest Grove** Jon Holan, Community Development Director

Reviewing Agency

Jurisdiction:	City of Forest Grove Washington County

Project Representative

Prepared by:	**SCJ Alliance** 315 W. Mill Plain Boulevard, Suite 208 Vancouver, WA 98660 360.352.1465 scjalliance.com
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Project Reference:	SCJ # 742.01

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1. INTRODUCTION AND BACKGROUND

The purpose of this memo is to summarize existing and projected future transportation and traffic conditions for the David Hill and Gales Creek Road, Purdin Road UGB, and Elm Street UGB planning areas in the City of Forest Grove. These three areas are being assessed to address and resolve land use and infrastructure needs to guide future development. The three planning areas are illustrated in **Figure 1**. Specific issues and objectives for these areas are described below:

- *David Hill and Gales Creek Road Area* – The City's recently-adopted Transportation System Plan (TSP) Update noted that a street network in this area could not be identified due to unresolved land use and natural resources issues. The David Hill area plan will include a land use elements, a sustainability framework, a conceptual multimodal transportation network that documents Transportation Planning Rule (TPR) compliance, an infrastructure concept that can be broadly costed, geotechnical analysis, and a general funding approach. It should be noted that the primary focus of this planning area is on David Hill in the area north of Watercrest Road. The Gales Creek area is included primarily to address issues related to context and connectivity.
- *Purdin Road Urban Growth Boundary (UGB) Area* – Purdin Road has recently been added to the City's UGB. The TSP Update identified future street extensions that could ultimately serve this area. Comprehensive planning for the area will help to ensure that it develops in a way that is coordinated with existing and planned street, water, sewer and stormwater infrastructure.
- *Elm Street UGB Area* – The City is interested in maximizing the development potential and is promoting sustainable development practices. It will be critical for the refinement plan to support development that is coordinated with existing and planned street, water, sewer, and stormwater infrastructure, and to accommodate future property annexation efforts. It will also be important to acknowledge the context of the property, which is largely industrial, with its southern boundary located along the current Tualatin River 100-year floodplain mapped by the Federal Emergency Management Agency (FEMA).

This memo is first in a series of transportation-related submittals leading towards a draft concept plan for transportation facilities to serve future development in these study areas. Transportation characteristics for the study area are described in the City's recently adopted Transportation System Plan (TSP) Update including street, bicycle and pedestrian facilities, current and projected traffic patterns and operations, and improvement recommendations. Elements relevant to the three Westside Plan study areas are summarized in this report including:

- Multi-modal transportation goals and policies
- Street and roadway system characteristics including existing facilities, travel patterns and operations, safety, future recommended facilities, and expected 2035 traffic operations
- Pedestrian Facilities including existing/proposed sidewalks and trails
- Bicycle Facilities including existing/proposed on-street facilities and trails

2. GOALS AND POLICIES

The transportation goals and policies of the City's TSP form the vision for how the local transportation system will be developed and maintained over the next 20 years. The policy framework of the plan was organized as follows:

Goal - A statement that describes an ideal condition that the City desires to attain over time for various aspects of the transportation system.

Policy - One or more statements that are intended to outline specific measures that will be taken to achieve a goal.

Actions - Discrete steps to be completed that support or enact a specific policy statement.

The following section lists the recommended goals, policies and actions from the Forest Grove TSP that are particularly relevant to preparation of refinement plans in the Westside Planning areas.

Goal 1:	**Develop and maintain a balanced transportation system that provides travel choices and reduces the number of trips by single occupant vehicles.**

Policy a. Provide a citywide network of safe and convenient walkways and bikeways that are integrated with other transportation modes and regional destinations.

- *Action: The City will develop new and improved pedestrian routes with ultimate goal of a complete 'pedestrian grid' in Forest Grove.*

Policy c. Support travel options that allow individuals to reduce single-occupant vehicle trips.

Policy e. Encourage local employment and commercial opportunities to reduce the number of locally generated regional work and shopping trips.

Goal 2:	**Develop and maintain a transportation system that reduces the length of travel and limits congestion.**

Policy a. Enhance street system connectivity wherever practical and feasible.

- *Action: Establish design criteria and implementing ordinances to enable the connection of streets identified on the plan as funds are available and new development or redevelopment opportunities arise. Exceptions will be given where connections are prevented by topography, barriers such as railroads, expressway or pre-existing development, or environmental constraints.*
- *Action: The City will develop a local and neighborhood street system with a preferred spacing of no more than 530 feet, between elements of the City street network.*
- *Action: The City will develop a walkway route system with a preferred spacing of no more than 330 feet, between elements of the City pedestrian network.*

Policy b. Maintain traffic flow and mobility on arterial and collector roadways.

Goal 3:	**Develop and maintain a transportation system that is safe.**

Policy a. Safe and secure pedestrian and bicycle ways shall be designed between parks and other activity centers in Forest Grove.

Policy b. Safe and secure routes to schools shall be designated for each school and any new residential project shall identify the safe path to school for children.

Policy c. All transportation-related improvements will be designed and constructed to meet City standards developed in the City's Design Standards, the Americans with Disabilities Act (ADA), and to encourage provisions for bicycling, walking and transit use.

Policy e. Generally favor granting property access from the street with the lowest functional classification.

Goal 4:	**Design and construct transportation facilities in a manner that enhances the livability of Forest Grove.**

Policy a. Maintain the livability of Forest Grove through proper location and design of transportation facilities.

- *Action: Design streets and highways to respect the characteristics of the surrounding land uses, natural features and other community amenities.*

Policy b. Increase the health and physical well-being of citizens by providing safe and convenient opportunities for walking and bicycling.

Policy c. Protect residential neighborhoods from excessive through traffic and travel speeds while providing reasonable access to and from residential areas.

Policy d. Provide a seamless and coordinated transportation system that is barrier-free, provides affordable and equitable access to travel choices and serve the needs of all people and businesses, including people with low income, children, seniors and people with disabilities.

- *Action: Pedestrian crossing spacing, traffic signal spacing and landscape standards for arterials in Forest Grove shall be developed in conjunction with Washington County, ODOT and Metro.*
- *Action: Construct new transportation facilities and rebuild existing facilities to fully comply with the Americans with Disabilities Act.*

Goal 5:	**Promote the development of Forest Grove, the state, and the national economy through the efficient movement of people, goods, services, and information in a safe manner.**

Policy c. Grade separation or gate control should be considered for all railroad crossings.

Policy d. Provide transportation facilities that support land development that is consistent with the Comprehensive Plan.

Policy e. Evaluate land development projects to determine possible adverse traffic impacts.

Policy f. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvement remedies.

- *Action: Require dedication of land for future streets when development is approved.*
- *Action: The property developer shall be required to make street improvements for their portion of the street commensurate with the proportional benefit that the improvement provides the development.*

Goal 6:	**Establish and maintain a context sensitive set of transportation design and development regulations.**

Policy b. Integrate bicycle and pedestrian facilities into all planning, design, construction and maintenance activities.

Policy c. Require developers to include pedestrian, bicycle, and transit-supportive improvements within proposed developments and to adjacent right-of way in accordance with adopted policies and standards.

Policy d. Promote context-sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

- *Action: Amend their street design standards to allow for design exceptions for various street elements (e.g., reduced lane width, methods and materials for provisions of sidewalks, etc.) to fit constrained settings, or unusual applications. Design exceptions would be subject to the review and approval of the City Engineer.*
- *Action: Amend their street design standards to allow for options related to storm drainage design on city facilities. These 'green street' design options would be subject to the review and approval of the City Engineer.*

Goal 7:	**Provide a transportation system that meets present needs without compromising the ability of future generations to meet their needs.**

Policy a. Encourage an energy efficient transportation system.

Policy b. Increase the use of walking and bicycling for all travel purposes.

Policy c. Improve and enhance the livability of Forest Grove residents by decreasing reliance on the automobile and increasing the use of other modes to minimize transportation system impacts on the environment.

Policy d. Practice stewardship of air, water, land, wildlife, and botanical resources. Take into account the natural environments in the planning, design, construction and maintenance of the transportation system.

Goal 8:	**Provide transportation performance measures set and maintained by the City.**

Policy a. A minimum intersection level of service standard shall be set for the City of Forest Grove. All public facilities under the city's jurisdiction shall be designed to meet this standard.

- *Action: Level of service D shall be the City's mobility standard to balance provision of roadway capacity with level of service and funding.*

Goal 9:	**Develop a transportation system that is consistent with the City's Comprehensive Plan and adopted state and regional plans.**

Policy a. Coordinate and cooperate with adjacent jurisdictions and other transportation agencies to develop transportation projects that benefit the City of Forest Grove and the region as a whole.

Policy b. Work collaboratively with other jurisdictions and agencies so the transportation system can function as one system.

- *Action: City will consider the State adopted mobility standards for all state facilities, based on the Oregon Highway Plan.*

Policy g. Coordinate with ODOT to address improvements to State highways within Forest Grove that will benefit all modes of transportation.

Goal 10:	**Efficiently use funding sources to implement transportation system improvement projects recommended in the TSP.**

Policy a. Provide a cost-effective transportation system where the public, land use development and users pay their respective share of the system's costs proportional to their respective demands placed upon the multimodal system.

Policy d. Identify local street improvement projects that can be funded by the State of Oregon to improve the state highway system.

- *Action: The City will identify local street system improvements that are cost-effective in improving state facility conditions. These projects could be candidates for State financial assistance.*

Policy e. Provide funding for local match share of joint funded capital projects with other public partners.

Policy g. Ensure pavement continuous sidewalks on at least one side of the street at a minimum for collector and local streets.

3. STREETS AND ROADS

This section presents detailed information about the existing street and roadway system, and its existing patterns of use and deficiencies. A discussion of future (2035) roadway needs and improvements recommendations based on the TSP is included in Section 6.

3.1 Functional Classification

The functional classification system is designed to serve a variety of transportation needs within the community ranging from short local trips to longer distance regional trips. The classification of a road or street relates to the predominate type of trip it serves (i.e., local, community or regional) and addresses the competing functional nature of roadway facilities as they relate to access, mobility, multi-modal transport, and facility design for these different types of trips. The goal of selecting functional classes for particular roadways is to provide a suitable balance of these four competing objectives

The existing functional classification of streets in Forest Grove as adopted in the City's TSP is represented by **Figure 2**. Any street not designated as either an arterial, collector, or neighborhood route is considered a local street. Washington County roadway classifications differ somewhat with those of the City of Forest Grove. Metro typically classifies roads that are considered to be of regional significance. Metro classifications are from the 2014 RTP. The roadway functional classifications for the City, County and Metro are summarized in Table 1.

Table 1. Major Street Network Classifications

	Functional Classification			
Street	**Forest Grove**	**Washington County**	**Metro**	**Lanes**
B Street (n/o Pacific Avenue)	Collector	Collector	NA	2
Brooke Street	Collector	Collector	NA	2
David Hill Road (w/o Thatcher Road)	Collector/NA	Collector	NA	2
David Hill Road (e/o Thatcher Road)	Arterial	Collector	Future Minor Arterial	2
Elm Street	Collector	Collector	NA	2
Fern Hill Road	Collector	Arterial	NA	2
Forest Gale Drive	Collector	Collector	NA	2
Gales Creek Road	Arterial	Arterial	Minor Arterial	2
Highway 47	Principal Arterial	Principal Arterial	Principal Arterial	2
Main Street	Collector	Collector	NA	2
Maple Street	Collector	Collector	NA	2
Sunset Drive	Collector	Collector	NA	2
Thatcher Road	Arterial	Collector	Minor Arterial	2
Sunset Drive	Collector	Collector	NA	2
Watercrest Road	Collector	Collector	NA	2
Willamina Avenue	Collector	Collector	NA	2

Source: 2014 Forest Grove TSP, Washington County TSP and 2014 Metro Regional Transportation Plan
NA = Data not available or not applicable

3.2 Roadway Jurisdiction

Roadway ownership and maintenance responsibilities of the various roads throughout the study area are identified in **Figure 3**. Highway 47 is a state highway and under ODOT jurisdiction. Thatcher Road,

Watercrest Road, Gales Creek Road and Fern Hill Road are under the jurisdiction of Washington County. The remaining roadways are under the jurisdiction of the City of Forest Grove.

3.3 Roadway Design Characteristics

Design characteristics of streets in Forest Grove were developed as part of the TSP to meet the purpose and demand for each functionally-classified facility type. Because the actual design of a roadway can vary, the objective was to define a system that allows standardization of key characteristics to provide consistency, but also to provide criteria for application that provides some flexibility, while meeting standards. In addition, guidance for the development of Green Streets consistent with regional policy is provided in this section.

3.3.1 Street Cross Sections

Figures 4 to 8 depict sample street cross-sections and design criteria for arterials, collectors, neighborhood routes and local streets. The most common roadways in Forest Grove are two, three and five lanes wide. Where center left turn lanes are identified, the actual design of the street may include sections without center turn lanes or with median treatments, where feasible. The actual treatment will be determined within the design and public process for implementation of each project. Specific right-of-way needs must be monitored continuously through the development review process to reflect current needs and conditions.

The City of Forest Grove will need to coordinate with regional agencies to assure consistency in cross section planning with the Washington County Transportation System Plan for roadways under the County's jurisdiction.

3.3.2 Local Street Connectivity

Much of the local street network in Forest Grove is fairly well connected, with multiple access opportunities for entering or exiting neighborhoods. This is particularly true for the area south of Pacific Avenue, where a "grid" street system is in place. However, there are a number of locations in Forest Grove where, due to the lack of connection points, the majority of neighborhood traffic is funneled onto one single street. This type of street network results in out-of-direction travel for motorists and an imbalance of traffic volumes. In addition to motor vehicles, direct connections contribute greatly to accessibility for pedestrians and bicyclists.

By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled (VMT) can be reduced, accessibility between various modes can be enhanced and traffic levels can be balanced out between various streets. The proposed connections in this section are intended to accomplish these objectives. Local connections can reducing potential neighborhood traffic impacts and mitigate capacity deficiencies by better dispersing traffic.

The preferred criteria used for providing connections is as follows

- Every 300 to 500 foot grid for pedestrians and bicycles
- Every 500-1,000 foot grid for automobiles

3.3.3 Street Grades

Section 10.8.610.M. of the City of Forest Grove Development Code addresses street grades. Per this section: "Grades shall not exceed 10% on arterials, 12% on collector streets, or 12% on any other street (except that local or residential access streets may have segments with grades of up to 15% for distances of no greater than 250 feet), and:

1. Centerline radii of curves shall not be less than 700 feet on arterials, 500 feet on major collectors, 350 feet on minor collectors, or 100 feet on other streets; and
2. Streets intersecting with a minor collector or greater functional classification street, or streets intended to be posted with a stop sign or signalization shall provide a landing averaging 5% or less. Landings are that portion of the street within twenty (20) feet of the edge of the intersecting street at full improvement."

3.3.4 Green Streets

An additional element of roadway design that should be considered for construction projects in the Westside is to include "green streets" characteristics. The main concept behind green street design is the incorporation of storm water management with environmentally sound street design to help protect streams and wildlife habitat. Green streets also have the additional benefit of adding other enhancing elements to the street right-of-way area, including increased safety and attractiveness for pedestrians and maximizing opportunities for street trees and other landscaping. Additionally, green street design allows for multimodal travel choices, and a visual and physical connection to public and open spaces. Table 2 is a matrix outlining different green street design elements/techniques.

Application of green street design is generally not based on functional class and can span across and be applicable to multiple types of streets. Green street design may not be suitable in many circumstances. The soils within an area where green street design could be implemented need to be tested to determine the rate of infiltration they can sustain. In addition to green streets, traditional storm water management facilities need to be designed to control overflow if the capacity of the green streets are exceeded.

Table 2. Green Street Design Elements

Element	Application	How It Works
Rainwater Harvesting	Capture and re-use stormwater runoff for landscape irrigation.	Stormwater is conveyed to storage facilities and collected during the wet season for use during the dry season.
Permeable Paving	Replace most of the impermeable surfaces in the right-of-way with permeable materials, such as permeable pavement, concrete, or paving blocks.	The permeable materials allow water infiltration through the surface to the subgrade.
Bio-retention	Aboveground or subgrade containers are used to promote infiltration and evapotranspiration of stormwater.	Engineered or amended soils can be used to promote this process.
Bio-swales	Subgrade channels with vegetation used to convey and treat stormwater.	Vegetation is used to control flow velocities and settle pollutants.

3.4 Existing Street Characteristics

Field inventory was conducted for the TSP to determine characteristics of major roadways in the study area. Data collected included general pavement condition, posted speed limits and intersection controls. These characteristics define roadway capacity and operating speeds that may affect travel path choices for drivers.

3.4.1 Pavement Conditions

A visual inspection of the street system of Forest Grove was conducted during preparation of the TSP using a pavement condition rating system. The system has three rating categories: good, fair and poor. These general ratings reflect the severity and amount of pavement distress and are shown in **Figure 9**. Within the study area, pavement conditions are generally good. However, it should be noted that this condition assessment is not a comprehensive one. The City of Forest Grove has a more detailed pavement condition assessment program which may vary from **Figure 9**.

3.4.2 Traffic Speed

Speed zones on arterials and collectors within the City of Forest Grove are summarized in **Figure 10**. There are three ways a speed zone can be established by statute. One is in a "residence district," another is a “business district” and the third is a school zone.[1] A residence district can be posted at 25 mph. A business district and a school zone can be posted at 20 mph. In all other cases, an engineering study is required to determine the appropriate speed zone (the basis is the 85th percentile speed).[2] The study is typically done by the appropriate ODOT region office. The recommendation (based on the engineering study) is then forwarded from the ODOT region office to Salem to be approved by the State Traffic Engineer.

If the jurisdiction requesting the speed study does not agree with the results of the engineering study and recommendation to the State Traffic Engineer, the jurisdiction can appeal the decision to the Speed Zone Review Panel (which meets once a year).

Vehicle speeds on several collector and residential streets are a concern for the community. In most cases, speeding becomes very noticeable when it is above 30-35 miles per hour. Speeding typically occurs on local streets where the streets are wide and straight for long stretches, or where downhill grades are extended.

3.4.3 Intersection Control

Eight of the intersections studied in the TSP were identified for consideration as part of the Westside Planning Program. The only signalized intersection in the study area is located on Highway 47 at Sunset Drive. The remaining seven intersections are controlled by stops signs on the minor street approaches. The study intersection locations and existing intersection controls are shown in **Figure 10** that includes all intersections studied for the TSP.

3.5 Existing Traffic Volumes

Roadway volume surveys were conducted in June of 2007 as part of the TSP Update. These traffic counts were conducted to provide the basis for analyzing existing problem areas, as well as establishing a base condition for future monitoring. Turn movement counts were conducted at eight intersections in the Westside during the evening (4-6 PM) peak period to determine intersection operating conditions. These counts are summarized in Appendix A.

3.6 Existing Traffic Levels of Service

While analysis of traffic flows and functional classifications are useful in understanding the general nature of traffic in an area, traffic volumes alone indicate neither the ability of the street network to

[1] Speed zones can be established by statute which is vaguely defined in the Oregon Vehicle Code in 801.430.
[2] The 85th percentile vehicle speed represents a condition when 15 percent of the vehicles surveyed were traveling faster than the 85th percentile speed and 85 percent were traveling slower than the 85th percentile speed.

carry additional traffic, nor the quality of service afforded by the street facilities. For this, the concept of level of service has been developed to correlate traffic volume data to subjective descriptions of traffic performance at intersections.

Level of Service (LOS) is used as a measure of effectiveness for both unsignalized and signalized intersection operation. It is similar to a "report card" rating based upon average vehicle delay.

- Level of Service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand.
- Level of Service D and E are progressively worse peak hour operating conditions.
- Level of Service F represents conditions where average vehicle delay exceeds 80 seconds per vehicle entering a signalized intersection, or 50 seconds at an unsignalized intersection, and demand has exceeded capacity.

As part of its adoption of the TSP, the City endorsed use of a minimum standard Level of Service (LOS) D to determine project improvement needs.

ODOT and Washington County standards apply to roadways under their jurisdiction. ODOT defines a maximum volume-to-capacity ratio for Highway 47 and Highway 8 (Tualatin Valley or TV Highway) of 0.99[3]. Washington County defines acceptable performance in urban areas as volume-to-capacity ratio of 0.99 with LOS E or better[4].

Table 3 provides a summary of PM peak hour levels of service at the eight intersections selected for analysis as part of the Westside Planning Program. The LOS for intersections controlled by STOP signs represents the condition for the major/minor street approach, respectively.

Table 3. Existing PM Peak Hour Intersection Level of Service

No.	Intersection	Operational Standard	Level of Service (LOS) [1]	Average Delay* (Seconds) [2]	Volume / Capacity (V/C) [2]
	Unsignalized Intersections				
1	Gales Creek Road/Forest Gale Drive	LOS E/0.99	A/B	11.4	0.13
2	Thatcher Road/Watercrest Road	LOS E/0.99	A/B	11.2	0.03
3	Gales Creek Road/Thatcher Road	LOS E/0.99	A/C	16.5	0.35
4	Gales Creek Road/Willamina Avenue	LOS E/0.99	A/C	12.9	0.10
11	Highway 47/Verboort & Purdin	V/C=0.99	A/D	32.0	0.71
17	Highway 47/Maple Street	V/C=0.99	**A/F**	**111.0**	**1.00**
18	Highway 47/Elm Street	V/C=0.99	A/D	31.3	0.45
	Signalized Intersection				
25	Highway 47/Sunset Drive	V/C=0.99	C	28.4	0.37

Note: Data has been extracted from the 2013 Forest Grove TSP, the numbers for each intersection are consistent with the references in that document.

* Minor street average delay reported for unsignalized intersections

1 First value is the free movement, second value is the worst stopped movement.

2 Worst stopped movement.

Source: SCJ Alliance, 2012.

[3] *Oregon Highway Plan, Policy Element*, Table 7, Oregon Department of Transportation, 1999.

[4] *Washington County 2020 Transportation System Plan*, Washington County, 2002.

All of the study intersections currently operate at LOS D or better with the exception of the side street movement at the intersection of Highway 47 with Maple Street which is operating at LOS E. In other words, most of the minor street approaches have average delays of less than 35 seconds during this hour. The intersection of Highway 47 with Maple Street met MUTCD[5] traffic signal warrant 3 (Peak Hour Warrant). The capacity analysis calculation sheets are in Appendix C of the 2013 TSP Update.

3.7 Crash History

Crash data was obtained for the TSP Update at study intersections from Oregon Department of Transportation for the period between January 1, 2002 and December 31, 2006. Table 4 summarizes the highest intersection crash rates.

Typically, intersections on collector and arterial roadways with a collision rate over 1.00 suggest further safety investigation is warranted. None of the intersections in the Westside exceeded this threshold.

Table 4. Study Intersection Crash Data

TSP Rank	North-South Roadway	East-West Roadway	Reported Crashes (2002-2006)	Intersection ADT	Crash Rate (per MEV)
5	Maple Street/Fern Hill Rd	Highway 47	11	15,950	0.42
7	Gales Creek Road	Willamina Avenue	5	8,670	0.35
8	Elm Street	Highway 47	7	14,025	0.30
14	Thatcher Road	Watercrest Road	1	4,225	0.14
16	Thatcher Road	Gales Creek Road	2*	8,480	0.13

Source: Oregon Department of Transportation (ODOT) crash analysis and reporting unit
Note: MEV means Million Entering Vehicles at the intersection.
*Crash data is for 2004-2008.

The Washington County Safety Priority Index System (SPIS) was used during preparation of the TSP to identify and evaluate existing hazardous intersections for potential safety improvements. The County SPIS list is compiled from vehicle crashes reported to ODOT, and includes intersections that have three or more crashes, or one or more severe injury or fatal crashes, based on the most recent three years of crash data. The SPIS list only includes intersections where the County has jurisdiction of at least one leg of the intersection. Based on the TSP Update, there are currently two intersections within the Westside that were on the County's SPIS list (2006 – 2008). These intersections along with their corresponding priority rank are listed below.

- Fern Hill Road at Maple Street/OR 47 (19)
- Oregon Highway 47 at Purdin Road/Verboort Road (42) – intersection recently reconstructed to provide deceleration and turning lanes.

[5] *Manual on Uniform Traffic Control Devices (MUTCD*), FHWA, 2003.

4. PEDESTRIAN TRANSPORTATION SYSTEM

This section summarizes key features of the active pedestrian transportation system in the Westside. Key destinations for this travel mode within and near the study area include various schools, parks, and employment/retail commercial centers located within reasonable proximity.

4.1 Pedestrian Facilities

The inventory of pedestrian facilities conducted for the TSP Update considered sidewalks, trails and any enhanced pedestrian crossings to major streets or highways within Forest Grove. Local street inventories were not included. It was found that several arterial and collector streets in Forest Grove do not have sidewalks on either side of the street, as shown in **Figure 11**.

Connectivity and pedestrian linkages are generally good on the arterial and collector street system in the downtown area and close-in residential neighborhoods. In the Westside, existing pedestrian are limited or non-existent, being focused largely along Forest Gale Road and the newly constructed portion of David Hill Road east of Thatcher Road. Pedestrian facilities also exist along Elm Street into the Elm Street UGB area, although there are no pedestrian facilities to aid in crossing high-speed Highway 47.

Although sidewalk availability on the arterial and collector street system is limited, some residential streets have sidewalks, especially in areas developed within the past ten to fifteen years south of David Hill Road. In addition to paved sidewalks, Forest Grove has a multi-use path located along the west side of Highway 47 between Pacific Avenue and B Street.

Major streets with significant sidewalks deficiencies in the planning area include:

- Thatcher Road north of Gales Creek Road
- Willamina Avenue from Gales Creek Road to Sunset Drive

4.2 Pedestrian System Improvements

With the foundations of an excellent pedestrian system already in place, Forest Grove has the potential to become one of the region's most walkable communities. The TSP identifies priorities for improving this system over the next 20 years that builds on the existing system of sidewalks, shared use paths, neighborhood accessways and other pedestrian infrastructure currently in place. As depicted in **Figure 6**, projects recommended in the TSP are intended to enhance pedestrian safety and convenience while making walking a more attractive travel mode. These projects include filling gaps in the sidewalk system, developing an interconnected shared use path network, and targeting specific intersections for pedestrian crossing enhancements. The pedestrian network was developed based on extensive input from previous planning efforts as well as input from the Project Advisory Group, City leaders and Forest Grove residents as part of the TSP development process. It should be noted that most future shared use path corridors depicted on the system map represent conceptual alignments, with further evaluation needed to identify specific routes. The sections below discuss specific pedestrian facilities in greater detail, while Table 4 at the end of this section presents the project list related to the Westside.

4.2.1 Sidewalks

Forest Grove benefits from a relatively complete sidewalk system in several areas, including the downtown core, immediate surrounding neighborhoods, and on recently-constructed and reconstructed streets such as Sunset Drive and portions of David Hill Road. A City ordinance requires sidewalks to be built along new roads and as properties redevelop along existing streets. New and realigned street corridors shown in the TSP will include sidewalks, as will streets identified for widening and/or reconstruction.

The major challenge facing Forest Grove lies in retrofitting existing streets where sidewalks are fragmented or lacking altogether, and in areas where significant redevelopment is not expected to occur. Completing some sidewalk links can be challenging, especially in older residential areas where residents have developed fencing and landscaping within the public right-of-way, and may consider those areas to be part of their personal space. In addition, some residents may not want traditional sidewalks due to the rural look of their neighborhoods, and potential impacts to mature landscaping and trees. Regardless, the public right-of way that is generally located on either side of the paved driving and parking area is intended for walking, whether or not a sidewalk currently exists. The presence of sidewalks enhances pedestrian safety and comfortable and encourages use of this transportation mode.

The City is taking an active role in completing sidewalk infill projects, as witnessed by recent sidewalk improvements in the downtown core and surrounding areas. The TSP continues the City's efforts of expanding the sidewalk system through street construction, reconstruction, and sidewalk infill projects. Gales Creek Road is one of several roads that could especially benefit from sidewalk improvements.

4.2.2 Intersection Improvements

Although pedestrian crossings at intersections represent a major challenge in Forest Grove's existing walking environment, improvement opportunities exist. The TSP provides an overall strategy to improve intersections and other pedestrian crossings through a variety of treatments. Most intersections that could benefit from improvements are located on streets with wide cross-sections (e.g., with multiple travel lanes), higher vehicle speeds and volumes, and/or other conditions complicating pedestrian crossing movements. Examples include the trail/roadway crossings along Highway 47, and the intersection of Gales Creek Road and Thatcher Road.

4.2.3 Shared Use Paths

Today, Forest Grove has the foundation of what could be an excellent interconnected path system. The base of this system includes the Highway 47 path, internal paths within city parks, and numerous neighborhood accessways. The City is also actively pursuing path development opportunities, as exhibited by recent efforts to construct the Gales Creek Trail, and the development of a master concept plan to complete a trail along Council Creek. The City's Community Trails Plan provides the base of Forest Grove's future shared use path network.

Metro's Regional Transportation Plan (RTP) also identifies several future shared use path corridors, including a path roughly following Forest Grove's western urban growth boundary between Richey Road and David Hill Road. The RTP also proposes a shared use path along David Hill Road between Forest Gale Drive and Thatcher Road.

4.2.4 Accessways

Forest Grove benefits from a comprehensive system of accessways providing direct bicycle/pedestrian connections in areas with limited street system connectivity. As part of the Westside Planning Program the City should explore accessway development opportunities in existing neighborhoods and continue developing accessways in future residential subdivisions including northern portions of the city in the David Hill and Purdin Road areas to maximize bicycle and pedestrian connectivity.

4.3 Pedestrian System Project List

Table 5 lists pedestrian improvement projects and planning-level cost estimates for facilities proposed in the TSP for the Westside. The table identifies projects specifically focusing on pedestrian facilities, while the Roadway Plan (Table 8) identifies street system improvements (e.g., new street corridors) that would also include sidewalks or other walkways. Table 5 includes joint bicycle/pedestrian improvement

projects (e.g., a project to add bike lanes and sidewalks to an existing street). The table also includes programmatic recommendations, which are discussed in greater detail in Appendix I of the TSP.

Table 5. Westside Planning Area Pedestrian System Projects and Programs

Project	Segment	Description	Planning-Level Cost Estimate (thousands)
Highway 47	Fern Hill Road to Poplar Street (south side)	Construct sidewalk.	$15
Willamina Avenue	Gales Creek Road to Sunset Drive	Complete sidewalk gaps	$328
Gales Creek Road	Forest Gale Way to Thatcher Road	Complete sidewalk gaps	$254
Thatcher Road	Gales Creek Road. to David Hill Road	Construct bike lanes and complete sidewalk gaps	$574
Fern Hill Road	Fern Hill wetlands nature trail to Highway 47	Construct bike lanes and complete sidewalk gaps	$130
Highway 47 Path Improvements	B Street to Highway 8	Repave existing deteriorated path segments; formalize path access points from adjacent residential streets; improve path/roadway crossing treatments at B, Elm, and Maple streets	$164
Safe Routes to School improvements	N/A	Inventory bicycle/pedestrian facilities near Forest Grove schools, and identify specific deficiencies that complicate bicyclist and pedestrian travel. Design and construct improvements, including shared use paths, neighborhood accessways, bike lanes, sidewalks, curb ramps, crosswalks, and other intersection improvements. Assign higher priority to projects along major bike- and walk-to-school routes	$1,000
Accessway Improvements	Citywide	Conduct citywide inventory of existing neighborhood accessways, and implement improvements (e.g., paving, re-paving, etc.) as needed	$500
ADA Transition Plan	Citywide	Develop an ADA Transition Plan identifying specific projects/strategies for bringing existing sidewalks and other pedestrian facilities into compliance with ADA standards	$50
Sidewalk Infill Program	Citywide	Fund an annual Sidewalk Infill Program to complete sidewalk gaps on existing streets	$50[1]
Spot Improvement Program	Citywide	Fund an annual Spot Improvement Program to address bicycle/pedestrian system needs	$50[1]
Bikeway/ Walkway Maintenance Program	Citywide	Develop and implement an annual Maintenance Program to provide regularly-scheduled maintenance activities for the on- and off-street bikeway and walkway system	$20[1]

Note: Cost estimates do not include contingency, design or construction management.
[1] This estimate represents an annual project cost.

The table is not intended to be an exhaustive list of all pedestrian projects, rather it is intended to lay out where the City should prioritize efforts based on the adopted TSP. It should be noted that all identified projects represent important elements of the pedestrian network, and should be implemented as soon as opportunities arise.

5. BICYCLE TRANSPORTATION SYSTEM

5.1 Bicycle Facilities

The arterial and collector roadway system within the study area has fairly continuous bicycle facilities. Bicyclist are able to utilize bike lanes to cross the City east-west on Gales Creek Road, E Street, Pacific Avenue / 19th Avenue and Highway 8. Bicyclists are able to utilize bike lanes to cross the northeast portion of the City on Highway 47 north of Highway 8. In addition to designated bike lanes, Forest Grove has a multi-use path located along the west side of Highway 47 between Pacific Avenue and B Street. Existing bike lanes and off-street multi-use paths are shown in **Figure 12**. Except for Highway 47, bicycles are permitted on all roadways in Forest Grove. Approximately two-thirds of the state highway system in the City provides bike lanes. Approximately half of the arterial roadway system in the City provides bike lanes. The majority of the collector roadway system in the City does not provide bike lanes on either side of the street.

5.2 Bicycle System Improvement Plans

Forest Grove has potential to transform itself into one of the region's most bikeable communities. The foundations of an excellent system already exist, but challenges will arise while improving it further. The TSP identifies a 20-year Preferred Plan for expanding this system which is also illustrated in **Figure 12**. The bicycle network builds upon previous and on-going planning efforts, and reflects the extensive input offered by City staff, stakeholder groups, and Forest Grove residents as a part of the TSP development process. As depicted **Figure 12**, the Bicycle Plan focuses on filling system gaps and developing a more complete network. The system includes an expanded bike lane network on streets where bicyclists could benefit from delineated separation from motorists, while shoulder bikeways (serving bicyclists and pedestrians) are identified on several roadways at the urban/rural fringe. The network also includes several Bicycle Boulevards, taking advantage of Forest Grove's extensive network of lower volume streets. As described in the section of pedestrian improvements, the network also includes a system of shared use paths and accessways. It should be noted that most future shared use path corridors depicted on the system map represent conceptual alignments, with further evaluation needed to identify specific routes. The paragraphs below discuss specific bicycle facilities in greater detail, while Table 5 at the end of this section presents the project list relevant to the Westside.

5.2.1 Bike Lanes

Several major streets in Forest Grove lack dedicated bike lanes. Safely accommodating bicyclists on major roadways is important for several reasons. First, major streets generally offer the most direct routes between bicyclist destinations while providing better connectivity compared with lower-order streets. Consequently, commuter cyclists and those traveling longer distances often gravitate to these routes. Second, the commercial character of major streets (e.g., employment, shopping, etc.) makes these corridors destinations in and of themselves.

To safely accommodate bicyclists on corridors with current or anticipated high traffic volumes, bike lanes are identified on several major streets in Forest Grove. In developing the bike lane network, consideration was given to several factors, including:

- Gaps in the existing bike lane system.
- Previous and on-going planning efforts identifying the need for bike lanes on specific streets.
- Planned street improvements that will include bike lanes as part of construction.
- Whether an existing street could be retrofitted to include bike lanes.

- Planned land development projects with the potential to generate bicycle travel demand on major streets.

Implementation of the bike lane projects depicted on the Bicycle Plan would primarily occur through new street construction, widening of existing streets, or roadway re-striping. Within the Westside, key streets proposed for bicycle facility improvements include:

- An extension of David Hill Road between Brooke Street and Highway 47
- Possible future widening of Thatcher Road or Fern Hill Road
- Possible restriping to reutilize available street width along portions of Gales Creek Road (to complete the missing link), and Willamina Avenue between Gales Creek Road and Sunset Drive.

5.2.2 Shoulder Bikeways

Shoulder bikeways are common in less-developed and rural areas, and typically consist of a paved shoulder (four to six feet wide) for pedestrian and bicycle travel. The bicycle element of the TSP recommends shoulder bikeways on several roads in Forest Grove's outlying areas, including Gales Creek Road (west of Willamina Avenue), Thatcher Road (north of David Hill Road), and Fern Hill Road (south of Taylor Way). Shoulder widening would be necessary on most of the roadways listed above. Although shoulder bikeways may suitably accommodate bicyclists and pedestrians today, the City will need to consider additional treatments (e.g., bike lanes, sidewalks and shared use paths) as new development occurs and as traffic volumes increase in these areas.

5.2.3 Shared Use Paths

Today, Forest Grove has the foundation of what could be a spectacular interconnected path system. As discussed above, the Pedestrian Plan describes the approach for improving and expanding this system which can also accommodate bicycle travel.

5.3 Bicycle System Project List

Table 6 lists bicycle improvement projects and planning-level cost estimates for facilities proposed in the TSP for the Westside. The table identifies projects specifically focusing on bicycle facilities, while the Roadway Plan (Table 8) identifies street system improvements (e.g., new street corridors) that would also include bicycle lanes or wide shoulders. Projects that would include joint bicycle/pedestrian improvements (e.g., shared use paths or street improvement projects that would include bike lanes and sidewalks), are listed in Table 5 under the pedestrian facility discussion. The table also includes programmatic recommendations that are discussed in greater detail in Appendix I of the TSP.

Table 6. Bicycle System Projects and Programs

Project	Segment	Description	Planning Level Cost Estimate (thousands)
Thatcher Rd.	Gales Creek Rd. to David Hill Rd.	Re-stripe roadway to provide bike lanes	$15
Willamina Ave.	Thatcher Rd. to Sunset Dr.	Re-stripe roadway to provide bike lanes	$18
Gales Cr. Rd.	Western UGB to Forest Gale Dr.	Construct shoulder bikeway	$388
Thatcher Rd.	David Hill Rd. to northern UGB	Construct shoulder bikeway	$582

Table 6 Continued. Bicycle System Projects and Programs

Project	Segment	Description	Planning Level Cost Estimate (thousands)
Fern Hill Rd.	Southern UGB to Taylor Way	Construct shoulder bikeway	$394
Willamina Ave./Goff Rd./23rd Ave.	Gales Cr. Rd. to Main St.	Develop Bicycle Boulevard	$83
Bicycle Wayfinding Signage Plan	N/A	Develop citywide bicycle Wayfinding Signage Plan identifying: appropriate locations for signs, destinations to be highlighted on each sign, and approximate distance and riding time to each destination	$20

Note: Cost estimates do not include contingency, design or construction management.

Project cost estimates were based on similar non-motorized planning efforts in Forest Grove and other nearby communities, and do not include additional costs related to right-of-way acquisition, storm drainage relocation or improvements, or utilities relocation. Further engineering study will be necessary to provide a more accurate cost estimate for budgeting these improvement projects.

The table does not list all bicycle projects, but is intended to lay out where the City should concentrate its efforts first. It should be noted that all projects represent important elements of the bikeway network, and should be implemented as soon as opportunities arise.

6. FUTURE STREET AND ROADWAY SYSTEM

This final section moves beyond a discussion of the existing transportation system and its needs and deficiencies. This section addresses deficiencies and improvement requirements resulting from future community growth over the 20-year planning horizon evaluated in the TSP.

6.1 Future Traffic Operations Analysis

2035 traffic volume forecasts for the PM peak hour were developed based on the City's recently adopted Comprehensive Land Use Plan. These forecasts include the roadway system improvements and extensions identified in **Figure 13**. This figure illustrates the recommended roadway improvement plan adopted as part of the City's TSP, including for the Westside:

- The extension of David Hill Road from its current terminus eastward to intersect at Highway 47.
- The addition of the Vista Drive and Talisman Lane extensions between Gales Creek and Thatcher Roads. With these improvements a significant volume of existing and projected future traffic would be diverted away from the intersection of Gales Creek and Thatcher Roads. Without these improvements it will be necessary to signalize or otherwise improve traffic operations at the Gales Creek/Thatcher intersection.
- A redistribution of traffic onto Verboort Road from destinations to the north and east would result in increased westbound right turn volumes at the intersection of this street with Highway 47. This redistribution is destined, in part, to the proposed mixed use development in the northwestern portion of the city facilitated by the extension of David Hill Road to intersect with Highway 47. This redistribution also draws westbound traffic away from the Highway 47/Martin Road intersection, helping to address expected future congestion problems at this location.

The results of operations analysis for the eight study area intersections during the 2035 PM peak hour are presented in Table 7, along with the results for unsignalized traffic operations at the intersection of Highway 47 with David Hill Road. Signalization of this location would be appropriate when warranted. Intersection traffic operations analysis worksheets for this scenario are included in Appendix L of the TSP.

The analysis documented in Table 7 indicates that, based on the preferred roadway plan in the TSP, intersection improvements will be needed at three locations in the Westside:

- Highway 47 at Verboort and Purdin Roads
- Highway 47 at Maple Street and Fern Hill Road
- Highway 47 at Elm Street

In addition to operational deficiencies identified at study intersections, local street connections are needed to improve circulation within Forest Grove and provide improved connectivity for pedestrians, bicyclists, and motor vehicles.

Table 7. 2035 PM Peak Hour Traffic Operations with Added Local Street Connectivity

			2035 Preferred Alternative		
No.	**Intersection**	**Operational Standard**	**Level of Service (LOS) [1]**	**Average Delay (Seconds) [2]**	**Volume / Capacity (V/C) [2]**
	Unsignalized Intersections				
1	Gales Creek Road/Forest Gale Drive	LOS E/0.99	A/C	18.4	0.25
2	Thatcher Road/Watercrest Road	LOS E/0.99	A/C	17.2	0.09
3	Gales Creek Road/Thatcher Road	LOS E/0.99	A/B	11.6	0.24
4	Gales Creek Road/Willamina Avenue	LOS E/0.99	A/B	11.3	0.09
11	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200**	**>2.00 [3]**
17	Highway 47/Maple St & Fern Hill Rd	V/C=0.99	**A/F**	**>200**	**>2.00**
18	Highway 47/Elm Street	V/C=0.99	**A/F**	**172.2**	**1.20**
33	Highway 47/David Hill Road	V/C=0.99	A	8.4	0.60
	Signalized Intersections				
25	Highway 47/Sunset Drive	V/C=0.99	B	16.1	0.50

1 First value is free movement, second value is worst stopped movement.
2 Worst stopped movement for minor street average delay reported for unsignalized intersections.
3 Development of local street connections may divert added WB traffic to this location requiring improvements. Monitor.
Source: SCJ Alliance, 2012.

6.2 Street and Roadway Plan

The TSP Preferred Roadway Plan builds upon the existing roadway network and aims to fill system gaps and develop a more complete and well-connected street network. The system includes new roadways, new connections between roadways and intersection improvements to address expected deficiencies. The network was developed based on extensive input from previous planning efforts, as well as input from ODOT, DLCD, Metro, City leaders and Forest Grove residents. It should be noted that proposed roadways and connections depicted on the preferred plan map represent conceptual alignments, with further evaluation needed to identify specific routes. The proposed improvements are tied to land that will have future development actions. It is important that these planning level transportation improvement proposals are carried through and developed further at the time of specific land use planning. Improvements tied to industrial land are particularly preliminary and may require significant adjustment as land use decisions are made. Additionally, development of projects affecting the state highway system will require on-going coordination with ODOT building on the discussions held during development the TSP.

The sub-sections below discuss specific roadway facilities in greater detail, while Table 8 at the end of this section presents the project list with particular relevance to the Westside.

6.2.1 Planned Projects

Figure 13 shows the proposed local street connections for Forest Grove. In each case, the specific alignments and design will be better determined upon further engineering and/or development review. Topography, railroads and environmental conditions limit the level of connectivity in Forest Grove. Where appropriate, neighborhood traffic management may be incorporated into design and construction of new connections to protect existing neighborhoods from potential traffic impacts.

Due to the complex and interconnected transportation issues of various corridors and sub-areas within the City, the need was identified in the TSP for several Refinement Plan studies to further develop appropriate long-term solutions. The proposed Refinement Plan Study areas would include:

- Development of a local street plan to guide future development of the David Hill area in the northwestern portion of the City. Existing challenges relate both to the long-term need to improve David Hill Road to an urban section (portions of this road are currently narrow and winding with minimal shoulders), to connect David Hill Road to Highway 47, and to provide a system of local streets serving the expected residential and mixed use development in this area. Topography and the need to preserve vegetative corridors must also be considered.
- Development of a street connectivity plan to provide access to the City's recently added UGB expansion (known as the Purdin Road area), as well as circulation within this area. The intent of this refinement plan is to ensure that potential improvements within the old and new UGB areas are compatible and appropriate to address expected travel needs.

The purpose of the Westside Planning Program is to address the refinement planning needs in there two areas. Thus, for these areas, the transportation solutions proposed in the TSP's Roadway Plan are considered to be preliminary, and may be modified upon completion of the Westside Planning Program.

6.2.2 Preferred Plan Project List

Table 8 lists roadway improvement projects for motor vehicles in the Westside, as well as planning-level cost estimates. The table also includes bicycle facilities, sidewalks, and pedestrian crossing projects, either as independent improvements or included within the roadway projects. **Figure 13** shows the Preferred Plan roadway network including the projects listed in Table 8. All roadway alignments are conceptual.

Project cost estimates were based on previous cost estimates and similar planning efforts in other Metro communities. These estimates may not include additional costs related to right-of-way acquisition, storm drainage relocation or improvements, or utilities relocation. Further engineering study will be necessary to provide a more accurate cost estimate for budgeting these improvement projects. All project cost estimates reflect 2014 dollars.

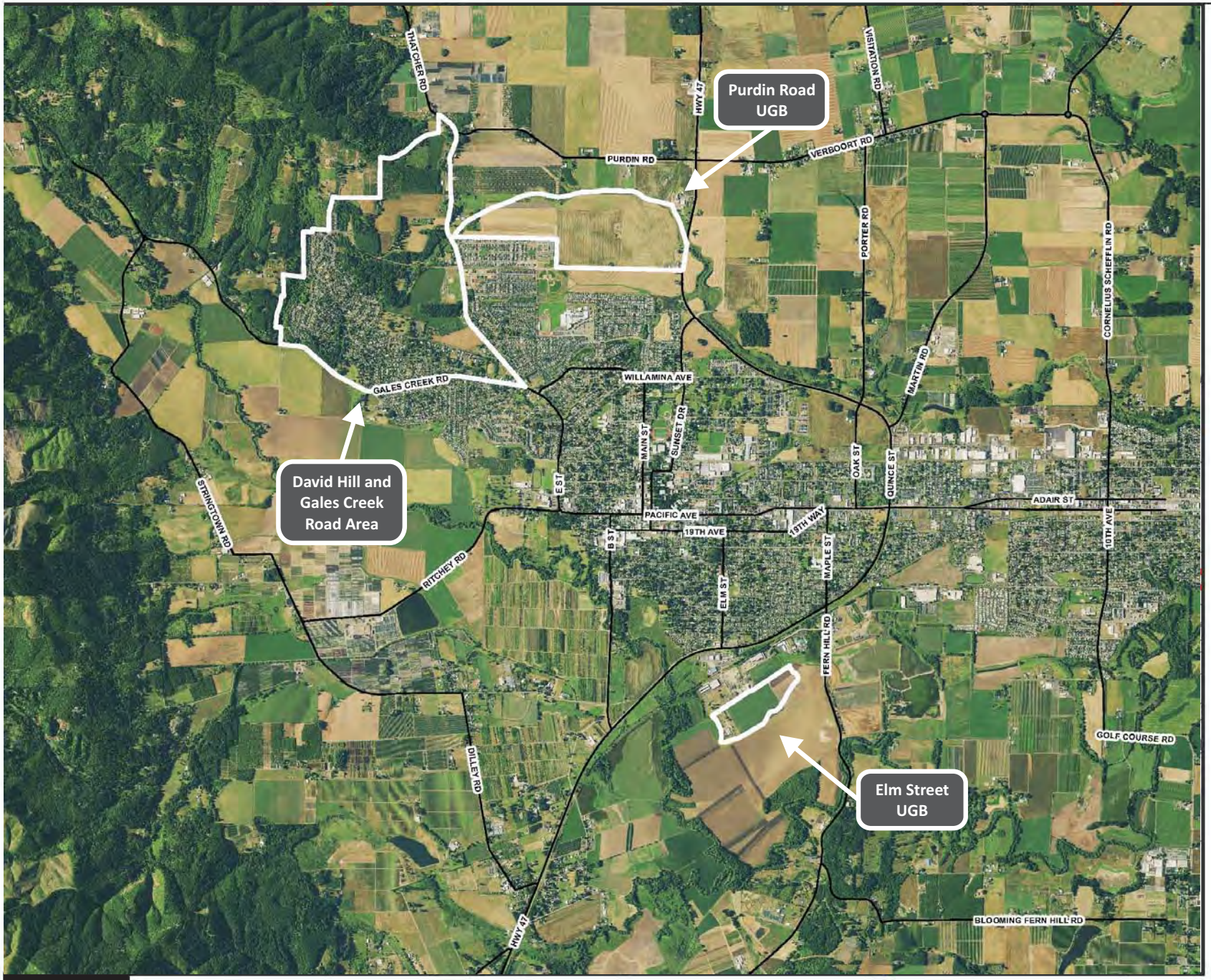
Table 8. TSP Roadway Projects and Programs Affecting Westside Planning Area (2014 Dollars in Millions)

No.	Name	Description	Purpose	Metro Project ID*	Total Cost ($Million)
1	David Hill Road Extension	Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing east terminus to Highway 47	Improve connectivity and balance circulation.	10772	$8.0
5	Highway 47 / Fern Hill-Maple Street Intersection Improvements *	Construct improvements (e.g. traffic signal) at Highway 47 intersection with Maple Street / Fern Hill Road, including interconnect with rail crossing	Improve operational deficiencies.	10780d	$5.0
8	Thatcher Road Realignment	Realign intersection at Thatcher Road at Gales Creek Road, signalize, include bike lanes	Eliminate substandard angles and improve intersection spacing. Improve access to labor markets and trade areas.	10773	$3.6
10	Council Creek Trail	16-mile multi-use trail from the end of the Westside MAX light-rail line in Hillsboro, through Washington County, and the Cities of Cornelius, Forest Grove and Banks, connecting to the Banks-Vernonia State Trail	Complete gap in system and improve safety and access to Cities.	10806	$5.20
11	Bike Lanes and Sidewalks	Address various network gaps within City	Complete gap in system and improve safety and access to town center.	10782	$8.29
14	Hwy 47 and Purdin Road Intersection Improvements *	Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin and Verboort Roads	Improve operational deficiencies.	10780f	$3.17
18	Hwy 47 /Elm Street Intersection Improvements *	Construct improvements (e.g. traffic signal.)	Improve operational deficiencies.	NA	$0.52

Table 8 Continued. Roadway Projects and Programs (2014 Dollars in Millions)

No.	Name	Description	Purpose	Metro Project ID*	Total Cost $Million
21	B Street Extension	Construct 2-lane local roadway between Hartford Drive and David Hill Road Extension	Improve local street system connectivity	NA	$6.1
22	Main Street Extension	Construct 2-lane local roadway between Hartford Drive and David Hill Road Extension	Improve local street system connectivity	NA	$6.1
23	Vista Drive Extension	Construct 2-lane local roadway between Watercrest and Thatcher Roads	Improve local street system connectivity	NA	$1.12
24	Talisman Lane Extension	Construct 2-lane local roadway between Gales Creek Road and Thatcher Road	Improve local street system connectivity	NA	$0.63
26	Gales Way, E Street to 23rd Avenue	Reconstruct and widen pavement with curbs, gutters and sidewalks	Improve local street system connectivity and safety	NA	$0.457
32	Taylor Way Extension (East)	Construct 2-lane industrial road between SW Fern Hill Road and Poplar Street	Improve connectivity and balance traffic flow	NA	$2.66
33	Taylor Way Extension (West)	Construct 2-lane industrial road between Elm Street and western terminus of Taylor Street	Improve connectivity and balance traffic flow	NA	$1.77

Notes:
* Projects will require ODOT approval. Inclusion of a project in this table does not obligate or imply the obligation of funds for any specific project.



city of forest grove

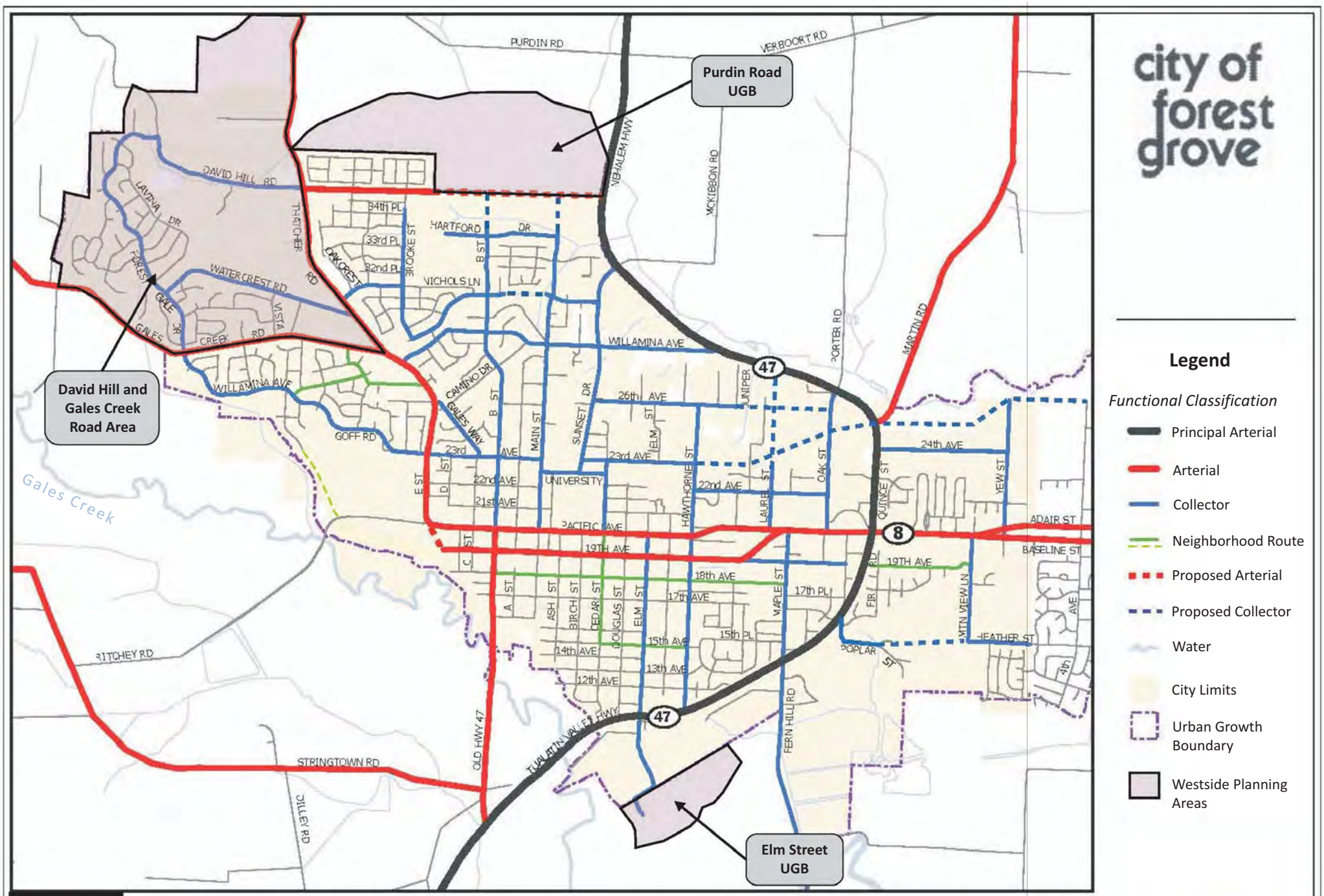
Legend

- Arterial
- Westside Planning Areas

FIGURE 1

Westside Planning Area

SCJ ALLIANCE
CONSULTING SERVICES



city of forest grove

Legend

Functional Classification

- Principal Arterial
- Arterial
- Collector
- Neighborhood Route
- Proposed Arterial
- Proposed Collector
- Water
- City Limits
- Urban Growth Boundary
- Westside Planning Areas

FIGURE 2

STREET FUNCTIONAL CLASSIFICATION SYSTEM

0 0.25 0.5 1 Miles

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CONSULTING SERVICES

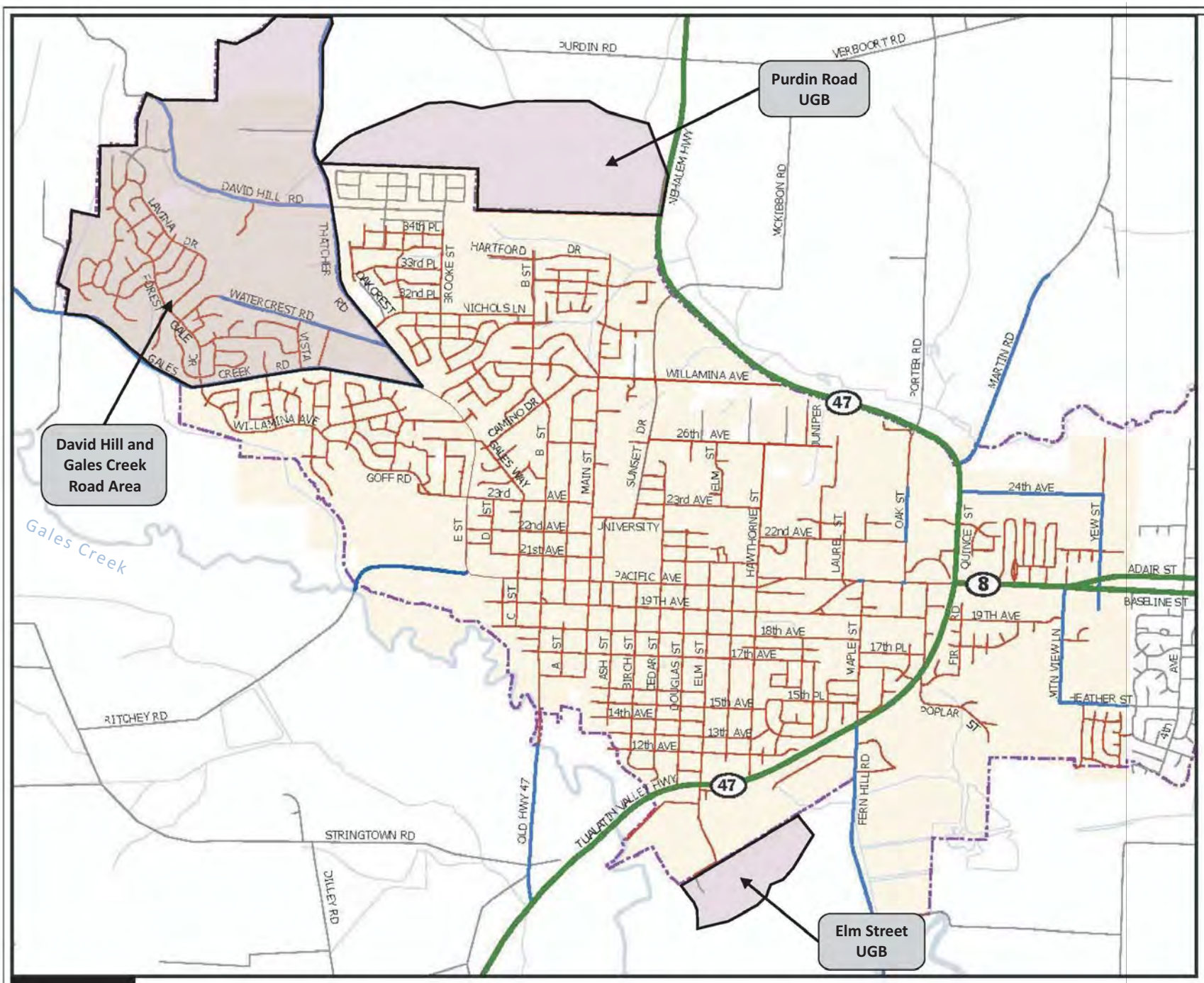
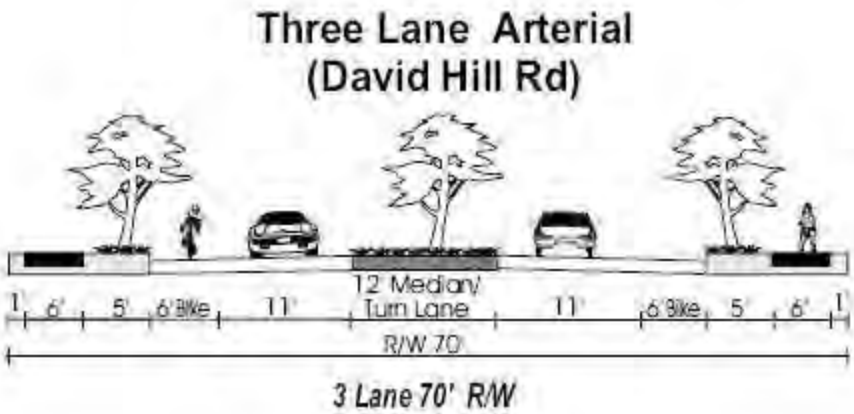


FIGURE 3

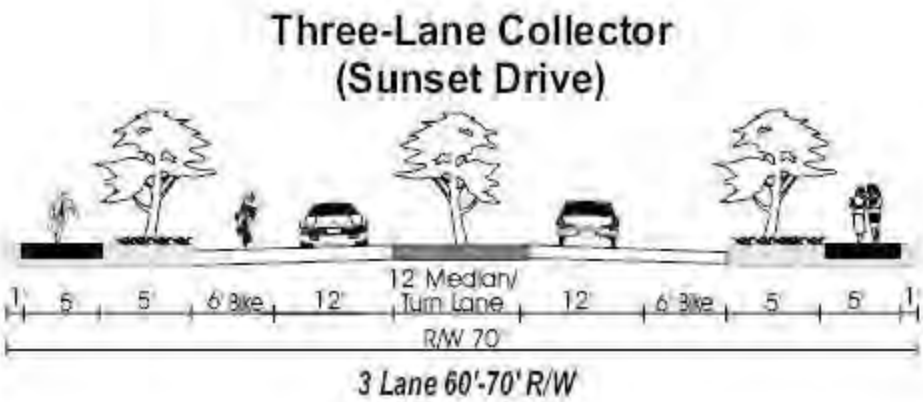
ROADWAY JURISDICTION

Figure 4. Sample Street Cross Section for Arterials



Criteria	3 Lane Arterial
Vehicle Lane Widths:	11-12 ft.
On Street Parking:	None
Bicycle Lanes:	5-6 ft.
Sidewalks:	5-8 ft.
Landscape Strips:	0-8 ft.
Medians/Turn Lane Widths:	12-14 ft.
Neighborhood Traffic Management:	Not Appropriate

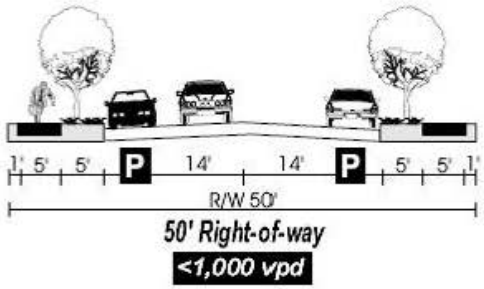
Figure 5. Sample Street Cross Section for 3-Lane Collector



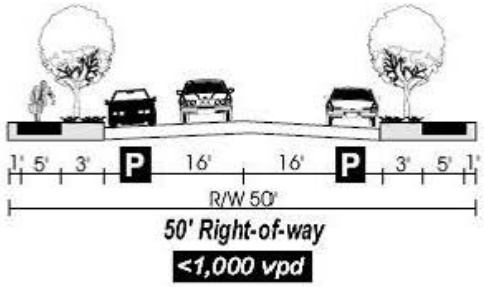
Criteria	Collector
Vehicle Lane Widths:	10-12 ft.
On Street Parking:	5-8 ft.
Bicycle Lanes:	5-6 ft.
Sidewalks:	5-7 ft.
Landscape Strips:	0-8 ft.
Medians/Turn Lane Widths:	10-14 ft.
Neighborhood Traffic Management:	Under Special Conditions

Figure 6. Sample Street Cross Section for Neighborhood Route

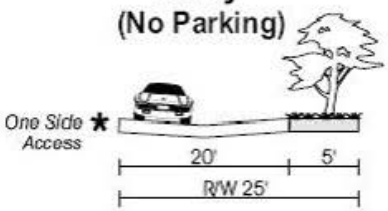
Figure 7. Sample Street Cross Sections for Residential/Local Streets



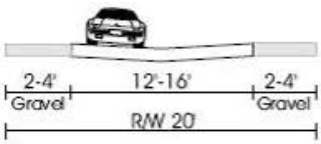
32' Standard Residential



Alley
(No Parking)



Alley
(No Parking)



Cul-de-sac
(No Parking)

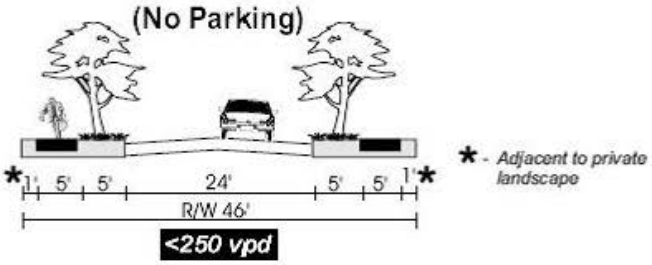
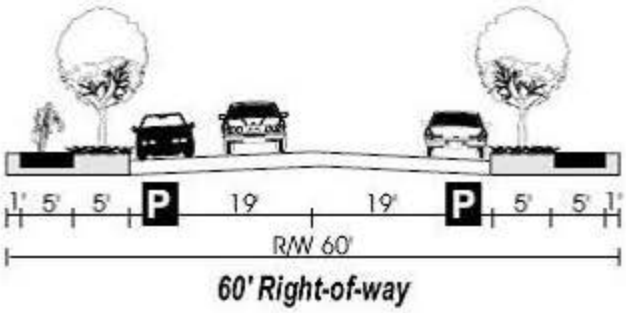
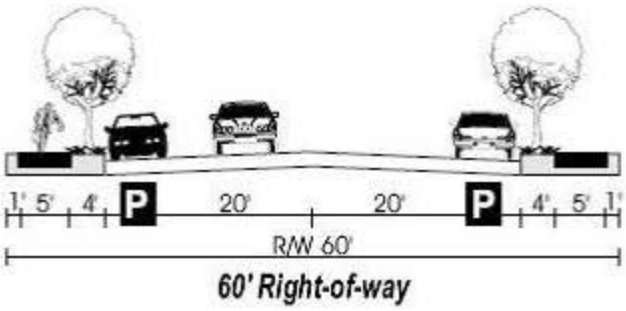


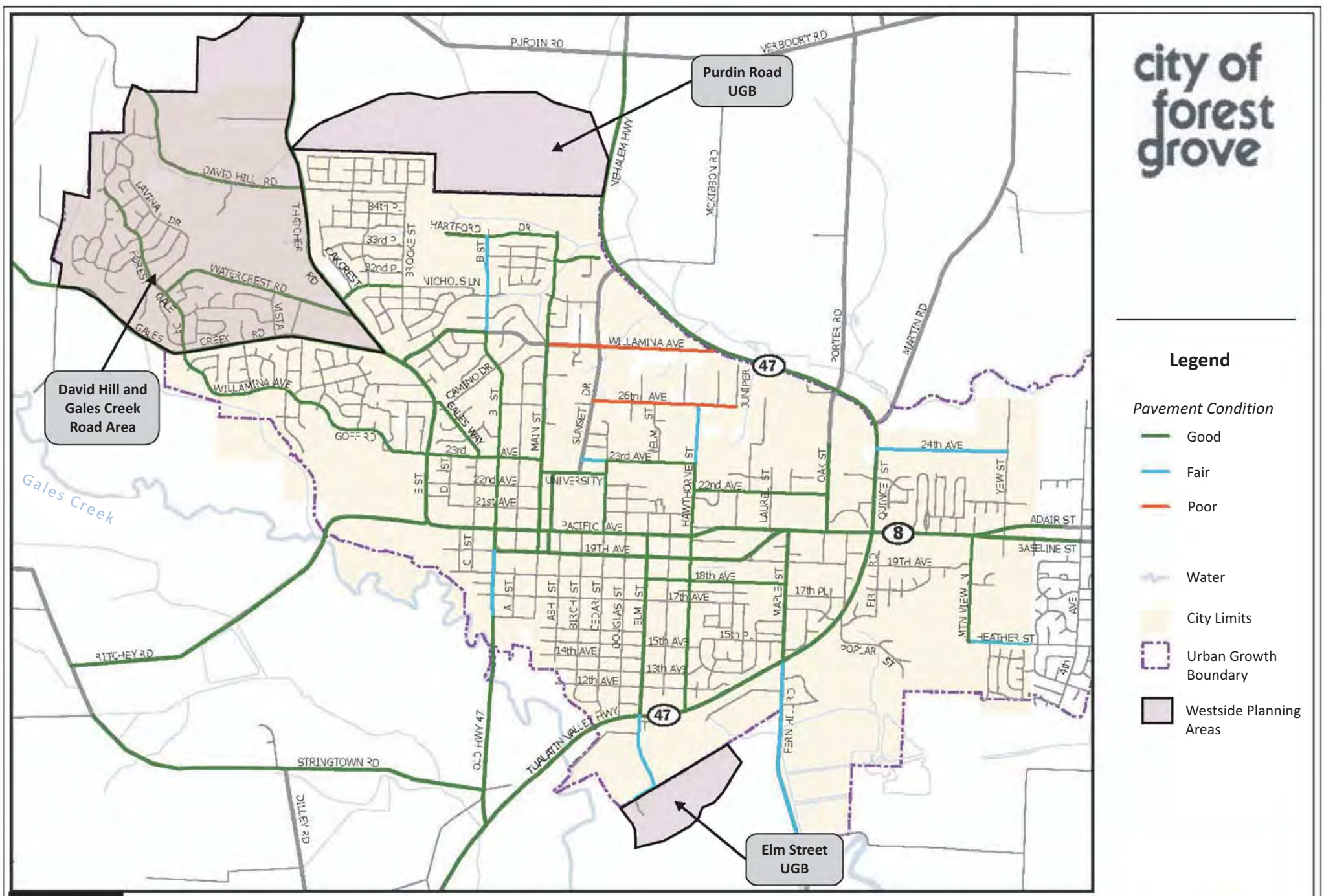
Figure 8. Sample Street Cross Sections for Commercial/Industrial Streets

38' Standard Commercial



40' Standard Industrial





city of forest grove

FIGURE 9

PAVEMENT CONDITIONS

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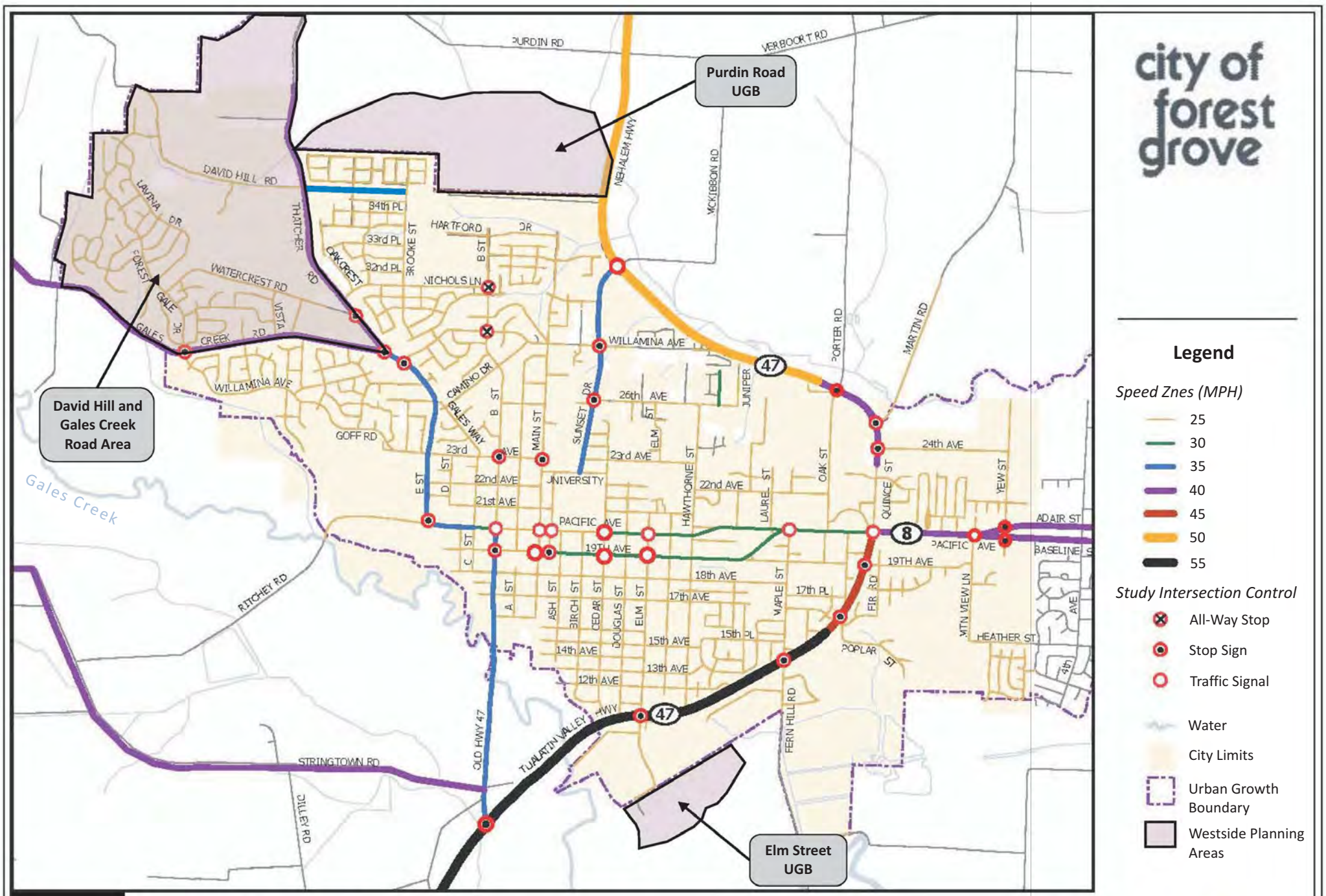
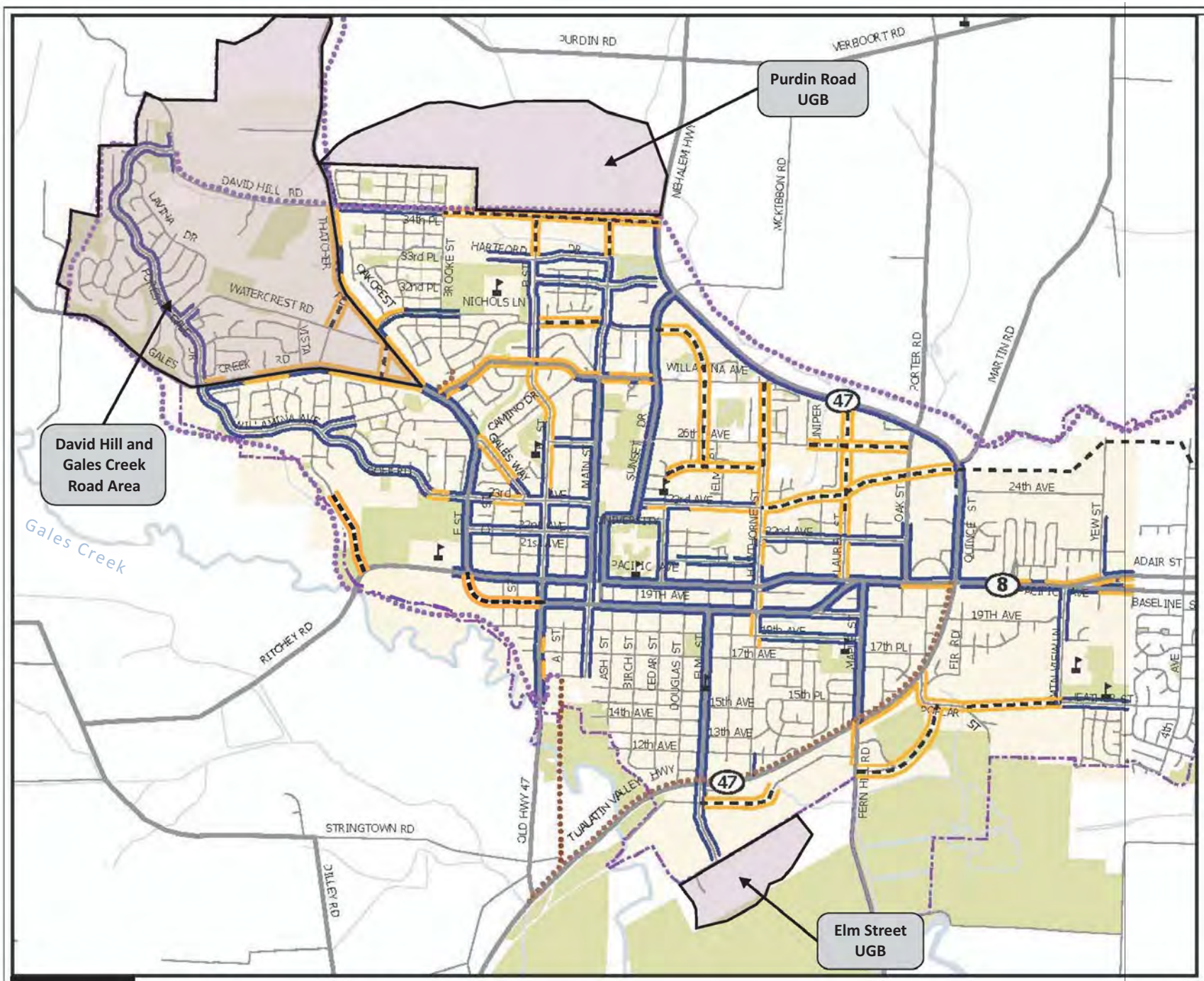


FIGURE 10

EXISTING SPEED ZONES and TRAFFIC CONTROLS



city of forest grove

Legend

- Proposed Sidewalks
- Existing Sidewalks on Arterial or Collector Streets
- Future Street
- All-Way Stop
- Proposed Multi-Use Path
- Water
- Schools
- Parks
- City Limits
- Urban Growth Boundary
- Westside Planning Areas

FIGURE 11

EXISTING AND PLANNED PEDESTRIAN SYSTEM

0 0.25 0.5 1 Miles

N

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CONSULTING SERVICES

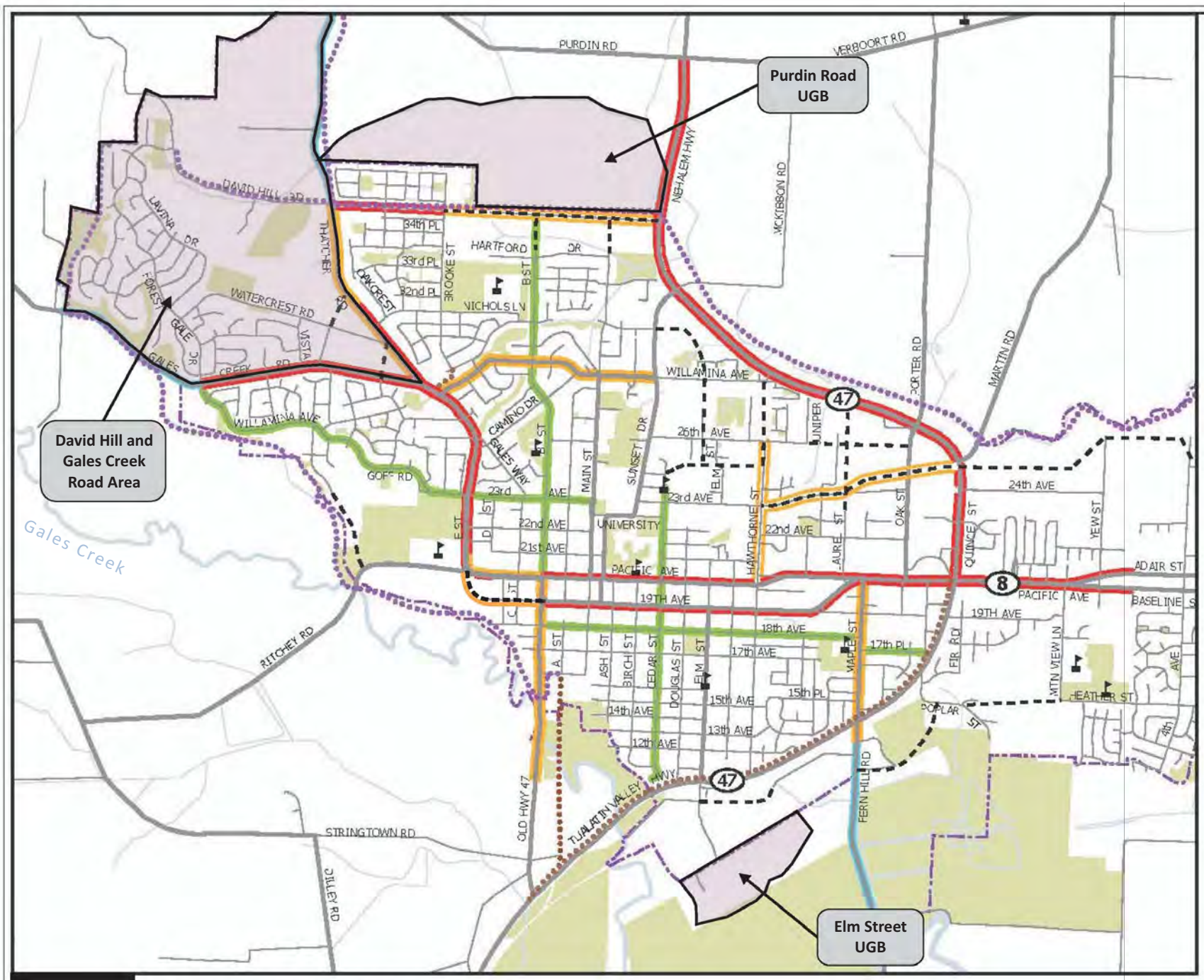


FIGURE 12

EXISTING AND PLANNED BICYCLE SYSTEM

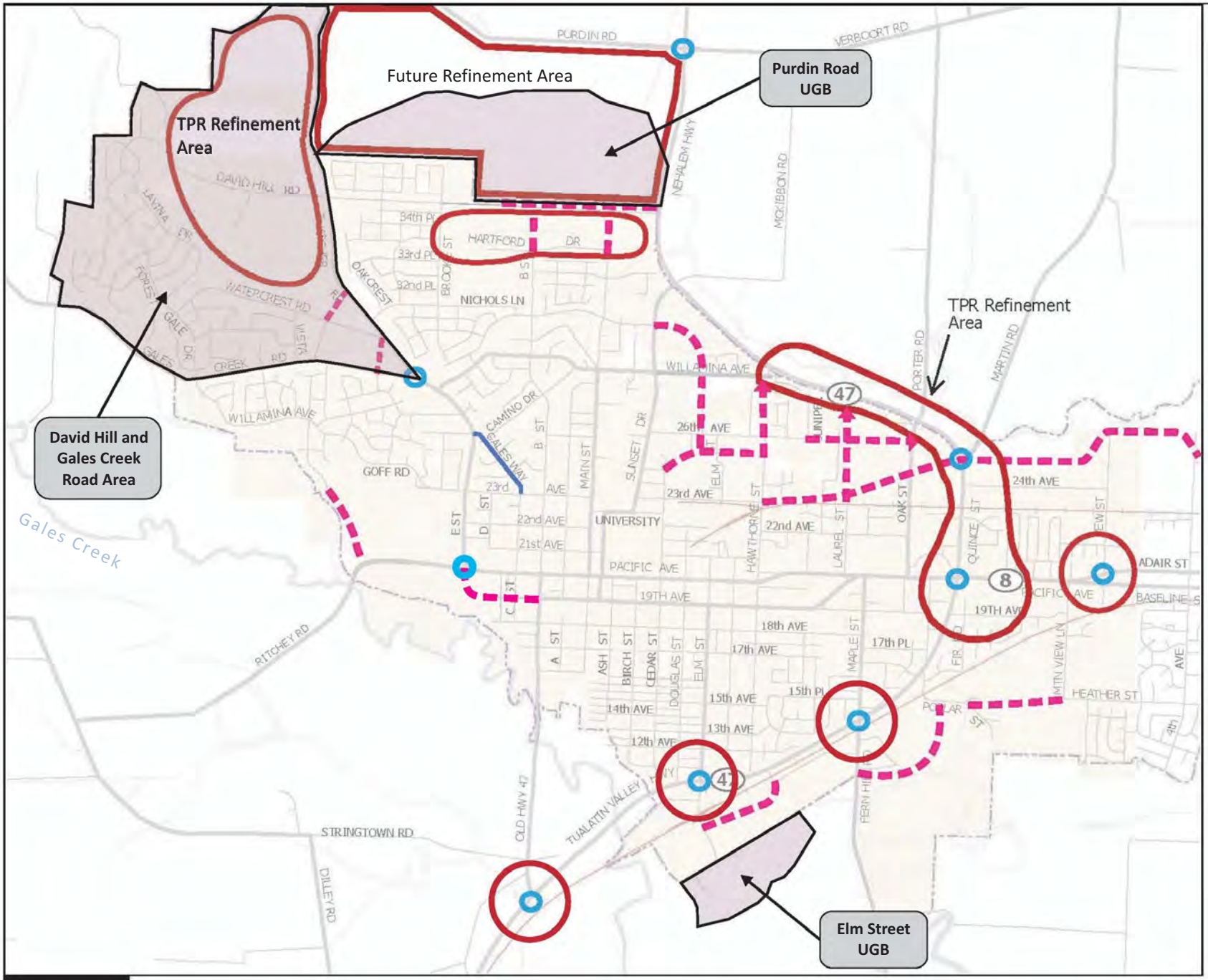
0 0.25 0.5 1 Miles

city of forest grove

Legend

- Proposed Bicycle Lane
- Existing Bicycle Lane
- Proposed Bicycle Boulevard
- Proposed Shoulder Bikeway
- Existing Multi-Use Path
- Proposed Multi-Use Path
- Future Street
- Water
- Schools
- Parks
- City Limits
- Urban Growth Boundary
- Westside Planning Areas

SCJ ALLIANCE
CONSULTING SERVICES



city of forest grove

Legend

- Future Study Area
- Water
- City Limits
- Urban Growth Boundary
- Proposed Roadway*
- Proposed Intersection Improvement
- Proposed Road Improvement
- Westside Planning Areas

* Road alignments are conceptual. Further study required.

Note: Projects proposed on State facilities will require ODOT approval.

FIGURE 13

ROADWAY NETWORK PLAN

0 0.25 0.5 1 Miles

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CONSULTING SERVICES

APPENDIX A

2007 TRAFFIC COUNTS AND 2035 TRAFFIC PROJECTIONS

Forest Grove TSP Turning Movement Projections

2007 Existing PM Peak Hour Turning

1 Gales Creek Road / Forest Gale Drive

			87		143			
			1	10	76			
90	2					134	244	
	57			414		85		
61	2					25	144	
			4	7	11			
			37		22			

2 Watercrest Road / Thatcher Road

			176		181			
			32	144	0			
58	17					0	0	
	0			384		0		
18	1					0	0	
			26	164	0			
			145		190			

3 Gales Creek Road / Thatcher Road

			155		180			
			69	0	86			
377	30					150	458	
	205			848		308		
235	0					0	291	
			0	0	0			
			0		0			

4 Gales Creek Road / Willamina Avenue

			45		44			
			35	0	10			
476	21					23	464	
	258			788		441		
279	0					0	268	
			0	0	0			
			0		0			

5 Sunset Drive / Willamina Avenue

			135		138			
			50	76	9			
88	34					8	13	
	2			345		4		
62	26					1	16	
			34	96	5			
			103		135			

2035 Baseline

1 Gales Creek Road / Forest Gale Drive

			100		236			
			1	11	87			
148	4					223	406	
	101			644		141		
108	4					42	203	
			5	10	15			
			57		30			

2 Watercrest Road / Thatcher Road

			286		344			
			52	234	0			
103	21					0	0	
	0			682		0		
22	1					0	0	
			51	323	0			
			235		374			

3 Gales Creek Road / Thatcher Road

			243		325			
			108	0	135			
677	48					277	846	
	331			1,468		569		
379	0					0	465	
			0	0	0			
			0		0			

4 Gales Creek Road / Willamina Avenue

			193		63			
			180	0	13			
861	36					27	708	
	442			1,379		681		
478	0					0	455	
			0	0	0			
			0		0			

5 Sunset Drive / Willamina Avenue

			204		224			
			76	115	14			
122	102					18	30	
	6			566		9		
186	78					2	25	
			37	104	5			
			195		146			

2035 Preferred Alternative

1 Gales Creek Road / Forest Gale Drive

			100		228			
			1	11	87			
143	4					215	391	
	101			629		136		
108	4					40	203	
			5	10	15			
			55		30			

2 Watercrest Road / Thatcher Road

			327		292			
			59	268	0			
102	25					0	0	
	0			663		0		
26	1					0	0	
			42	268	0			
			269		310			

3 Gales Creek Road / Thatcher Road

			281		335			
			125	0	156			
712	50					286	872	
	339			1,542		586		
389	0					0	495	
			0	0	0			
			0		0			

4 Gales Creek Road / Willamina Avenue

			190		75			
			178	0	12			
875	39					36	733	
	478			1,440		697		
517	0					0	490	
			0	0	0			
			0		0			

5 Sunset Drive / Willamina Avenue

			158		253			
			59	89	11			
102	134					7	11	
	8			572		3		
245	103					1	24	
			40	112	6			
			193		158			

2035 Preferred Alternative (Added Streets)

1 Gales Creek Road / Forest Gale Drive

			100		319			
			1	11	87			
200	4					305	555	
	119			812		193		
127	4					57	221	
			5	10	15			
			73		30			

2 Watercrest Road / Thatcher Road

			301		406			
			55	246	0			
115	25					0	121	
	0			769		0		
26	1					0	0	
			60	382	0			
			248		442			

3 Gales Creek Road / Thatcher Road

			161		98			
			72	0	89			
257	8					90	275	
	53			497		185		
61	0					0	143	
			0	0	0			
			0		0			

4 Gales Creek Road / Willamina Avenue

			50		29			
			39	0	11			
372	12					17	350	
	143			555		333		
155	0					0	154	
			0	0	0			
			0		0			

5 Sunset Drive / Willamina Avenue

			106		305			
			39	60	7			
142	33					43	70	
	2			558		22		
60	25					5	21	
			81	229	12			
			90		322			

2007 Existing PM Peak Hour Turning

6 Sunset Drive / 26th Avenue

		154		132			
		0	83	71			
0	0				43	46	
	0		294		0		
0	0				3	76	
		0	89	5			
		86		94			

7 23rd Avenue / B Street

		133		87			
		12	107	14			
118	7				17	109	
	77		450		86		
112	28				6	104	
		20	63	13			
		141		96			

8 23rd Avenue / Main Street

		184		231			
		21	163	0			
105	22				0	0	
	0		571		0		
94	72				0	0	
		84	209	0			
		235		293			

9 Pacific Avenue / E Street

		0		0			
		0	0	0			
370	0				0	404	
	237		869		315		
263	26				89	384	
		55	0	147			
		115		202			

10 19th Avenue / Council Street

		49		0			
		0	0	49			
0	0				0	0	
	857		906		0		
857	0				0	906	
		0	0	0			
		0		0			

2035 Baseline

6 Sunset Drive / 26th Avenue

		228		165			
		0	123	105			
0	0				42	45	
	0		403		0		
0	0				3	112	
		0	123	7			
		126		130			

7 23rd Avenue / B Street

		130		122			
		12	105	14			
206	9				33	214	
	100		610		169		
145	36				12	130	
		25	79	16			
		153		121			

8 23rd Avenue / Main Street

		189		381			
		22	167	0			
165	25				0	0	
	0		795		0		
106	81				0	0	
		143	357	0			
		249		500			

9 Pacific Avenue / E Street

		0		0			
		0	0	0			
615	0				0	671	
	324		1,233		560		
360	36				111	471	
		55	0	147			
		147		202			

10 19th Avenue / Council Street

		54		0			
		0	0	54			
0	0				0	0	
	934		988		0		
934	0				0	988	
		0	0	0			
		0		0			

2035 Preferred Alternative

6 Sunset Drive / 26th Avenue

		238		206			
		0	128	110			
0	0				65	70	
	0		456		0		
0	0				5	118	
		0	140	8			
		133		148			

7 23rd Avenue / B Street

		133		143			
		12	107	14			
280	9				48	305	
	95		709		241		
138	35				17	127	
		28	87	18			
		158		133			

8 23rd Avenue / Main Street

		192		487			
		22	170	0			
204	34				0	0	
	0		971		0		
144	110				0	0	
		182	453	0			
		280		635			

9 Pacific Avenue / E Street

		0		0			
		0	0	0			
594	0				0	688	
	332		1,269		536		
368	36				152	487	
		58	0	155			
		188		213			

10 19th Avenue / Council Street

		72		0			
		0	0	72			
0	0				0	0	
	941		1,013		0		
941	0				0	1,013	
		0	0	0			
		0		0			

2035 Preferred Alternative (Added Streets)

6 Sunset Drive / 26th Avenue

		276		424			
		0	149	127			
0	0				309	331	
	0		728		0		
0	0				22	134	
		0	115	6			
		170		121			

7 23rd Avenue / B Street

		133		136			
		12	107	14			
248	9				41	265	
	104		679		209		
151	38				15	135	
		27	85	18			
		159		130			

8 23rd Avenue / Main Street

		185		325			
		21	164	0			
139	32				0	0	
	0		732		0		
135	103				0	0	
		118	294	0			
		1476		412			

9 Pacific Avenue / E Street

		0		0			
		0	0	0			
481	0				0	546	
	159		924		426		
176	17				120	306	
		55	0	147			
		138		202			

10 19th Avenue / Council Street

		64		0			
		0	0	64			
0	0				0	0	
	893		957		0		
893	0				0	957	
		0	0	0			
		0		0			

2007 Existing PM Peak Hour Turning	2035 Baseline	2035 Preferred Alternative	2035 Preferred Alternative (Added Streets)

11 Highway 47 / Purdin Road/Verboort Road

			224		321				468		613
			23	187	14				48	391	29
153	14					17	285	118	14				6	97
	51		941			115			51		1,370		39	
75	10					153	117	75	10				52	187
			15	290	52				31	593	106			
			350		357				453		730			

			480		615				851		530
			49	401	30				87	710	53		
123	14					6	107	204	14				13	224
	51		1,394			43			51		1,769		90	
75	10					57	188	75	10				120	194
			31	595	107				26	503	90			
			468		732				841		619			

12 Highway 47 / Oak Street/Porter Road

			46		34				43		34
			7	35	4				5	33	5		
347	4					8	353	489	4				7	576
	245		715			320			263		1,310		385	
267	18					25	256	446	179				184	391
			20	22	7				99	23	123			
			78		49				396		245			

			43		34				42		34
			5	33	5				6	32	4		
486	4					7	573	321	4				7	403
	252		1,295			384			316		950		246	
438	182					182	378	382	2				150	411
			97	23	121				69	23	91			
			397		241				184		181			

13 Highway 47 / Martin Road

			351		204				752		508
			43	0	308				356	0	396		
353	25					179	489	576	76				432	652
	231		1,096			310			315		1,795		220	
256	0					0	539	391	0				0	711
			0	0	0				0	0	0			
			0		0				0		0			

			751		507				704		704
			353	0	398				150	304	250		
573	73					434	654	403	75				178	531
	305		1,783			220			332		2,338		253	
378	0					0	703	412	5				100	822
			0	0	0				0	451	240			
			0		0				409		691			

14 Highway 47 / 24th Avenue

			539		489				711		652
			0	516	23				4	679	28		
0	0					59	79	209	0				95	179
	0		1,060			0			5		1,838		59	
0	0					20	35	228	223				25	50
			0	430	12				146	557	17			
			536		442				927		720			

			703		654				573		531
			4	671	28				0	545	28		
212	0					92	185	0	0				112	185
	5		1,841			61			0		1,195		0	
226	221					32	51	121	0				73	46
			147	562	18				0	419	18			
			924		727				618		437			

15 Highway 47 / 19th Avenue

			696		558				772		669
			0	639	57				0	694	78		
0	0					43	94	0	0				67	116
	0		1,343			0			0		1,529		0	
0	0					51	95	0	0				49	117
			0	515	38				0	602	39			
			690		553				743		641			

			763		671				698		611
			0	699	64				0	634	64		
0	0					70	94	0	0				70	94
	0		1,489			0			0		1,364		0	
0	0					24	95	0	0				24	95
			0	601	31				0	541	31			
			723		632				658		572			

2007 Existing PM Peak Hour Turning

16 Highway 47 / Poplar Street

		0	0	0		
666	0				0	690
	481		1,274		635	
481	0				55	553
		31	0	72		
		55		103		

17 Highway 47 / Maple Street

		55	26	24		
668	28				50	666
	395		1,430		554	
468	45				62	481
		59	70	62		
		133		191		

18 Highway 47 / Elm Street

		66	1	39		
664	53				69	667
	403		1,275		590	
457	1				8	468
		8	11	26		
		10		45		

19 Highway 47 / B Street

		150	0	32		
754	101				61	665
	425		1,373		604	
526	0				0	457
		0	0	0		
		0		0		

20 Adair Street / Yew Street

		27	87	0		
1,665	0				79	1,722
	0		1,869		1,616	
0	0				27	0
		22	11	0		
		114		33		

2035 Baseline

16 Highway 47 / Poplar Street

		0	0	0		
723	0				0	744
	565		1,473		657	
587	22				87	641
		66	0	76		
		109		142		

17 Highway 47 / Maple Street

		224	97	74		
824	65				60	723
	414		1,997		536	
614	135				127	587
		64	102	99		
		359		265		

18 Highway 47 / Elm Street

		166	1	92		
913	24				75	824
	488		1,641		741	
513	1				8	614
		6	5	34		
		10		45		

19 Highway 47 / B Street

		205	0	86		
1,024	206				95	914
	427		1,838		819	
731	0				0	513
		0	0	0		
		0		0		

20 Adair Street / Yew Streer

		31	83	0		
1,820	0				170	1,950
	0		2,124		1,749	
0	0				31	0
		40	20	0		
		114		60		

2035 Preferred Alternative

16 Highway 47 / Poplar Street

		0	0	0		
715	0				0	723
	536		1,441		651	
557	21				85	620
		64	0	84		
		106		148		

17 Highway 47 / Maple Street

		200	91	61		
819	64				48	715
	411		1,957		548	
610	135				127	557
		71	116	85		
		353		272		

18 Highway 47 / Elm Street

		181	1	88		
921	24				75	819
	488		1,645		734	
513	1				8	610
		6	5	34		
		10		45		

19 Highway 47 / B Street

		243	0	52		
1020	171				144	921
	461		1,848		777	
632	0				0	513
		0	0	0		
		0		0		

20 Adair Street / Yew Street

		31	83	0		
1862	0				176	1998
	0		2,172		1,791	
0	0				31	0
		40	20	0		
		114		60		

2035 Preferred Alternative (Added Streets)

16 Highway 47 / Poplar Street

		0	0	0		
615	0				0	623
	436		1,241		551	
457	21				85	520
		64	0	84		
		106		148		

17 Highway 47 / Maple Street

		177	77	56		
728	35				48	635
	497		1,784		490	
589	57				97	634
		61	108	81		
		231		250		

18 Highway 47 / Elm Street

		171	2	85		
858	24				65	756
	477		1,559		679	
502	1				9	588
		8	11	26		
		13		45		

19 Highway 47 / B Street

		235	0	50		
930	175				129	824
	467		1,751		695	
642	0				0	517
		0	0	0		
		0		0		

20 Adair Street / Yew Street

		27	87	0		
1858	0				176	1998
	0		2,172		1,791	
121	0				31	0
		40	20	0		
		118		60		

2007 Existing PM Peak Hour Turning

21 Baseline Street / Yew Street

		107		45			
		0	19	88			
0	28				0	0	
	1,331		1,527		0		
1,386	27				0	1,436	
		0	17	17			
		46		34			

22 19th Avenue / B Street

		635		106			
		3	164	468			
5	1				0	0	
	26		890		0		
30	3				0	612	
		2	105	118			
		167		225			

23 Willamina Avenue / B Street

		120		92			
		9	86	25			
75	8				28	76	
	41		347		44		
72	23				4	67	
		22	56	1			
		113		79			

24 Bonnie Lane / B Street

		37		33			
		8	24	5			
133	5				6	78	
	84		381		59		
168	79				13	99	
		66	22	10			
		116		98			

25 Highway 47 / Sunset Drive

		2		9			
		0	2	0			
357	3				1	347	
	160		974		196		
351	188				150	268	
		161	5	108			
		340		274			

2035 Baseline

21 Baseline Street / Yew Street

		107		49			
		0	19	88			
0	32				0	0	
	1,539		1,744		0		
1,603	31				0	1,644	
		0	17	17			
		50		34			

22 19th Avenue / B Street

		797		151			
		4	206	587			
7	1				0	0	
	26		1,149		0		
30	3				0	782	
		3	150	169			
		209		322			

23 Willamina Avenue / B Street

		143		218			
		11	102	30			
137	19				41	110	
	96		645		64		
168	54				6	128	
		62	159	3			
		162		224			

24 Bonnie Lane / B Street

		60		18			
		13	39	8			
96	4				6	78	
	74		321		59		
148	70				13	86	
		24	8	4			
		122		35			

25 Highway 47 / Sunset Drive

		5		11			
		0	5	0			
584	3				1	489	
	345		1,451		343		
607	259				145	447	
		241	7	102			
		409		350			

2035 Preferred Alternative

21 Baseline Street / Yew Street

		107		50			
		0	19	88			
0	33				0	0	
	1,548		1,753		0		
1612	31				0	1653	
		0	17	17			
		50		34			

22 19th Avenue / B Street

		802		155			
		4	207	591			
7	1				0	0	
	26		1,163		0		
30	3				0	791	
		3	154	174			
		210		331			

23 Willamina Avenue / B Street

		162		262			
		12	116	34			
161	22				46	126	
	111		756		73		
195	62				7	148	
		76	194	3			
		185		273			

24 Bonnie Lane / B Street

		79		33			
		17	51	11			
143	4				6	78	
	74		405		59		
148	70				13	95	
		67	22	10			
		134		100			

25 Highway 47 / Sunset Drive

		5		11			
		0	5	0			
590	3				1	489	
	336		1,495		344		
645	306				144	439	
		246	7	103			
		455		356			

2035 Preferred Alternative (Added Streets)

21 Baseline Street / Yew Street

		107		50			
		0	19	88			
0	33				0	0	
	1,548		1,753		0		
1612	31				0	1653	
		0	17	17			
		50		34			

22 19th Avenue / B Street

		312		170			
		1	81	230			
5	1				0	0	
	275		954		0		
278	3				0	695	
		3	169	190			
		84		363			

23 Willamina Avenue / B Street

		151		246			
		11	108	31			
140	8				29	80	
	40		596		46		
70	22				4	75	
		82	209	4			
		135		295			

24 Bonnie Lane / B Street

		68		59			
		15	44	9			
220	4				6	78	
	74		511		59		
148	70				13	105	
		146	49	22			
		127		217			

25 Highway 47 / Sunset Drive

		5		9			
		0	5	0			
461	3				1	319	
	341		1,047		258		
476	132				60	380	
		203	5	39			
		197		249			

2007 Existing PM Peak Hour Turning

26 Pacifc Avenue (Hwy 8) / Quince Street (Hwy 47)

			572		442			
			137	260	175			
1,203	111					148	1,511	
	863			3,703		1,015		
1,062	88					348	1,362	
			51	183	324			
			696		558			

27 Pacific Avenue / Mountain View Lane

			0		0			
			0	0	0			
1,691	0					0	1,683	
	1,304			3,289		1,565		
1,398	94					118	1,386	
			126	0	82			
			212		208			

28 Pacific Avenue / B Street

			104		134			
			8	96	0			
512	16					73	634	
	0			1,200		450		
363	347					111	0	
			54	45	0			
			554		99			

29 Pacific Avenue / Main Street

			221		226			
			61	160	0			
715	0					164	876	
	0			1,180		633		
0	0					79	0	
			21	62	0			
			239		83			

30 Pacific Avenue / College Way/Council Street

			64		8			
			33	31	0			
873	0					8	861	
	0			925		840		
0	0					13	0	
			0	0	0			
			44		0			

2035 Baseline

26 Pacifc Avenue (Hwy 8) / Quince Street (Hwy 47)

			898		507			
			278	320	300			
1,494	105					165	1,689	
	813			4,258		1,155		
1,001	83					369	1,484	
			61	237	371			
			772		669			

27 Pacific Avenue / Mountain View Lane

			0		0			
			0	0	0			
1,827	0					0	1,850	
	1,488			3,677		1,700		
1,585	97					150	1,603	
			127	0	115			
			247		242			

28 Pacific Avenue / B Street

			133		176			
			10	123	0			
750	20					111	966	
	0			1,650		686		
452	432					169	0	
			54	45	0			
			724		99			

29 Pacific Avenue / Main Street

			237		228			
			84	153	0			
967	0					113	1,022	
	0			1,440		817		
0	0					92	0	
			66	115	0			
			245		181			

30 Pacific Avenue / College Way/Council Street

			95		95			
			59	36	0			
1,022	0					95	1,076	
	0			1,171		963		
0	0					18	0	
			0	0	0			
			54		0			

2035 Preferred Alternative

26 Pacifc Avenue (Hwy 8) / Quince Street (Hwy 47)

			878		510			
			281	319	278			
1510	106					166	1694	
	822			4,255		1,168		
1012	84					360	1472	
			61	238	372			
			763		671			

27 Pacific Avenue / Mountain View Lane

			0		0			
			0	0	0			
1872	0					0	1853	
	1,495			3,722		1,723		
1603	108					130	1612	
			149	0	117			
			238		266			

28 Pacific Avenue / B Street

			140		179			
			11	129	0			
765	20					114	987	
	0			1,684		701		
458	438					173	0	
			54	45	0			
			740		99			

29 Pacific Avenue / Main Street

			201		233			
			55	146	0			
989	0					91	1072	
	0			1,463		885		
0	0					96	0	
			48	142	0			
			242		190			

30 Pacific Avenue / College Way/Council Street

			184		169			
			95	89	0			
1072	0					169	1164	
	0			1,348		977		
0	0					18	0	
			0	0	0			
			107		0			

2035 Preferred Alternative (Added Streets)

26 Pacifc Avenue (Hwy 8) / Quince Street (Hwy 47)

			878		478			
			210	299	369			
1436	95					166	1694	
	660			4,015		1,168		
812	57					360	1385	
			58	217	356			
			716		630			

27 Pacific Avenue / Mountain View Lane

			0		0			
			0	0	0			
1872	0					0	1853	
	1,495			3,722		1,723		
1603	108					130	1612	
			149	0	117			
			238		266			

28 Pacific Avenue / B Street

			140		154			
			11	129	0			
663	12					97	843	
	0			1,358		598		
276	264					148	0	
			54	45	0			
			541		99			

29 Pacific Avenue / Main Street

			262		277			
			72	190	0			
859	0					197	1051	
	0			1,420		759		
0	0					95	0	
			27	80	0			
			284		107			

30 Pacific Avenue / College Way/Council Street

			91		10			
			47	44	0			
1052	0					10	1030	
	0			1,121		1,005		
0	0					16	0	
			0	0	0			
			60		0			

2007 Existing PM Peak Hour Turning

31 Pacific Avenue / Elm Street

		18	24			
		6	12	0		
978	0				6	978
	0		1,072		914	
0	0				58	0
		58	18	0		
		70	76			

32 Pacific Avenue / Maple Street

		0	17			
		0	0	0		
1,207	16				0	1,244
	891		2,421		1,102	
973	66				142	989
		105	1	98		
		208	204			

33 Highway 47 / David Hill Road

		0	0			
		0	0	0		
0	0				0	0
	0		0		0	
0	0				0	0
		0	0	0		
		0	0			

2035 Baseline

31 Pacific Avenue / Elm Street

		70	28			
		23	47	0		
1,494	0				9	1,507
	0		1,658		1,408	
0	0				89	0
		62	19	0		
		136	81			

32 Pacific Avenue / Maple Street

		0	16			
		0	0	0		
1,599	14				0	1,636
	789		2,789		1,449	
862	58				187	929
		150	1	140		
		245	291			

33 Highway 47 / David Hill Road

		0	0			
		0	0	0		
0	0				0	0
	0		0		0	
0	0				0	0
		0	0	0		
		0	0			

2035 Preferred Alternative

31 Pacific Avenue / Elm Street

		70	29			
		23	47	0		
1496	0				9	1506
	0		1,661		1,407	
0	0				89	0
		65	20	0		
		136	85			

32 Pacific Avenue / Maple Street

		0	16			
		0	0	0		
1601	14				0	1623
	782		2,794		1,438	
854	58				185	934
		163	2	152		
		243	317			

33 Highway 47 / David Hill Road

		0	0			
		0	0	0		
0	0				0	0
	0		0		0	
0	0				0	0
		0	0	0		
		0	0			

2035 Preferred Alternative (Added Streets)

31 Pacific Avenue / Elm Street

		70	27			
		23	47	0		
1288	0				8	1288
	0		1,438		1,204	
0	0				76	0
		61	19	0		
		123	80			

32 Pacific Avenue / Maple Street

		0	15			
		0	0	0		
1645	13				0	1651
	743		2,817		1,463	
811	55				188	913
		183	2	171		
		243	355			

33 Highway 47 / David Hill Road

		841	619			
		415	426	0		
525	271				0	0
	0		1,620		0	
321	50				0	0
		110	348	0		
		476	458			

SCJ ALLIANCE
CONSULTING SERVICES

MEMORANDUM

TO:	Jon Holan, Community Development Director City of Forest Grove
FROM:	Anne Sylvester, PTE
DATE:	March 8, 2017
PROJECT #:	0742.01 Forest Grove Westside Planning Project
SUBJECT:	Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative (10/26/15 Version)

Introduction and Background

The memorandum presents the results of traffic operations analysis for the revised land use alternative developed by the City of Forest Grove on October 26, 2015 for the Westside Planning Project. Included in this memo is a discussion of:

- Key elements in the land use alternative
- The methodology used to develop and analyze long-range traffic forecasts at key intersections impacted by Westside growth
- Review of the traffic forecasts and operating analysis results including a comparison with the adopted 2014 Transportation System Plan
- Identification of impacts associated with Westside development and potential roadway improvement needs including mitigation for adverse impacts to the County's two pending roundabout improvement projects on Oregon Highway 47. These impacts would be associated with development in the Purdin Road planning area that was not originally anticipated when the City's most recent TSP was adopted.

As illustrated in Figure 1, two areas within the City of Forest Grove are included in the Westside Planning Project:

- David Hill planning area
- Purdin Road planning area

David Hill - The David Hill planning area is located in the northwestern portion of the City of Forest Grove and has been included in the Urban Growth Boundary (UGB) for several years. David Hill is one of the city's prime growth areas and over 90 percent of this area is projected to develop by 2025. While urban land use designations currently exist, the need for street and infrastructure planning is urgent. However, due to the extent of unknown factors affecting the development of a transportation system for David Hill, the City's recently adopted Transportation System Plan (TSP) did not identify a potential future street system. The TSP called for further refinement planning to address the unique aspects of providing urban services in this topographically challenged area. This refinement planning has been

incorporated into the Westside Project along with consideration of connectivity issues for the Gales Creek area located immediately south of David Hill.

Purdin Road - The Purdin Road planning area is located east of David Hill and directly north of the city. It is predominately used for agricultural purposes. This area was added to the UGB through legislative action in 2014, but there has been no comprehensive planning to guide the designation of urban land uses or infrastructure. The Westside Planning Project is intended to meet these needs.

Figure 1. Westside Planning Project Study Areas

Revised Land Use Alternative (10/26/15)

Figure 2 was developed by City staff to illustrate the component elements of the Revised Westside Land Use Alternative dated October 26, 2015. This figure identifies a series of transportation zones by which different land uses are aggregated for analysis purposes. Table 1 includes detailed information concerning the specific land use types and quantities included in each zone. Figure 2 also shows existing riparian areas which must be avoided as the area is developed, along with the 440-foot contour interval on the west side of the David Hill area. This elevation represents the limit of existing city water service.

As indicated in Table 1, a net total of just over 374 acres have been identified for development as part of the Westside Planning Project. This excludes areas designated as vegetated corridors under Clean Water Services standards. Under the existing Comprehensive Plan (adopted in 2014) the two planning areas are entirely zoned for residential development yielding a total of 693 single family dwelling units. Under the Revised land use scenario, mixed use development is proposed consisting of single and multi- family

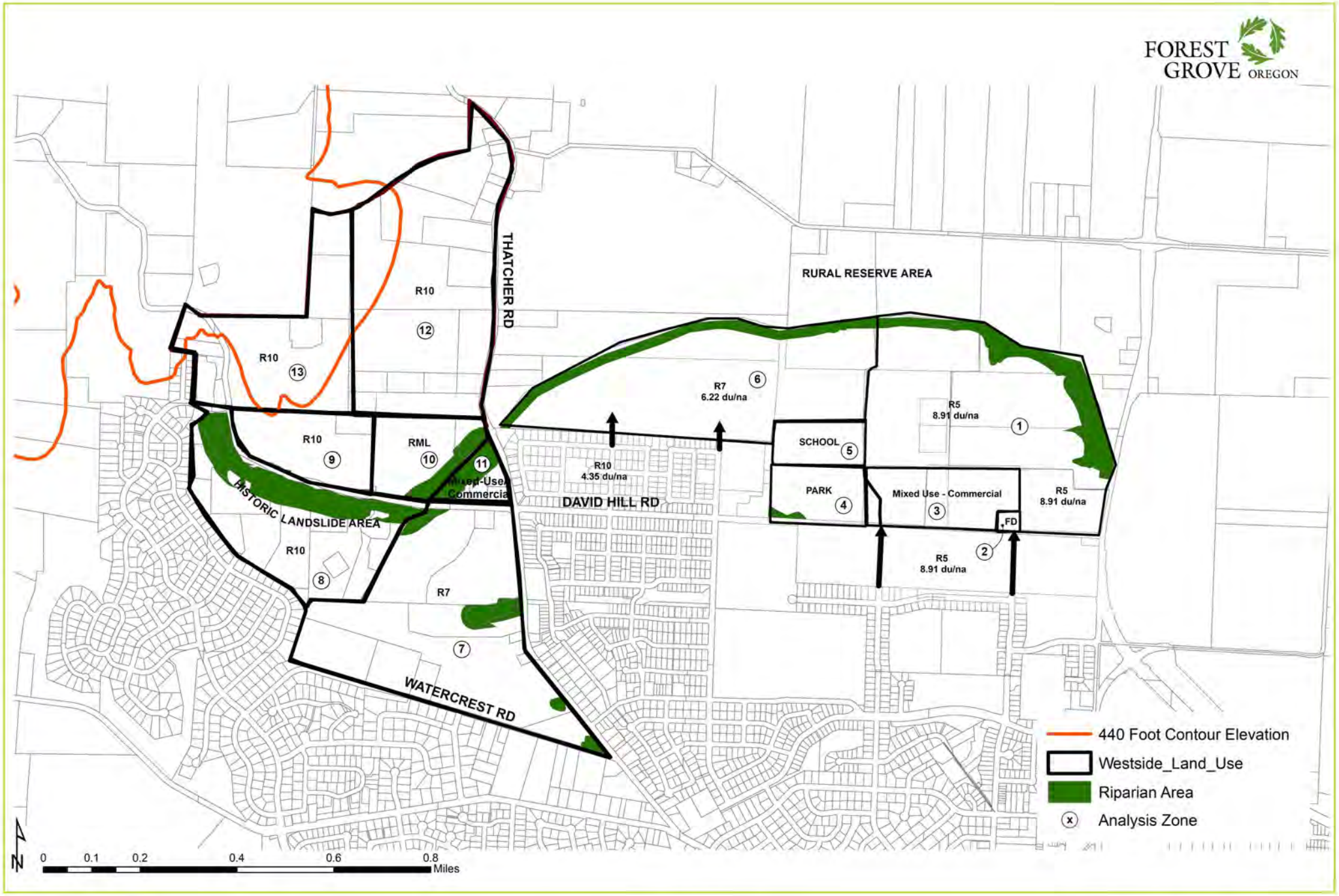

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Figure 2
Revised Land Use Alternative (10/26/15)

Westside Planning Project
Forest Grove, OR

Table 1. Comparison of Existing Comprehensive Plan and Revised Alternative

		Revised Land Use Alternative (10/26/2015)							2014 Comprehensive Plan			
Zone	**Area**	**Density (units/ac)**	**Net Ac**	**Slope Deduction**	**Dwelling Units**	**KSF**	**Acres**	**Employees**	**Density (units/ac)**	**Net Ac**	**Slope Deduction**	**Dwelling Units**
1	Purdin (R5)	8.71	67.76	0%	590					67.76	0%	2
2	Fire Station		2.00	0%				3		2.00	0%	
3	Purdin (Residential)	12.0	18.50	0%	221					18.50	0%	
3	Purdin (Retail Commercial)[1]					46.5		46				
4	Purdin (Park)		10.98	0%			10.98			10.98	0%	
5	Purdin (Elementary School)[2]		11.96	0%		65.0				11.96	0%	
6	Purdin (R7)	6.22	62.08	0%	386				1/20 ac	62.08	0%	3
	Sub-Total Purdin		*173.28*		*1,197*	*111.5*	*10.98*	*49*		*173.28*		*5*
7	Watercrest (R7)[3]	6.22	56.50	10%	316				4.35	56.50	10%	220
8	South of David Hill Rd (R10)[4]	4.35	10.39	20%	36				4.35	10.39	20%	36
9	North of David Hill Rd (R10)	4.35	14.18	15%	52				4.35	14.18	15%	52
10	David Hill Village (RML)	12.0	12.05	15%	122				4.35	12.05	15%	44
11	David Hill Village (Comm)		2.90	0%		15.0		32		2.90	0%	
11	David Hill Village (Res)[5]	12.0	--	0%	4				4.35	--	0%	12
12	Thatcher (R10)	4.35	76.65	10%	300				4.35	76.65	10%	300
13	David Hill (R10)	4.35	28.50	15%	105				1.0	28.50	15%	24
	Sub-Total David Hill/Gales Creek		*201.17*		*935*	*15.0*	*0*	*32*		*201.17*		*688*
	Totals		**374.45**		**2,132**	**126.5**	**10.98**	**81**		**374.45**		**693**

[1] Retail employment based on FAR of 0.25 for retail uses and 11 employees per net acre of commercial land within mixed-use area (approximately 4.2 net acres).
[2] Assumes average school size of 65,000 sq. ft. consistent with newer elementary schools in Forest Grove.
[3] Land area within Thatcher Park and Thatcher Woods has been deducted from total land area. This deduction is approximately 25.18 acres.
[4] Area outside of riparian zone and landslide hazard area.
[5] Assumes limited residential above retail or standalone-plex development

dwellings, retail, a fire station and an elementary school. This development would include an estimated 2,132 dwelling units, an increase of 1,439 units over the existing plan with 247 more in the David Hill planning area and 1,192 more in the Purdin Road planning area. The development would also include 61,500 square feet of retail (yielding an estimated 78 employees), a 10.98-acre park, a 2-acre fire station with an estimated 3 employees, and a 65,000-square foot elementary school.

2035 Traffic Projections

To determine traffic impacts associated with the revised land use alternative and to identify any potential roadway improvement needs, the expected traffic volumes associated with this development must be forecast and analyzed. The process used to prepare Westside traffic projections is described in the following pages. For consistency with the City's recently adopted TSP, the 2035 PM peak hour was chosen as the basis for this analysis.

Traffic Forecasting Methodology

The development of 2035 PM peak hour projections for the Westside involved a multi-step process starting with review of the volumes and land development assumptions inherent in the TSP. These volumes were developed using Metro's regional travel demand model with a modified version of the Gamma population and employment projections that is based on the City's 2014 *Comprehensive Plan*. Seven intersections were identified for analysis as these were either critical locations in the Forest Grove transportation system or would likely experience the greatest degree of impact associated with proposed Westside land uses.

The process of moving from TSP forecasts to Westside forecasts based on the revised land use alternative includes the following steps:

1. **Comparison of Land Use Projections** – The household and employment forecasts that are consistent with the 2014 *Comprehensive Plan* and which undergird the TSP were compared with the estimate dwelling unit and employment forecasts for the Westside revised alternative for TAZ's 1392, 1393 and 1396 in the modified regional travel demand model.

2. **Calculation of Land Use Growth** – Estimates of new growth in household and employment forecasts (over the forecasts used in the TSP) were determined by location.

3. **Development of Trip Generation Estimates** – Trip end estimates consistent with the TSP were obtained from the regional model for TAZ's 1392 (Purdin Road area), 1393 (David Hill area) and 1396 (Gales Creek area). These estimates were factored up or down by location consistent with the new dwelling unit and/or employment growth in the revised alternative. For the Gales Creek and David Hill areas, total trip ends with the revised alternative are expected to very slightly decrease in comparison with the TSP. This is because, while the number of dwelling units increased with the revised alternative, the regional model originally included trips related to future employment in these areas. As the revised alternative includes only minor growth in employment in TAZ's 1393 and 1396, the net growth in trip-making in comparison to the TSP would likely decrease. Total trip ends for TAZ 1392 (the Purdin Road planning area) are expected to see a significant increase as this area was not included within the UGB at the time the TSP was developed. ITE trip generation rates were used to estimate likely daily and PM peak hourly traffic volumes for this area. These were added to the TSP's 2035 PM peak hour projections.

4. **Identification of Trip Distribution Patterns** – Trip distribution assumptions for the net increase in trips with the revised alternative were developed through review of traffic patterns from

several different runs of the Metro regional model. The trip distribution analysis also incorporated a variety of roadway network additions that are included in the TSP, and thus in the regional travel forecasts. There is a strong attractiveness from the Purdin Road planning area to/from the north and east (linking Forest Grove with Hillsboro and Portland). Approximately 47 percent of net new trips are expected to travel in this direction. However, it is anticipated that the majority of new trips to/from the Purdin planning area would be destined to the west and southwest (approximately 25 percent), south (about 5 percent) and southeast (about 23 percent). Highway 47 is a highly attractive route for these trips, as is David Hill and Thatcher Roads.

5. **Preparation of Trip Assignments** – Net new trips from each Westside analysis zone (see Figure 2 for the location of these zones) were assigned to the street system consistent with the assumed trip distribution pattern.

Roadway Network Assumptions

Traffic forecasts for the revised alternative include the roadway system improvements and extensions in the Westside vicinity that were adopted as part of the City's TSP. These are described below:

- **David Hill Road** – The extension of David Hill Road is included from its current terminus eastward to intersect at Highway 47. A single lane roundabout was assumed for this intersection based on current project development activities.
- **Vista Drive/Talisman Lane** – The addition of the Vista Drive and Talisman Lane extensions between Gales Creek and Thatcher Roads are included. With these improvements a significant volume of existing and projected future traffic would be diverted away from the intersection of Gales Creek and Thatcher Roads. Without these improvements it will be necessary to signalize or otherwise improve traffic operations at the Gales Creek/Thatcher intersection.
- **Highway 47 at Verboort Road/Purdin Road** – Improvements to the intersection of Highway 47 and Verboort/Purdin Road are included to address existing safety issues and future capacity needs. A single lane roundabout was assumed based on current project development activities. Improvements to this location, increasing densification in the Westside and completion of the David Hill Road extension are all expected to draw traffic away from the Highway 47/Martin Road intersection, helping to address expected future congestion problems at this location.
- **Highway 47 at Martin Road** – As noted above, the addition of new local and arterial street connections in the northwestern portion of the City will help to reduce regional traffic entering the city via Martin Road. As noted in the TSP, the connection of Martin Road across Highway 47 is assumed to ultimately connect with 23rd Avenue. This connection is expected to reduce some traffic volumes along Highway 47, but would worsen traffic operations at the intersection with Martin Road, exacerbating the need for intersection improvements that could include signalization.
- **Main Street and B Street Extensions** – The proposed recommended street layout for the Purdin Road area includes connections into developed portions of the city via extensions of Main Street and B Streets. Extensions of these two streets are included in the adopted TSP between Hartford Drive and the David Hill Road extension.

2035 PM Peak Hour Turning Movement Projections

Figure 3 presents the 2035 PM peak hour turning movement projections resulting from the analysis process described above.

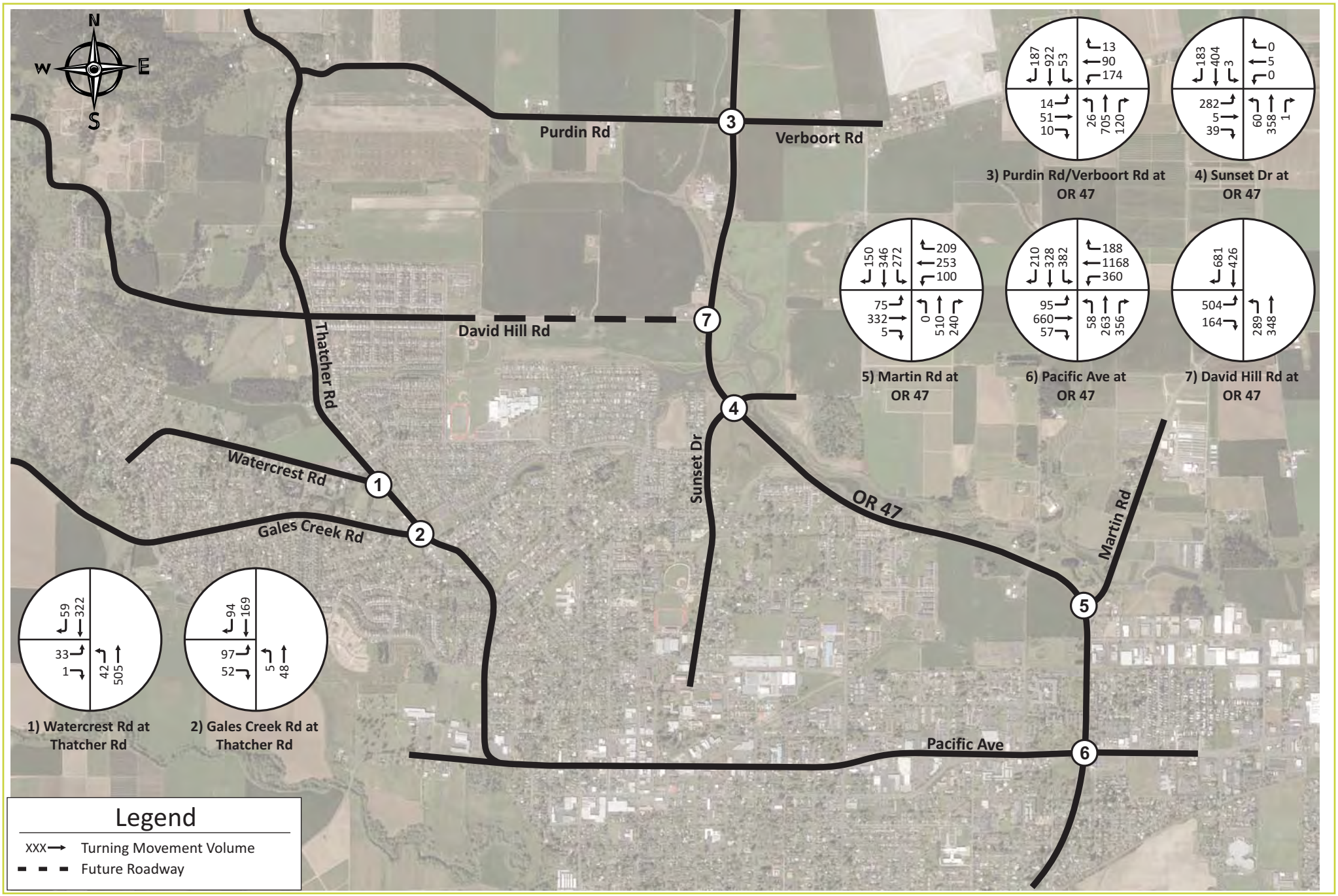

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Figure 3
2035 PM Peak Hour Traffic Volumes
with Revised Land Use Alternative (10/26/15)

Westside Planning Project
Forest Grove, OR

2035 Projected PM Peak Hour Traffic Operations

Mobility Standards

Level of Service, delay and volume-to-capacity ratios are used as measures of effectiveness for study intersection performance. As part of its adoption of the 2011 TSP, the City endorsed use of a minimum standard Level of Service (LOS) D to determine project improvement needs for streets under its jurisdiction. ODOT and Washington County standards apply to roadways under their jurisdiction. The applicable intersection operational standards for Washington County and ODOT are summarized below.

- ODOT defines a maximum volume-to-capacity ratio for Highway 47 of 0.99[1]
- Washington County defines acceptable performance in urban areas as volume-to-capacity ratio of 0.99 with LOS E or better[2]

These two standards apply to the various intersections analyzed for Westside land uses.

2035 PM Peak Hour Operations Analysis Results

To identify the magnitude of traffic impacts associated with the revised alternative, a comparison was made with the 2035 PM peak hour traffic operations as incorporated into the recently adopted TSP. As noted above, traffic analysis in the TSP used future volume forecasts that were consistent with the adopted 2014 Comprehensive Plan. These forecasts also assumed the roadway connections and improvements discussed above. Operations analysis results based on adopted TSP traffic projections are presented in Table 2. Worksheets for this analysis are included in appendices to the TSP.

Table 2. 2035 PM Peak Hour Intersection Operations with TSP Land Uses and Streets

No.	Intersection	Mobility Standard	Level of Service [1]	Average Delay (Sec)*	Volume / Capacity
	Unsignalized Intersections				
1	Thatcher Road/Watercrest Road	LOS E/0.99	A/C	17.2 [2]	0.09 [2]
2	Gales Creek Road/Thatcher Road	LOS E/0.99	A/B	11.6 [2]	0.24 [2]
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
5	Highway 47/Martin Road	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
	Signalized Intersections				
4	Highway 47/Sunset Drive	V/C=0.99	B	16.1	0.50
6	Pacific Avenue/Quince Street	V/C=0.99	D	53.4	0.97

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

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[1] *Oregon Highway Plan, Policy Element*, Table 7, Oregon Department of Transportation, 1999.

[2] *Washington County 2020 Transportation System Plan*, Washington County, 2002.

Table 2 includes information for each intersection including the relevant operational standard based on roadway jurisdiction (e.g., ODOT, or Washington County), Level of Service for the through unstopped movement and the worst stopped movement, average delay for the worst stopped movement, and volume-to-capacity ratio for the worst stopped movement.

As indicated in this table, two intersections along Highway 47 are expected to fail by 2035 during the PM peak hour – Highway 47 at Verboort Road/Purdin Road and Highway 27 at Martin Road. The TSP assumes that both of these intersections would retain their existing configurations.

Table 3 presents a summary of intersection operations analysis results for conditions with the revised land use alternative. As indicated in the table, the intersection of Highway 47 with Martin Road would still show significant failure and will need further study to identify an appropriate solution. The intersection of Highway 47 with Verboort/Purdin Road was assumed to be improved to a single lane roundabout which provides substantially more capacity than the existing stop-controlled single lane configuration. However, by 2035 with the addition of Purdin Road planning area traffic, this location could begin to see significant delays with a volume/capacity ratio exceed the adopted mobility standard. The new intersection of Highway 47 with David Hill Road is currently being developed as a single lane roundabout, but this location is also expected to see failure by 2035 with the addition of Purdin Road traffic.

All other intersections within the study area are expected to operate within their adopted mobility standards during the 2035 PM peak hour. Worksheets for this analysis are included in Appendix A.

Table 3. 2035 PM Peak Hour Intersection Operations with Westside Revised Land Use Scenario

No.	Intersection	Mobility Standard	Level of Service [1]	Average Delay (Sec)*	Volume / Capacity
	Unsignalized Intersections				
1	Thatcher Road/Watercrest Road	LOS E/0.99	A/C	21.8 [2]	0.15 [2]
2	Gales Creek Road/Thatcher Road	LOS E/0.99	A/B	10.8 [2]	0.21 [2]
5	Highway 47/Martin Road	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2]
	Roundabouts				
3	Highway 47/Verboort & Purdin	V/C=0.99	**F**	**87.4** [2,3]	**1.34** [2,3]
7	Highway 47/David Hill Road	V/C=0.99	**F**	**91.4** [2,3]	**1.33** [2,3]
	Signalized Intersections				
4	Highway 47/Sunset Drive	V/C=0.99	C	33.4	0.60
6	Pacific Avenue/Quince Street	V/C=0.99	E	65.5	0.99

* Minor street average delay reported for unsignalized intersections
1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.
2 Worst stopped movement.
3 Pending single lane roundabout intersection improvements are assumed here.

Improvements

In order to address requirements for compliance of the Westside Plan with the Transportation Planning Rule (TPR) potential improvements to the currently proposed and pending roundabouts along Highway 47 need to be identified. Table 4 presents a comparison between expected 2035 PM peak hour traffic operations using volumes forecast from the recently adopted TSP, and forecasts prepared for the Westside Plan. The table shows the effectiveness of the proposed roundabouts at the intersections of

Highway 47 with Purdin Road/Verboort Road and David Hill Road and identifies where further mitigation would be required to accommodate the increased traffic associated with Purdin Road development. Improvement options to meet this mitigation need are also presented and further discussed below.

Highway 47 at Verboort Road/Purdin Road

This intersection is currently located outside of the Forest Grove UGB in rural Washington County. Working together, Washington County and ODOT have partnered to develop an improvement concept to address existing safety deficiencies and future congestion needs at this location. As shown in Table 4, the TSP indicated that the current stop-controlled intersection would see major failure by the 2035 PM peak hour. With the addition of the County's proposed roundabout improvement project, operations would improve from a V/C ratio of more than 2.00 to 1.06 which lies just above the ODOT mobility standard of 0.99. Additional mitigation in the form of a northbound right turn slip lane would bring operations assuming TSP volumes into compliance with the mobility standard with a V/C ratio of 0.89.

Table 4. Comparison of 2035 PM Peak Hour Traffic Operations with and without Mitigation at Key Highway 47 Intersections

No.	Intersection	Mobility Standard	Level of Service [1]	Average Delay (Sec)*	Volume / Capacity
Analysis Based on TSP Traffic Volumes					
Without Roundabout (Unsignalized)					
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
With Proposed Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	**C**	**27.5**	**1.06**
7	Highway 47/David Hill Road	V/C=0.99	A	7.8	0.81
With Mitigated Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	A	9.3 [6]	0.89 [6]
Analysis Based on Westside Traffic Volumes					
With Proposed Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	**F**	**87.4** [5]	**1.34** [5]
7	Highway 47/David Hill Road	V/C=0.99	**F**	**91.4** [5]	**1.33** [5]
With Mitigated Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	B	12.4 [7]	0.92 [7]
7	Highway 47/David Hill Road	V/C=0.99	B	14.6 [8]	0.95 [8]

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

5 Pending single lane roundabout intersection improvements are assumed here.

6 Mitigation is addition of NB right-turn slip lane

7 Mitigation is addition of SB right-turn slip lane

8 Mitigation is addition of 2nd circulating lane to provide separate lanes for NB left-turn and NB through, as well as separate lane for SB right-turn.

In comparison, the addition of Westside traffic volumes would change the distribution of traffic at this intersection by adding an increase in east/west movement which is attracted to the development west of Thatcher Road and south of Purdin Road in the David Hill planning area. This expected shift in traffic volumes would improve traffic operations with the County's proposed roundabout in comparison to conditions based on TSP volumes to a V/C ratio of 1.34. However, this ratio would still exceed the adopted mobility standard of 0.99. Mitigation of this intersection through the addition of a southbound right turn slip ramp would bring operations into compliance with the ODOT standard with a V/C ratio of 0.92. Worksheets for this analysis and diagrams of the proposed lane configurations at the roundabouts are included in Appendix B.

Highway 24 at David Hill Road

Washington County and ODOT have also partnered to extend David Hill Road from its existing easterly terminus to connect with Highway 47, including development of a single lane roundabout at the new intersection. As with the Verboort Road/Purdin Road intersection, some improvement at this location will be needed by 2035 to accommodate traffic volumes expected with the Westside Plan.

As indicated in Table 4, this intersection would see significant failure with its current stop-controlled configuration. The addition of a roundabout using volumes projected for the TSP would operate within the adopted ODOT mobility standard for this location (improving its V/C ratio from 1.54 to 0.81). With the addition of Westside traffic (particularly including development in the Purdin Road area) traffic operations with the proposed roundabout would fail with a V/C ratio of 1.33. Mitigation at this location would include the addition of a second circulating lane to provide separation for northbound left-turning and through traffic, as well as a separate lane for southbound right turns. These additions would improve traffic operations at the intersection to a V/C ratio of 0.95. Worksheets for this analysis and diagrams of the proposed lane configurations at the roundabouts are included in Appendix B.

Highway 47 at Martin Road

This intersection is currently unsignalized with stop-control on Martin Road. It operates within ODOT's mobility targets based on the TSP's existing conditions analysis. As noted in the TSP, as the community grows, this intersection (and the immediately adjacent intersection of 24th Avenue) will become increasingly congested. Both signalization and installation of a roundabout were considered for this location during the TSP planning process (the intersection is expected to meet signal warrants based on the 2035 traffic projections in the TSP). However, no resolution of differences among affected agencies on the appropriate improvement could be achieved. Accordingly, this area is shown in the Roadway Network Plan of the TSP as a "TPR Refinement Area" for which further study and deliberation needs to be conducted leading to a recommended course of action.

Traffic volumes at this intersection with the Westside Plan would not be substantively different than volumes forecast with the TSP (expected to be within ± 3.6%). Accordingly, based on the TPR Refinement Area designation in the TSP, no issue with TPR compliance for the Westside Plan should exist at this location.

Next Steps

It is recommended that the City's next TSP Update incorporate the improvements suggested above to the roundabouts on Highway 47 at Purdin Road/Verboort Road and David Hill Road, and include a cost estimate and funding strategy.

APPENDIX A

2035 PM PEAK HOUR INTERSECTION OPERATIONS ANALYSIS WORKSHEETS WITH WESTSIDE VOLUMES

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	SET	SER	NWL	NWT
Vol, veh/h	33	1	322	59	42	505
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	1	350	64	46	549

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1022	382	0	0	414	0
Stage 1	382	-	-	-	-	-
Stage 2	640	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	261	665	-	-	1145	-
Stage 1	690	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	246	665	-	-	1145	-
Mov Cap-2 Maneuver	246	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	495	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	21.8	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	SET	SER
Capacity (veh/h)	1145	-	251	-	-
HCM Lane V/C Ratio	0.04	-	0.147	-	-
HCM Control Delay (s)	8.3	0	21.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	5	48	169	94	97	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	150	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	52	182	101	104	56

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	182	0	-	0	244	182
Stage 1	-	-	-	-	182	-
Stage 2	-	-	-	-	62	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1393	-	-	-	744	861
Stage 1	-	-	-	-	849	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1393	-	-	-	741	861
Mov Cap-2 Maneuver	-	-	-	-	741	-
Stage 1	-	-	-	-	849	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1393	-	-	-	779
HCM Lane V/C Ratio	0.004	-	-	-	0.206
HCM Control Delay (s)	7.6	-	-	-	10.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER	SER2
Lane Configurations												
Traffic Volume (veh/h)	75	332	5	100	253	209	0	510	240	272	346	150
Future Volume (Veh/h)	75	332	5	100	253	209	0	510	240	272	346	150
Sign Control		Free			Free			Stop		Stop		
Grade		0%			0%			0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.96	0.96	0.96	0.92
Hourly flow rate (vph)	82	361	5	104	275	218	0	531	250	283	360	163
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									9			
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	493			366			1354	1228	364	1508	1122	384
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	493			366			1354	1228	364	1508	1122	384
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			91			0	0	63	0	0	75
cM capacity (veh/h)	1071			1182			0	149	679	0	171	664

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SE 1	SE 2
Volume Total	82	366	104	493	0	781	283	523
Volume Left	82	0	104	0	0	0	283	0
Volume Right	0	5	0	218	0	250	0	163
cSH	1071	1700	1182	1700	1700	200	0	223
Volume to Capacity	0.08	0.22	0.09	0.29	0.00	3.91	Err	2.35
Queue Length 95th (ft)	6	0	7	0	0	Err	Err	1055
Control Delay (s)	8.6	0.0	8.3	0.0	0.0	Err	Err	654.8
Lane LOS	A		A		A	F	F	F
Approach Delay (s)	1.6		1.5		Err		Err	
Approach LOS					F		F	

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: Purdin Rd/Verboort Rd at Hwy 47

Projected 2035 Total Westside Volumes
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Hwy 47											
3	L2	27	7.0	0.791	11.9	LOS B	11.2	287.8	0.79	0.57	35.2
8	T1	734	3.0	0.791	5.9	LOS A	11.2	287.8	0.79	0.57	35.3
18	R2	125	6.0	0.791	5.9	LOS A	11.2	287.8	0.79	0.57	34.2
Approach		886	3.5	0.791	6.1	LOS A	11.2	287.8	0.79	0.57	35.1
East: WB Verboort Rd											
1	L2	181	1.0	0.528	19.2	LOS B	4.6	115.6	0.96	1.05	31.5
6	T1	94	0.0	0.528	13.3	LOS B	4.6	115.6	0.96	1.05	31.4
16	R2	14	0.0	0.528	13.3	LOS B	4.6	115.6	0.96	1.05	30.6
Approach		289	0.6	0.528	17.0	LOS B	4.6	115.6	0.96	1.05	31.4
North: SB Hwy 47											
7	L2	55	14.0	1.342	174.2	LOS F	122.6	3177.3	1.00	3.41	10.1
4	T1	960	5.0	1.342	168.2	LOS F	122.6	3177.3	1.00	3.41	10.1
14	R2	195	0.0	1.342	168.1	LOS F	122.6	3177.3	1.00	3.41	10.0
Approach		1210	4.6	1.342	168.4	LOS F	122.6	3177.3	1.00	3.41	10.1
West: EB Purdin Rd											
5	L2	15	14.0	0.199	18.5	LOS B	1.4	35.0	0.93	0.91	32.7
2	T1	53	2.0	0.199	12.4	LOS B	1.4	35.0	0.93	0.91	32.9
12	R2	10	0.0	0.199	12.4	LOS B	1.4	35.0	0.93	0.91	32.1
Approach		78	4.0	0.199	13.5	LOS B	1.4	35.0	0.93	0.91	32.8
All Vehicles		2464	3.7	1.342	87.4	LOS F	122.6	3177.3	0.92	2.03	15.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: David Hill Rd at Hwy 47

Projected 2035 Total Westside Volumes
PM Peak Hour
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Hwy 47											
3	L2	314	2.0	0.995	47.3	LOS D	27.8	705.2	1.00	1.68	23.0
8	T1	378	2.0	0.995	41.4	LOS D	27.8	705.2	1.00	1.68	22.9
Approach		692	2.0	0.995	44.1	LOS D	27.8	705.2	1.00	1.68	22.9
North: SB Hwy 47											
4	T1	463	2.0	1.329	162.5	LOS F	119.3	3030.8	1.00	3.36	10.3
14	R2	743	2.0	1.329	162.5	LOS F	119.3	3030.8	1.00	3.36	10.2
Approach		1207	2.0	1.329	162.5	LOS F	119.3	3030.8	1.00	3.36	10.3
West: EB David Hill Rd											
5	L2	548	2.0	0.830	19.8	LOS B	14.0	356.1	1.00	1.05	30.9
12	R2	178	2.0	0.830	13.9	LOS B	14.0	356.1	1.00	1.05	30.0
Approach		726	2.0	0.830	18.4	LOS B	14.0	356.1	1.00	1.05	30.7
All Vehicles		2625	2.0	1.329	91.4	LOS F	119.3	3030.8	1.00	2.28	15.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	3	404	183	60	358	1	282	5	39	1	5	1
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1800	1714	1782	1800	1731	1800	1748	1800	1800	1800	1800	1800
Adj Flow Rate, veh/h	3	434	0	65	385	1	303	5	42	1	5	1
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	5	1	0	4	4	3	0	0	0	0	0
Cap, veh/h	317	757	669	317	777	2	396	40	340	365	356	71
Arrive On Green	0.18	0.44	0.00	0.18	0.45	0.43	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1714	1714	1515	1714	1726	4	1391	165	1389	1380	1457	291
Grp Volume(v), veh/h	3	434	0	65	0	386	303	0	47	1	0	6
Grp Sat Flow(s),veh/h/ln	1714	1714	1515	1714	0	1730	1391	0	1555	1380	0	1749
Q Serve(g_s), s	0.2	22.7	0.0	3.9	0.0	19.0	25.3	0.0	2.8	0.1	0.0	0.3
Cycle Q Clear(g_c), s	0.2	22.7	0.0	3.9	0.0	19.0	25.7	0.0	2.8	2.9	0.0	0.3
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.89	1.00		0.17
Lane Grp Cap(c), veh/h	317	757	669	317	0	779	396	0	380	365	0	428
V/C Ratio(X)	0.01	0.57	0.00	0.21	0.00	0.50	0.76	0.00	0.12	0.00	0.00	0.01
Avail Cap(c_a), veh/h	317	757	669	317	0	779	537	0	538	505	0	605
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	25.0	0.0	41.5	0.0	23.4	44.1	0.0	35.5	36.5	0.0	34.4
Incr Delay (d2), s/veh	0.0	3.1	0.0	0.3	0.0	2.3	4.5	0.0	0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	11.4	0.0	1.9	0.0	9.5	10.3	0.0	1.2	0.0	0.0	0.2
LnGrp Delay(d),s/veh	40.0	28.2	0.0	41.8	0.0	25.6	48.6	0.0	35.6	36.5	0.0	34.4
LnGrp LOS	D	C		D		C	D		D	D		C
Approach Vol, veh/h		437			451			350			7	
Approach Delay, s/veh		28.3			27.9			46.8			34.7	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	28.2	57.0		34.8	27.2	58.0		34.8
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	10.0	51.0		41.0	9.0	52.0		41.0
Max Q Clear Time (g_c+I1), s	5.9	24.7		27.7	2.2	21.0		4.9
Green Ext Time (p_c), s	0.0	1.6		1.2	0.1	1.4		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	33.4
HCM 2010 LOS	C

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	3	404	183	60	358	1	282	5	39	1	5	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	4.0	4.0	6.0	4.0		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.87		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1710	1714	1480	1710	1730		1660	1559		1710	1755	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.75	1.00		0.73	1.00	
Satd. Flow (perm)	1710	1714	1480	1710	1730		1317	1559		1307	1755	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	3	434	197	65	385	1	303	5	42	1	5	1
RTOR Reduction (vph)	0	0	98	0	0	0	0	30	0	0	1	0
Lane Group Flow (vph)	3	434	99	65	386	0	303	17	0	1	5	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	0%	5%	1%	0%	4%	0%	3%	0%	0%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases			2				4	4		8		
Actuated Green, G (s)	1.8	58.3	58.3	11.3	67.8		32.4	32.4		32.4	32.4	
Effective Green, g (s)	2.8	60.3	60.3	11.3	69.8		32.9	32.9		32.9	32.9	
Actuated g/C Ratio	0.02	0.50	0.50	0.09	0.58		0.27	0.27		0.27	0.27	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	39	861	743	161	1006		361	427		358	481	
v/s Ratio Prot	0.00	c0.25		c0.04	c0.22			0.01			0.00	
v/s Ratio Perm			0.07				c0.23			0.00		
v/c Ratio	0.08	0.50	0.13	0.40	0.38		0.84	0.04		0.00	0.01	
Uniform Delay, d1	57.3	19.9	15.9	51.2	13.5		41.1	31.9		31.6	31.7	
Progression Factor	0.84	0.51	0.01	1.01	1.09		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.6	0.3	1.6	1.1		15.6	0.0		0.0	0.0	
Delay (s)	49.0	11.7	0.4	53.3	15.9		56.7	32.0		31.6	31.7	
Level of Service	D	B	A	D	B		E	C		C	C	
Approach Delay (s)		8.3			21.3			53.3			31.7	
Approach LOS		A			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	95	660	57	360	1168	188	58	263	359	382	328	210
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1636	1731	1565	1636	1748	1714	1667	1667	1698	1714	1617	1800
Adj Flow Rate, veh/h	96	667	0	364	1180	85	59	266	0	386	331	192
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	10	4	15	10	3	5	8	8	6	5	16	16
Cap, veh/h	104	712	288	377	1300	568	66	278	241	395	352	204
Arrive On Green	0.13	0.43	0.00	0.08	0.13	0.13	0.04	0.17	0.00	0.24	0.37	0.37
Sat Flow, veh/h	1558	3288	1330	1558	3320	1450	1587	1667	1443	1633	961	558
Grp Volume(v), veh/h	96	667	0	364	1180	85	59	266	0	386	0	523
Grp Sat Flow(s),veh/h/ln	1558	1644	1330	1558	1660	1450	1587	1667	1443	1633	0	1519
Q Serve(g_s), s	7.3	23.2	0.0	27.9	42.1	2.9	4.4	19.0	0.0	28.2	0.0	39.9
Cycle Q Clear(g_c), s	7.3	23.2	0.0	27.9	42.1	2.9	4.4	19.0	0.0	28.2	0.0	39.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	104	713	288	377	1300	568	66	278	241	395	0	557
V/C Ratio(X)	0.92	0.94	0.00	0.97	0.91	0.15	0.89	0.96	0.00	0.98	0.00	0.94
Avail Cap(c_a), veh/h	104	713	288	377	1300	568	66	278	241	395	0	557
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.60	0.60	0.00	0.66	0.66	0.66	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.7	33.2	0.0	54.7	50.1	7.5	57.2	49.6	0.0	45.2	0.0	36.7
Incr Delay (d2), s/veh	47.1	14.8	0.0	29.2	7.5	0.4	74.0	42.4	0.0	39.4	0.0	24.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	11.8	0.0	15.1	20.7	1.2	3.3	12.0	0.0	17.0	0.0	20.4
LnGrp Delay(d),s/veh	98.8	48.0	0.0	83.9	57.6	7.9	131.3	92.0	0.0	84.6	0.0	60.8
LnGrp LOS	F	D		F	E	A	F	F		F		E
Approach Vol, veh/h		763			1629			325			909	
Approach Delay, s/veh		54.4			60.9			99.1			70.9	
Approach LOS		D			E			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	33.0	30.0	9.0	48.0	12.0	51.0	33.0	24.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	25.0	5.0	44.0	8.0	46.0	29.0	20.0
Max Q Clear Time (g_c+I1), s	29.9	25.2	6.4	41.9	9.3	44.1	30.2	21.0
Green Ext Time (p_c), s	0.0	0.0	0.0	1.0	0.0	1.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	65.5
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	660	57	360	1168	188	58	263	359	382	328	210
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1555	3288	1300	1555	3320	1412	1583	1667	1443	1629	1522	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1555	3288	1300	1555	3320	1412	1583	1667	1443	1629	1522	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	96	667	58	364	1180	190	59	266	363	386	331	212
RTOR Reduction (vph)	0	0	45	0	0	106	0	0	303	0	19	0
Lane Group Flow (vph)	96	667	13	364	1180	84	59	266	61	386	524	0
Confl. Peds. (#/hr)	4		1	1		4						
Heavy Vehicles (%)	10%	4%	15%	10%	3%	5%	8%	8%	6%	5%	16%	4%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	8.0	25.0	25.0	29.0	46.0	46.0	5.0	20.0	20.0	29.0	44.0	
Effective Green, g (s)	8.0	26.0	26.0	29.0	47.0	47.0	5.0	20.0	20.0	29.0	44.0	
Actuated g/C Ratio	0.07	0.22	0.22	0.24	0.39	0.39	0.04	0.17	0.17	0.24	0.37	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	103	712	281	375	1300	553	65	277	240	393	558	
v/s Ratio Prot	0.06	0.20		c0.23	c0.36		0.04	c0.16		0.24	c0.34	
v/s Ratio Perm			0.01			0.06			0.04			
v/c Ratio	0.93	0.94	0.04	0.97	0.91	0.15	0.91	0.96	0.25	0.98	0.94	
Uniform Delay, d1	55.7	46.2	37.2	45.1	34.5	23.6	57.3	49.6	43.5	45.2	36.7	
Progression Factor	0.98	0.86	1.00	0.90	0.94	0.85	1.00	1.00	1.00	0.93	0.90	
Incremental Delay, d2	52.3	16.0	0.2	31.5	8.1	0.4	78.9	43.1	0.6	40.4	23.7	
Delay (s)	106.7	55.9	37.4	72.0	40.3	20.4	136.2	92.7	44.0	82.3	56.8	
Level of Service	F	E	D	E	D	C	F	F	D	F	E	
Approach Delay (s)		60.6			44.8			70.8			67.4	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	57.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX B

2035 PM PEAK HOUR INTERSECTION OPERATIONS ANALYSIS WORKSHEETS FOR MITIGTION OF KEY HIGHWAY 47 INTERSECTIONS

MOVEMENT SUMMARY

Site: Purdin Rd/Verboort Rd at Hwy 47

Projected 2035 Total TSP Volumes
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Hwy 47											
3	L2	27	2.0	1.055	46.8	LOS F	62.1	1576.4	1.00	1.18	23.4
8	T1	524	2.0	1.055	40.9	LOS F	62.1	1576.4	1.00	1.18	23.4
18	R2	645	2.0	1.055	40.9	LOS F	62.1	1576.4	1.00	1.18	22.9
Approach		1196	2.0	1.055	41.0	LOS D	62.1	1576.4	1.00	1.18	23.2
East: WB Verboort Rd											
1	L2	125	2.0	0.328	13.6	LOS B	2.3	57.7	0.78	0.81	34.1
6	T1	94	2.0	0.328	7.6	LOS A	2.3	57.7	0.78	0.81	34.0
16	R2	14	2.0	0.328	7.7	LOS A	2.3	57.7	0.78	0.81	33.1
Approach		232	2.0	0.328	10.8	LOS B	2.3	57.7	0.78	0.81	34.0
North: SB Hwy 47											
7	L2	55	2.0	0.889	20.4	LOS C	19.5	496.5	1.00	0.98	32.3
4	T1	740	2.0	0.889	14.5	LOS B	19.5	496.5	1.00	0.98	32.2
14	R2	91	2.0	0.889	14.5	LOS B	19.5	496.5	1.00	0.98	31.4
Approach		885	2.0	0.889	14.9	LOS B	19.5	496.5	1.00	0.98	32.2
West: EB Purdin Rd											
5	L2	15	2.0	0.185	17.4	LOS B	1.3	32.4	0.92	0.89	33.4
2	T1	53	2.0	0.185	11.4	LOS B	1.3	32.4	0.92	0.89	33.4
12	R2	10	2.0	0.185	11.4	LOS B	1.3	32.4	0.92	0.89	32.4
Approach		78	2.0	0.185	12.5	LOS B	1.3	32.4	0.92	0.89	33.3
All Vehicles		2392	2.0	1.055	27.5	LOS C	62.1	1576.4	0.98	1.06	27.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: David Hill Rd at Hwy 47

Projected 2035 Total TSP Volumes
PM Peak Hour
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Hwy 47											
3	L2	120	2.0	0.528	12.4	LOS B	4.3	108.3	0.71	0.67	35.1
8	T1	378	2.0	0.528	6.4	LOS A	4.3	108.3	0.71	0.67	35.0
Approach		498	2.0	0.528	7.9	LOS A	4.3	108.3	0.71	0.67	35.1
North: SB Hwy 47											
4	T1	463	2.0	0.810	6.0	LOS A	12.3	311.4	0.85	0.59	35.4
14	R2	451	2.0	0.810	6.0	LOS A	12.3	311.4	0.85	0.59	34.4
Approach		914	2.0	0.810	6.0	LOS A	12.3	311.4	0.85	0.59	34.9
West: EB David Hill Rd											
5	L2	295	2.0	0.443	13.4	LOS B	3.3	82.6	0.78	0.83	33.6
12	R2	54	2.0	0.443	7.5	LOS A	3.3	82.6	0.78	0.83	32.6
Approach		349	2.0	0.443	12.5	LOS B	3.3	82.6	0.78	0.83	33.4
All Vehicles		1761	2.0	0.810	7.8	LOS A	12.3	311.4	0.80	0.66	34.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Purdin Rd/Verboort Rd at Hwy 47 with Mit

Projected 2035 Total TSP Volumes
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Hwy 47											
3	L2	27	2.0	0.404	10.5	LOS B	3.1	77.6	0.40	0.46	36.6
8	T1	524	2.0	0.404	4.6	LOS A	3.1	77.6	0.40	0.46	36.6
18	R2	645	2.0	0.467	4.5	LOS A	3.9	97.9	0.41	0.49	35.9
Approach		1196	2.0	0.467	4.7	LOS A	3.9	97.9	0.40	0.47	36.2
East: WB Verboort Rd											
1	L2	125	2.0	0.304	13.8	LOS B	1.9	48.1	0.72	0.80	34.1
6	T1	94	2.0	0.304	7.9	LOS A	1.9	48.1	0.72	0.80	34.0
16	R2	14	2.0	0.304	7.9	LOS A	1.9	48.1	0.72	0.80	33.1
Approach		232	2.0	0.304	11.1	LOS B	1.9	48.1	0.72	0.80	34.0
North: SB Hwy 47											
7	L2	55	2.0	0.886	20.3	LOS C	19.2	488.7	1.00	0.98	32.4
4	T1	740	2.0	0.886	14.4	LOS B	19.2	488.7	1.00	0.98	32.3
14	R2	91	2.0	0.886	14.4	LOS B	19.2	488.7	1.00	0.98	31.4
Approach		885	2.0	0.886	14.8	LOS B	19.2	488.7	1.00	0.98	32.2
West: EB Purdin Rd											
5	L2	15	2.0	0.185	17.4	LOS B	1.3	32.4	0.92	0.89	33.4
2	T1	53	2.0	0.185	11.4	LOS B	1.3	32.4	0.92	0.89	33.4
12	R2	10	2.0	0.185	11.4	LOS B	1.3	32.4	0.92	0.89	32.4
Approach		78	2.0	0.185	12.5	LOS B	1.3	32.4	0.92	0.89	33.3
All Vehicles		2392	2.0	0.886	9.3	LOS A	19.2	488.7	0.67	0.71	34.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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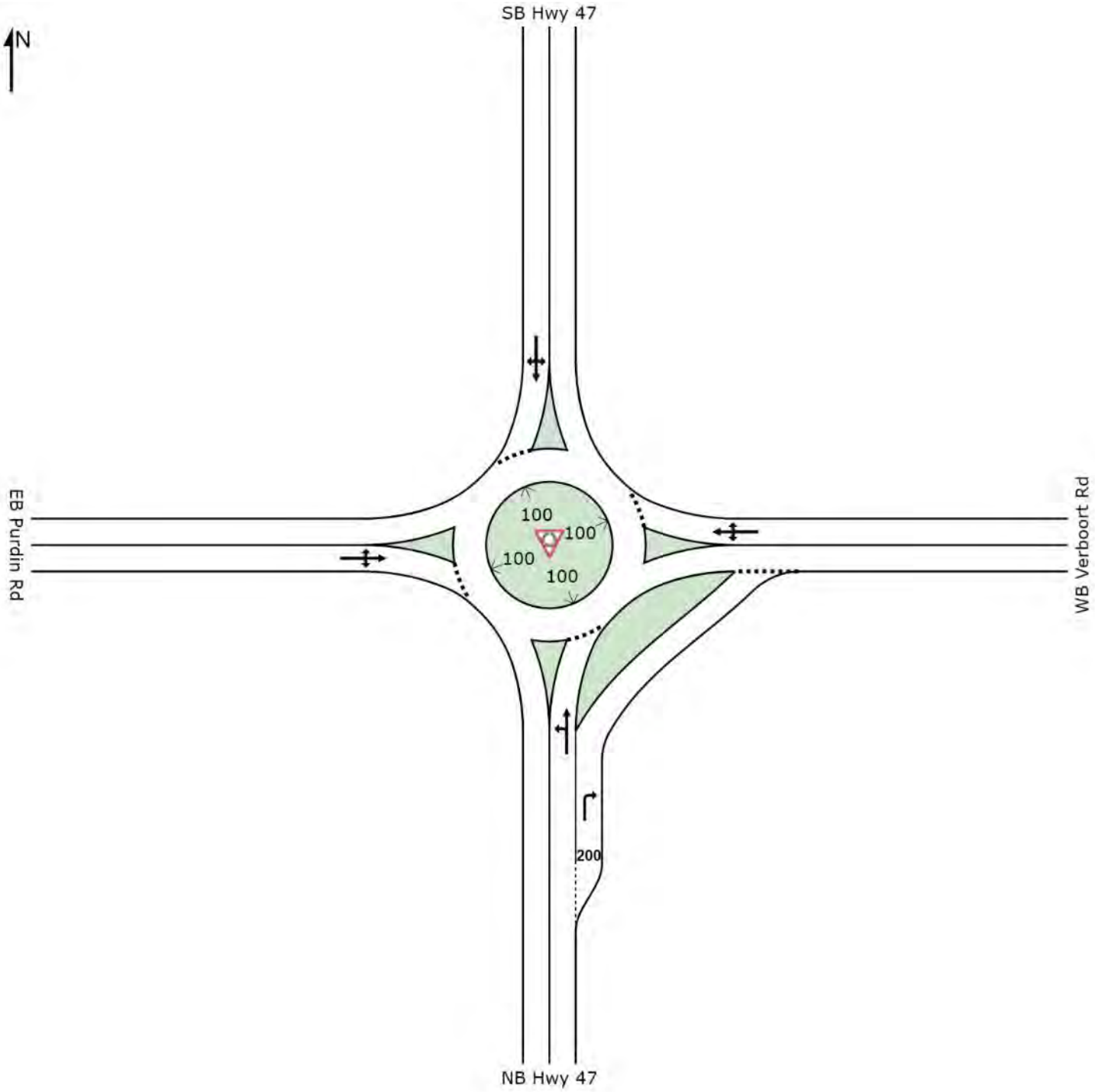
SITE LAYOUT

Site: Purdin Rd/Verboort Rd at Hwy 47 with Mit

Projected 2035 Total TSP Volumes
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: Purdin Rd/Verboort Rd at Hwy 47 - Westside Mit

Projected 2035 Total Westside Volumes
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Hwy 47											
3	L2	27	7.0	0.803	12.8	LOS B	12.0	308.0	0.84	0.62	35.1
8	T1	734	3.0	0.803	6.7	LOS A	12.0	308.0	0.84	0.62	35.1
18	R2	125	6.0	0.803	6.8	LOS A	12.0	308.0	0.84	0.62	34.0
Approach		886	3.5	0.803	6.9	LOS A	12.0	308.0	0.84	0.62	35.0
East: WB Verboort Rd											
1	L2	181	1.0	0.536	19.4	LOS B	4.7	118.9	0.96	1.06	31.4
6	T1	94	0.0	0.536	13.4	LOS B	4.7	118.9	0.96	1.06	31.4
16	R2	14	0.0	0.536	13.4	LOS B	4.7	118.9	0.96	1.06	30.6
Approach		289	0.6	0.536	17.2	LOS B	4.7	118.9	0.96	1.06	31.4
North: SB Hwy 47											
7	L2	55	14.0	0.920	23.0	LOS C	23.3	609.3	1.00	1.07	31.2
4	T1	960	5.0	0.920	16.4	LOS B	23.3	609.3	1.00	1.07	31.4
14	R2	195	0.0	0.141	4.3	LOS A	0.9	21.7	0.32	0.47	36.2
Approach		1210	4.6	0.920	14.7	LOS B	23.3	609.3	0.89	0.98	32.1
West: EB Purdin Rd											
5	L2	15	14.0	0.330	28.0	LOS C	2.4	61.7	1.00	1.00	29.4
2	T1	53	2.0	0.330	19.8	LOS B	2.4	61.7	1.00	1.00	29.6
12	R2	10	2.0	0.330	19.8	LOS B	2.4	61.7	1.00	1.00	28.9
Approach		78	4.2	0.330	21.3	LOS C	2.4	61.7	1.00	1.00	29.5
All Vehicles		2464	3.7	0.920	12.4	LOS B	23.3	609.3	0.88	0.86	32.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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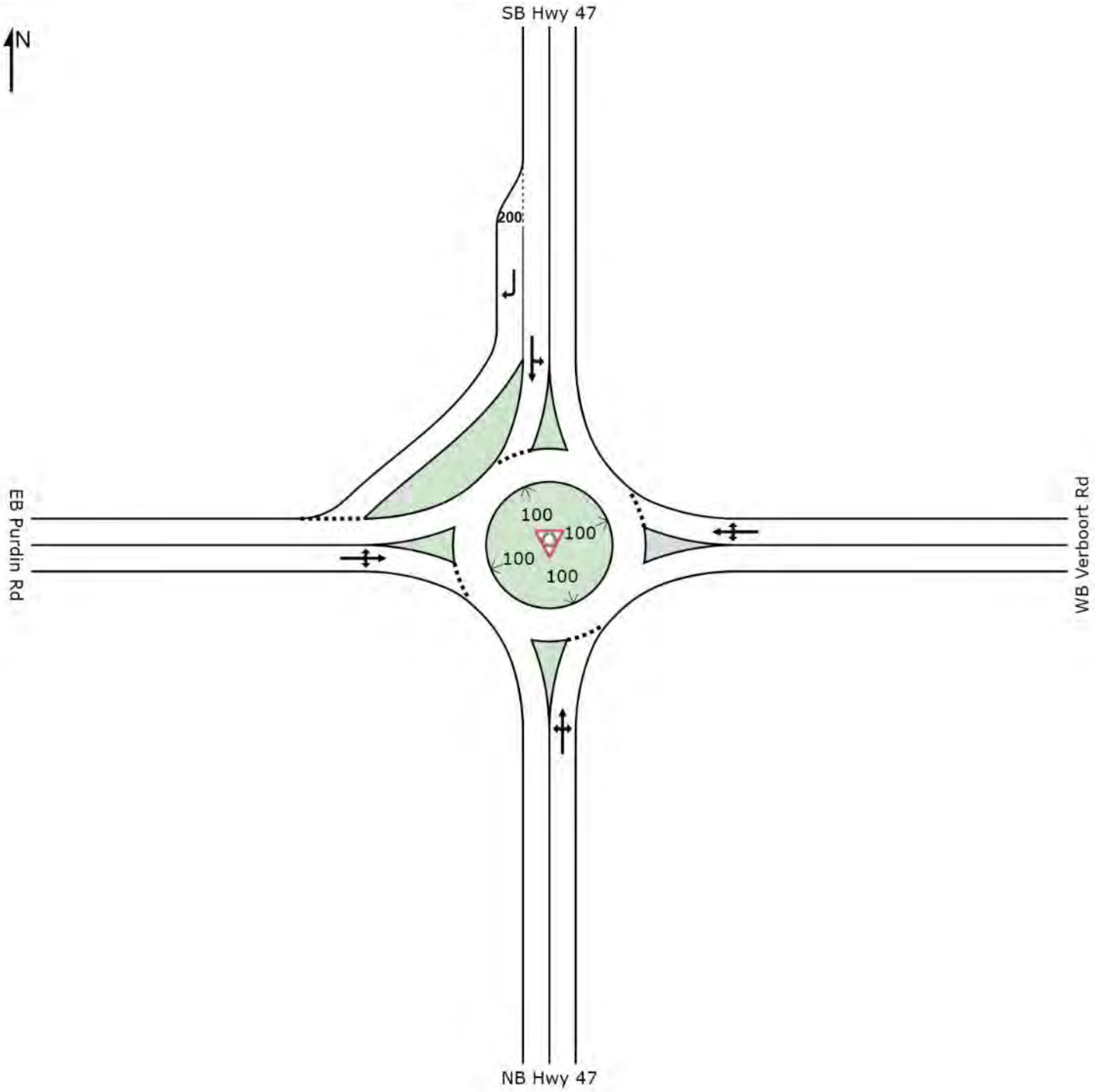
SITE LAYOUT

Site: Purdin Rd/Verboort Rd at Hwy 47 - Westside Mit

Projected 2035 Total Westside Volumes
PM Peak Hour
Roundabout



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Project: N:\Projects\0742 City of Forest Grove\0742.01 Forest Grove Westside Plan\Phase 10 - Westside Plan\03-Analysis\Traffic\Operations\2-28-2017\Purdin-Hwy 47 RAB v1.sip6

MOVEMENT SUMMARY

Site: David Hill Rd at Hwy 47 - Westside - Mit2

Projected 2035 Total Westside Volumes
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Hwy 47											
3	L2	314	2.0	0.424	13.8	LOS B	3.2	81.2	0.84	0.86	33.1
8	T1	378	2.0	0.428	7.1	LOS A	3.5	88.1	0.84	0.70	35.1
Approach		692	2.0	0.428	10.1	LOS B	3.5	88.1	0.84	0.77	34.1
North: SB Hwy 47											
4	T1	463	2.0	0.515	6.6	LOS A	3.7	94.0	0.66	0.62	35.7
14	R2	743	2.0	0.714	8.1	LOS A	8.1	205.5	0.81	0.81	34.6
Approach		1207	2.0	0.714	7.5	LOS A	8.1	205.5	0.75	0.73	35.0
West: EB David Hill Rd											
5	L2	548	2.0	0.950	32.1	LOS C	21.0	533.2	1.00	1.43	26.7
12	R2	178	2.0	0.950	26.1	LOS C	21.0	533.2	1.00	1.43	26.0
Approach		726	2.0	0.950	30.6	LOS C	21.0	533.2	1.00	1.43	26.5
All Vehicles		2625	2.0	0.950	14.6	LOS B	21.0	533.2	0.84	0.94	31.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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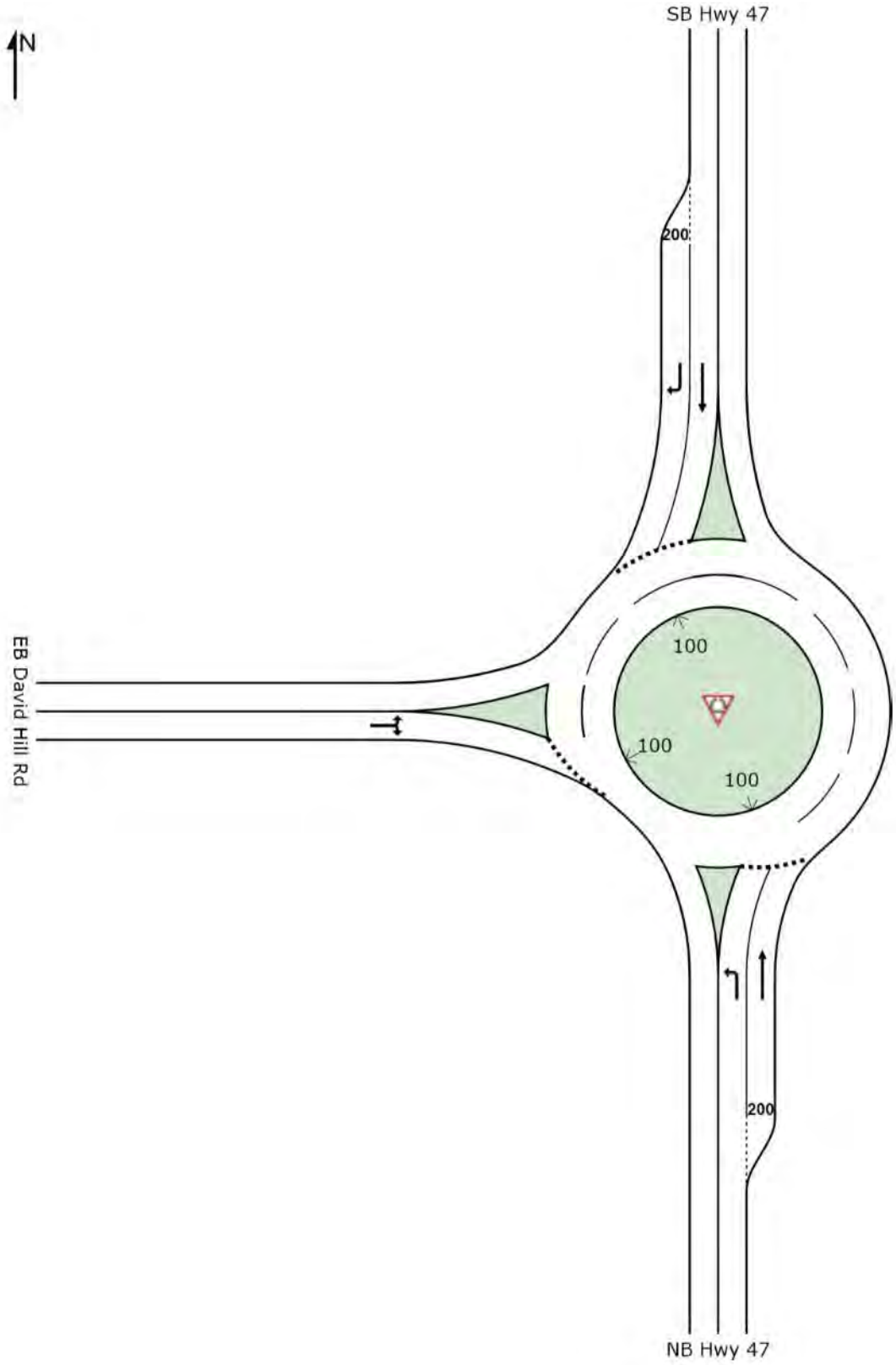
SITE LAYOUT

Site: David Hill Rd at Hwy 47 - Westside - Mit2

Projected 2035 Total Westside Volumes
PM Peak Hour
Roundabout



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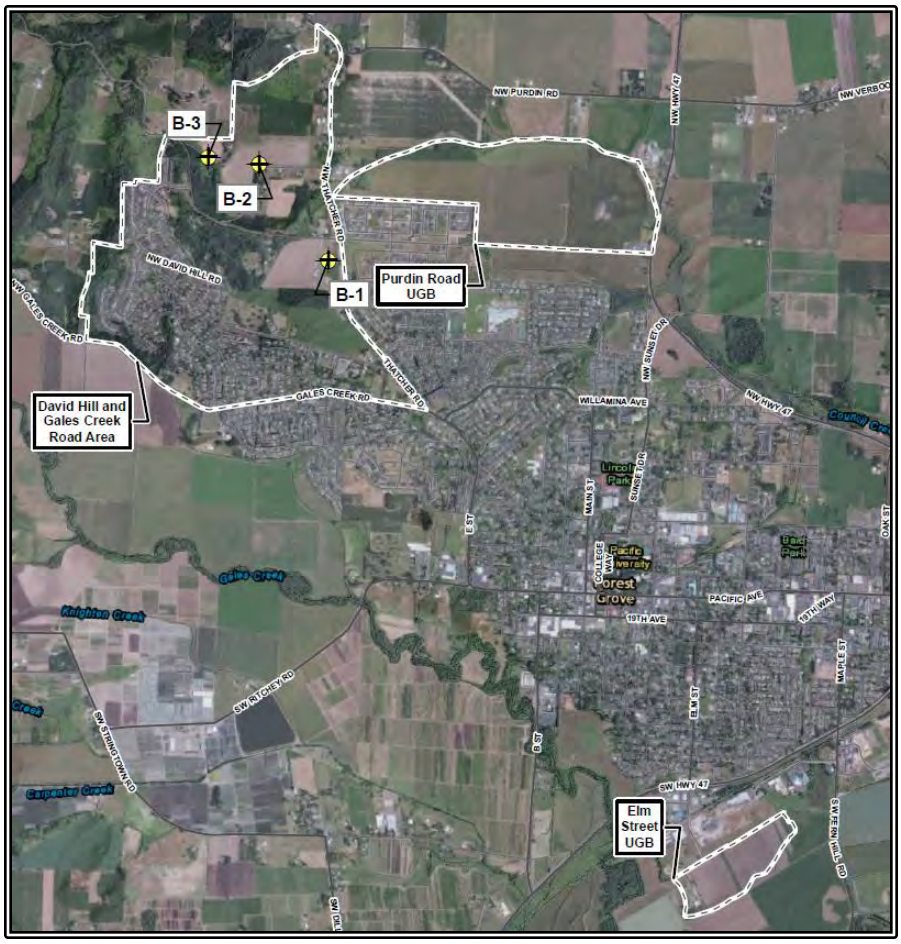
Geological and Geotechnical Assessment Report Westside Planning Project

David Hill & Gales Creek Road, Purdin Road UGB, and Elm Street UGB
Forest Grove, Oregon



Prepared for:

SCJ Alliance
Vancouver, Washington

February 2015
Project No. 73121.000

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February 2, 2015

SCJ Alliance
Attn: Ms. Anne Sylvester, PTE
315 W Mill Plain Boulevard, Suite 208
Vancouver, Washington 98660

Via Email: Annes@scjalliance.com

Re: Geological and Geotechnical Assessment Report
David Hill & Gales Creek Road, Purdin Road UGB, and Elm Street UGB
City of Forest Grove – Westside Planning Project, Forest Grove, Oregon
PBS Project No. 73121.000

INTRODUCTION AND BACKGROUND

This report presents the results of the PBS Engineering and Environmental Inc. (PBS) geological and geotechnical assessment for the David Hill & Gales Creek Road, Purdin Road UGB, and Elm Street UGB in Forest Grove, Oregon (site). The following paragraphs outline the Westside Planning Project for the City of Forest Grove (City).

The City is experiencing a significant increase in development activity, which is rapidly depleting the supply of approved single-family residential parcels. The Westside Planning Project is intended to address and resolve the land use and infrastructure issues in the David Hill and Gales Creek Road (DH&GCR), Purdin Road, and Elm Street planning areas (Figure 1, Vicinity Map; Figure 2, Study Area Map; and Figure 3, David Hill Urban Reserve Concept Plan). Specific issues and objectives for these areas are as follows.

David Hill and Gales Creek Road Area – The City's recent Transportation System Plan (TSP) update, noted that a street network in this area could not be identified due to unresolved land use and natural resource issues. The David Hill area plan will include a land-use element, a sustainability framework, geotechnical analysis, including the recommendations for revising development standards in steeply sloped areas (provided in this report), a conceptual transportation network that documents TPR compliance, an infrastructure concept that can be broadly costed, and a general financing approach. It should be noted that the primary focus of this planning area is on David Hill in the area north of Watercrest Road. The Gales Creek area is included primarily to address issues realted to contect and connectivity.

Purdin Road Urban Growth Boundary (UGB) – Purdin Road has recently been added to the City's UGB. The TSP update identified future street extensions that could ultimately serve the Purdin Road area. Comprehensive planning for this area will help to assure that it develops in a way that is coordinated with existing and planned street, water, sewer, and stormwater infrastructure.

Elm Street UGB – The City is interested in maximizing the development potential and is promoting sustainable development practices. It will be critical for the refinement plan to support development that is coordinated with existing and planned street, water, sewer, and stormwater infrastructure, and to accommodate future property annexation efforts. It will also be important to acknowledge the context of

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the property, which is largely industrial, with its southern boundary located along the current Tualatin River 100-year floodplain mapped by Federal Emergency Management Agency (FEMA).

The primary project goals for the geotechnical-related aspects of the Westside Planning Project are to evaluate slope stability, soil constraints, and seismic issues potentially affecting development and to prepare guidance for the City's use in updating development code provisions. This work also includes preparing Geographic Information System (GIS) mapping for the project study areas to illustrate development constraints and planning recommendations.

As part of this multi-discipline effort, PBS has documented several geotechnical-related conditions for the Westside Planning Project that may constrain and influence future land and infrastructure development. To the extent possible, PBS has obtained readily available and applicable information of the DH&GCR, Purdin Road UGB, and Elm Street UGB study areas. These data have included aerial photographs and light detection and ranging (LiDAR) imagery, geologic and geohazard maps, and soil surveys.

In addition to the desktop studies, PBS completed three geotechnical borings in the DH&GCR study area to provide more specific information in regards to potential slope stability issues, depth to groundwater, and characterize soil erosion potential.

The information obtained from the geotechnical work is included in this report and has been used to provide conceptual recommendations for slope setbacks related to slope heights and inclinations. The information has been compiled in the attached figures and in a geographic information system (GIS [ArcGIS 9.3™]) data file for use by the project team and the City.

Several data sources were used to provide information for this report. These sources are provided at the end of this report.

GOAL 5: NATURAL RESOURCES, SCENIC AND HISTORIC AREAS, AND OPEN SPACES

The State of Oregon has established guidelines under Oregon Administrative Rule (OAR) 660-015-0000(5), named GOAL 5, to protect natural resources and conserve scenic and historic areas and open spaces. Based on the guidelines, local governments need to adopt programs that will protect these features to promote a healthy environment and natural landscape that contributes to Oregon's livability. The resources that shall be included:

- Riparian Corridors
- Wetlands
- State Scenic Waterways
- Federal Wild and Scenic Rivers
- Groundwater Resources
- Natural Areas
- Wilderness Areas
- Mineral/Aggregate Resources
- Cultural areas
- Energy Sources
- Approved Oregon Recreation Trails

In addition, local governments and state agencies are encouraged to maintain current inventories for:

- Historic Resources
- Open Spaces
- Scenic Views and Sites

PBS has included the information in the GIS as a Goal 5 layer and a compilation of the features is presented on Figure 4, Oregon Goal 5 Resources. Of these resources, PBS has identified wetland and recreation areas in the DH&GCR study area using the METRO RLIS data bank. A wetland is also

shown along the edge of the Purdin Road UGB study area. Only those resources identified within the project boundary are shown.

GOAL 7: AREAS SUBJECT TO NATURAL HAZARDS

The State of Oregon has established guidelines under Oregon Administrative Rule (OAR) 660-015-0000(7), named GOAL 7, to protect people and property from natural hazards by adopting comprehensive plans (inventories, policies and implementing measures). Natural hazards for purposes of this goal are:

- Floods (coastal and riverine)
- Landslides[a]
- Earthquakes and related hazards
- Coastal erosion
- Tsunamis
- Wildfires

[a] For "rapidly moving landslides," the requirements of ORS 195.250-195.275 (1999 edition) apply.

As part of this GOAL 7, the City should consider: a) the benefits of maintaining natural hazard areas as open space, recreation and other low density uses; b) the beneficial effects that natural hazards can have on natural resources and the environment; and c) the effects of development and mitigation measures in identified hazard areas on the management of natural resources. The City should also coordinate their land use plans and decisions with emergency preparedness, response, recovery and mitigation programs.

For development purposes under GOAL 7:

1. The City should give special attention to emergency access when considering development in identified hazard areas.
2. The City should consider programs to manage stormwater runoff as a means to help address flood and landslide hazards.
3. The City should consider non-regulatory approaches to help implement this goal, including but not limited to:
    a. providing financial incentives and disincentives;
    b. providing public information and education materials;
    c. establishing or making use of existing programs to retrofit, relocate, or acquire existing dwellings and structures at risk from natural disasters.
4. When reviewing development requests in high hazard areas, local governments should require site-specific reports, appropriate for the level and type of hazard (e.g., hydrologic reports, geotechnical reports or other scientific or engineering reports) prepared by a licensed professional. Such reports should evaluate the risk to the site as well as the risk the proposed development may pose to other properties.
5. The City should consider measures that exceed the National Flood Insurance Program (NFIP) such as:
    a. limiting placement of fill in floodplains;
    b. prohibiting the storage of hazardous materials in floodplains or providing for safe storage of such materials; and
    c. elevating structures to a level higher than that required by the NFIP and the state building code.
6. Flood insurance policy holders may be eligible for reduced insurance rates through the NFIP's Community Rating System Program when local governments adopt these and other flood protection measures.

In order to conform to these guidelines, new hazard inventory information provided by federal and state agencies will be reviewed by the Department of Land Conservation and Development (Department) in consultation with affected state and local government representatives. After consultation, the Department will notify local governments if the new hazard information requires a local response. Local governments will then respond to new inventory information on natural hazards within 36 months after being notified by the Department, unless extended by the Department.

To the extent possible, this study documents the applicable natural hazards listed above using the most recent information at the time the analyses were performed. Hazards such as coastal flooding, tsunamis, and coastal erosion will not impact the study areas and, therefore, were excluded.

GEOLOGIC SETTING

The three project areas included in this study lie within two geologic provinces in Oregon. The DH&GCR study area is located on the northeastern flank of the Oregon Coast Range geomorphic province while the Purdin Road UGB and Elm Street UGB study areas are within the Tualatin Basin portion of the Willamette Lowland geomorphic province.

The Oregon Coast Range generally consists of a long, narrow belt of moderately high mountains and coastal headlands. The province extends from approximately the Columbia River to the north to the Coquille River (near Bandon) to the south – a distance of approximately 200 miles. Width of the province varies from approximately 30 to 60 miles and extends from the western edge of the Willamette Valley to the offshore continental shelf and slope.

Formation of the province began in the early Eocene age when a volcanic island chain was accreted to the North American plate. These volcanic rocks form the basement complex of the province. It is estimated the volcanic rocks are up to two miles thick (Orr and others 1992). The convergence of large tectonic plates resulted in the formation of a forearc basin that began filling with Eocene to Miocene marine sediments. Intrusive rocks derived from magma chamber(s) below the forearc were emplaced in the marine sediments. Exposed by uplift and erosion, these intrusive rocks form the major peaks of the Oregon Coast Range that exist today. Uplift of the range was nearly complete by the late Oligocene and early Miocene (Orr and others, 1992). Erosion by rainfall, mass wasting processes (e.g., landslides), and major rivers cutting their drainage courses through the range to the Pacific Ocean, modified the geomorphology of the range created the topographic features characteristic of the current range.

Locally, the DH&GCR study area is mapped as lower Miocene to Eocene Marine sedimentary rocks (Tm) on the south side of NW David Hill Road and Miocene Columbia River Basalt Group (Tcr) on the north side (Gannett and Caldwell, 1998) (Figure 5, Geologic Map). The Tm Unit generally consists of sandstone, siltstone, shale, and claystone with lesser conglomerate that can be locally tuffaceous. The Tcr Unit consists of layered flows of dark gray to black basalt that includes tuffaceous sedimentary beds, and is typically deeply weathered near the surface. In addition to the mapped bedrock units by the U.S. Geological Survey (USGS), the Natural Resources Conservation Service (NRCS) soil survey indicates that some of the soils are derived from loess parent materials. Based on the PBS borings, we interpret the loess deposits are overlying the residual bedrock soil.

Four separate basins are generally recognized in the Willamette Lowland; 1) the southern Willamette Valley; 2) the central Willamette Valley; 3) the Tualatin Basin; and 4) the Portland Basin (Gannett and Caldwell, 1998). Narrow ridges underlain by the Columbia River Basalt Group separate the basins.

Basins and tributary valleys, such as those in the Forest Grove area from the Tualatin River, are generally filled with over 1,600 feet of unconsolidated alluvial deposits derived from surrounding highland areas and the Columbia River Basin (Gannett and Caldwell, 1998; O'Connor and others, 2001). The Missoula Floods from approximately 12,000 to 15,000 years ago, caused widespread inundation of the valley with up to 250 feet of silt, sand, and gravel being deposited in the eastern adjacent Portland Basin, and up to 130 feet of silt, known as the Willamette Silt, were deposited elsewhere in the valley (Woodward and others, 1998).

Locally, the Elm Street UGB is mapped as Holocene Alluvial deposits (Qal) and the Purdin UGB study area as Pleistocene Alluvium and glacial-outburst flood sediment (Qs) (refer, Figure 5). The Qal unit consists of sand, gravel, and silt deposits along channels and flood plains of present-day drainage systems. The Qs Unit consists of silt, sand, and gravel deposited primarily during late Pleistocene glacial-outburst floods.

No faults are mapped as underlying the study areas. The northwest striking Gales Creek fault zone is mapped approximately 1 ½ miles south of the project areas. The fault zone has no unequivocal evidence of deformation of Quaternary deposits, but a thick sequence of silty sediment deposited by the Missoula floods covers much of the southern part of the fault trace. The fault zone is considered capable of generating a Mw 6.8 (moment magnitude) earthquake. Other examples of significant faults capable of strong ground shaking include the Cascadia Subduction Zone (Mw 9.3) and the Portland Hills fault (Mw 6.8).

GEOLOGIC AND SEISMIC HAZARDS

Geologic and seismic hazards are defined as those conditions associated with the geologic and seismic environment that could influence existing and/or proposed improvements. In general, the geologic and seismic hazards most commonly associated with the physical and chemical characteristics of near surface soil, rock, and groundwater include:

- **Slope stability**
- **Adverse soils**
- Land subsidence
- Subsurface voids
- **Hydrology and drainage**
- Hazardous Minerals and gases
- **Erosion and sedimentation**
- **Hydrogeology and groundwater**
- Volcanic hazards
- Permafrost and freeze-thaw
- Seismic hazards (**liquefaction, lateral spreading, earthquake-induced landslides,** fault ground rupture)

Those shown in **bold** above are possible hazards that could impact the study areas' development and should be considered in the planning process. Specific discussions of readily recognized hazards are presented for the individual study areas below and in the conclusions and recommendations section. The "Level of Concern" in Tables 2 through 4 is a qualitative assessment based on our engineering judgment. Where noted with footnotes in the tables, the terminology is taken from a specific source (i.e. HazVu). Figures 6 through 9 present the published geologic, flood, and seismic hazards for the areas.

DH&GCR

This study area has residential developments in its southern portion and has the greatest relief within the UGB of the three study areas. We understand that part of the impetus for this geotechnical-related planning assessment is due to unanticipated hazards encountered during the earlier residential developments that primarily included slope failures. The primary geologic and seismic hazards to

consider in planning are the slopes and associated stability (static and earthquake-induced), adverse soil conditions, hydrology and drainage, and erosion and sedimentation.

Slopes and Slope Instabilities
This study area has high relief, particularly the slopes descending toward NW David Hill Road. Table 1 presents the generalized slopes in the study area taken from profiles created through Google Earth. These profiles were compared to the slope values generated using the LiDAR data in the GIS. Figure 10 – DH&GCR Generalized Slope Areas shows these locations.

Table 1: Generalized Slopes in the DH&GCR Study Area

Location	Location No. on Figure 10	Approximate Slope Trend	Slope Ratio	Slope Percent	Slope Instabilities (Y/N)[a]
Forest Gale Drive to NW Antler Road on south side of NW David Hill Road	1	North	Max: 1.5H:1V General: 3H:1V to 6H:1V	Max: 67 General: 33.5 to 17	Y
NW Antler Road to Thatcher Road on south side of NW David Hill Road	2	North	Max: 6H:1V General: 6H:1V to 20H:1V	Max: 17 General: 17 to 5	N
Unnamed Road at top of NW David Hill Road to Thatcher Road on north side of NW David Hill Road	3	East	Max: 4H:1V General: 6H:1V to 8H:1V	Max: 25 General: 17 to 12	N
North portion of the study area to Thatcher Road	4	East	Max: 4H:1V General: 6H:1V to 20H:1V	Max: 25 General: 17 to 5	N
Wismer Property to NW David Hill Road	5	South	Max: 2H:1V General: 6H:1V to 10H:1V	Max: 50 General: 17 to 10	Y
NW Plum Hill Lane to NW David Hill Road	6	South	Max: 2.5H:1V General: 4H:1V to 8H:1V	Max: 40 General: 25 to 12	Y
Previously Developed Area[b]	7	Southwest and South			Y

[a] Mapped by DOGAMI or readily observable in LiDAR imagery
[b] Two slope failures were noted prior to or during construction of the earlier David Hill Estates, Phase 1 development

In general, the study area should be considered prone to slope instabilities, and landslides have historically occurred within both of the two mapped geologic units Tms and Tcr. In particular, the location between Forest Drive and NW Antler Road is mapped by DOGAMI as a landslide complex that is further supported by surface expressions in the LiDAR imagery (Figure 6, Landslide Inventory). No other landslides are mapped by DOGAMI within the study area though several are immediately adjacent on the north and west sides of the boundary line.

Other areas to consider include apparent shallow debris flow-type failures in the portions identified in the table above as the Wismer Property to NW David Hill Road and NW Plum Hill Lane to NW David Hill Road. These areas should be field verified prior to development. Slopes adjacent to and within steep drainages also show indications of ancient or historical instabilities throughout.

Additional discussion of LiDAR and its interpretation is provided in the LiDAR Section below.

Earthquake-induced landslide hazard maps are not available for the Forest Grove area. However, landslides generated under dynamic conditions are a potential hazard during a significant earthquake.

Other Potential Hazards
In addition to the primary slope stability hazard, adverse soil conditions, hydrology and drainage, erosion and sedimentation, and seismic hazards (Figure 7, Earthquake Liquefaction and Figure 8, Earthquake Ground Shaking) should also be considered in this study area. Additional information and soil parameters about adverse soil conditions, hydrology and drainage, and hydrogeology and groundwater information are provided in Tables 5 through 7 in the following NRCS Soil Description Section. The study area is not mapped within the FEMA 100-year flood zone (Figure 9, FEMA 100-Year Flood Hazard). Table 2 below summarizes these other potential hazards

Table 2: Summary of Other Potential Geologic and Seismic Hazards in the DH&GCR Study Area

Geologic and Seismic Hazard	Possible Examples	Level of Concern
Adverse Soils	Artificial Fill Expansive Soil Compressible Soil Organic-Rich Soil Sensitive Clay	Low Low to Moderate Low Moderate Low
Hydrology and Drainage	Flooding[a] Standing Water	None[b] Low
Hydrogeology and Groundwater	Shallow Groundwater Seepage and Piping Permeability and Percolation	Low to Moderate Moderate High
Erosion and Sedimentation		Low to Moderate
Seismic Hazards	Liquefaction and Lateral Spread[c] Seismically-Induced Settlement Earthquake Shaking[c]	None[d] Low Strong

[a] FEMA 100-year flood zone from METRO RLIS. Zone effective date September 30, 1982.
[b] Not mapped within the DH&GCR study area
[c] Information and nomenclature from the Department of Geology and Mineral Industries (DOGMAI), Oregon HazVu: Statewide Geohazards Viewer, http://www.oregongeology.org/hazvu/
[d] Area map is blank indicating liquefaction or lateral spreading is not significant. Minimal amounts may occur during strong ground shaking

Purdin Road UGB

The Purdin Road UGB has relatively low relief with a gentle slope to the east and is currently cultivated farmland. The primary geologic and seismic hazards to consider in this study area, in order of potential significance, include seismic hazards, adverse soils, hydrogeology and groundwater, and hydrology and drainage.

Seismic Hazards
Based on the Oregon HazVu by DOGAMI, approximately 75 percent of the area is mapped as having a high potential risk of liquefaction and the remaining 25 percent is considered low to moderate (refer, Figure 7). Potential lateral spreading may occur adjacent to open drainages and stream channels. All of the study area will be susceptible to severe ground shaking during a large earthquake (refer, Figure 8).

Other Potential Hazards

Additional information and soil parameters about adverse soil conditions, hydrology and drainage, and hydrogeology and groundwater information are provided in Tables 5 through 7 in the following NRCS Soil Description Section. Only the eastern edge of this study area adjacent to Council Creek is mapped within the FEMA 100-year flood zone (refer, Figure 9). Table 3 summarizes the other potential geological and seismic hazards in the study area.

Table 3: Summary of Other Potential Geologic and Seismic Hazards in the Purdin Road UGB Study Area

Geologic and Seismic Hazard	Possible Examples	Level of Concern
Slope Stability	Landslides and Existing Slope Movements	Low
Adverse Soils	Artificial Fill Expansive Soil Compressible Soil Organic-Rich Soil Sensitive Clay	Low Low to Moderate Low Moderate Low
Hydrology and Drainage	Flooding[a] Standing Water	None to Frequent[b] Low
Hydrogeology and Groundwater	Shallow Groundwater Seepage and Piping Permeability and Percolation	Moderate to High Low High
Erosion and Sedimentation		Low

[a] FEMA 100-year flood zone from METRO RLIS. Zone effective date September 30, 1982.

[b] Mapped on the eastern boundary of the property

Elm Street UGB

The Elm Street UGB has relatively low relief with a gentle slope to the east and south with the exception of the portion of the property with existing structures, which slopes steeply down to the west. The area is primarily cultivated farmland. The primary geologic and seismic hazards to consider in this study area, in order of potential significance, include seismic hazards, adverse soils, hydrogeology and groundwater, and hydrology and drainage. Slope stability should be considered on the western portion of the property near the existing structures.

Seismic Hazards

Based on the Oregon Geohazards Viewer (HazVu) by Oregon Department of Geology and Mineral Industries (DOGAMI), approximately 75 percent of the area is mapped as having a high potential risk of liquefaction, and the remaining 25 percent is considered low (refer, Figure 7). Potential lateral spreading may occur adjacent to open drainages and stream channels and significant ground shaking may result in seismically-induced settlement. All of the study area will be susceptible to severe ground shaking during a large earthquake (refer, Figure 8).

Other Potential Hazards

Additional information and soil parameters about adverse soil conditions, hydrology and drainage, and hydrogeology and groundwater information are provided in Tables 5 through 7 in the following NRCS Soil Description Section. The southern portion of the study area is mapped within the Preliminary FEMA 100-year flood zone and less so within the current FEMA 100-year flood zone (refer, Figure 9). FEMA is

currently updating data for several counties, which is shown as preliminary data in HazVu. However, HazVu states these data should not currently be used for regulatory purposes. Table 4 summarizes the other potential geological and seismic hazards in the study area.

Table 4: Summary of Other Potential Geologic and Seismic Hazards in the Elm Street UGB Study Area

Geologic and Seismic Hazard	Possible Examples	Level of Concern
Slope Stability	Landslides and Existing Slope Movements	Low
Adverse Soils	Artificial Fill Expansive Soil Compressible Soil Organic-Rich Soil Sensitive Clay	Low Low to Moderate Low Moderate Low
Hydrology and Drainage	Flooding[a] Standing Water	None to Frequent[b] Low
Hydrogeology and Groundwater	Shallow Groundwater Seepage and Piping Permeability and Percolation	Low to High Low High
Erosion and Sedimentation		Low

[a] FEMA 100-year flood zone from METRO RLIS. Zone effective date September 30, 1982.
[b] Mapped on the eastern boundary of the property

NRCS SOIL DESCRIPTIONS

The NRCS provides information from local soil surveys through the U.S. Department of Agriculture (USDA) Web Soil Survey portal. The soil surveys provide the mapped soil unit that includes soil type, soil profiles, soil quality, and soil engineering characteristics. In addition, the soil survey also has suitabilities and limitations for various land use purposes based on the mapped soil units. Figures 11 through 17 present several of the soil unit layers that are applicable to the project's goals. Please note the NRCS soil descriptions are generalizations of the soil characteristics and do not always provide site specific information for features, such as the depth to groundwater, since the soil units may cover a larger area than that being studied.

The following Tables 5 through 7 provide the soil units mapped within the study areas and applicable information to assist in determining the suitability and limitations of development to consider in planning. In general, soils with **more than** 5 percent of the total area are included. The DH&GCR study area has several mapped soil units with less than 5 percent. However, most of these units can be grouped under the same map soil name with the difference being the percent slopes. Therefore, the soils with the same soil map unit name have been combined if in total, these exceed 5 percent of the area.

The NRCS uses a rating system that combines soil characteristics (i.e. soil type and slope) to determine the suitability or limitations of a soil unit. Definitions of the ratings and criteria for the soil characteristics, or suitability/limitations, are provided in Attachment A.

Table 5: Summary of Applicable Soil Information for the DH&GCR Study Area

Soil Unit	Cornelius and Kinton silt loams	Helvetia silt loam	Laurelwood silt loam	Verboort silty clay loam	Woodburn silt loam
Soil Number	11B, 11C, 11D, 11E	19B, 19C, 19D	28B, 28C, 28D, 29Fa	42	45A, 45B, 45C
Percentage of Area	3, 12, 12, 8, total 35	5, 5, 2, total 12	9, 1, 27, 4, total 41	5	4, 1, 2, total 7
Parent Material	Loess over fine-silty Old Alluvium	Old Alluvium	Loess	Alluvium	Old Alluvium
Typical Profile (inches)	0 to 17: silt loam 17 to 38: silty clay loam 38 to 60: silt loam	0 to 5: silt loam 5 to 10: silty clay loam 10 to 48: silty clay 48 to 60: silty clay loam	0 to 11: silt loam 11 to 52: silty clay loam 52 to 72: silty clay	0 to 19: silty clay loam 19 to 33: clay 33 to 60: silty clay loam	0 to 16: silt loam 16 to 31: silty clay loam 31 to 60: silt loam
Unified Soil Classification (Surface)	ML	ML	ML	ML	ML
AASHTO[a] Group Classification (Surface)	A-4	A-4	A-4	A-6	A-4
Slope (percentage)	B: 2 to 7 C: 7 to 12 D: 12 to 20 E: 20 to 30	B: 2 to 7 C: 7 to 12 D: 12 to 20	B: 3 to 7 C: 7 to 12 D: 12 to 20 29F: 30 to 60	0 to 3	A: 0 to 3 B: 3 to 7 C: 7 to 12
Depth to Restrictive Layer	30 to 40 inches to fragipan	More than 80 inches	More than 80 inches	16 to 26 inches to abrupt textural change	More than 80 inches
Natural Drainage Class	Moderately well drained	Moderately well drained	Well drained	Poorly drained	Moderately well drained
Capacity of Most Limiting Layer to transmit Water	Moderately low to moderately high (0.06 to 0.20 in/hr)	Moderately high (0.20 to 0.57 in/hr)	Moderately high (0.20 to 0.57 in/hr)	Very low to moderately low (0.00 to 0.06 in/hr	Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to Water Table	About 27 to 37 inches	About 36 to 72 inches	More than 80 inches	About 0 to 24 inches	About 25 to 32 inches
Frequency of Flooding	None	None	None	Frequent	None
Frequency of Ponding	None	None	None	None	None
Linear Extensibility (Shrink-Swell)	2.5 percent	4.0 percent	4.0 percent	5.2 percent	2.3 percent
Hydrologic Soil Group	C	C	B	D	C

Soil Unit	Cornelius and Kinton silt loams	Helvetia silt loam	Laurelwood silt loam	Verboort silty clay loam	Woodburn silt loam
Corrosion to Steel	High	High	Moderate	High	High
Corrosion to Concrete	Moderate	Moderate	Moderate	Moderate	Low
Farmland Classification	B: Prime C, D, E: Statewide importance	B: Prime C, D: Statewide importance	B: Prime C, D: Statewide importance 29F: Not prime	Statewide importance	A, B:Prime C: Statewide importance
Erosion Hazard (Road, Trail)	B: Moderate C, D, E: Severe	B: Moderate C, D: Severe	B: Moderate C, D, 29F: Severe	Slight	A: Slight B: Moderate C: Severe
Mechanical Site Preparation (Surface)	B, C: Well suited D, E: Poorly suited	B, C: Well suited D: Poorly suited	B, C: Well suited D: Poorly suited 29F: Unsuited	Well suited	Well suited
Mechanical Site Preparation (Deep)	B, C: Well suited D, E: Poorly suited	B, C: Well suited D: Poorly suited	B, C: Well suited D: Poorly Suited 29F: Unsuited	Well suited	Well suited
Soil Rutting Hazard	Severe	Severe	Severe	Severe	Severe
Suitability for Roads (Natural Surface) (Oregon)	B, C, D: Moderately suited E: Poorly suited	Moderately suited	Moderately suited 29F: Poorly suited	Poorly suited	Moderately suited
Local Roads and Streets	Very limited	Very limited	Very limited	Very limited	Very limited

[a] AASHTO = American Association of State Highway and Transportation Officials

Table 6: Summary of Applicable Soil Information for the Purdin Road UGB Study Area

Soil Unit	42 - Verboort silty clay loam	45A - Woodburn silt loam, 0 to 3 percent slopes	45B - Woodburn silt loam, 3 to 7 percent slopes
Percentage of Area	20	70	10
Parent Material	Alluvium	Old Alluvium	Old Alluvium
Typical Profile (inches)	0 to 19: silty clay loam 19 to 33: clay 33 to 60: silty clay loam	0 to 16: silt loam 16 to 31: silty clay loam 31 to 60: silt loam	0 to 16: silt loam 16 to 31: silty clay loam 31 to 60: silt loam
Unified Soil Classification (Surface)	ML	ML	ML
AASHTO Group Classification (Surface)	A-6	A-4	A-4
Slope (percentage)	0 to 3	0 to 3	3 to 7
Depth to Restrictive Layer	16 to 26 inches to abrupt textural change	More than 80 inches	More than 80 inches
Natural Drainage Class	Poorly drained	Moderately well drained	Moderately well drained
Capacity of Most Limiting Layer to transmit Water	Very low to moderately low (0.00 to 0.06 in/hr	Moderately low to moderately high (0.06 to 0.20 in/hr)	Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to Water Table	About 0 to 24 inches	About 25 to 32 inches	About 25 to 32 inches
Frequency of Flooding	Frequent	None	None
Frequency of Ponding	None	None	None
Linear Extensibility (Shrink-Swell)	5.2 percent	2.3 percent	2.3 percent
Hydrologic Soil Group	D	C	C
Corrosion to Steel	High	High	High
Corrosion to Concrete	Moderate	Low	Low
Farmland Classification	Statewide Importance	Prime	Prime
Erosion Hazard (Road, Trail)	Slight	Slight	Moderate
Mechanical Site Preparation (Surface)	Well Suited	Well Suited	Well Suited
Mechanical Site Preparation (Deep)	Well Suited	Well Suited	Well Suited
Soil Rutting Hazard	Severe	Severe	Severe
Suitability for Roads (Natural Surface)(OR)	Poorly Suited	Moderately suited	Moderately suited
Local Roads and Streets	Very Limited	Very Limited	Very Limited

Table 7: Summary of Applicable Soil Information for the Elm Street UGB Study Area

Soil Unit	37A - Quatama loam, 0 to 3 percent slopes	37B - Quatama loam, 3 to 7 percent slopes	30 - McBee silty clay loam	9 - Chehalis silty clay loam, occasional overflow
Percentage of Area	70	15	10	5
Parent Material	Loamy Alluvium	Loamy Alluvium	Alluvium	Mixed Alluvium
Typical Profile (inches)	0 to 15: loam 15 to 30: clay loam 30 to 62: loam	0 to 15: loam 15 to 30: clay loam 30 to 62: loam	0 to 11: silty clay loam 11 to 45: silty clay loam 45 to 65: clay loam	0 to 16: silty clay loam 16 to 45: silty clay loam 45 to 60: silt loam
Unified Soil Classification (Surface)	ML	ML	ML	CL
AASHTO Group Classification (Surface)	A-4	A-4	A-6	A-7
Slope (percentage)	0 to 3	3 to 7	0 to 3	0 to 3
Depth to Restrictive Layer	More than 80 inches	More than 80 inches	More than 80 inches	More than 80 inches
Natural Drainage Class	Moderately well drained	Moderately well drained	Moderately well drained	Well drained
Capacity of Most Limiting Layer to transmit Water	Moderately high (0.20 to 0.57 in/hr)	Moderately high (0.20 to 0.57 in/hr)	Moderately high (0.20 to 0.57 in/hr)	Moderately high to high (0.57 to 1.98 in/hr)
Depth to Water Table	About 24 to 36 inches	About 24 to 36 inches	About 24 to 36 inches	More than 80 inches
Frequency of Flooding	None	None	Frequent	Occasional
Frequency of Ponding	None	None	None	None
Linear Extensibility (Shrink-Swell)	1.5 percent	1.5 percent	4.5 percent	4.5 percent
Hydrologic Soil Group	C	C	C	B
Corrosion to Steel	High	High	High	Moderate
Corrosion to Concrete	Moderate	Moderate	Low	Low
Farmland Classification	Prime	Prime	Prime	Prime
Erosion Hazard (Road, Trail)	Slight	Moderate	Slight	Slight
Mechanical Site Preparation (Surface)	Well Suited	Well Suited	Well Suited	Well Suited
Mechanical Site Preparation (Deep)	Well Suited	Well Suited	Well Suited	Well Suited
Soil Rutting Hazard	Severe	Severe	Severe	Severe
Suitability for Roads (Natural Surface)(OR)	Moderately suited	Moderately suited	Poorly Suited	Moderately suited
Local Roads and Streets	Very Limited	Very Limited	Very Limited	Very Limited

LIDAR

LiDAR imagery was obtained from DOGAMI covering the Gales Creek and Forest Grove quadrangles (refer, Figures 18 through 20). LiDAR is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the earth. These light pulses, combined with other data recorded by an airborne system, generate precise three-dimensional information about the shape of the earth and its surface characteristics. Over the past decade, DOGAMI has been collecting and analyzing these data to generate landslide maps, including for the two quadrangles that encompass the study areas. The information is presented by DOGAMI through several venues such as the Statewide Landslide Information Database for Oregon (SLIDO), DOGAMI LiDAR data viewer, HazVu, and the interpretive map series IMS-39 (Forest Grove quadrangle) and IMS-46 (Gales Creek quadrangle) maps. PBS obtained the data disks for this planning project to incorporate the files into the GIS and perform our own analyses.

Several slope instabilities were identified within the DH&GCR study area, which are also shown in Table 2 of this report. We focused our evaluation on the undeveloped portion of the DH&GCR and **did not** include the previously developed areas. In particular, the location between Forest Drive and NW Antler Road is mapped by DOGAMI as a landslide complex encompassing approximately 38 acres, occurring at a depth of about 25 feet within the Tms Unit. This landslide area is further supported by surface expressions in the LiDAR imagery presented on Figure 18, David Hill & Gales Creek Road Area LiDAR that shows hummocky terrain typical of recent slope movements. No other landslides are mapped by DOGAMI within the study area, though several are immediately adjacent to the north and west sides of the UGB line.

Based on the LiDAR imagery, other areas to consider include apparent shallow debris flow-type instabilities in the portions identified in the Table 2 of this report as the Wismer Property to NW David Hill Road and NW Plum Hill Lane to NW David Hill Road. Slopes adjacent to, and within steep drainages, also show indications of instabilities throughout the area.

Please note that construction grading can remove surface indictors (e.g., scarps and hummocky terrain) that are used to assist in identifying slope instability features. This is most apparent in the southern portion of the DH&GCR study area where slope instabilities were known to exist prior to the residential developments.

The Purdin Road UGB and Elm Street UGB do not show distinct ground surface disturbance from the LiDAR that would suggest slope instabilities.

DH&GCR GEOTECHNICAL BORINGS

On November 14, 2014, three borings (designated as B-1, B-2, and B-3) were drilled within the DH&GCR study area (refer, Figure 2 and Figure 18). The borings were advanced to depths between 21.5 and 31.5 feet below ground surface (bgs) using mud-rotary drilling techniques by Western States Soil Conservation, Inc. of Hubbard, Oregon. A PBS engineering geologist observed the general soil conditions that were then used to estimate geotechnical parameters for planning purposes. Soil laboratory testing was not included in this scope of work and the soil types are based on field visual-manual classifications using ASTM International (ASTM) D 2488-09a guidelines. Boring logs are presented in Attachment B. The following Table 8 summarizes the boring data.

Table 8: Summary of Geotechnical Borings in the DH&GCR Study Area

Boring	Location	Depth (feet bgs)	Approximate Ground Elevation (feet msl)[a]	Groundwater (feet bgs)	Bedrock (feet bgs)
B-1	Thatcher Park	21.5	273	n/e[b]	n/e
B-2	NW Plum Hill Lane	31.5	385	n/e	n/e
B-3	Wismer Property	31.5	505	n/e	n/e

[a] msl = mean sea level, based on Google Earth
[b] n/e = not encountered during drilling

In general, the three borings encountered similar soil materials from the ground surface to the total depths explored. Fine-grained, light brown to reddish brown silt (MH) and clay (CH) soil with medium stiff to stiff consistencies, N-values between 4 and 16 blows per foot, were observed. The soil samples had low to high plasticity and were generally moist.

PRELIMINARY SLOPE STABILITY ANALYSIS

Previous geotechnical reports in the developed portion of the DH&GCR study area identified two slope failures on the southwestern hillslope. Based on the information provided by GRI (2000) and GeoPacific Engineering, Inc. (2001) in their reports, these landslides are characteristic of rotational and shallow slump-type failures.

PBS has performed preliminary slope stability analyses at the three boring locations. Slope stability is influenced by various factors including, the geometry of the soil mass and subsurface materials, weight of soils overlying the failure surface, the shear strength of soils and/or rock along the failure surface, and the hydrostatic pressure (groundwater levels) along the failure surface. We have used information developed from our field explorations and our experience with similar earth materials to develop the stability analysis model. Our analyses are based upon the assumption that subsurface conditions everywhere within the landslide mass are not significantly different from those encountered by the field explorations. In addition, the exploration depths limit possible failures to 21.5 feet to 31.5 feet bgs. Possible deeper-seated slope instabilities are not addressed and should be considered during development-specific geotechnical evaluations. The slope profiles are based on Google Earth elevation data and are shown on Figure 18. The results of the very limited slope stability analyses are presented on Attachment C. These results should not be considered to be definitive indications of current or future slope stability. They merely suggest current apparent relative slope conditions for planning purposes.

Soil and Material Parameters – Information from our subsurface explorations and our previous experience on similar projects were utilized to estimate material strengths and unit weight parameters for the various geologic units. Table 9 presents the soil layer designations and the physical material parameters used in our stability analyses.

Table 9: Material Properties for Slope Stability Analysis

Boring	Soil Unit	Total Density, γ_m (pcf)	Friction Angle (degrees)	Cohesion, c (psf)
B-1	Med Stiff CL	110	0	600
	Med Stiff CH	110	0	800
	Med Stiff ML	115	30	0
	Very Stiff CL	110	0	1800
	Very Stiff CH	110	0	2000
B-2	Med Stiff ML	115	30	50
	Stiff CL	110	0	2000
B-3	Med Stiff CL	110	0	1100
	Med Stiff CH	110	0	1500

The unit weights of all soils were based on the soil classifications and our experience. The values for shear strength (i.e., internal angle of friction, ϕ, and cohesion, c), were based on soil types and index properties, and our experience.

Table 10 summarizes the results of the three slope stability profiles.

Table 10: Summary of Slope Stability Analysis

Location	Factor of Safety	
	Static	Pseudo-Static
B-1	3.84	1.47
B-2	1.79	1.01
B-3	2.25	1.10

The preliminary slope stability analysis indicates the B-2 area near NW Plum Hill Lane with a slope descending to the south has the lowest static and pseudo-static FOS based on the generalized parameters used in the analysis. The stability of a slope is expressed in terms of factor of safety (FS), which is defined as the ratio of resisting forces to driving forces. At equilibrium, the FS is equal to 1.0 and the driving forces are balanced by the resisting forces. Failure occurs when the driving forces exceed the resisting forces (i.e., FS less than 1.0). An increase in the FS above 1.0, whether by increasing the resisting forces and/or decreasing the driving forces, reflects a corresponding increase in the stability of the mass. The actual FS may differ from the calculated FS due to uncertainty in soil strengths, subsurface geometry, failure surface location and orientation, groundwater levels, and other factors that are not completely known or understood.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Wetlands and recreational areas have been identified within the DH&GCR study area. In addition, a wetland is mapped along the eastern edge of the Purdin Road UGB. No Goal 5 resources have been identified in the Elm Street UGB study area.

The City owns most of the properties that are recreation areas within the DH&GCR study area. The wetlands should be considered during development and either avoided or balanced in both the DH&GCR and Purdin Road UGB areas.

The primary geotechnical-related aspects to consider in the planning and development of the study areas include:

- weak surface soils
- slope stability
- soil liquefaction during a seismic event
- poorly draining soils
- seismic ground shaking
- shallow groundwater
- potentially expansive soils
- highly disturbed ground surface soil due to past farming practices

In general, the impacts these issues may pose can be mitigated or avoided through implementing proper guidelines following current Federal, State, and local codes, and performing appropriate geotechnical studies at the time of development. Geotechnical approaches to resolve most of these issues would be at the discretion of the Geotechnical Engineer of Record for the development and may include, but not limited to, surface soil ground improvements such as cement treating to strengthen weak or potentially expansive soils, over-excavation to remove poor soil conditions, and deep foundations or ground improvements, as applicable. The areas and associated development should include a liquefaction analysis based on the relevant Oregon Structural Specialty Code (OSSC) at the time of development. Impacts of liquefaction and the appropriate method to mitigate would be at the discretion of the Geotechnical Engineer of Record.

The International Building Code (IBC) (2012) provides guidelines for foundations on, or adjacent to, slopes in IBC Section 1808. In general, buildings should be placed at least the smaller of Height (H)/2 or 15 feet from the toe of the slope and at least the smaller of H/3 or 40 feet from the top of slope. IBC Section 1808.7 provides additional details that should be considered in development planning. We recommend following these codes for all areas of development, if not already implemented by the City.

Modifications to the City of Forest Grove Code, Section 10.8.310 HAZARD AREAS may be considered by the City and include additional, specific information for performing slope stability studies in a designated Landslide Study Zone (LSZ) and / or areas of steeper than a specified slope. The City requested PBS to use greater than 10 percent slope as the determiner for areas that would require slope stability studies. To remove ambiguity interpreting the code for undulating topography in the DH&GCR, PBS has created a LSZ to be considered by the City. In areas like the DH&GCR, slopes flatter than 10 percent can still be prone to or affected by slope instabilities because, for example, it lies within the body of or landslide, may be impacted by landslide movement upslope, or could be impacted by landslide movement down slope.

The presented LSZ only includes the DH&GCR due to the scope of this project but could be extended to other areas with similar characteristics within the City bounds. The LSZ is based on:

1) The relatively steep and pervasive slopes in the area (greater than 10 percent was used to depict these slopes in Figures 21 and 22),
2) Known, existing slope instabilities throughout the study area, and
3) Past developments in the area where construction grading and excavations resulted in slope instabilities.

Furthermore, based on GOAL 7 requirements and guidelines and pertinent case studies, we **do not** recommend permitting further development of structures or infrastructure within the DOGAMI mapped landslide between Forest Gale Drive to NW Antler Road south of David Hill Road (Area 1 on Figure 10)

unless the landslide and its impacts are clearly addressed in the design of the project. Even with these measures, the City should consider alternative uses (i.e. open space) as a potential plan for the area.

Based on conversations with the City, the properties within the NW Antler Road to Thatcher Road south of David Hill Road location are primarily owned by the City of Forest Grove School District and the City of Forest Grove Parks and Recreation Department. We understand the City of Forest Grove School District property may eventually be selected for private development. Although this land is currently shown as an ORCA from the METRO RLIS database on Figure 4, it does not preclude its future development.

Figures 21 and 22, Study Areas Slope Percentages and DH&GCR Slope Percentages, generated by analyzing the LIDAR data through the GIS shows the steep slopes (4:1; ≥ 25 percent), slopes greater than 10 percent, and a potential Landslide Study Zone (around the DH&GCR) for the three study areas. The revised code would result in portions of the Purdin UGB and Elm Street UGB requiring slope stability studies based on these areas having slopes greater than 10 percent (refer, Figure 21).

The current code and potential modifications (in *red italics*) is shown below.

A. Information and studies for hazards shall be provided as follows:
   1. (pertains to flood plains and is omitted)
   2. For development sites within *a Landslide Study Zone (LSZ) or* having slopes of *10%* or more, the following requirements shall be met. To ensure compliance with the provisions of this ordinance, prior to the issuance of a building permit for the construction of any new building within the city, and prior to any grading, excavation or filling or other site modification within *a LSZ or* areas having a slope of *10%* or greater, there shall be submitted to the Community Development Department for review and approval, or approval with modifications:
      a. a site plan (showing any grading, excavating or filling) drawn to scale of the entire property developed and of the proposed construction;
      b. the submission of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist who is a registered geologist certified in the specialty of Engineering Geology under provisions of ORS 672.505 to 672.705 *and a Geotechnical Engineer under provisions of ORS 672.002 to 672.325*. The assessment and report shall address the entire site and meet the following requirements:
         i. The geological *and engineering* assessment shall include information and data regarding the nature, distribution of underlying geology, and the physical and chemical properties of existing soils; an opinion as to stability of the site, and conclusions regarding the effect of geologic conditions on the proposed development.
         ii. *The study shall include: 1) review of aerial photography including stereo views and LiDAR imagery, 2) review of geologic literature or previous reports, 3) site reconnaissance including mapping of observable geologic features or hazards, 4) field explorations, as necessary, and 5) laboratory testing.*
         iii. The geotechnical report shall include a comprehensive description of the site topography and geology; an opinion as to the adequacy of the proposed development from an engineering standpoint; and opinion as to the extent that instability on adjacent properties may adversely affect the

project; a description of the field investigation and findings; conclusions regarding the effect of geologic conditions on the proposed development; and specific requirements for plan modification, corrective grading and special techniques and systems to facilitate a safe and stable development. The report shall provide other recommendations as necessary, commensurate with the project grading and development.

iv. Address the requirements of Section 10.8.310 B.

B. Through hazard study(ies) required pursuant to Section 10.8.310 A., the applicant shall establish methods to minimize hazards to acceptable risks by:
   1. Site design approaches that avoids development within hazard area;
   2. Grading, erosion control and other site preparation techniques to minimize hazard impacts;
   3. Techniques to minimize impacts from utility installation; and/or
   4. Building and foundation techniques to minimize hazard impacts.

C. Where a hazard area is proposed to be avoided:
   1. For divisions of land, the area shall be placed in an open space tract separate from areas intended for development. The open space tract is subject to the requirements of 10.8.200 et seq.
   2. For development not involved in a division of land, the area shall be held in common for residential condominiums or by the primary land owner for apartment complexes or non-residential development. The area shall be placed within an easement and adequate maintenance provisions shall be provided consistent with the requirements of Section 10.8.200.
   3. The tract or easement area shall be restricted to open space. Utilities may be located within the area provided that the report proposes acceptable measures to minimize hazard impacts. Open space tracts are subject to the provisions of Section 10.8.200.

LIMITATIONS

Our conclusions are based upon limited review of the referenced documents and subsurface explorations intended to suggest general conditions of the DH&GCR study area. The guidelines and recommendations provided in this report are for the City's consideration for the Westside Planning Project. Federal, State, and Local codes, guidelines, and statutes should be followed. Subsurface conditions, material types, groundwater, and similar, can change substantially over relative short distances, and from time to time. Consequently, the borings and related information and preliminary slope stability analyses presented herein must not be relied upon for future development plans.

The information provided in this report is for use in feasibility planning associated with the study areas, and PBS is not liable in any regard for decisions related to due diligence, purchase, or design and construction estimating. Site-specific exploration and engineering is required in order to refine the very general discussion of subsurface conditions (based on nearby information) provided in this report.

CLOSING

We trust this Geological and Geotechnical Assessment Report meets your current needs. If you have any questions or wish to further discuss our observations, conclusions, and recommendations, please contact Saiid Behboodi at 503.417.7705 or Mark Swank at 503.417.7738.

Sincerely,
PBS Engineering and Environmental Inc.

Mark Swank, RG, CEG
Senior Engineering Geologist

REVIEWED BY:

Saiid Behboodi, PE, GE
Principal Geotechnical Engineer

Arlan H. Rippe, PE, GE, D.GE
Senior Geotechnical Consultant

MWS/SB/AR

ATTACHMENTS

Attachment A – Soil Classification Descriptions
Attachment B – Soil Boring Logs
Attachment C – Slope Stability Analysis

FIGURES

Figure 1 – Vicinity Map
Figure 2 – Study Area Map
Figure 3 – David Hill Urban Reserve Concept Plan
Figure 4 – Oregon GOAL 5 Resources
Figure 5 – Geologic Map
Figure 6 – Landslide Inventory
Figure 7 – Earthquake Liquefaction
Figure 8 – Earthquake Ground Shaking
Figure 9 – FEMA 100-Year Flood Zone Hazard
Figure 10 – DH&GCR Generalized Slope Areas
Figure 11 – NRCS Soils
Figure 12 – Soils – Linear Extensibility
Figure 13 – Hydrologic Soil Group
Figure 14 – Soils – Corrosion of Steel
Figure 15 – Soils – Corrosion of Concrete
Figure 16 – Soils – Erosion Hazard (Roads and Trails)
Figure 17 – Soils – Local Roads and Streets
Figure 18 – David Hill and Gales Creek Road Area LIDAR
Figure 19 – Purdin Road UBG LIDAR
Figure 20 – Elm Street UGB LIDAR
Figure 21 – Study Areas Slope Percentages
Figure 22 – DH&GCR Slope Percentages

DATA SOURCES

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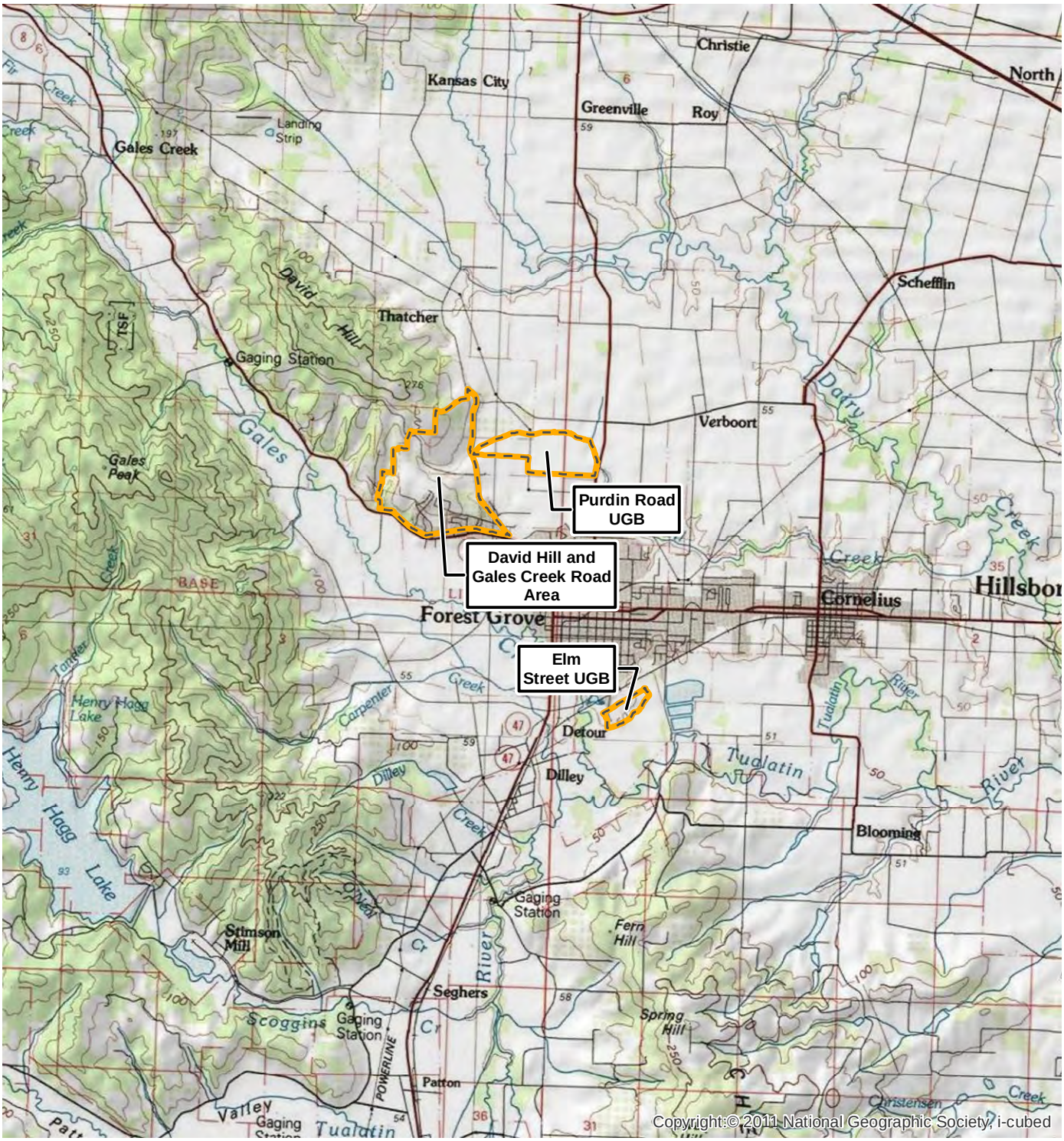
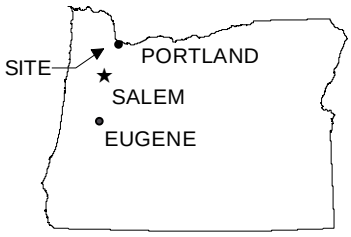
FIGURES





Legend

Westside Planning Study Area

0 4,000 8,000 16,000'

1 inch = 8,000 feet

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PBS

PROJECT # 73121.000

DATE JAN 2015

VICINITY MAP

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE 1

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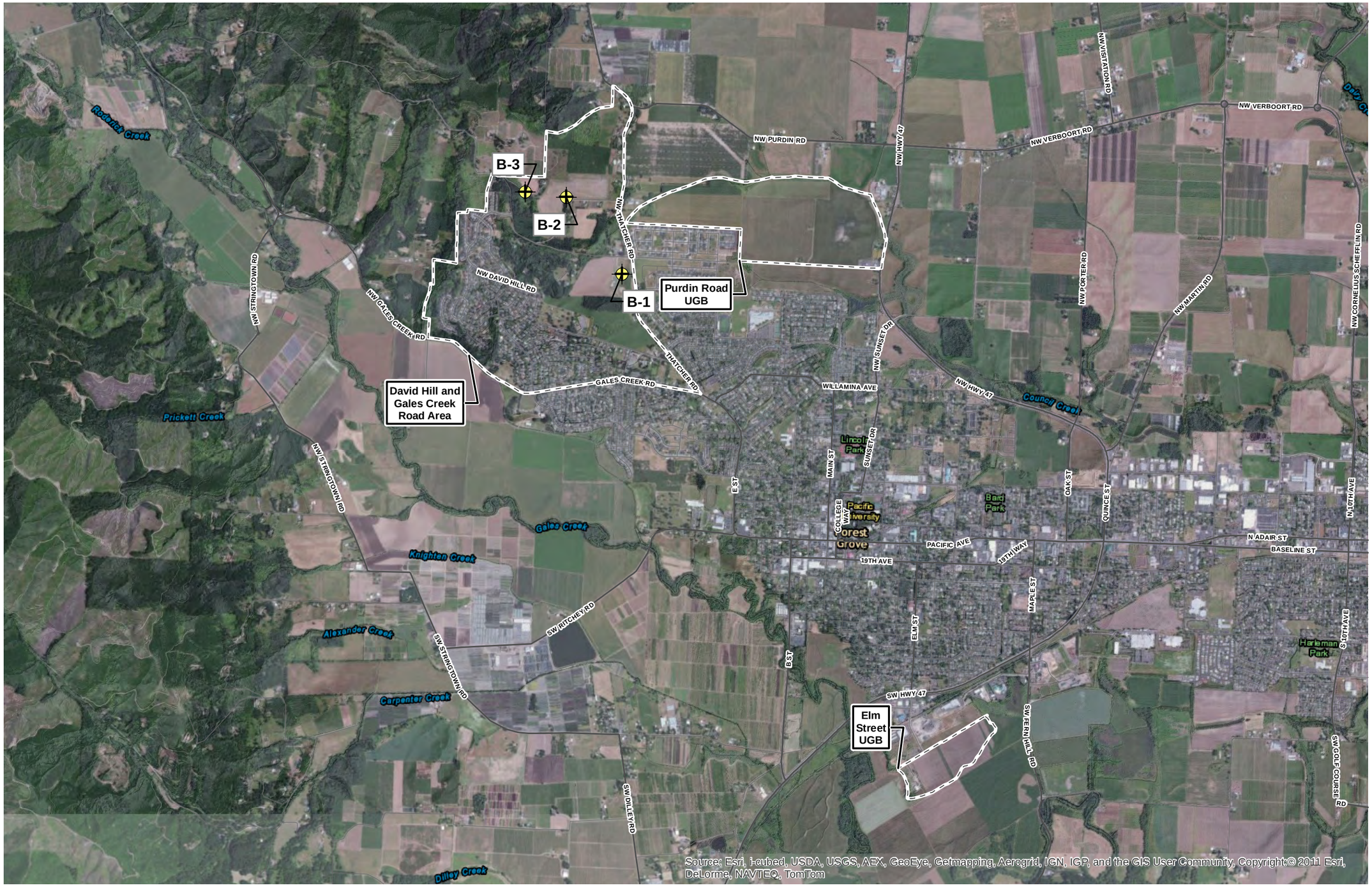

SOURCES: Metro RLIS

PREPARED FOR: SCJ Alliance

LEGEND

- Westside Planning Study Area
- Borings
- Arterial Street
- Street

STUDY AREA

0 1,250 2,500 5,000'

1 inch = 2,500 feet

PBS
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866.727.0140 Fax
www.pbsenv.com

FOREST GROVE WESTSIDE PLANNING PROJECT

FOREST GROVE, OREGON

PROJECT	73121.000
DATE	JAN 2015
FIGURE	2

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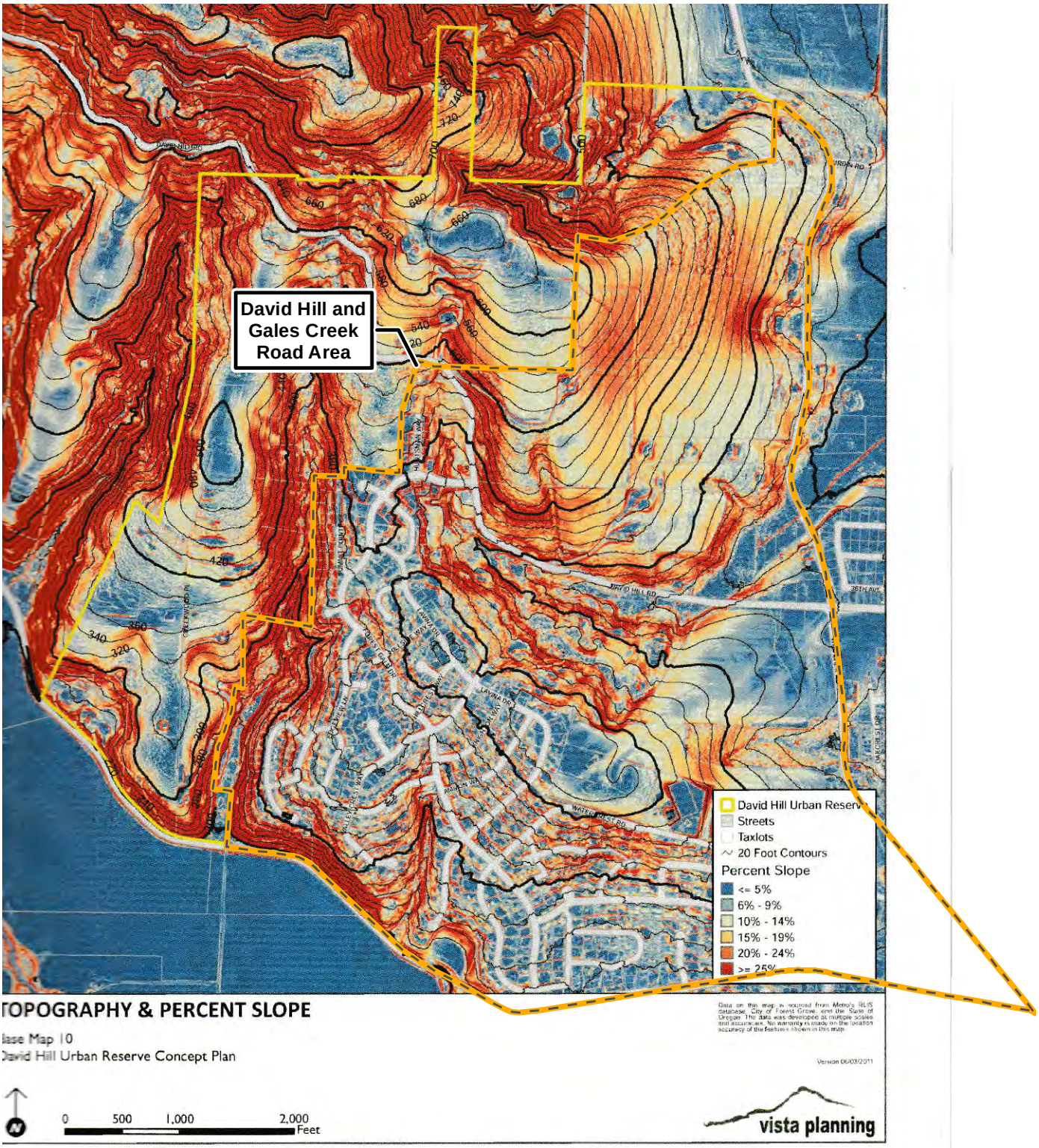

SOURCE: "David Hill Urban Reserve Concept Plan, Appendices", Vista Planning and Portland State University, June 2011

Legend

- Westside Study Areas
- Arterial streets
- Slope 10-20%
- Slope >20%
- Landslide Hazard Zone -Possible

0 625 1,250 2,500 '

1 inch = 1,250 feet

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DATE JAN 2015

DAVID HILL URBAN RESERVE CONCEPT PLAN

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE 3

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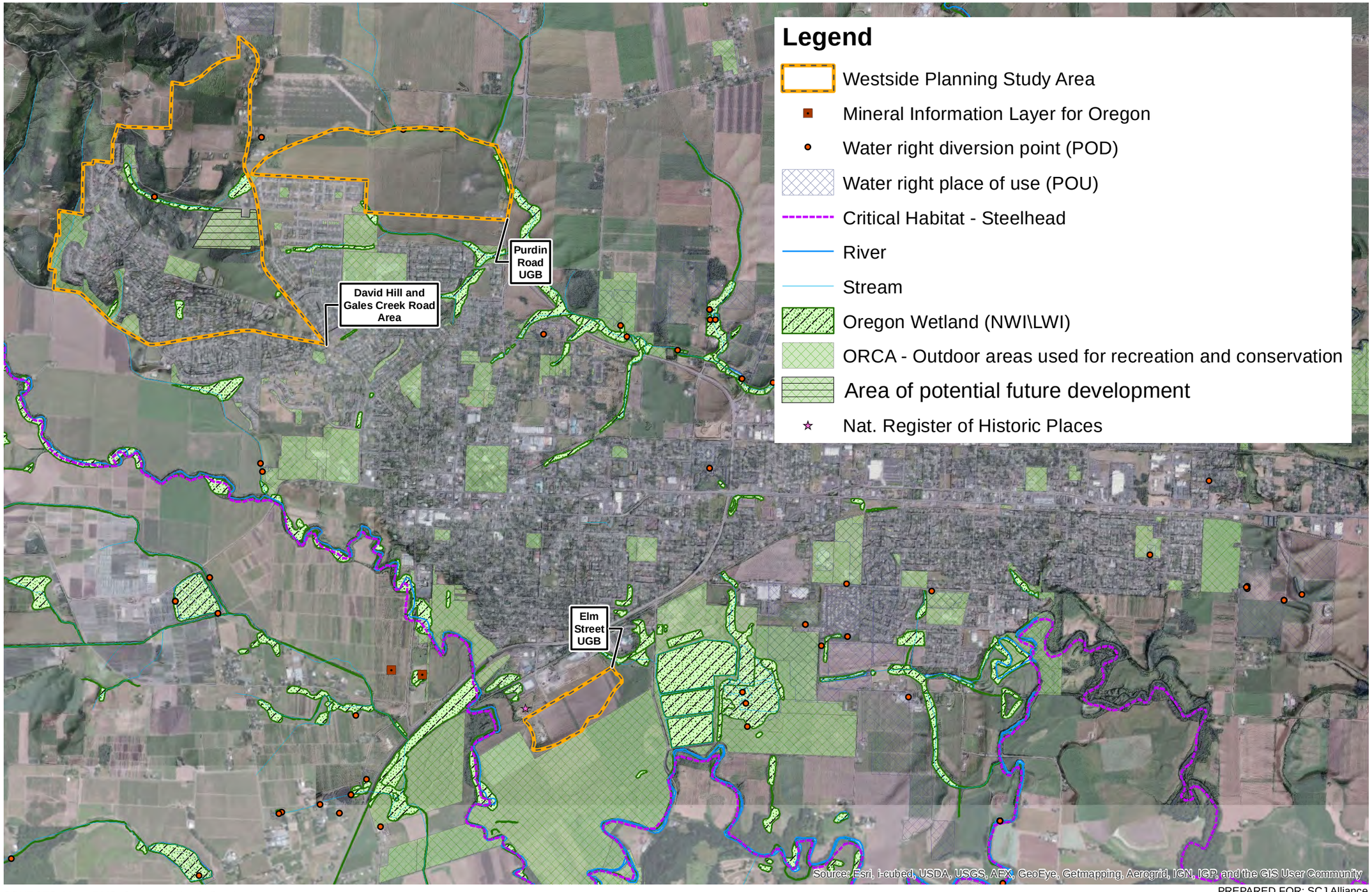

SOURCES: Metro RLIS; Oregon Wetlands Geodatabase,
Oregon Natural Heritage Information Center & The Wetlands Conservancy;
National Park Service, National Register of Historic Places;
Oregon Department of Geology and Mineral Industries;
Oregon Water Resources Dept.

PREPARED FOR: SCJ Alliance

OREGON GOAL 5 RESOURCES

0 1,250 2,500 5,000'

1 inch = 2,500 feet

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FOREST GROVE WESTSITE PLANNING PROJECT

FOREST GROVE, OREGON

PROJECT	73121.000
DATE	JAN 2015
FIGURE	4

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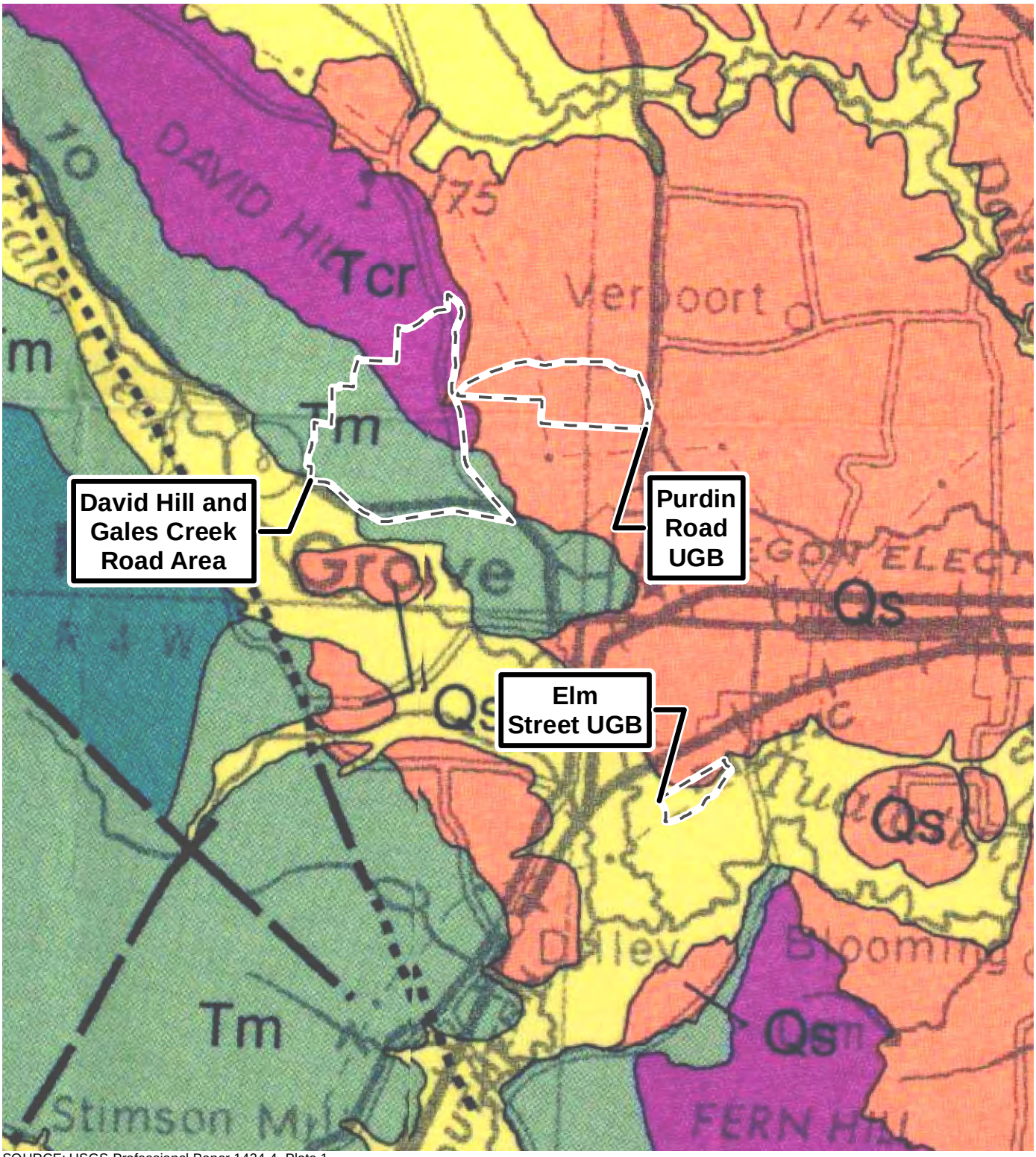

SOURCE: USGS Professional Paper 1424-4, Plate 1

Legend

Westside Planning Study Area

Geologic Features

- Qal: Alluvial deposits (Holocene)
- Qs: Alluviam and glacial-outburst flood sediment (Pleistocene)
- Tcr: Columbia River Basalt Group (Miocene)
- Tm: Marine sedimentary rocks, undivided (lower Miocene to Eocene)
- Tvc: Volcanic rocks of the Coast Range (Eocene)

0 2,500 5,000 10,000'

1 inch = 5,000 feet

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DATE JAN 2015

GEOLOGIC MAP

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **5**

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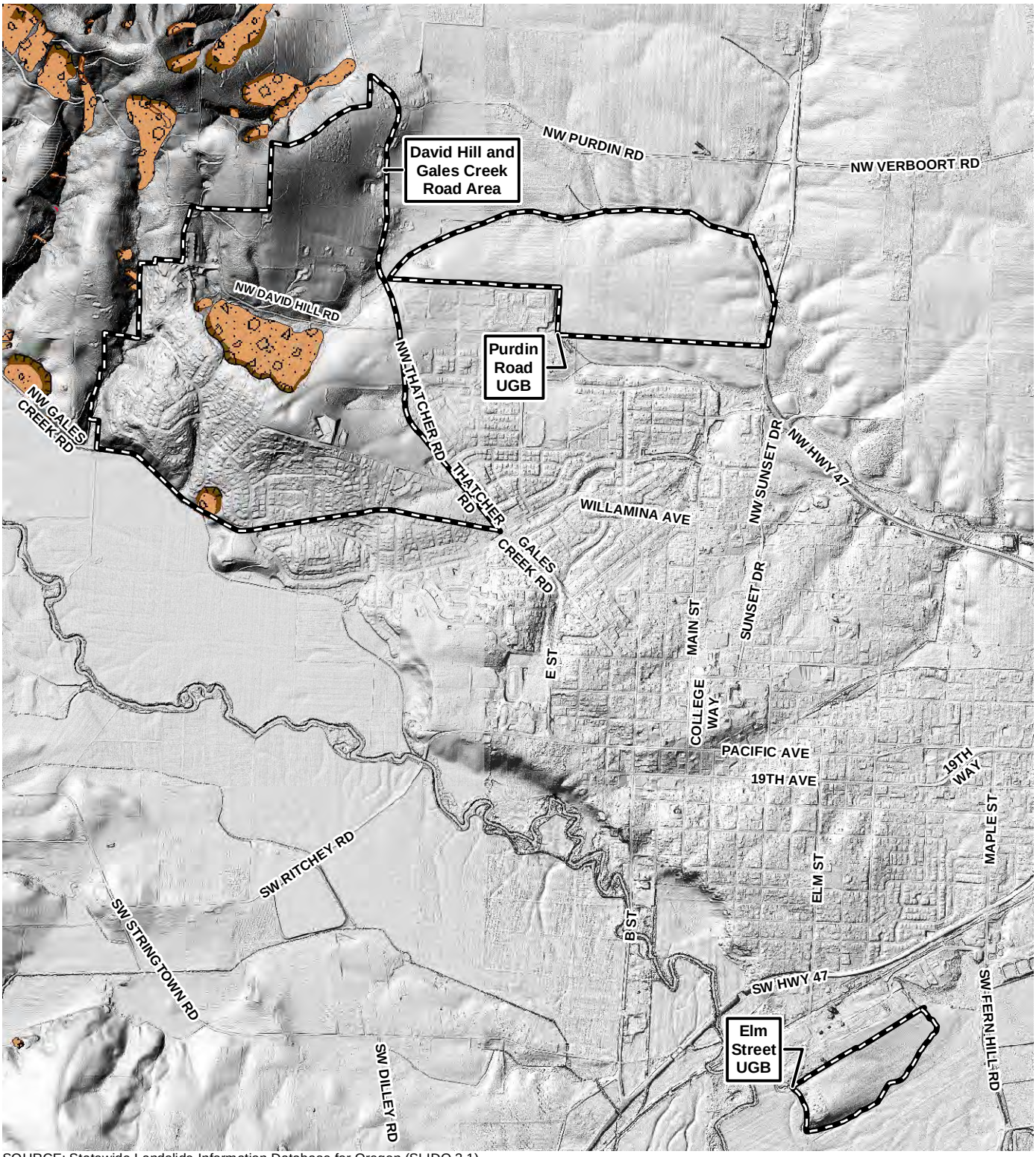

SOURCE: Statewide Landslide Information Database for Oregon (SLIDO 3.1)

Legend

Westside Planning Study Area

Arterial streets

0 1,250 2,500 5,000'

1 inch = 2,500 feet

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DATE JAN 2015

LANDSLIDE INVENTORY

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE 6

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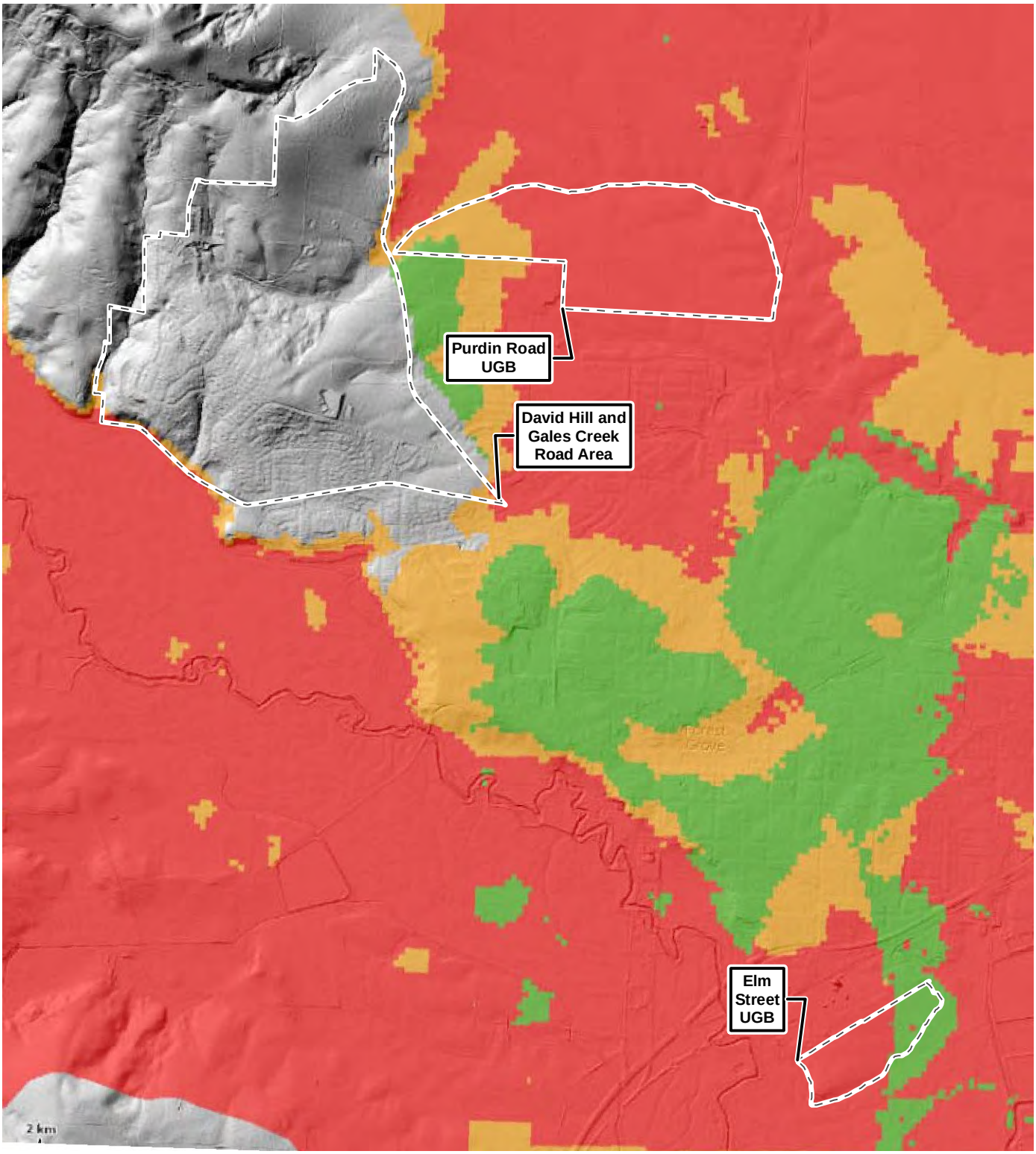

SOURCE: Oregon DOGAMI HAZVU Statewide Geohazards Viewer - Earthquake Liquefaction accessed 12/2014

Legend

Westside Planning Study Area

Earthquake Liquefaction Hazard

- High
- Moderate
- Low
- None to Minimal

0 1,250 2,500 5,000'

1 inch = 2,500 feet

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PROJECT # 73121.000

DATE JAN 2015

EARTHQUAKE LIQUEFACTION

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE 7

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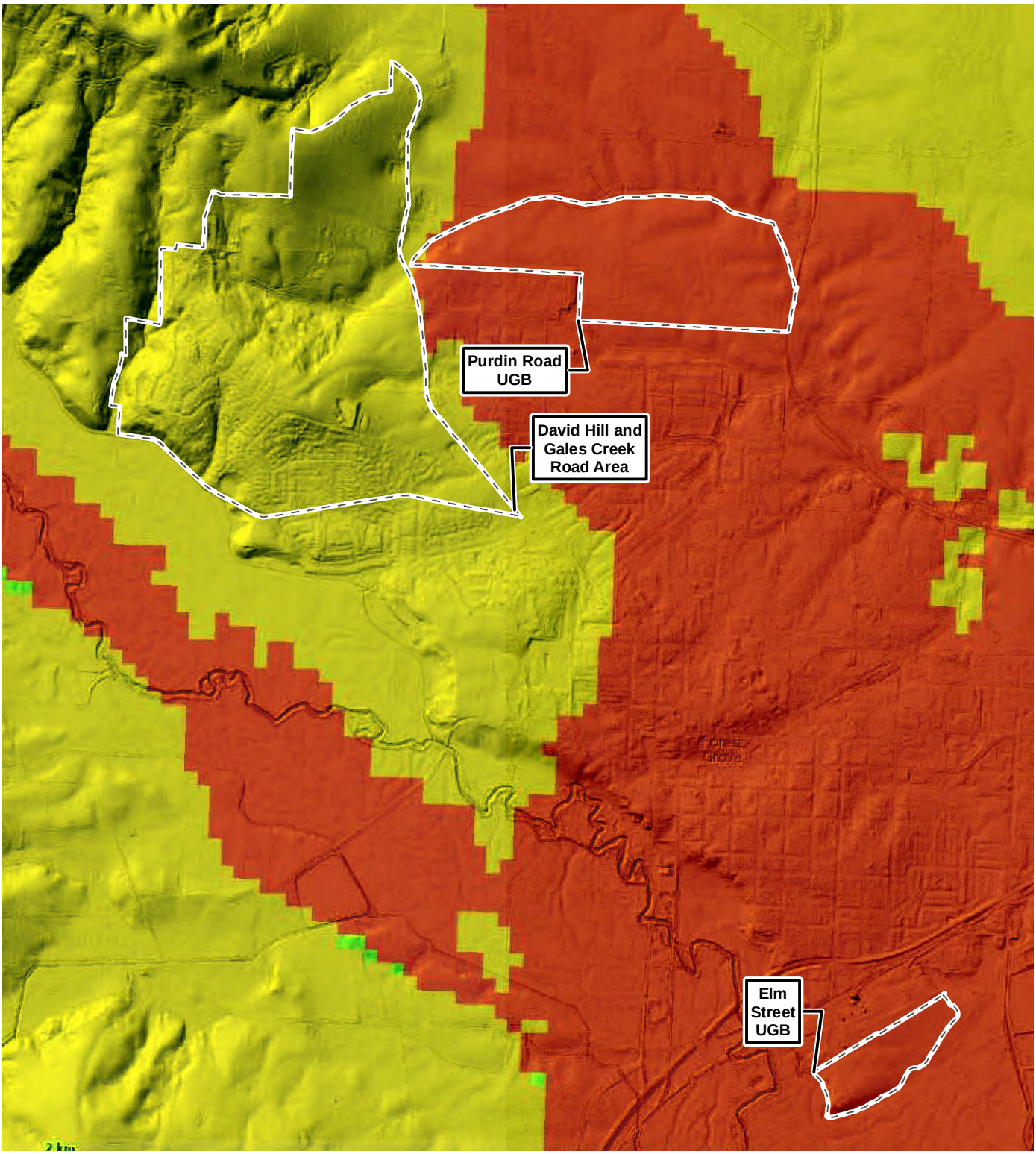


SOURCE: PBS Engineering and Environmental; Oregon DOGAMI HAZVU Statewide Geohazards Viewer - Expected Earthquake Shaking accessed 12/2014

Legend

Westside Planning Study Area

Expected Ground Shaking

- Violent
- Severe
- Very Strong
- Strong
- Moderate
- Light

0 1,250 2,500 5,000'

1 inch = 2,500 feet

PREPARED FOR: SCJ Alliance

PBS

PROJECT # 73121.000

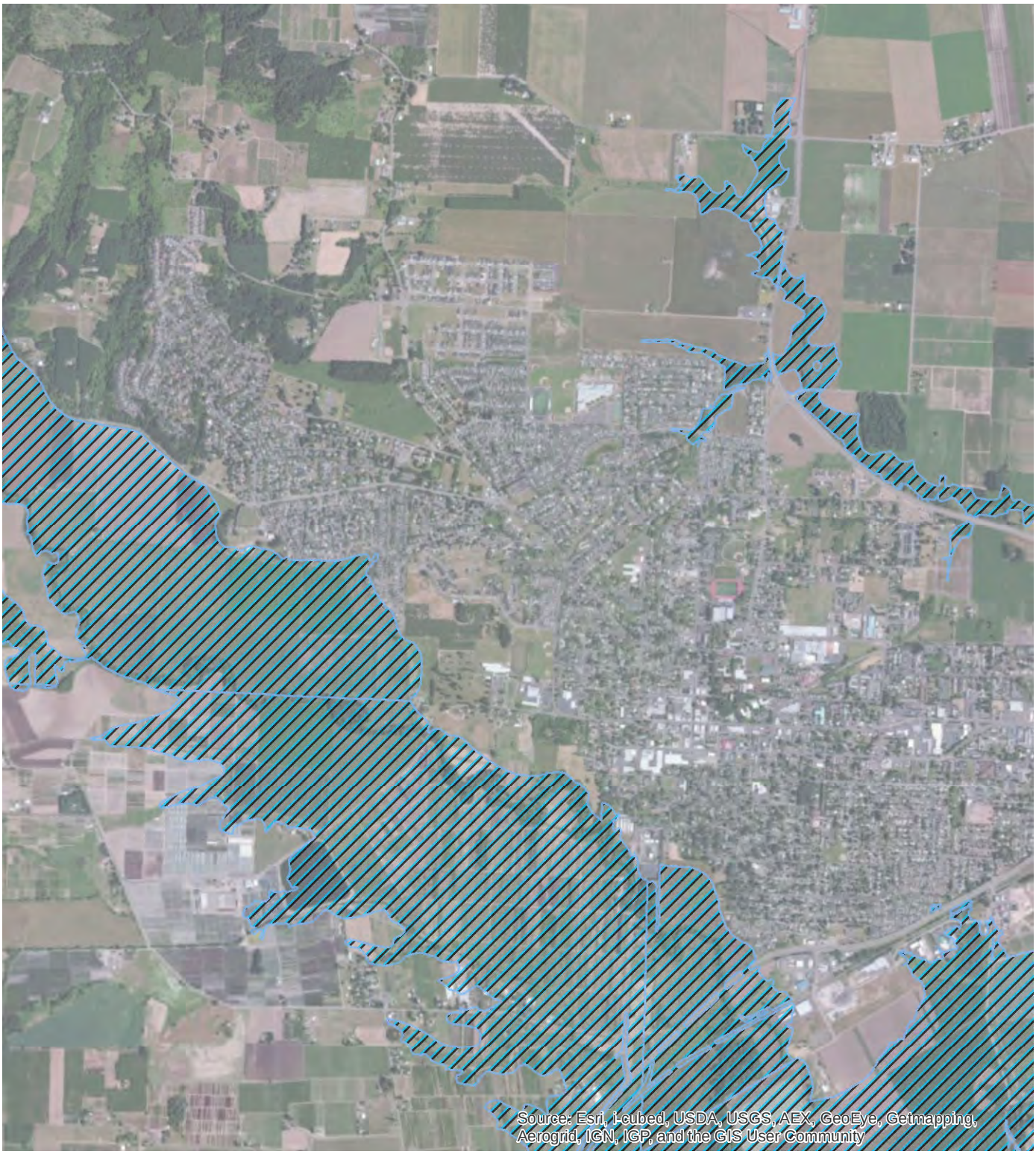
DATE JAN 2015

EARTHQUAKE GROUND SHAKING

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE 8

L:\Projects\73000\73100-73199\73121_FirstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig8_GroundShaking.mxd



SOURCE: Oregon Metro RLIS

Legend

- Westside Planning Study Area
- FEMA Floodplain

0 1,250 2,500 5,000'

1 inch = 2,500 feet

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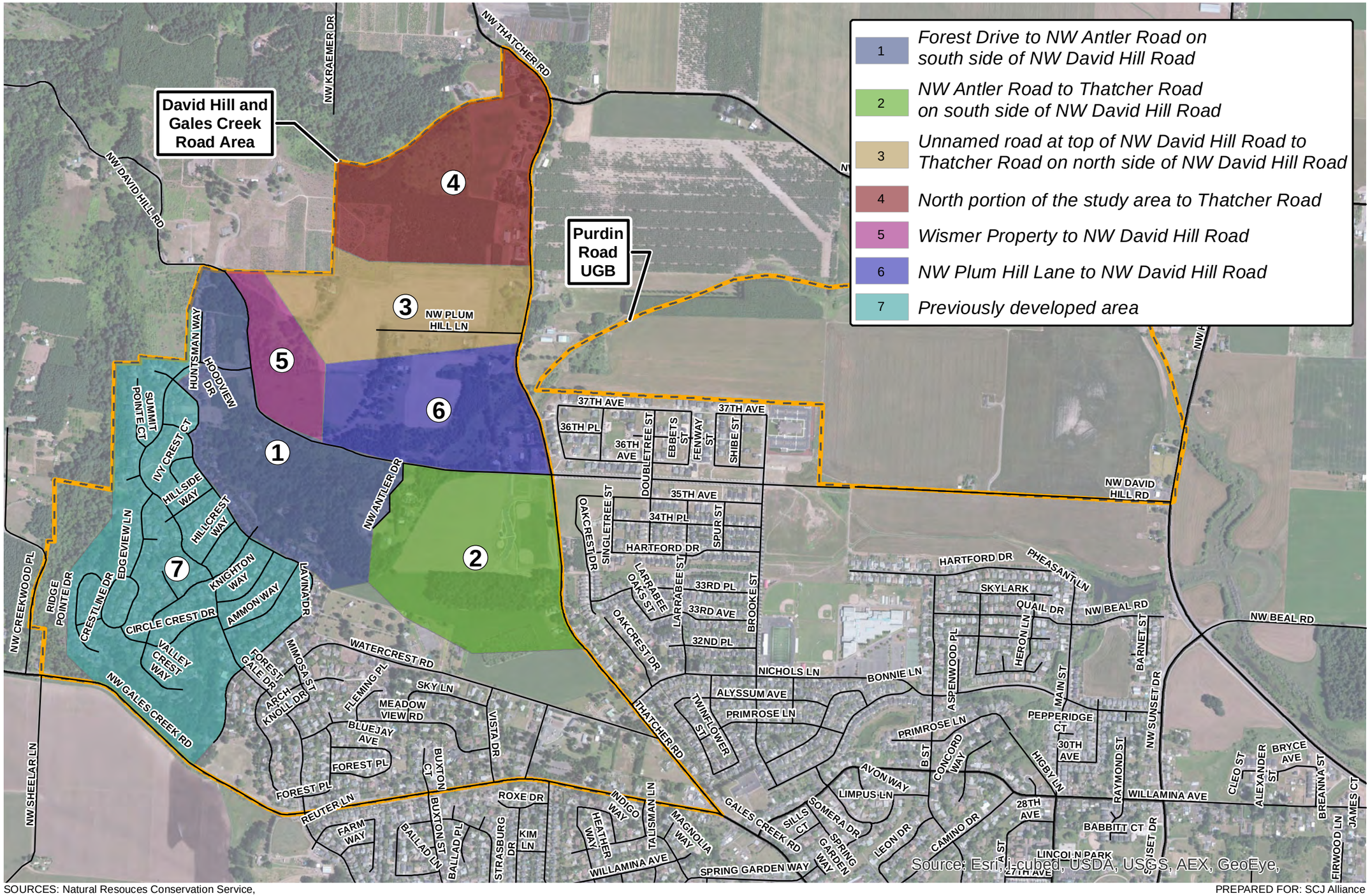
FEMA 100-YEAR FLOOD HAZARD

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE 9

L:\Projects\73000\73100-73199\73121_FirstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig9_FEMA 100-Year Flood.mxd



SOURCES: Natural Resouces Conservation Service,
United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

PREPARED FOR: SCJ Alliance

Legend

Westside Study Areas — Streets — Arterial streets

DH&GCR GENERALIZED SLOPE AREAS

0 500 1,000 2,000
Feet
1 inch = 1,000 feet

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FOREST GROVE WESTSITE PLANNING PROJECT
FOREST GROVE, OREGON

PROJECT	73121.000
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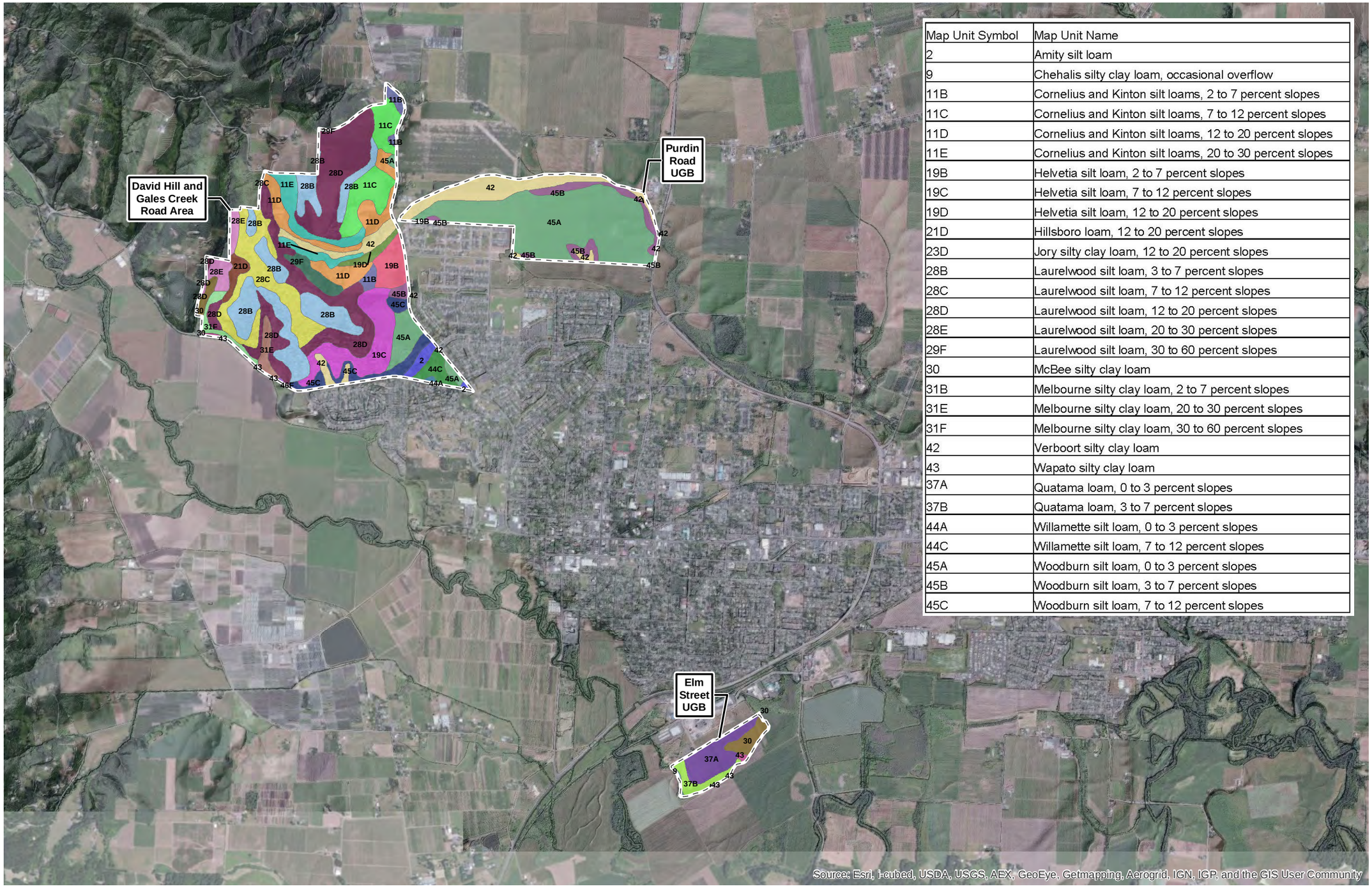
FIGURE	10

L:\Projects\73000\73100-73199\73121 FirstGroveWestsidePlanning\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig10_DHGCR_Areas_11x17.mxd



Map Unit Symbol	Map Unit Name
2	Amity silt loam
9	Chehalis silty clay loam, occasional overflow
11B	Cornelius and Kinton silt loams, 2 to 7 percent slopes
11C	Cornelius and Kinton silt loams, 7 to 12 percent slopes
11D	Cornelius and Kinton silt loams, 12 to 20 percent slopes
11E	Cornelius and Kinton silt loams, 20 to 30 percent slopes
19B	Helvetia silt loam, 2 to 7 percent slopes
19C	Helvetia silt loam, 7 to 12 percent slopes
19D	Helvetia silt loam, 12 to 20 percent slopes
21D	Hillsboro loam, 12 to 20 percent slopes
23D	Jory silty clay loam, 12 to 20 percent slopes
28B	Laurelwood silt loam, 3 to 7 percent slopes
28C	Laurelwood silt loam, 7 to 12 percent slopes
28D	Laurelwood silt loam, 12 to 20 percent slopes
28E	Laurelwood silt loam, 20 to 30 percent slopes
29F	Laurelwood silt loam, 30 to 60 percent slopes
30	McBee silty clay loam
31B	Melbourne silty clay loam, 2 to 7 percent slopes
31E	Melbourne silty clay loam, 20 to 30 percent slopes
31F	Melbourne silty clay loam, 30 to 60 percent slopes
42	Verboort silty clay loam
43	Wapato silty clay loam
37A	Quatama loam, 0 to 3 percent slopes
37B	Quatama loam, 3 to 7 percent slopes
44A	Willamette silt loam, 0 to 3 percent slopes
44C	Willamette silt loam, 7 to 12 percent slopes
45A	Woodburn silt loam, 0 to 3 percent slopes
45B	Woodburn silt loam, 3 to 7 percent slopes
45C	Woodburn silt loam, 7 to 12 percent slopes

SOURCES: Natural Resouces Conservation Service,
United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

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Legend

Westside Planning Study Area

NRCS SOILS

0 1,250 2,500 5,000
Feet
1 inch = 2,500 feet

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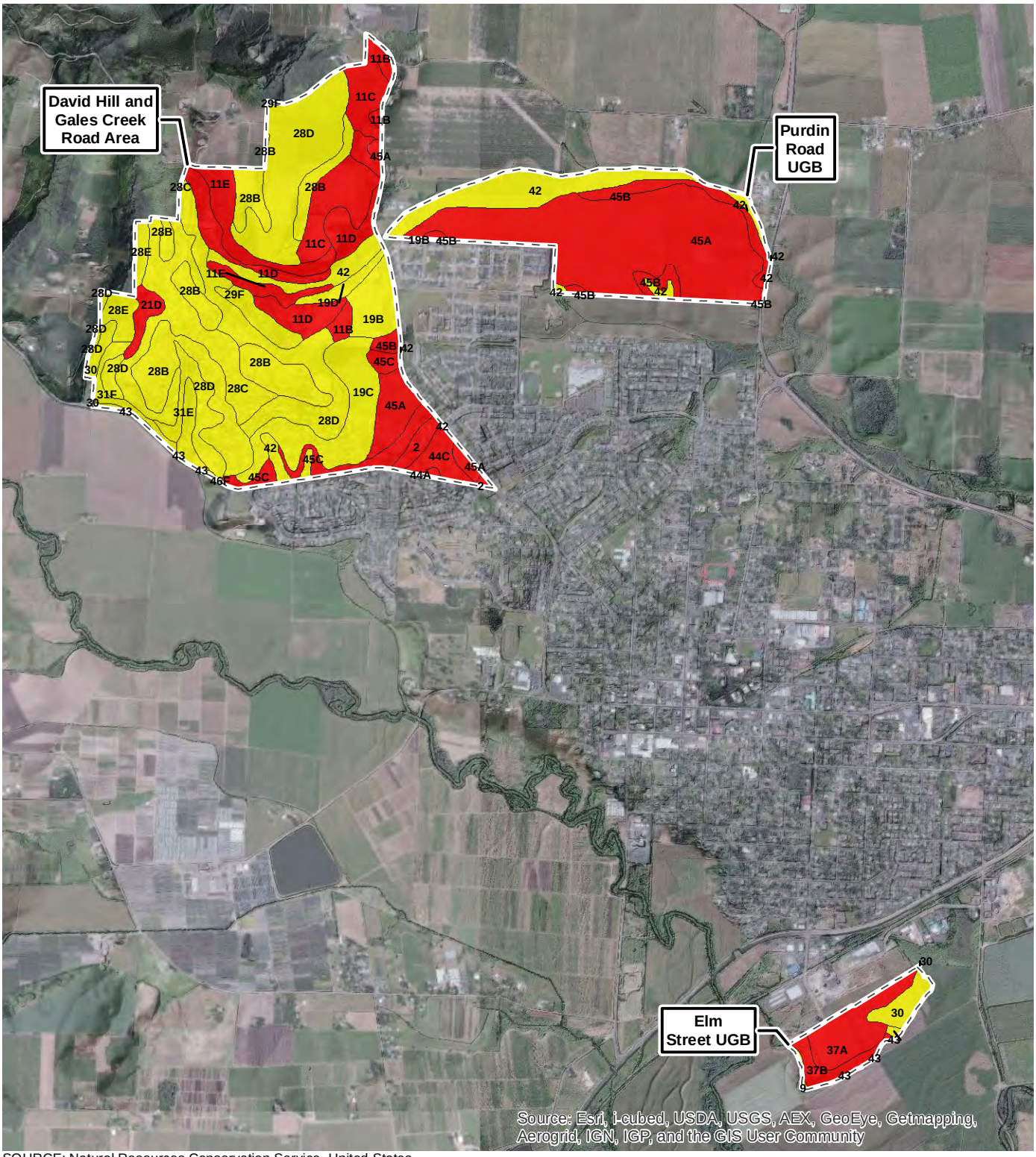
FIGURE	11

L:\Projects\73000\73100-73199\73121_FrstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig11_NRCS_Soils 11x17.mxd



SOURCE: Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

Legend

Westside Planning Study Area

Linear Extensibility

- Low (0 - 3)
- Moderate (3 - 6)
- High (6 - 9)
- Very High (9 - 30)

0 1,250 2,500 5,000 '

1 inch = 2,500 feet

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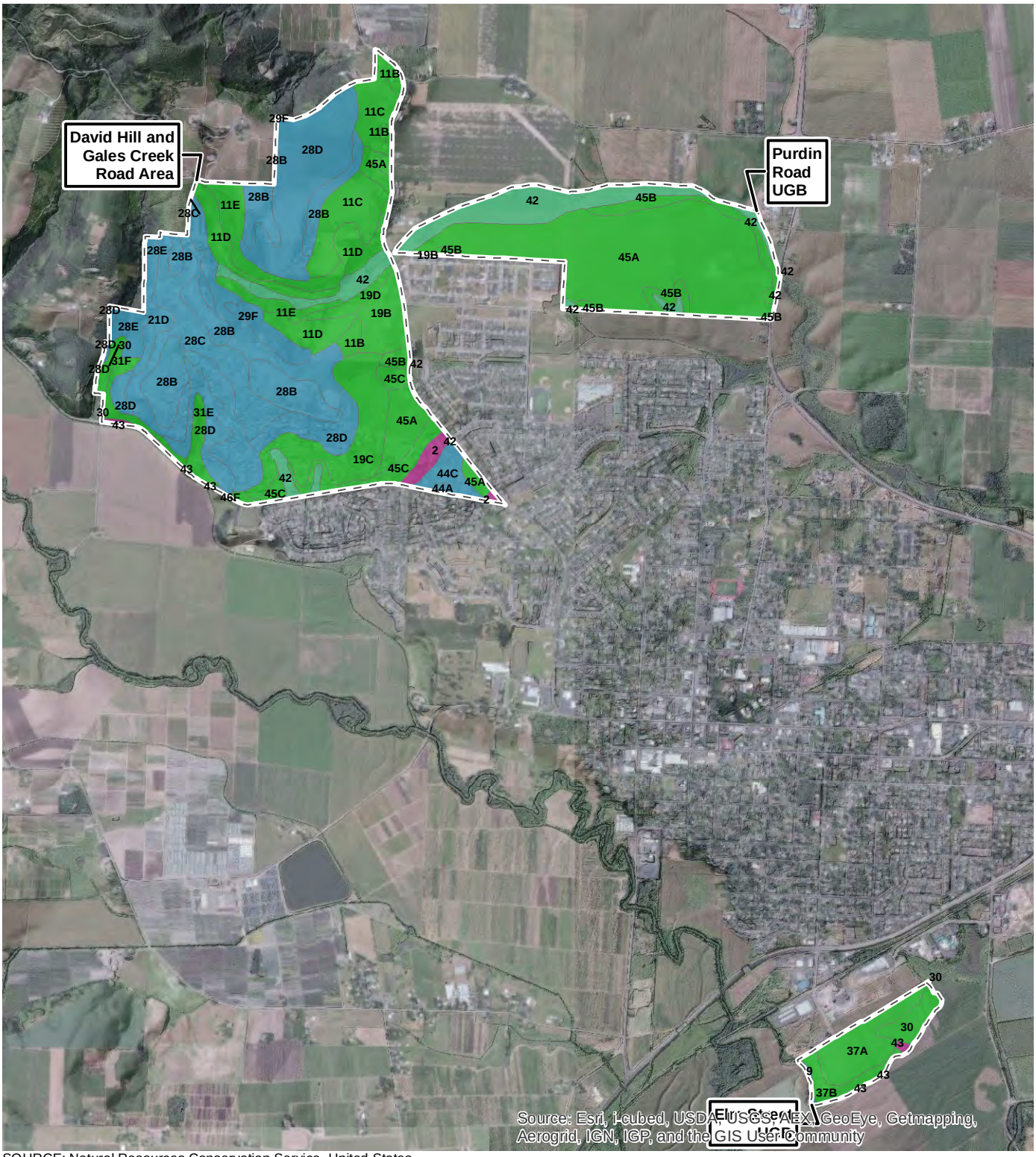
SOILS - LINEAR EXTENSIBILITY

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **12**

L:\Projects\73000\73100-73199\73121_FirstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig12_Soil_LinExt.mxd



SOURCE: Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

Legend

Westside Planning Study Area

Hydrologic Soil Group

- A
- A/D
- B
- B/D
- C
- C/D
- D

0 1,250 2,500 5,000 '

1 inch = 2,500 feet

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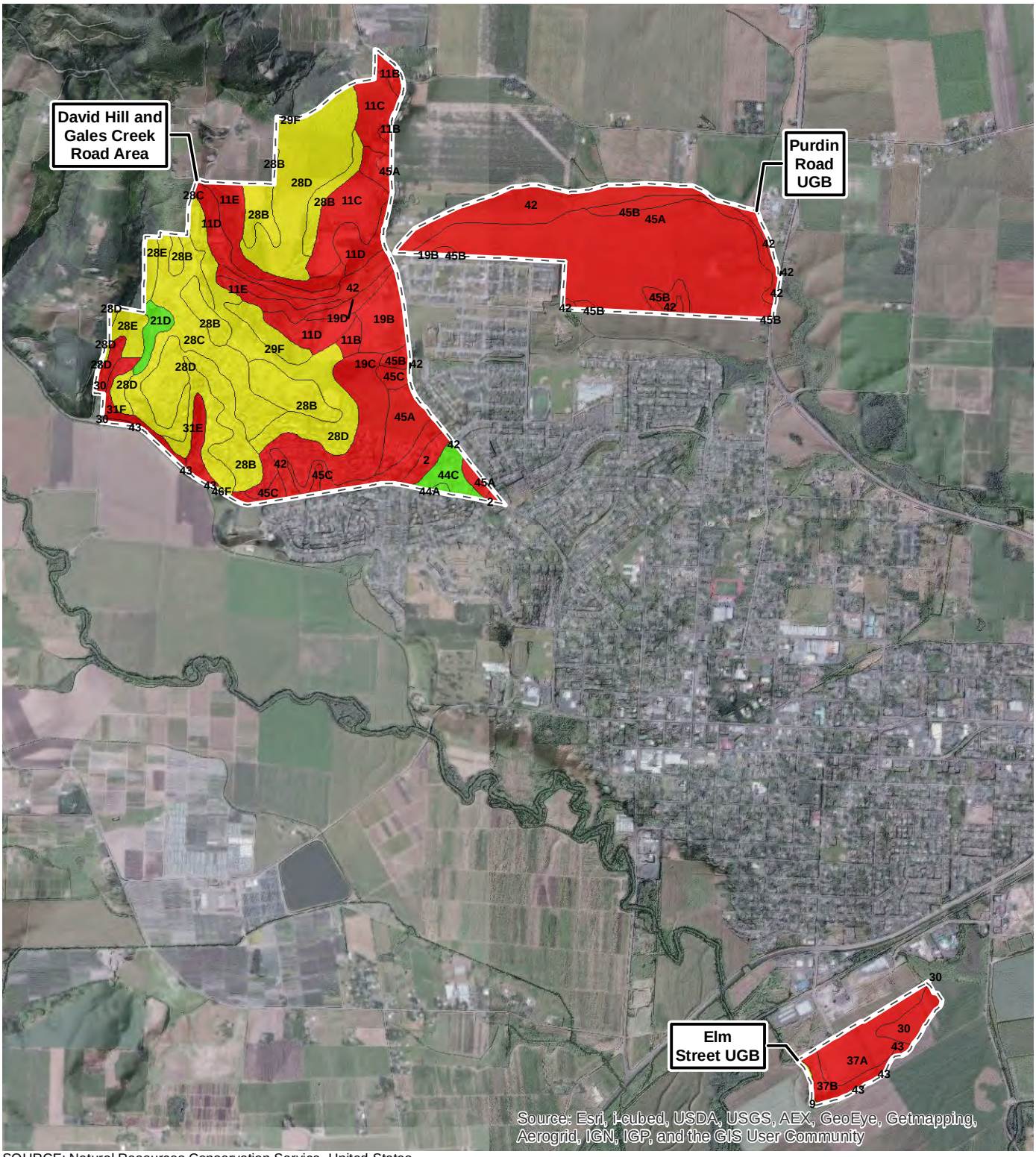
HYDROLOGIC SOIL GROUP

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **13**

L:\Projects\73000\73100-73199\73121_FirstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig13_Soil_HydGrp.mxd



SOURCE: Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

Legend

Westside Planning Study Area

Corrosion of Steel

- Low
- Moderate
- High

0 1,250 2,500 5,000 '

1 inch = 2,500 feet

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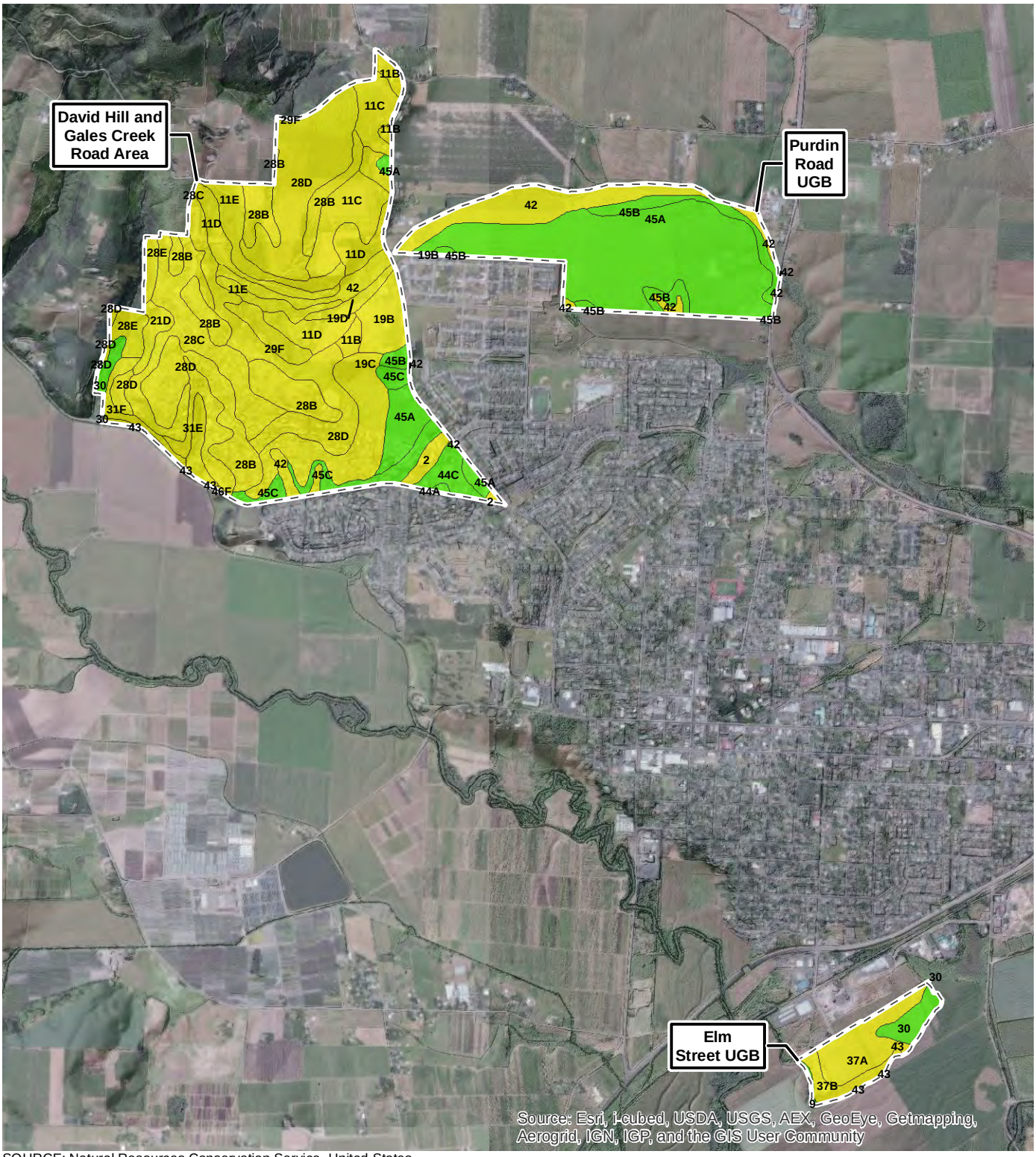
SOILS - CORROSION OF STEEL

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **14**

L:\Projects\73000\73100-73199\73121 FirstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig14 Steel.mxd



SOURCE: Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

Legend

Westside Planning Study Area

Corrosion of Concrete

- Low
- Moderate
- High

0 1,250 2,500 5,000 '

1 inch = 2,500 feet

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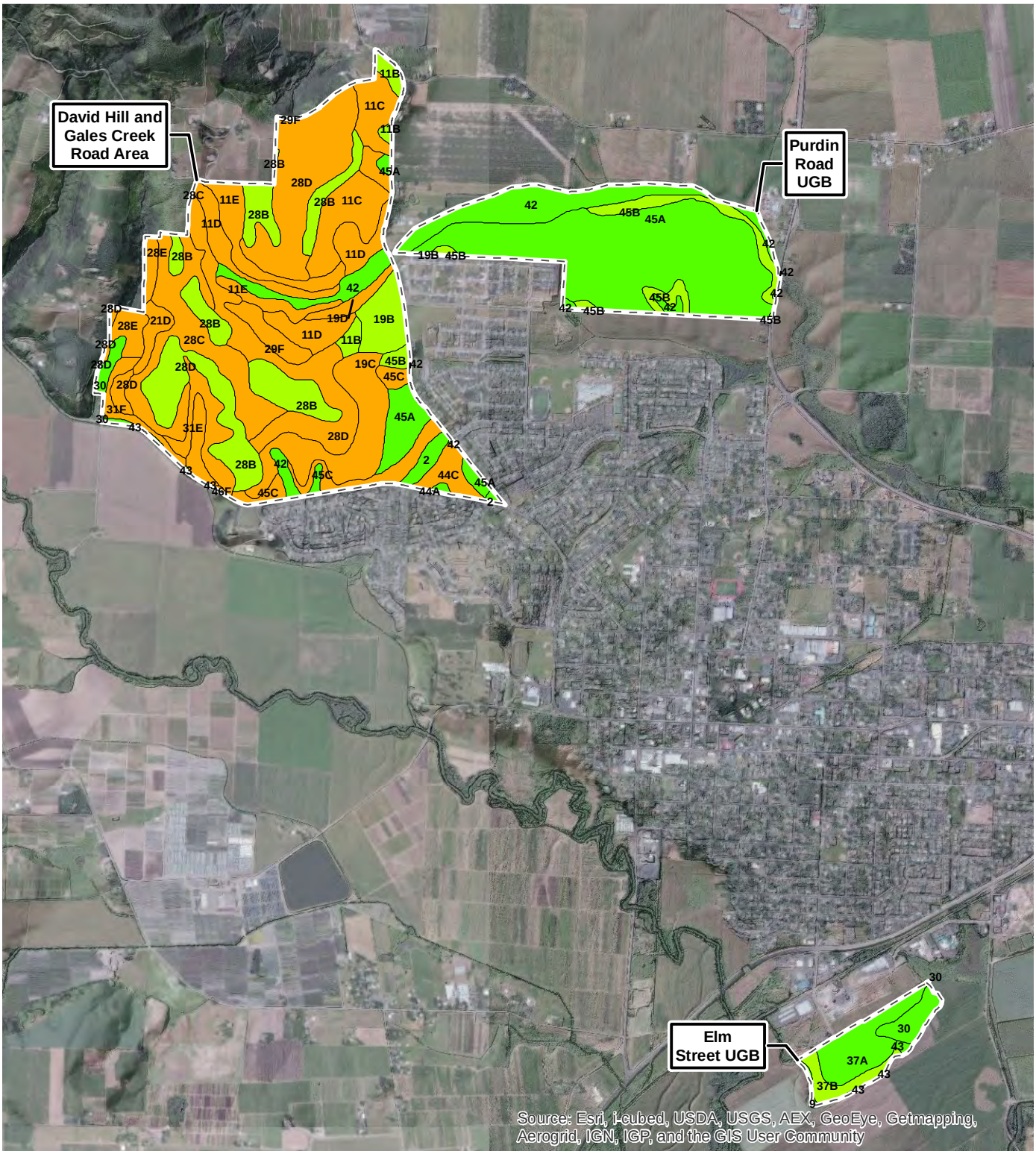
SOILS - CORROSION OF CONCRETE

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **15**

L:\Projects\73000\73100-73199\73121 FirstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig15 Concrete.mxd



SOURCE: Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

Legend

Westside Planning Study Area

Soil Erosion (Road, Trail)

- Very Severe
- Severe
- Moderate
- Slight

0 1,250 2,500 5,000 '

1 inch = 2,500 feet

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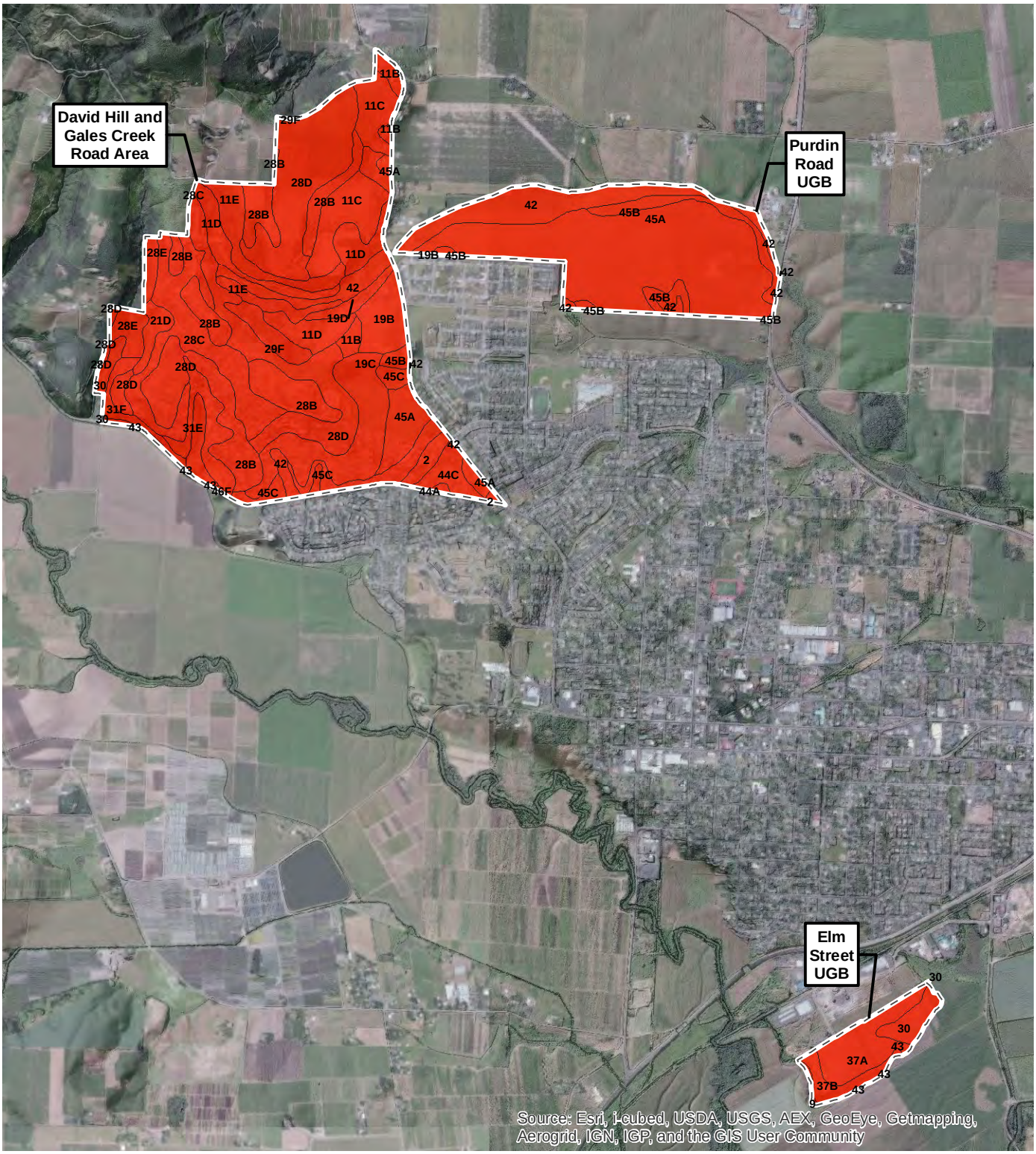
SOILS - EROSION HAZARD (ROADS AND TRAILS)

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **16**

L:\Projects\73000\73100-73199\73121_FirstGroveWestsidePlanning\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig16_ErosionRdsTrails.mxd



SOURCE: Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

Legend

Westside Planning Study Area

Local Roads and Streets

- Very limited
- Somewhat Limited
- Not Limited

0 1,250 2,500 5,000 '

1 inch = 2,500 feet

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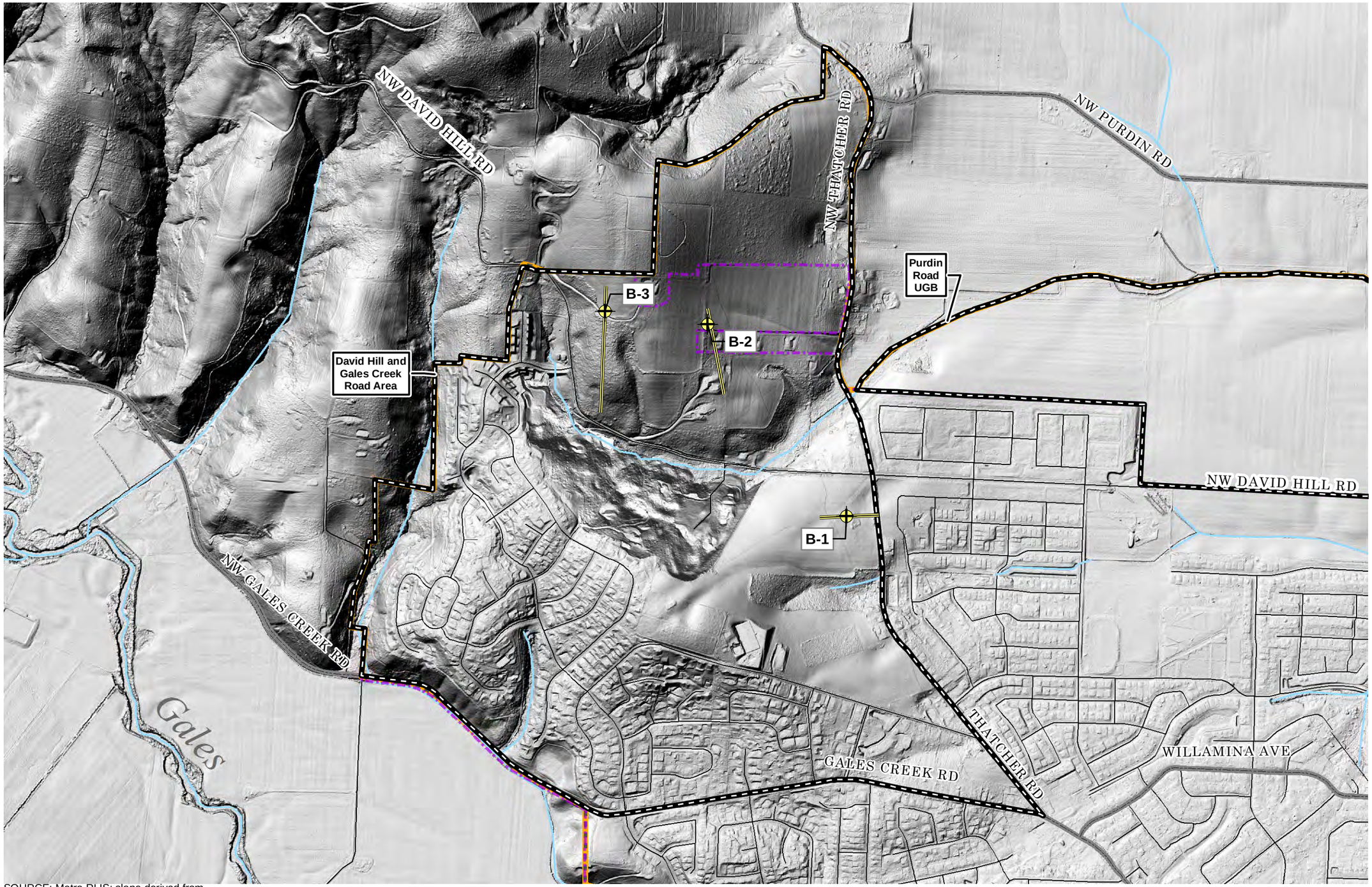
SOILS - LOCAL ROADS AND STREETS

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **17**

L:\Projects\73000\73100-73199\73121_FirstGroveWestsidePlanning\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig17_RdsStreet.mxd



SOURCE: Metro RLIS; slope derived from Oregon DOGAMI data and DEM acquired 10/28/2014

LEGEND

- Westside Planning Study Area
- Urban growth boundary
- Forest Grove City Boundary
- Borings
- Profile
- Arterial streets
- Streets
- Streams and water bodies

DAVID HILL & GALES CREEK ROAD AREA LIDAR

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0 500 1,000 2,000 '

1 inch = 1,000 feet

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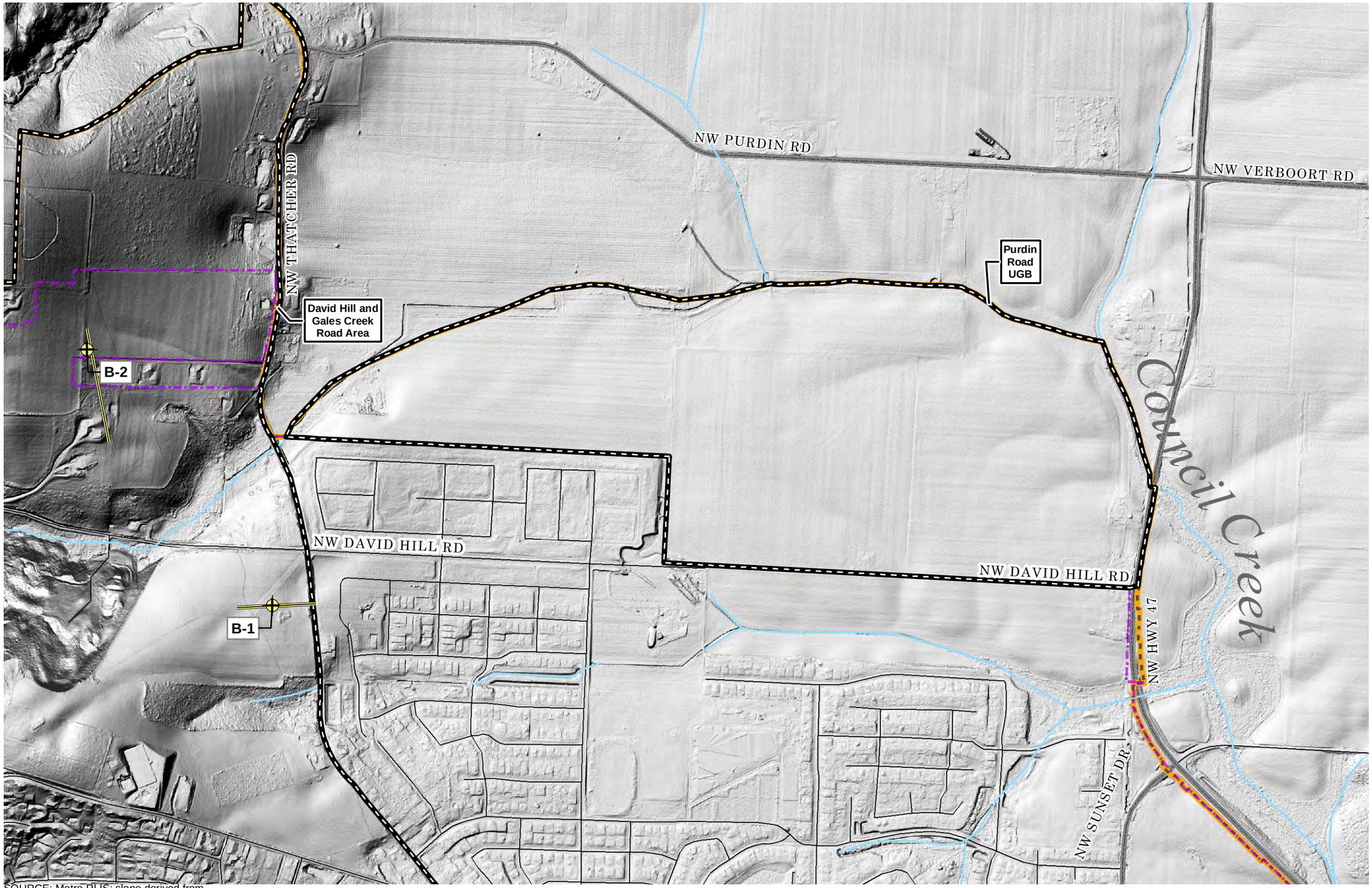
FIGURE	18

L:\Projects\73000\73100-73199\73121 FrstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig18 DHGC LiDAR.mxd



SOURCE: Metro RLIS; slope derived from Oregon DOGAMI data and DEM acquired 10/28/2014

PREPARED FOR: SCJ Alliance

LEGEND
- Westside Planning Study Area
- Urban growth boundary
- Forest Grove City Boundary
- Borings
- Profile
- Arterial streets
- Streets
- Streams and water bodies

PURDIN ROAD UGB
LIDAR

0 375 750 1,500 '

1 inch = 750 feet

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FOREST GROVE WESTSIDE PLANNING PROJECT

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PROJECT	73121.000
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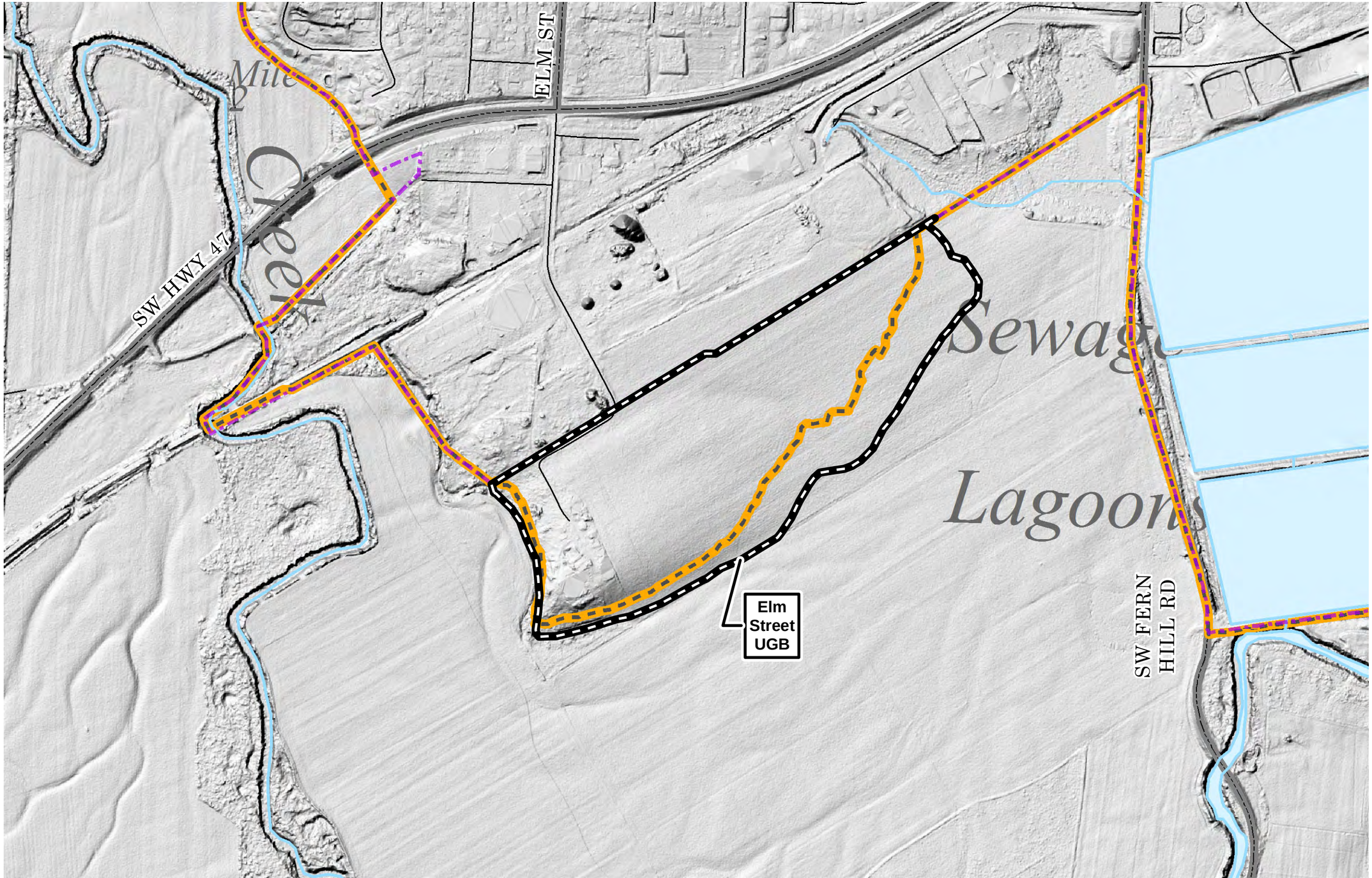
FIGURE	19

L:\Projects\73000\73100-73199\73121_FrstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig19_Purdin_LiDAR.mxd



SOURCE: Metro RLIS; slope derived from Oregon DOGAMI data and DEM acquired 10/28/2014

LEGEND

- Westside Planning Study Area
- Urban growth boundary
- Forest Grove City Boundary
- Arterial streets
- Streets
- Streams and water bodies

ELM STREET UGB LIDAR

PREPARED FOR: SCJ Alliance

0 250 500 1,000 '

1 inch = 500 feet

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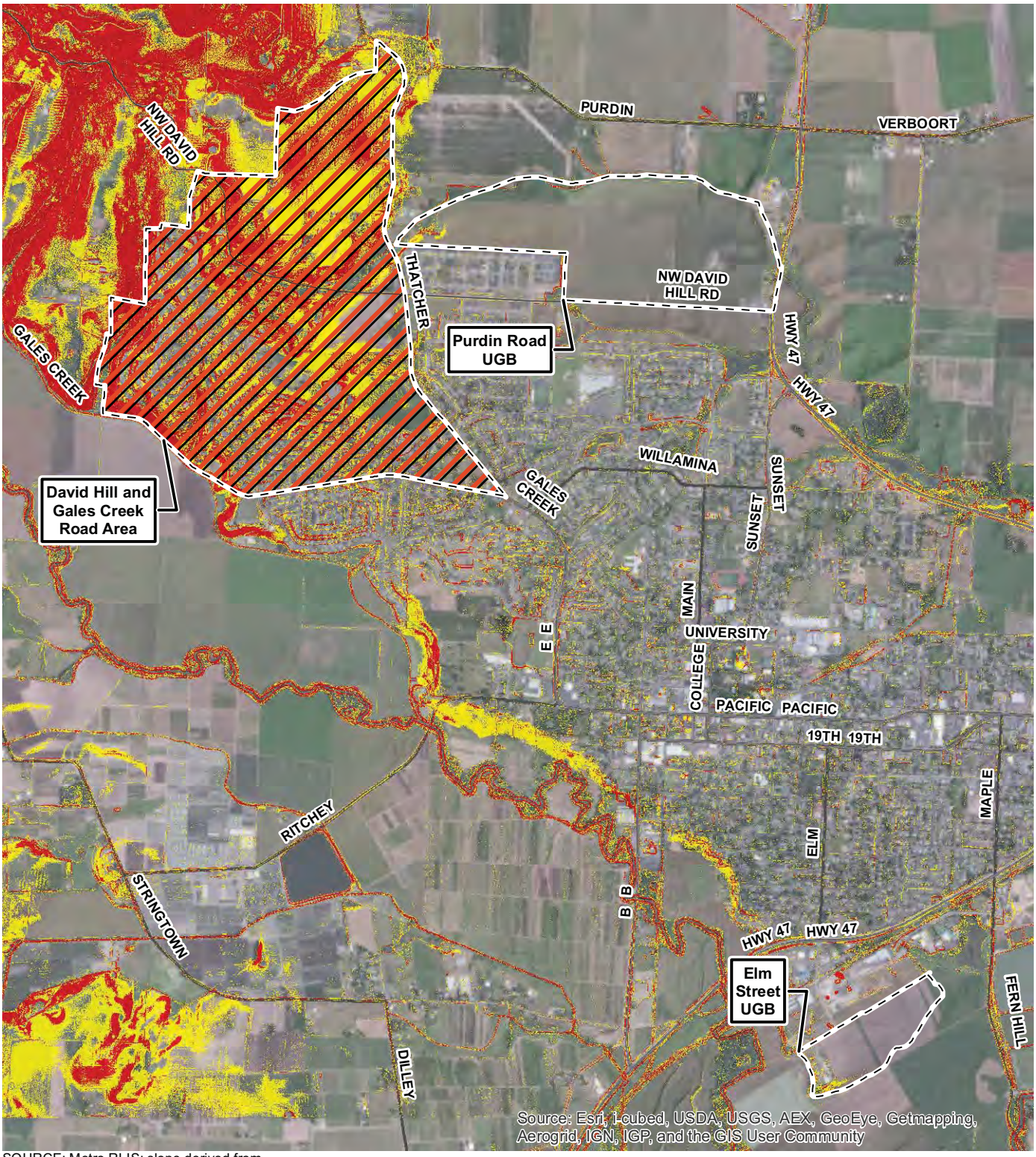
FOREST GROVE WESTSIDE PLANNING PROJECT

FOREST GROVE, OREGON

PROJECT	73121.000
DATE	JAN 2015
FIGURE	20

L:\Projects\73000\73100-73199\73121 FirstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig20 Elm LiDAR.mxd



SOURCE: Metro RLIS; slope derived from Oregon DOGAMI data and DEM acquired 10/28/2014

Legend

- Westside Planning Study Area
- Arterial streets
- > 20%
- 10-20%
- Landslide Study Zone - Possible

0 1,250 2,500 5,000 '

1 inch = 2,500 feet

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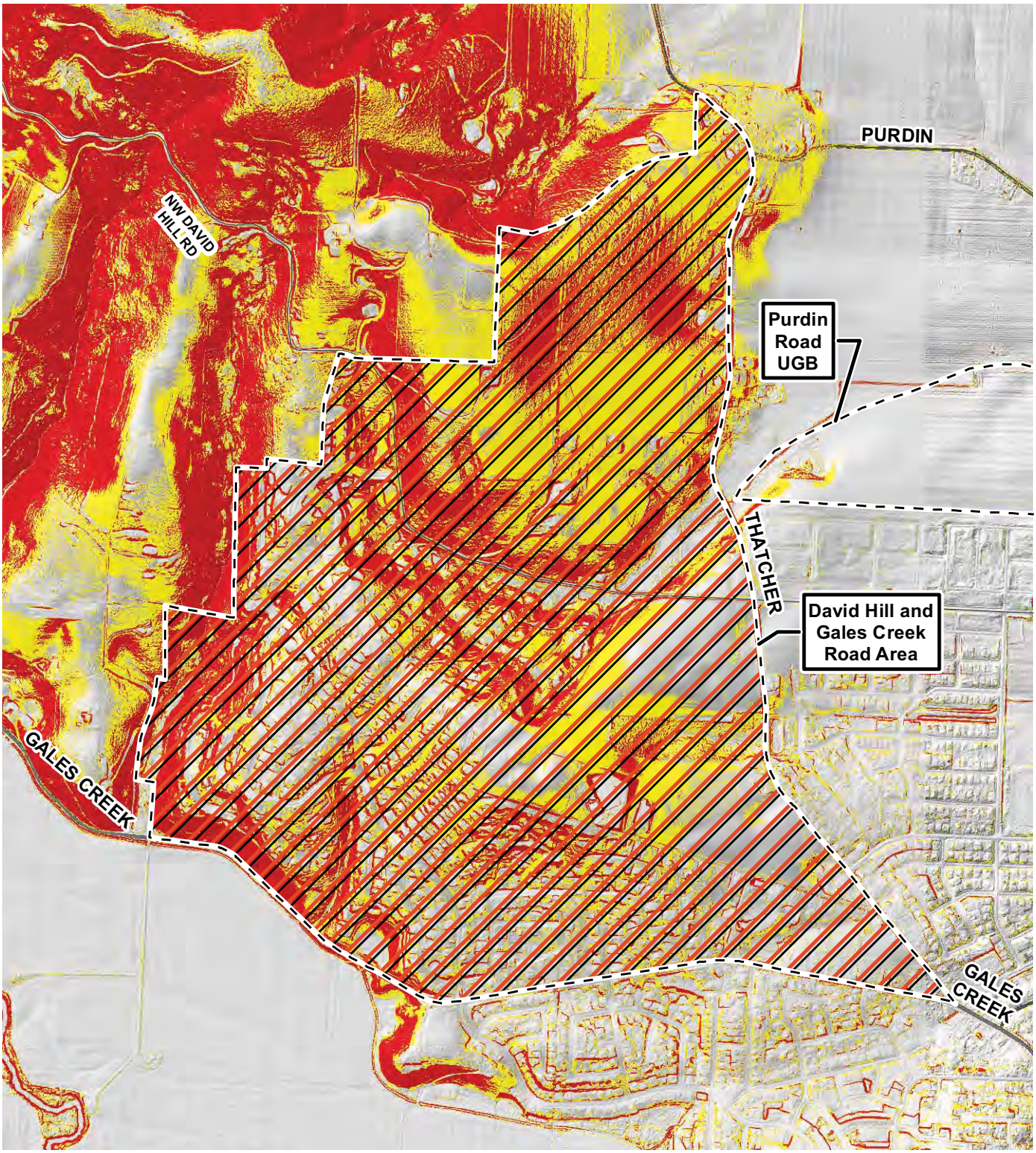
DATE JAN 2015

STUDY AREAS SLOPE PERCENTAGES

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE 21

L:\Projects\73000\73100-73199\73121_FirstGroveWestsidePlanning\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig21_LandslideHaz.mxd



SOURCE: Metro RLIS; slope derived from
Oregon DOGAMI data and DEM acquired 10/28/2014

Legend

- Westside Study Areas
- Arterial streets
- Slope 10-20%
- Slope >20%
- Landslide Study Zone -Possible

0 625 1,250 2,500 '

1 inch = 1,250 feet

PREPARED FOR: SCJ Alliance

L:\Projects\73000\73100-73199\73121 FrstGroveWestsidePlanng\Plans - Maps - Specs\GIS\MXD\Report Figures\Fig22 LandslideHaz DHGCR.mxd

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DH&GCR SLOPE PERCENTAGES

WESTSIDE PLANNING PROJECT
FOREST GROVE, OREGON

FIGURE **22**

ATTACHMENT A

Soil Classification Descriptions

ATTACHMENT A – SOIL CLASSIFICATION DESCRIPTIONS

Unified Soil Classification (Surface)

The Unified soil classification system classifies mineral and organic mineral soils for engineering purposes on the basis of particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: (i) coarse-grained soils having less than 50 percent, by weight, particles smaller than 0.074 mm in diameter; (ii) fine-grained soils having 50 percent or more, by weight, particles smaller than 0.074 mm in diameter; and (iii) highly organic soils that demonstrate certain organic characteristics. These divisions are further subdivided into a total of 15 basic soil groups. The major soil divisions and basic soil groups are determined on the basis of estimated or measured values for grain-size distribution and Atterberg limits. ASTM D 2487 shows the criteria chart used for classifying soil in the Unified system and the 15 basic soil groups of the system and the plasticity chart for the Unified system.

The various groupings of this classification correlate in a general way with the engineering behavior of soils. This correlation provides a useful first step in any field or laboratory investigation for engineering purposes. It can serve to make some general interpretations relating to probable performance of the soil for engineering uses.

For each soil horizon in the database one or more Unified soil classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.

AASHTO Group Classification

AASHTO group classification is a system that classifies soils specifically for geotechnical engineering purposes that are related to highway and airfield construction. It is based on particle-size distribution and Atterberg limits, such as liquid limit and plasticity index. This classification system is covered in AASHTO Standard No. M 145-82. The classification is based on that portion of the soil that is smaller than 3 inches in diameter.

The AASHTO classification system has two general classifications: (i) granular materials having 35 percent or less, by weight, particles smaller than 0.074 mm in diameter and (ii) silt-clay materials having more than 35 percent, by weight, particles smaller than 0.074 mm in diameter. These two divisions are further subdivided into seven main group classifications, plus eight subgroups, for a total of fifteen for mineral soils. Another class for organic soils is used.

For each soil horizon in the database one or more AASHTO Group Classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.

Depth to Restrictive Layer

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to any type of restrictive layer that is described for each map unit. If more than one type of restrictive layer is described for an individual soil type, the depth to

the shallowest one is presented. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Natural Drainage Class
"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized- excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Capacity of Most Limiting Layer to transmit Water
Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Depth to Water Table
"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Frequency of Flooding
Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Frequency of Ponding
Ponding is standing water in a closed depression. The water is removed only by deep percolation, transpiration, or evaporation or by a combination of these processes. Ponding frequency classes are based on the number of times that ponding occurs over a given period. Frequency is expressed as none, rare, occasional, and frequent.

"None" means that ponding is not probable. The chance of ponding is nearly 0 percent in any year.

"Rare" means that ponding is unlikely but possible under unusual weather conditions. The chance of ponding is nearly 0 percent to 5 percent in any year.

"Occasional" means that ponding occurs, on the average, once or less in 2 years. The chance of ponding is 5 to 50 percent in any year.

"Frequent" means that ponding occurs, on the average, more than once in 2 years. The chance of ponding is more than 50 percent in any year.

Linear Extensibility (Shrink/Swell) (Figure 12)
Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A

"representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Hydrologic Soil Group (Figure 13)
Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A – Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B – Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C – Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D – Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in Group D are assigned to dual classes.

Corrosion of Steel (Figure 14)
"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Corrosion of Concrete (Figure 15)
"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Farmland Classification
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Erosion Hazard (Road, Trail) (Figure 16)
The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments.

The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site.

Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Mechanical Site Preparation (Surface)
The ratings in this interpretation indicate the suitability for use of surface-altering soil tillage equipment during site preparation in forested areas. The ratings are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

The ratings are both verbal and numerical. Rating class terms indicate the degree to which the soils are suited to this aspect of forestland management. The soils are described as "well suited," "poorly suited," or "unsuited" to this management activity. "Well suited" indicates that the soil has features that are favorable for the specified kind of site preparation and has no limitations. Good performance can be expected, and little or no maintenance is needed. "Poorly suited" indicates that the soil has one or more properties that are unfavorable for the specified kind of site preparation. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. "Unsuited" indicates that the expected performance of the soil is unacceptable for the specified kind of site preparation or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Mechanical Site Preparation (Deep)
The ratings in this interpretation indicate the suitability for the use of deep soil tillage equipment during site preparation in forested areas. The ratings are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

The ratings are both verbal and numerical. Rating class terms indicate the degree to which the soils are suited to this aspect of forestland management. The soils are described as "well

suited," "poorly suited," or "unsuited" to this management activity. "Well suited" indicates that the soil has features that are favorable for the specified kind of site preparation and has no limitations. Good performance can be expected, and little or no maintenance is needed. "Poorly suited" indicates that the soil has one or more properties that are unfavorable for the specified kind of site preparation. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. "Unsuited" indicates that the expected performance of the soil is unacceptable for the specified kind of site preparation or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Soil Rutting Hazard

The ratings in this interpretation indicate the hazard of surface rut formation through the operation of forestland equipment. Soil displacement and puddling (soil deformation and compaction) may occur simultaneously with rutting.

Ratings are based on depth to a water table, rock fragments on or below the surface, the Unified classification of the soil, depth to a restrictive layer, and slope. The hazard is described as slight, moderate, or severe. A rating of "slight" indicates that the soil is subject to little or no rutting. "Moderate" indicates that rutting is likely. "Severe" indicates that ruts form readily.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented

to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Suitability for Roads (Natural Surface)(OR)
The ratings in this interpretation indicate the suitability for using the natural surface of the soil for roads. The ratings are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification of the soil, depth to a water table, ponding, flooding, and the hazard of soil slippage.

The ratings are both verbal and numerical. The soils are described as "well suited," "moderately suited," or "poorly suited" to this use. "Well suited" indicates that the soil has features that are favorable for the specified kind of roads and has no limitations. Good performance can be expected, and little or no maintenance is needed. "Moderately suited" indicates that the soil has features that are moderately favorable for the specified kind of roads. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. "Poorly suited" indicates that the soil has one or more properties that are unfavorable for the specified kind of roads. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed on the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Local Roads and Streets (Figure 17)
Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material

(concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

ATTACHMENT B

Soil Boring Logs

PBS Engineering + Environmental
4412 SW Corbett Avenue
Portland, Oregon 97239
Phone: 503.248.1939
Fax: 866.727.0140

WEST SIDE PLANNING PROJECT
FOREST GROVE, OREGON

PBS PROJECT NUMBER:
73121.000

BORING B-1

APPROX. BORING B-1 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION NOTE: 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	BLOW COUNT / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC% (0 – 50 – 100)	INSTALLATION AND COMMENTS Surface Conditions: Grass lawn
0.0		Topsoil (6 inches)	0.5				
		Medium stiff light brown LEAN CLAY (CL); medium plasticity; moist.			S-1	8	
		Medium stiff red brown FAT CLAY (CL); high plasticity; moist.	4.0		S-2	7	
5.0		Medium stiff to very stiff red brown SILT (ML); low plasticity; moist.	7.0		S-3	8	
10.0					S-4	15	
		Very stiff red LEAN CLAY (CL); medium plasticity; moist.	14.0		S-5	15	
15.0		Very stiff red FAT CLAY (CH); high plasticity; moist.	18.0		S-6	18	
20.0		Boring complete at 21.5 ft bgs Groundwater not observed at time of exploration	21.5				
25.0							
30.0							

DRILLING METHOD: Mud Rotary
DRILLED BY: Western States Soil Conservation, Inc.
LOGGED BY: B. Portwood

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT:
LOGGING COMPLETED: 11/14/14

FIGURE B1

BORING LOG 73121 BORINGS B1 THRU B3.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 12/5/14:MS

PBS Engineering + Environmental
4412 SW Corbett Avenue
Portland, Oregon 97239
Phone: 503.248.1939
Fax: 866.727.0140

WEST SIDE PLANNING PROJECT
FOREST GROVE, OREGON

PBS PROJECT NUMBER:
73121.000

BORING B-2

APPROX. BORING B-2 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION NOTE: 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	▲ BLOW COUNT ◇ DYNAMIC CONE PENETROMETER ● MOISTURE CONTENT % ▥ RQD% ▨ CORE REC% (0 – 50 – 100)	INSTALLATION AND COMMENTS Surface Conditions: Gravel driveway
0.0		3/4"-0 crushed rock	0.3				
		Medium stiff light brown SILT (ML); low plasticity; moist.			S-1	8	
5.0					S-2	10	
					S-3	4	
		Very stiff light red brown spotted dark brown SILT (ML); low plasticity; moist.	9.0				
10.0					SH-4		
				PP	S-5	16	PP = 4.5 Tsf tsf
15.0					S-6	15	
		Stiff red LEAN CLAY (CL); medium plasticity; moist.	18.0				
20.0					S-7	14	
25.0					S-8	12	
30.0					S-9	12	
		Boring complete at 31.5 ft bgs Groundwater not observed at time of drilling	31.5				

DRILLING METHOD: Mud Rotary
DRILLED BY: Western States Soil Conservation, Inc.
LOGGED BY: B. Portwood

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT:
LOGGING COMPLETED: 11/14/14

FIGURE B2

BORING LOG 73121 BORINGS B1 THRU B3.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 12/5/14:MS

PBS Engineering + Environmental
4412 SW Corbett Avenue
Portland, Oregon 97239
Phone: 503.248.1939
Fax: 866.727.0140

WEST SIDE PLANNING PROJECT
FOREST GROVE, OREGON

PBS PROJECT NUMBER:
73121.000

BORING B-3

APPROX. BORING B-3 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION NOTE: 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	▲ BLOW COUNT ◇ DYNAMIC CONE PENETROMETER ● MOISTURE CONTENT % ▥ RQD% ▨ CORE REC% (0 – 50 – 100)	INSTALLATION AND COMMENTS Surface Conditions: AC driveway
0.0		Asphalt (2 inches)	0.3				
		3/4"-0 Crushed rock FILL	1.0				
		Medium stiff to stiff light brown LEAN CLAY (CL); medium plasticity; dry to moist.			S-1	12	
5.0					S-2	10	
					S-3	7	
		Stiff red brown LEAN CLAY (CL); medium plasticity; moist.	9.0				
10.0					S-4	14	
		Stiff red FAT CLAY (CH); high plasticity; moist.	14.0				
15.0					S-5	13	
20.0					S-6	12	
25.0					S-7	9	
		Stiff light yellow brown with red-brown and white streaks FAT CLAY (CH); high plasticity; moist to wet.	28.0				
30.0					S-8	11	
		Boring complete at 31.5 ft bgs Groundwater not observed at time of drilling	31.5				

DRILLING METHOD: Mud Rotary
DRILLED BY: Western States Soil Conservation, Inc.
LOGGED BY: B. Portwood

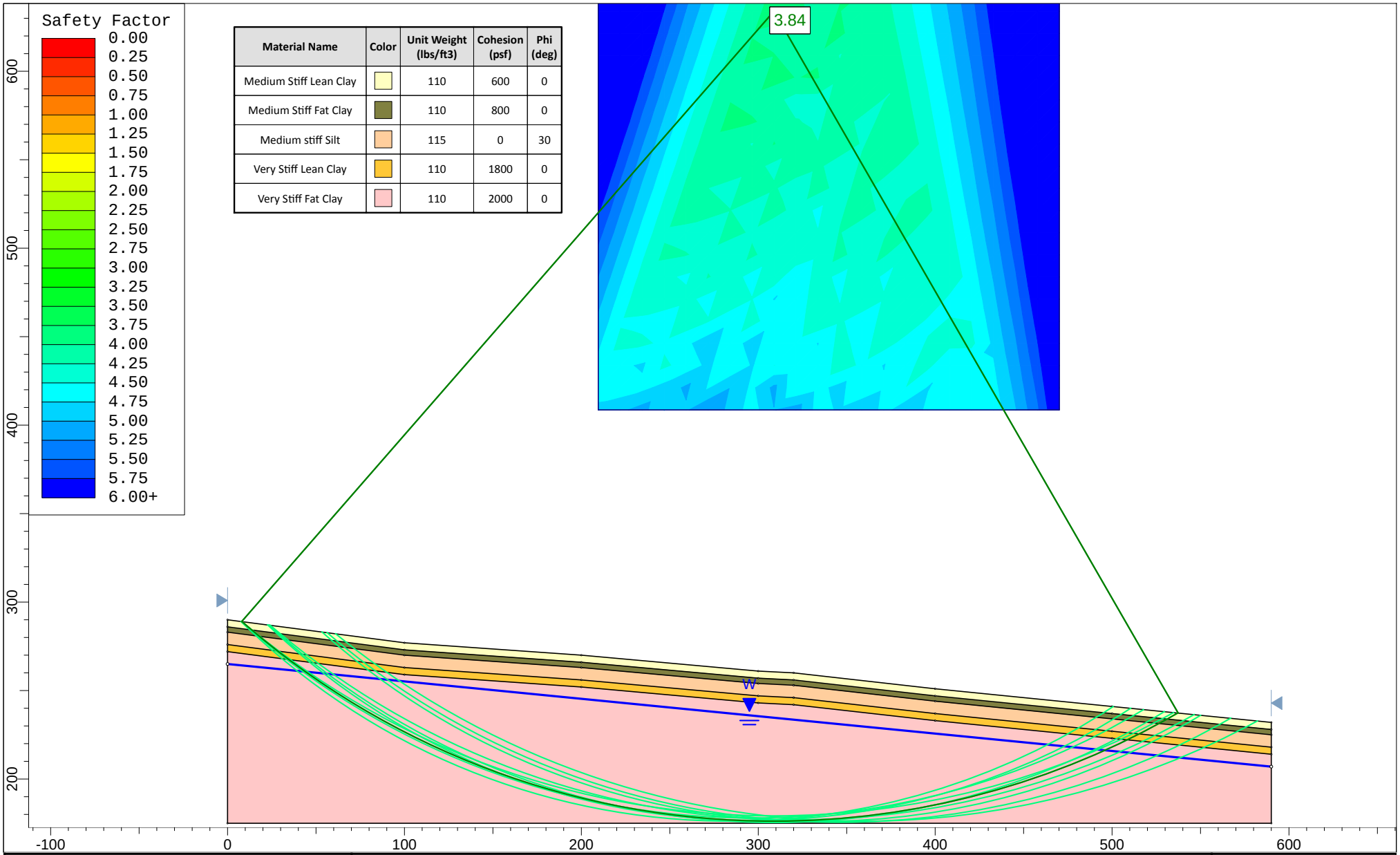
BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT:
LOGGING COMPLETED: 11/14/14

FIGURE B3

BORING LOG 73121 BORINGS B1 THRU B3.GPJ PBS DATATMPL GEO.GDT PRINT DATE: 12/5/14:MS

ATTACHMENT C

Preliminary Slope Stability Analyses



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Medium Stiff Lean Clay		110	600	0
Medium Stiff Fat Clay		110	800	0
Medium stiff Silt		115	0	30
Very Stiff Lean Clay		110	1800	0
Very Stiff Fat Clay		110	2000	0

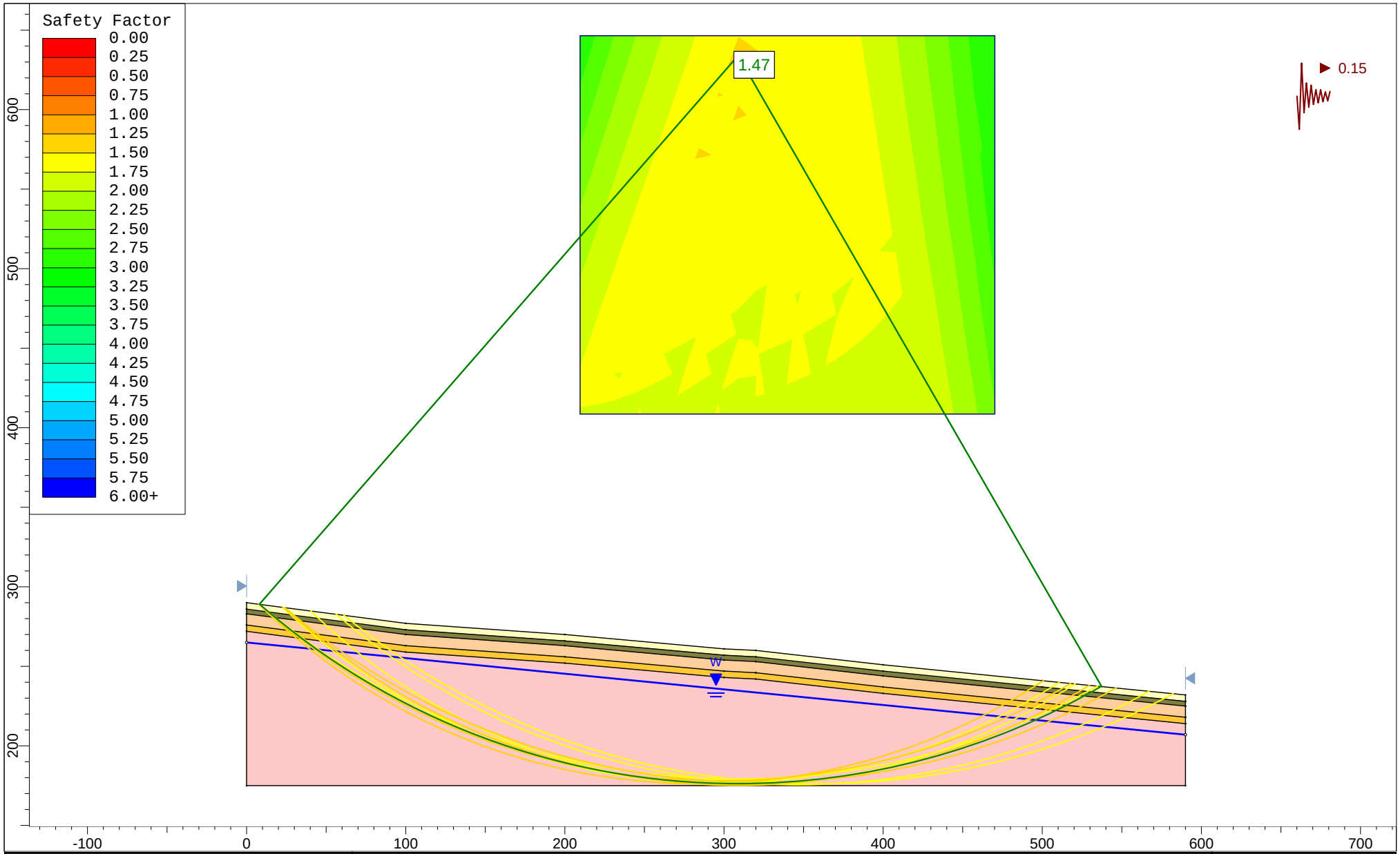
PBS Engineering + Environmental

SLIDEINTERPRET 6.025

Project	73121.000 Westside Planning - Forest Grove
Analysis Description	B-1 Static
Drawn By	R. White
Company	
Date	12/3/2014, 10:20:23 AM
File Name	B1.slim

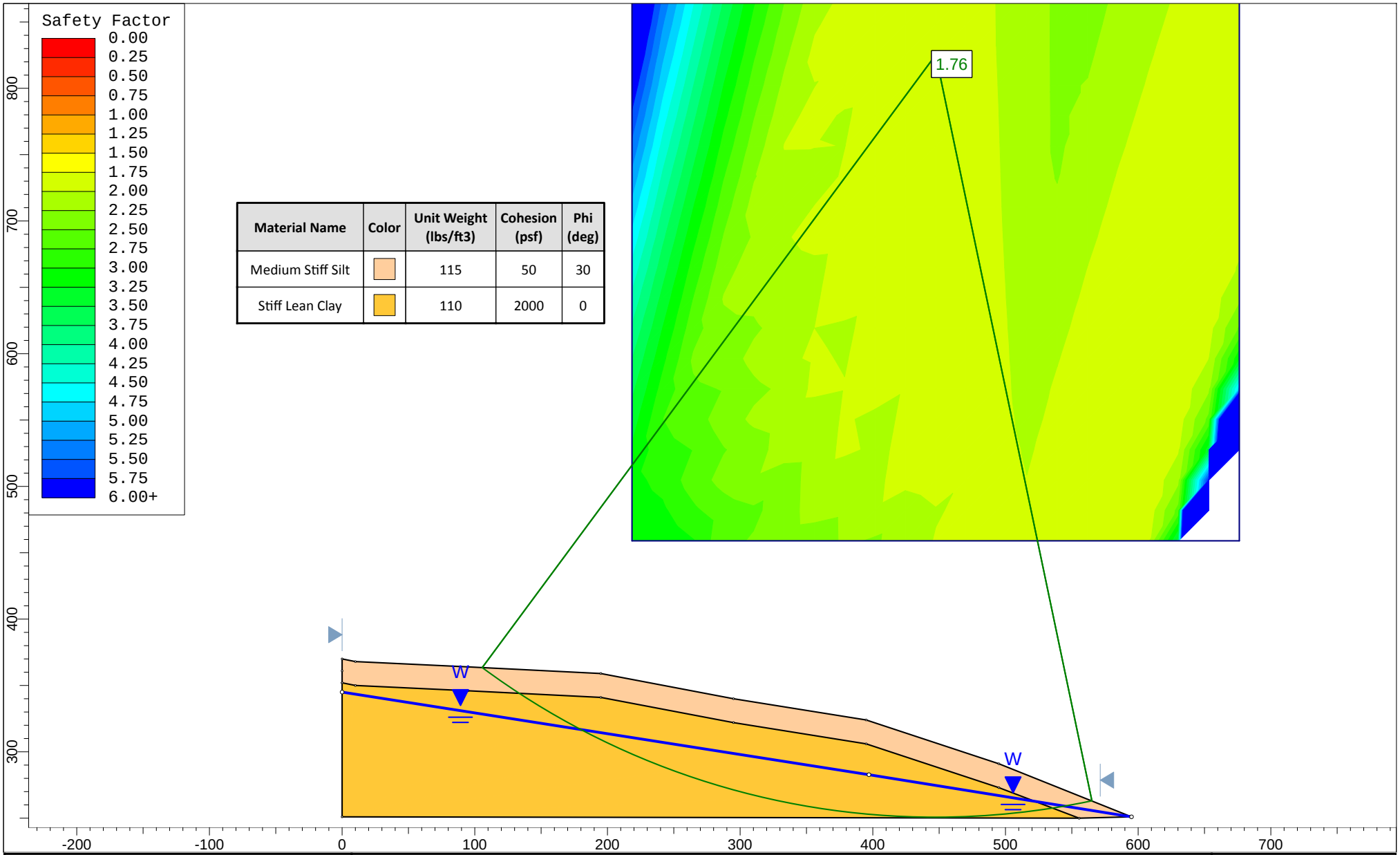
FIGURE:

C1



PBS Engineering + Environmental	Project: 73121.000 Westside Planning - Forest Grove		FIGURE:
	Analysis Description: B-1 Seismic		C2
	Drawn By: R. White	Company:	
	Date: 12/3/2014, 10:20:23 AM	File Name: B1_seismic.slim	

SLIDEINTERPRET 6.025



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Medium Stiff Silt		115	50	30
Stiff Lean Clay		110	2000	0

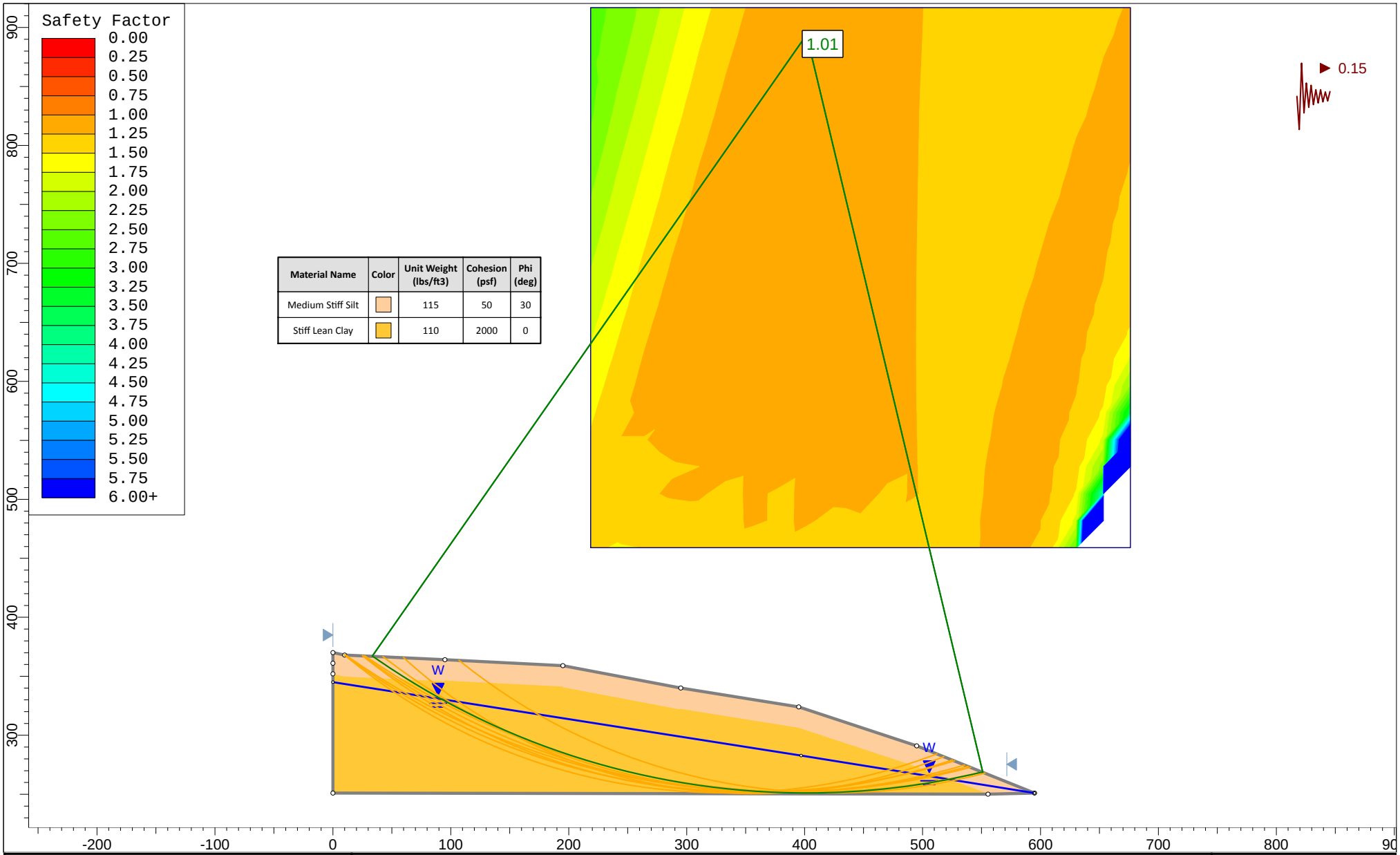
PBS Engineering + Environmental

SLIDEINTERPRET 6.025

Project	73121.000 Westside Planning - Forest Grove
Analysis Description	B-2 Static
Drawn By	R. White
Company	
Date	12/3/2014, 10:55:33 AM
File Name	B2.slim

FIGURE:

C3



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Medium Stiff Silt		115	50	30
Stiff Lean Clay		110	2000	0

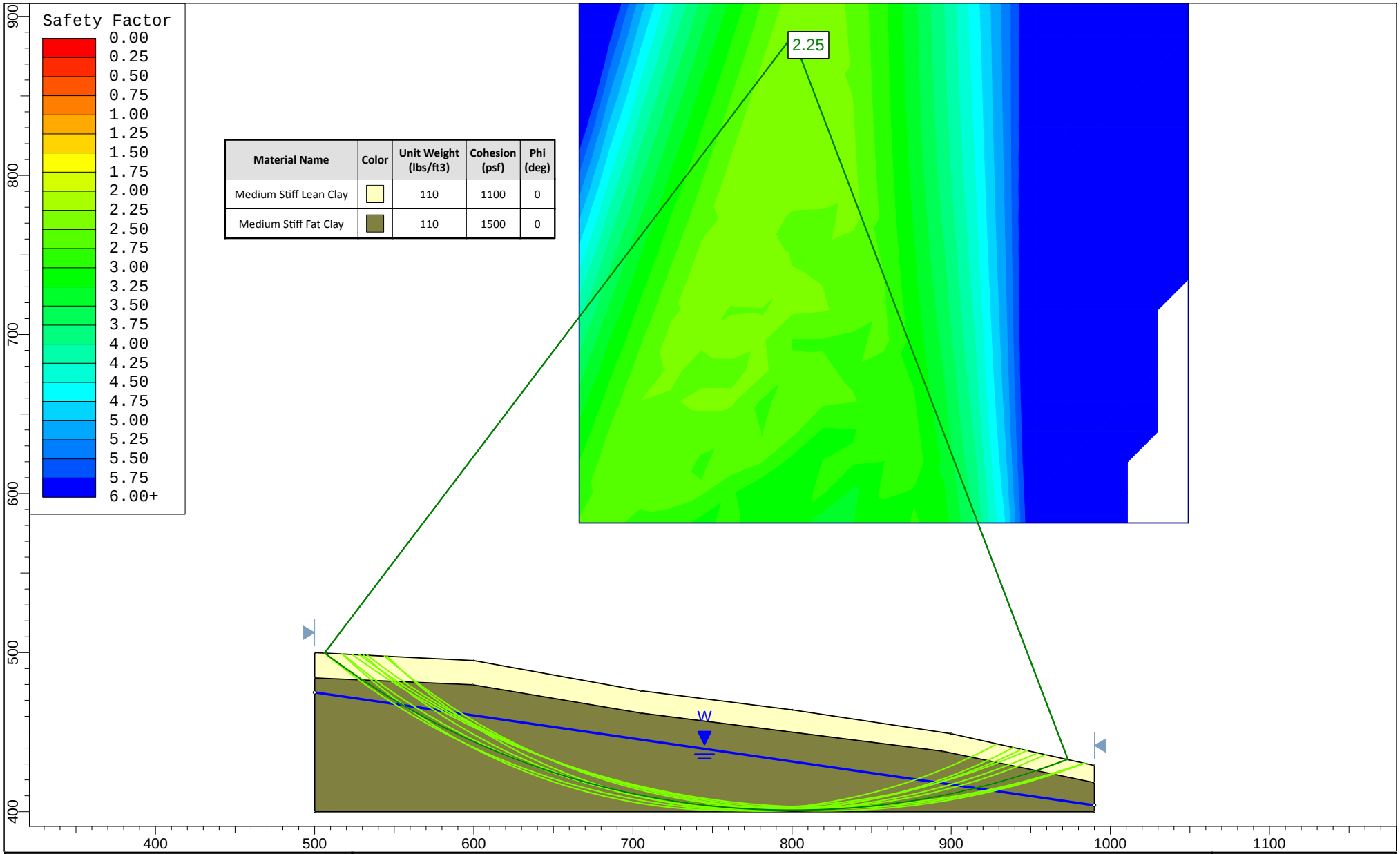
PBS Engineering + Environmental

SLIDEINTERPRET 6.025

Project	73121.000 Westside Planning - Forest Grove
Analysis Description	B-2 Seismic
Drawn By	R. White
Company	
Date	12/3/2014, 10:55:33 AM
File Name	B2_seismic.slim

FIGURE:

C4



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Medium Stiff Lean Clay		110	1100	0
Medium Stiff Fat Clay		110	1500	0

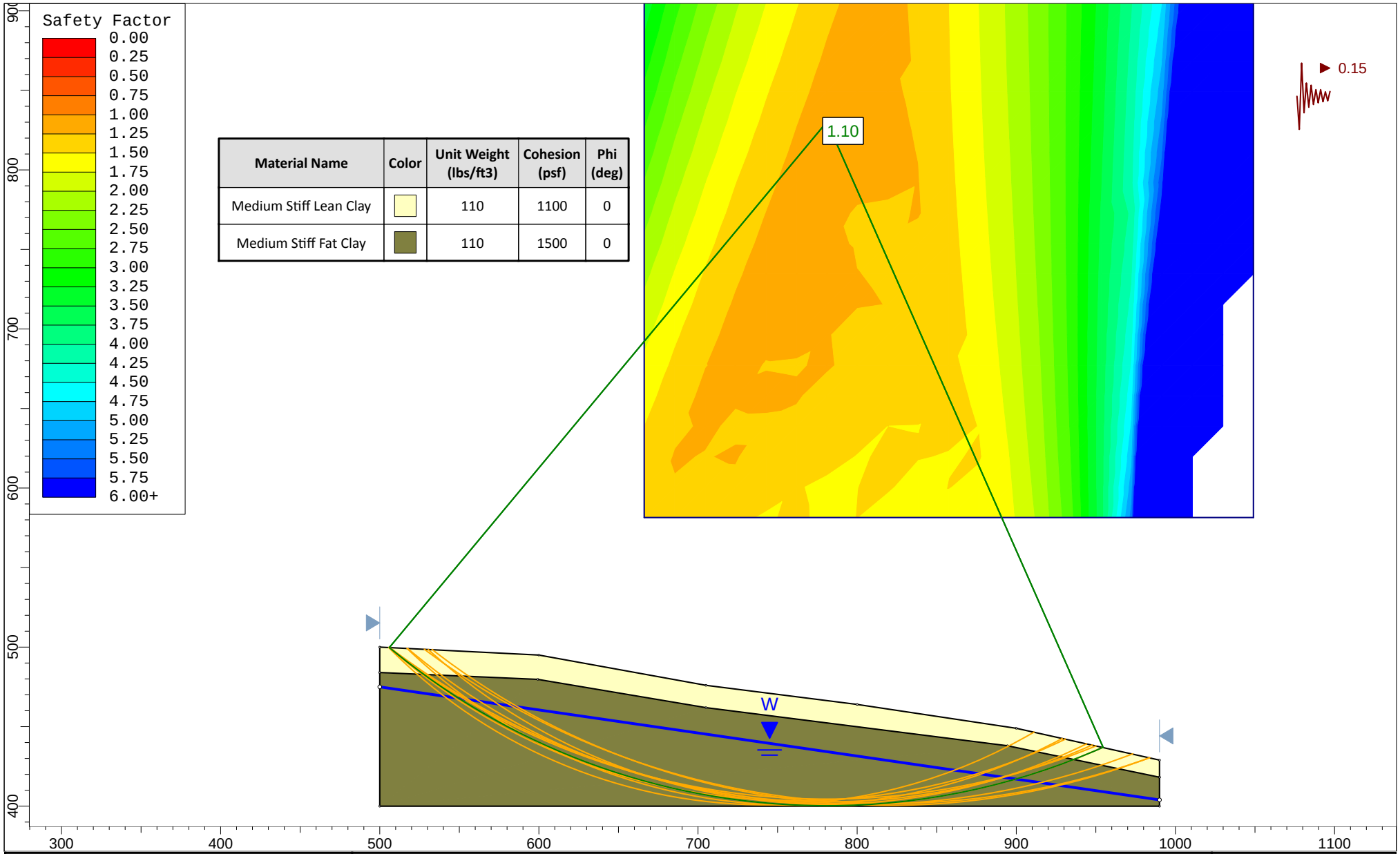
PBS Engineering + Environmental

SLIDEINTERPRET 6.025

Project	73121.000 Westside Planning - Forest Grove
Analysis Description	B-3 Static
Drawn By	R. White
Company	
Date	12/3/2014, 9:53:35 AM
File Name	B3.slim

FIGURE:

C5



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Medium Stiff Lean Clay		110	1100	0
Medium Stiff Fat Clay		110	1500	0

PBS Engineering + Environmental

SLIDEINTERPRET 6.025

Project	73121.000 Westside Planning - Forest Grove
Analysis Description	B-3 Seismic
Drawn By	R. White
Company	
Date	12/3/2014, 9:53:35 AM
File Name	B3_seismic.slim

FIGURE:

C6

SCJ ALLIANCE
CONSULTING SERVICES

MEMORANDUM

TO:	Jon Holan, Community Development Director City of Forest Grove
FROM:	Anne Sylvester, PTE and Jim Gibson, PE
DATE:	June 24, 2016
PROJECT #:	0742.01 Forest Grove Westside Planning Project
SUBJECT:	Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis

Introduction and Background

This memorandum presents an assessment of the key municipal infrastructure systems that needs to be in place to develop property in the Westside Planning Area. This infrastructure system includes: a collector level street system, a water service system, a sewer system and a stormwater management system. Included in the memorandum are:

- Maps that lay out the proposed systems for providing municipal services,
- Descriptive text that outlines key assumptions, findings and conclusions for each system, and
- Cost estimates for each road and for each element of the water, sewer and stormwater management systems.

As illustrated in Figure 1, two areas within the City of Forest Grove are included in the Westside Planning Project:

- David Hill planning area
- Purdin Road planning area

David Hill - The David Hill planning area is located in the northwestern portion of the City of Forest Grove and has been included in the Urban Growth Boundary (UGB) for several years. David Hill is one of the city's prime growth areas and over 90% of this area is projected to develop by 2025. While urban land use designations currently exist, the need for street and infrastructure planning is urgent. As noted in the figure, the David Hill planning area also incorporates an area between David Hill Road and Gales Creek Road. Much of this area is already developed but it is included to address the integration of land uses and transportation/urban service connectivity.

Purdin Road - The Purdin Road planning area is located east of David Hill and directly north of the city. Today it is predominately used for agricultural purposes. This area was added to the UGB through legislative action in 2014, but there has been no comprehensive planning to guide the designation of urban land uses or infrastructure development. The Westside Planning Project is intended to meet these needs.

Figure 1. Westside Planning Project Study Areas

Organization of This Memorandum

In addition to this Introduction, this memorandum includes five additional sections. These are:

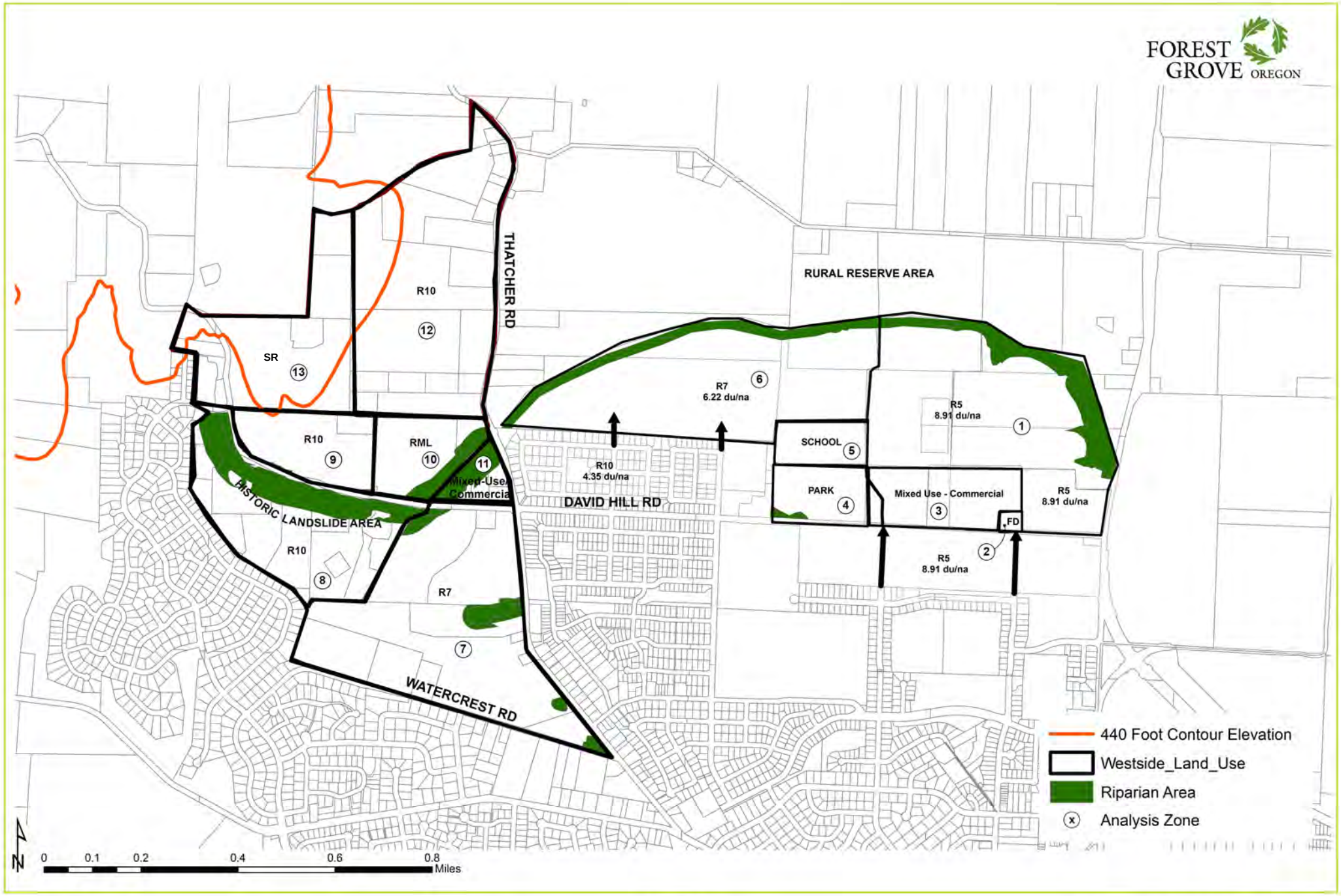
- Land Use Development Assumptions
- Internal Street System
- Sewer System
- Stormwater Management System
- Water System

Revised Land Use Development Assumptions

The development of municipal infrastructure to serve properties in the David Hill and Purdin Road planning areas is based on both the types of land uses that are envisioned for these areas and the magnitude of development that is anticipated.

As with the traffic impact analysis documented in a separate memorandum and conducted to identify roadway improvement needs, potential Transportation System Plan (TSP) amendments, and Transportation Planning Rule (TPR) compliance, the analysis of municipal utility infrastructure is based on the Westside Land Use Alternative as developed by the City and dated October 26, 2015. Figure 2 was developed by City staff to illustrate the component elements of this alternative.

This figure identifies a series of transportation zones by which different land uses are aggregated for analysis purposes. Table 1 includes detailed information concerning the specific land use types and



SCJ ALLIANCE
CONSULTING SERVICES

Figure 2
Revised Land Use Alternative (10/26/15)

Westside Planning Project
Forest Grove, OR

Table 1. Comparison of Existing Comprehensive Plan and Revised Alternative

		Revised Land Use Alternative (4/15/2016)							2014 Comprehensive Plan			
Zone	Area	Density (units/ac)	Net Ac	Slope Deduction	Dwelling Units	KSF	Acres	Employees	Density (units/ac)	Net Ac	Slope Deduction	Dwelling Units
1	Purdin (R5)	8.71	67.76	0%	590					67.76	0%	2
2	Fire Station		2.00	0%				3		2.00	0%	
3	Purdin (Residential)	12.0	18.50	0%	221					18.50	0%	
3	Purdin (Retail Commercial)[1]					46.5		46				
4	Purdin (Park)		10.98	0%			10.98			10.98	0%	
5	Purdin (Elementary School)[2]		11.96	0%		65.0				11.96	0%	
6	Purdin (R7)	6.22	62.08	0%	386				1/20 ac	62.08	0%	3
	Sub-Total Purdin		*173.28*		*1,197*	*111.5*	*10.98*	*49*		*173.28*		*5*
7	Watercrest (R7)[3]	6.22	56.50	10%	316				4.35	56.50	10%	220
8	South of David Hill Rd (R10)[4]	4.35	10.39	20%	36				4.35	10.39	20%	36
9	North of David Hill Rd (R10)	4.35	14.18	15%	52				4.35	14.18	15%	52
10	David Hill Village (R10)	4.35	12.05	15%	44				4.35	12.05	15%	44
11	David Hill Village (Comm)		2.90	0%		15.0		32		2.90	0%	
11	David Hill Village (Res)[5]	12.0	--	0%	4				4.35	--	0%	12
12	Thatcher (R10)	4.35	76.65	10%	300				4.35	76.65	10%	300
13	David Hill (R10)[6]	4.35	28.50	15%	105				1.0	28.50	15%	24
	Sub-Total David Hill/Gales Creek		*201.17*		*857*	*15.0*	*0*	*32*		*201.17*		*688*
	Totals		**374.45**		**2,054**	**126.5**	**10.98**	**81**		**374.45**		**693**

[1] Retail employment based on FAR of 0.25 for retail uses and 11 employees per net acre of commercial land within mixed-use area (approximately 4.2 net acres).
[2] Assumes average school size of 65,000 sq. ft. consistent with newer elementary schools in Forest Grove.
[3] Land area within Thatcher Park and Thatcher Woods has been deducted from total land area. This deduction is approximately 25.18 acres.
[4] Area outside of riparian zone and landslide hazard area.
[5] Assumes limited residential above retail or standalone-plex development
[6] While Figure 2 shows SR zoning for this area, analysis was based on R10 level of development to provide a “worst case” scenario.

quantities included in each zone. Figure 2 also shows existing riparian areas which must be avoided as the area is developed, along with the 440-foot contour interval on the west side of the David Hill area. This elevation represents the limit of existing city water service.

As indicated in Table 1, a net total of just over 374 acres have been identified for development as part of the Westside Planning Project. This excludes areas designated as vegetated corridors under Clean Water Services standards. Under the existing Comprehensive Plan (adopted in 2014) the two planning areas are entirely zoned for residential development yielding a total of 693 single family dwelling units. Under this Revised land use scenario, mixed use development is proposed consisting of single and multi- family dwellings, retail, a fire station and an elementary school. This development would include an estimated 2,054 dwelling units, an increase of 1,361 units over the existing plan with 169 more in the David Hill planning area and 1,192 more in the Purdin Road planning area. The development would also include 61,500 square feet of retail (yielding an estimated 78 employees), a 10.98-acre park, a 2-acre fire station with an estimated 3 employees, and a 65,000-square foot elementary school.

The land use assumptions shown in Table 1 should be considered as a "worst case" scenario for purposes of infrastructure planning. These land uses differ from the version originally endorsed by the Forest Grove Planning Commission in 2015 as follows:

- **Purdin Road** - In the Purdin Road Planning Area the April 2016 documented in this report include a total of 1,197 dwelling units in comparison to the Planning Commission which included 979 dwelling units. Conversely, the Planning Commission version showed a much higher growth assumption for commercial development with 202,600 square feet compared to the 46,500 square feet in the April 2016 version. Fundamentally, the current version assumed much higher residential development (218 more units) and much lower commercial development (156,100 fewer square feet) than the Planning Commission version.
- **David Hill** – Residential development assumptions for the April 2016 version are slightly higher than the Planning Commission version (857 as compared to 776). The primary difference lies in the assumed development density for the area at the western edge of the David Hill. This area has been identified for Suburban Residential development at 1 du/acre in both scenarios, but has been analyzed at a higher density (R10) for purposes of this infrastructure memo. This approach provides a means of testing the financial feasibility of a higher level of development.

Internal Street System

Due to the extent of unknown factors affecting the development of a transportation system for David Hill, the City's recently adopted Transportation System Plan (TSP) did not identify a potential future street system. The TSP called for further refinement planning to address the unique aspects of providing urban services in this topographically challenged area. This refinement planning effort has been incorporated into the Westside Project, along with consideration of connectivity issues for the Gales Creek area located immediately south of David Hill Road. In addition, since the Purdin Road Planning Area was incorporated into the Urban Growth Boundary by Legislative action, no concept plan had been prepared outlining an internal street system. The Westside Project is also intended to address this need.

The development of an internal street system focused on laying out a system of collector level roads intended to provide access to and connectivity through major portions of each planning area.

Street Layout Assumptions

Assumptions made for the initial planning level layout of this collector street system include:

- The number of internal roads and their points of connection to the surrounding street system relies on the traffic impact and improvement needs analysis discussed in a separate memorandum. Internal roads will generally have a single travel lane in each direction with left turn channelization at key intersections.
- The layout of all internal collector streets was based on the collector street classification in the City's Development Code that requires 60 feet of right-of-way and a 40-foot street cross-section. However the streets with half-street roadway improvements require modified collector street standards. (See the Appendix for each street geometric section.)
- All internal collector streets would have bicycle lanes and sidewalks on both sides.
- Connectivity to the surrounding street system takes into account some of the key findings in the City's TSP with respect to the following roads:
    - **David Hill Road** – The extension of David Hill Road is included from its current terminus eastward to intersect at Highway 47 (this project is currently under design and is expected to open in 2018). A single lane roundabout was assumed for the intersection with Highway 47 based on existing project development activities.
    - **Vista Drive** – The addition of the Vista Drive extension between Gales Creek and Thatcher Roads is included in the TSP. With this improvement a significant volume of existing and projected future traffic would be diverted away from the intersection of Gales Creek and Thatcher Roads. Without this improvement it will be necessary to signalize or otherwise improve traffic operations at the Gales Creek/Thatcher intersection.
    - **Main Street and B Street Extensions** – The proposed recommended street layout for the Purdin Road area includes connections into developed portions of the city via extensions of Main Street and B Street. Extensions of these two streets are included in the adopted TSP between Hartford Drive and the David Hill Road extension.

General Street Design Assumptions and Conclusions

- As each road is actually designed it will need to be fully reviewed for compliance with AASHTO, City and/or County standards.
- Vertical curves will need to be designed. The length of each vertical curve identified during final design will affect the volume of cut and fill that were identified based on the initial planning level layout.
- A sight distance review has not been completed. This will need to be included in the roadway final design. This review may require adjustments to the volume of cut and fill initially identified.
- Due to the poor quality of soil infiltration that was identified by the geo-technical consultant for the Westside Planning Project, stormwater is expected to be collected in catch basins and conveyed to stormwater facilities for treatment and detention prior to being released.
- Wetland studies may be required to refine the level of detail currently available about possible wetland locations and impacts to determine if it is necessary to modify the proposed internal street system to avoid wetland impacts or to provide for necessary mitigation.
- It will be necessary to review where and how site access is provided along the proposed collector street system. Where appropriate, site access should occur on the lowest order street

in the functional classification hierarchy (i.e., onto a collector street rather than an arterial like David Hill or NW Thatcher Roads, or onto a local street rather than a collector).

- Roadway access in the David Hill planning area must also consider how topography will affect access to property adjacent to collector roads if this access is required. In many portions of David Hill 3:1 side slopes from the proposed roads would extend up or down for approximately 10 feet. This would make it hard for residential driveways to be constructed. Further, any secondary or local road connections to a collector street will likely start 10 feet below or above the adjacent road grade. This will make it difficult to construct the local road with a grade of less than 12%.
- In-road sewer lines and water line pressure will need to be reviewed with respect to roadway grades. A water storage tank may be needed for additional storage/fire flow or to increase the pressure for the lots. These are further discussed in the sections on the sewer and water systems.
- While the planning level street system layout considers the intersection and driveway spacing requirements of relevant City and/or County standards, the spacing of these connection points will need to be reviewed during final design.
- Roadway design will need to coordinate with all the utilities in addition to the municipal services addressed in this memorandum (i.e., cable, electrical, phone, fiber-optic, natural gas, and/or others).

Individual Street Assumptions and Conclusions

This section presents assumptions, findings and conclusions from the initial planning level layout of individual collector streets within the David Hill and Purdin Road planning areas. These streets are illustrated in Figure 3 and each has been assigned a unique identifier number. It should be noted that only proposed collector roads are shown within the planning areas in this figure. All other internal streets would be considered local roads, and would be identified and laid out when property development proposals are prepared.

Road 1

Road 1 is a northerly extension of Vista Drive which is identified for implementation in the City's 2014 TSP. This road would provide a connection between Watercrest Road and NW Thatcher Road, helping to relieve traffic congestion at the intersection of Thatcher Road with Gales Creek Road. The road would be located through undeveloped property. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- Traffic control during construction would be required at intersections with Watercrest Drive and NW Thatcher Road.
- Road grade would be approximately 8 to 10%.

Road 2

This road would provide connectivity to potential future development along the south side of David Hill Road between the Vista Drive extension (Road 1) and a proposed extension of Valley Crest Way from south of Lavina Drive into the development area. The roadway will be located south of an existing resource parcel.

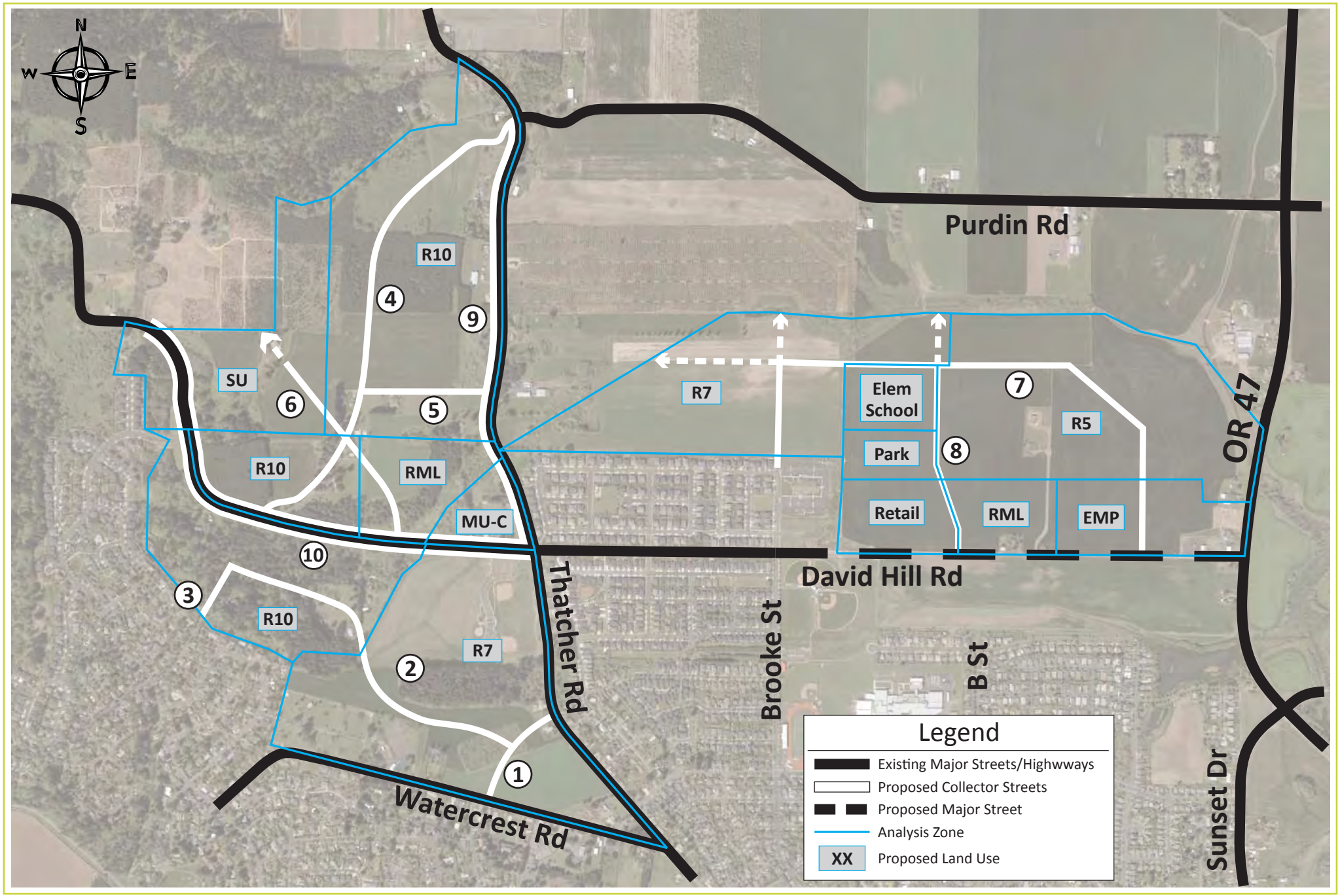


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Figure 3
Proposed Street System

Westside Planning Project
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This area has been identified as a Landslide Hazard Zone and further investigation related to the feasibility of building residential development and associated infrastructure in this area will likely be necessary prior to final design and/or construction of this road. Planning level roadway design considerations included:

- A collector roadway section was used with catch slopes of 3:1.
- Road grade is assumed to be 15% to match the existing site grade of 15% through three small segments of the road totaling 1,250 feet. The remainder of the road would have a grade of 12% or less. If the entire road grade were limited to 12% as required by City Code, additional cut and fill (with associated additional costs) would be required.
- Culverts will need to be sized and placed under the road to allow for stormwater runoff to flow from south to north to the existing creek along the south side of David Hill Road. A minimum of three culverts may be required. See Figure 5 for locations.

Road 3

This road would be an extension of Valley Crest Way north of Lavina Drive. As with Road 2, ultimate feasibility of this road would linked to the overall feasibility of development in the Landslide Hazard Area. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road grade was assumed to be 12%.
- The road would have an intersection at Lavina Drive that would require traffic control during construction.
- The existing terrain where the road is to be located is forested.

A connection from Road 3 to David Hill Road is not shown due to the potential landslide hazard in this area and the need to cross the stream and vegetative corridor that runs along the south side of David Hill Road through this area.

Road 4

This road would provide major north/south access through the entire David Hill planning area. It would intersect David Hill Road at an existing driveway approximately 2,500 feet west of the intersection with NW Thatcher Road, and then extend generally north and northeast for approximately 4, 700 feet to intersect NW Thatcher Road at Purdin Road. This road represents the spine around which most access into and out of the David Hill planning area would congregate. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- Road grade is assumed to be 15% to match the existing site grade of 15% through a small segment of the road totaling slightly over 600 feet in a single location. The remainder of the road would have a grade of 12% or less. If the entire road grade were limited to 12% as required by City Code, additional cut and fill (with associated additional costs) would be required. The earthwork cut section would start out as negligible and increase to an additional six fee of cut at the center and ultimately daylight at the top of the rise. This represents an excavation cost increase of approximately 40% over the 15% design. The cost estimate for this road assumes concrete pavement for this distance.

The analysis in this memo is based on aerial contours and GIS information provided by the City, Metro and other sources. It is possible that when a future developer conducts a field survey of the area and prepares preliminary roadway design, actual topography may be somewhat different than the values assumed in this report. If that were to occur, then it may be possible to meet the 12% grade limitation of the existing Development Code. However, it is also possible that a revision to the City's Development Code may be necessary to allow 15% grades longer than 250 feet. This issue should be addressed if and when it becomes necessary.

- The elevation of Road 4 at its intersection of with Road 6 will need to match. This may control the slope of one or both of the roads.
- The two intersections at the connecting streets were aligned to follow the existing grades more closely. Retaining walls will need to be constructed on each side of the roadway for about 400 feet to match into existing grades at each of these intersections. The wall locations and types will be determined by the residential development during the final design phase.

Road 5

Using the existing alignment of the privately-owned Plum Hill Road, Road 5 would be constructed to urban standards to provide a direct connection between Road 4 and NW Thatcher Road. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- Road 5 would have grades ranging from 12% to 15% for the full length of the roadway. If a consistent grade of 12% is used for the design of this road, the elevation of the intersection would need to match Road 4.

Road 6

This road would also provide access into the David Hill planning area from David Hill Road at a new intersection approximately 1,250 feet west of NW Thatcher Road. This access point takes advantage of a location where grades are less steep than most locations along the north side of David Hill Road at this location. This road is assumed to run approximately 2,300 feet north and west of the David Hill Road intersection, serving the far western edge of the planning area. When initially constructed it is expected that this road would end in a temporary turnaround at its western end, but it will be extended further west into the City's Urban Reserve area at such time as this area comes into the UGB and development occurs. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road grade is assumed to be 15% to match the existing 15% grade for the entire length of the road. If a flatter (12%) slope was assumed, it would require approximately 240,000 cubic yards of additional cut and fill above the level required to achieve a 15% grade. The cul-de-sac at the westerly end of this road would be 40-feet below existing grade if a 12% slope was used.
- The elevation of Road 6 at its intersection with Road 4 will need to match. This may control the slope of one or both of the roads.
- There is an existing residence in the vicinity of the proposed cul-de-sac.

Road 7

Road 7 is the primary road serving the Purdin Road planning area. On its easterly end, it intersects the David Hill Road extension approximately 900 feet west of Highway 47 and then runs north and west into

the planning area. This road would bisect the proposed employment area and provide access into and through the single family residential areas. It turns south at a point that generally aligns with Brooke Street (a city-designated collector street facility). Other roads serving the proposed single family residential areas located in the northern portion of the planning area would be local streets. They are not shown in Figure 3 but would be identified when and as development proposals are prepared. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road is flat with grades under 5%.
- Culverts will need to be sized and placed under the road to allow for stormwater runoff to flow from west to east. A minimum of two culverts may be required.
- The turns in Road 7 as shown in Figure 3 are for illustrative purposes and will need to be adjusted during final design to meet ASSHTO standards.

Road 8

This north/south road connects to David Hill Road on its southern end approximately 2,400 feet west of Highway 47. This connection is recommended to occur directly opposite an extension of B Street as proposed in the TSP and identified in the pending Silverstone development. On its northern end, Road 8 would intersect Road 7 about 1,500 east of the extension of Brooke Street north into the planning area (i.e., the westernmost end of Road 7). Road 8 provides direct access to a mixed use residential area and commercial development proposed for the north side of David Hill Road. It would also serve the proposed park and elementary school in the heart of the planning area, and provides an alternate route into the single family residential area. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road is flat with grades under 5%.

Road 9 (Thatcher Road)

Planning level roadway design discussions with the City indicate that half street improvements will be required on the east side of this roadway from Purdin Road to David Hill Road, a distance of approximately 4,050 feet in length. A section of the roadway will be raised to allow for a gravity sewer line to cross over the existing drainage located approximately 900 north of David Hill Road. Crossing the creek depression will take a fill prism of 800 feet. The fill would start at existing grade at the beginning and increase to 15 feet in the center of the depression (approximately 400 feet of distance) then transition back down to existing grade at the 800-foot mark. These improvements are considered as a portion of the City's roadway collector requirements and are included in the cost estimate. See the Appendix for details.

Road 10 (David Hill Road)

David Hill Road is planned for a reconstruction from Thatcher Road west by 5,100 feet. A three lane section is proposed from Thatcher Road west by 850 feet to the existing drainage way. A two lane section is proposed from the drainage way west for another 4,250 feet. Planning level roadway design consideration include:

- A road way section was used with catch slopes of 3:1.
- The road grade is assumed to match the existing grade for the entire length of the road.

Other Roads

Figure 3 also illustrates some potential future roadway connections that are intended to provide collector arterial road access into the Rural Reserve area south of Purdin Road and north of the existing east/west creek (the current UGB line). It is not anticipated that these connections would be made within the 20-year planning horizon for the Westside Planning Area study. However, they are shown to provide a very long-term vision of a future transportation network to both serve this area and to provide guidance on the type and size of roads that should be built within the UGB.

In Figure 3, these roads are shown as dashed lines with arrows that point to the future extension. They include future extensions of Brooke Street and B Street north of Road 7, and a westerly extension of Road 7 to the UGB that would be aligned north of and parallel to David Hill Road. This westerly extension could ultimately connect with Road 5 on the west side of Thatcher Road providing additional east/west connectivity between the David Hill area and the Purdin Road area.

These street extensions would be designated as collector streets and designed accordingly. It is anticipated that they will provide local access only if the Rural Reserve area develops. At that time they will function as collectors.

Internal Road System Cost Estimates

Table 2 summarizes planning level cost estimates prepared for the ten internal roads in the Westside Planning Project area. More detailed information is included in a cost estimate worksheet prepared for each road and included in Appendix A. As indicated in the table, total estimated cost for constructing the designated collector street system with the amenities and cross-section required by City Code would be $29,463,900. It should be noted that this estimate does not include any local street construction or any street mitigation that may be required as a result of the traffic impact assessment. This estimate is subject to the limitations and caveats noted above in general and/or for each specific roadway. All costs included in Table 2 are assumed to be private costs associated with providing access for development or traffic impact mitigation.

Table 2. Westside Planning Project Area Internal Street System Cost Estimates

No.	Street Name	Limits	Description	Estimated Cost
1	Road 1 – Gales Ck (Vista Drive)	Watercrest Road to NW Thatcher Road	Construct new 1,050-foot urban collector street	$1,000,300
2	Road 2 – Gales Ck	Area 7 to Area 8	Construct new 3,200-foot urban collector street	$4,246,000
3	Road 3 – Gales Ck	Area 8 Connector	Construct new 600-foot urban collector street	$787,200
4	Road 4 – David Hill	David Hill Road to Purdin Road	Construct new 4,700-foot urban collector street	$6,409,200
5	Road 5 – David Hill (Plum Hill Road)	Area 13 Mid-Block Connection to Thatcher Road	Construct new 1,250-foot urban collector street	$1,212,200
6	Road 6 – David Hill	Area 13 to temporary turn-around	Construct new 2,300-foot urban collector street	$2,391,000
7	Road 7 – Purdin	Brooke Street to David Hill Road	Construct new 5,500-foot urban collector street	$4,766,200

Table 2 Continued. Westside Planning Project Area Internal Street System Cost Estimates

No.	Street Name	Limits	Description	Estimated Cost
8	Road 8 - Purdin	David Hill Road to Proposed Brooke Street	Construct new 1,750-foot urban collector street	$1,583,700
9	Road 9 – Thatcher	David Hill Road to Purdin Road	Half street reconstruction, 4050-foot ½ street improvements	$3,124,600
10	Road 10 – David Hill	Thatcher Road to West of Area 9	Full street reconstruction, 5,100-foot urban collector street	$3,943,500
			Totals	**$29,463,900**

Note: See Figure 2 for an illustration of the areas that are referenced in this table.

Sewer System

This section presents a discussion of the proposed sewer system to serve residential and other urban development in the Westside Planning Area. The analysis of sewer system needs is based on the development assumptions identified in Table 2. Sewer services should be designed to meet City of Forest Grove development standards.

Figure 4 illustrates the proposed sewer system improvements to provide service to both the David Hill and Purdin Road planning areas. This system typically follows the existing and/or proposed street system. It includes both sewer lines and manholes.

General Sewer System Design Assumptions and Conclusions

Specific observations, findings and recommendations with respect to the provision of future sewer service to the Westside Planning Area are summarized in the bullet points below:

- The lots off of Road 2 and 3 will flow to a sewer line located south of David Hill Road as indicated in Figure 4. An 8” diameter sewer pipe will be required, but its ultimate location will be determined at the time of development application, and will depend on the nature of development in this area.
- Based on the alignment shown in Figure 3, Road 4 would slope in two directions. The southern ends of Road 4 and Road 6 would generally slope to the south and east. Sewage is this area would be served by gravity flow to an existing connection point at a manhole located at the intersection of David Hill Road and NW Thatcher Road.
- Sewage flow from the north end of Road 4 would flow north and then south along NW Thatcher Road to an existing manhole located approximately 560 feet north of the intersection of David Hill Road and NW Thatcher Road. One of the challenges of making this connection is the stream crossing north of David Hill Road. As noted in the discussion of Road 9 (Thatcher Road), the proposed improvements on this road would include raising approximately 800-feet of this facility to allow gravity flow for the sewer line. It should be recognized that there are other options for moving sewage across the creek including installation of either a siphon or a pump station. These options should be considered during final design of roadway improvements along Thatcher Road.

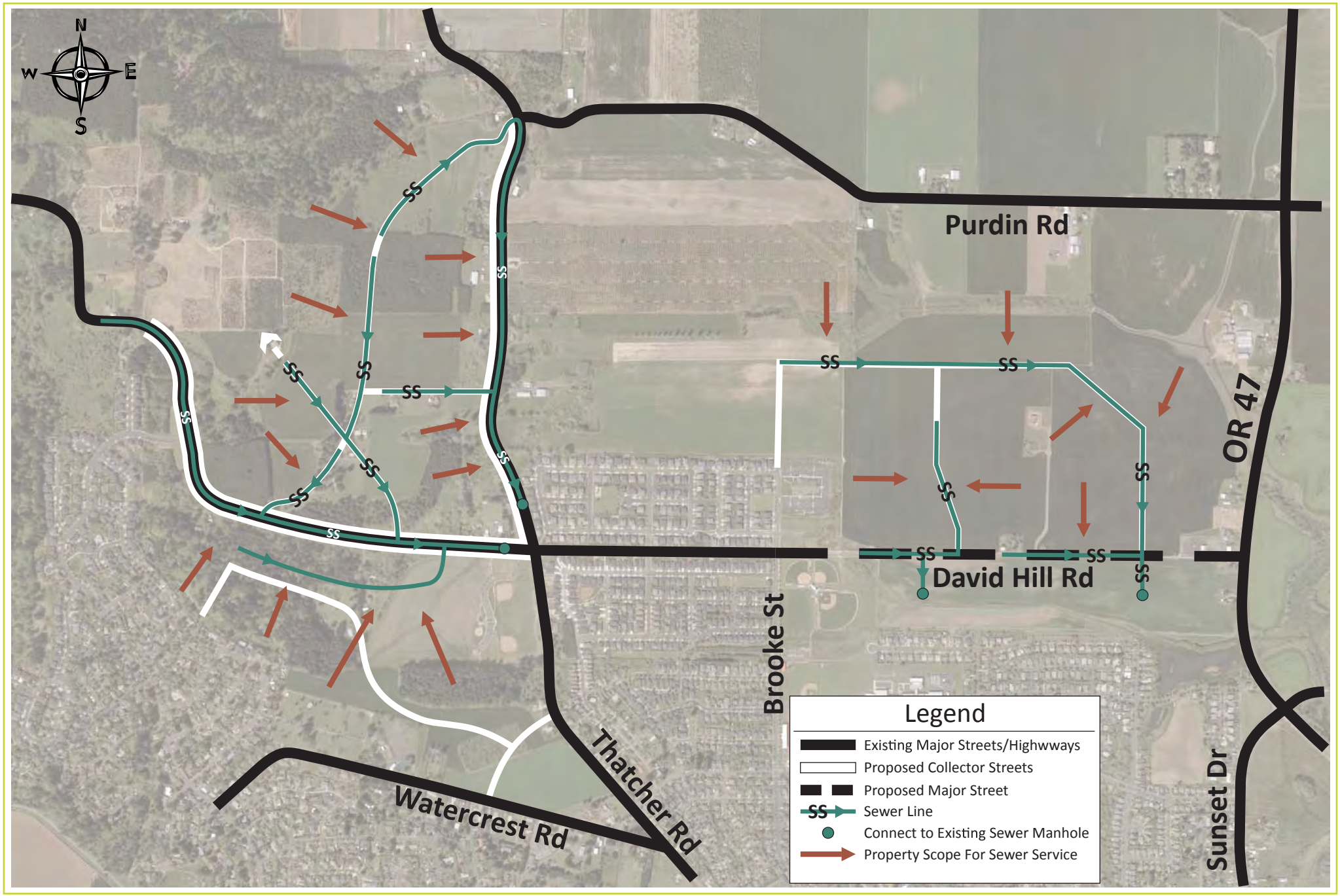

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Figure 4
Sewer Utilities

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- Sewage flow from Road 5 (Plum Hill Road) will flow east to a gravity sewer line located at the intersection of Road 5 and NW Thatcher Road. The sewer line proposed in Thatcher Road will flow south to an existing sewer line located 600 feet north of David Hill Road.
- The use of connections to the existing sewer system on Thatcher and David Hill Roads was based on an analysis of potential sewer flows from the David Hill Planning Area and a review of the 2009 *Sewer Master Plan*. The Master Plan did not identify a current constriction in the downstream system that would preclude service to the David Hill area. This area is in the current UGB and development at the level identified in the Comprehensive Plan would have been assumed in the development of the Master Plan. The David Hill development assumed in this report would have approximately 170 more dwelling units than were assumed in the Comprehensive Plan. Our analysis also took into account the sewer extensions/connections along David Hill Road (Nehalem Lateral in the 2009 *Sewer Master Plan,* see appendix for an illustration) that are being installed with the roadway connection as currently planned. The Nehalem Lateral extension would connect at generally the same location as the Future North Forest Grove Trunk line. This future trunk line is shown in the Rural Reserve Area north of the Westside Planning Area and the stream. The extension of a sewer line through a Rural Reserve area to connect two portions of a UGB is permitted under state land use regulations[1].
- Sewage flow from Roads 7 and 8 will gravity flow an existing sewer manhole located at the intersection of Hartford Drive and Main Street. This will require coordination with the pending Silverstone development located along the south side of the new David Hill Road alignment west of Highway 47.
- The system wide capacity and flow will need to be verified for design level documents. This report has used the proposed land uses and flows to provide planning level estimates for pipe sizing. This has shown that new 8" diameter sewer mains should be able to support the proposed land uses.
- Based on the assumption that for all new sewer mains 8 inches in size the installation shall be at the developers' expense and no cost sharing is expected between the City and future development. All new sewer mains that are expected to be more than 8 inches in size are assumed to be publicly-funded.
- Additional sewer calculations will need to be completed to determine the required pipe sizes, slopes and pipe cover.

Sewer System Cost Estimates

Table 3 summarizes planning level cost estimates prepared for the major components of the sewer system proposed for the Westside Planning Area. More detailed information is included in a cost estimate worksheet in the Appendix. As indicated in the table, total estimated cost for constructing the proposed sewer system as required by City Code would be $3,635,600. In most cases, the sewer lines were proposed to be 8-inches in diameter. Funding for all 8-inch pipes is assumed to be provided by private developers. Funding for pipes larger than 8 inches is expected to be publicly-funded. This includes the sewer lines proposed along Roads 7 and 8 that are anticipated to be 10-inches in diameter and the line along Road 10 (David Hill Road) is expected to be 12-inches in diameter.

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[1] Per email communication with Anne Debbaut of DLCD staff on May 23, 2016.

The Sewer system cost estimate is preliminary in nature and based best available information at the time of the report. Sewer main locations are based on preliminary roadway locations and GIS topography information. No survey or field verifications have been completed as part of this analysis.

Table 3. Westside Planning Project Area Sewer System Cost Estimates

No.	Description	Estimated Cost
1	Road 1, 2, 3 Sewer Line	$225,000
4	Road 4 Sewer Line	$300,000
5	Road 5 Sewer Line	$82,500
6	Road 6 Sewer Line	$165,000
7	Road 7 Sewer Line (10”)	$405,000
8	Road 8 Sewer Line (10”)	$255,000
9	Road 9 Sewer Line	$262,500
10	Road 10 Sewer Line (700 LF 12”)	$382,500
	Contingencies and Engineering	$1,558,100
	Totals	**$3,2635,600**

Stormwater System

This section presents a discussion of the proposed stormwater management system to the future collector streets being proposed in the Westside Planning Area. The analysis of stormwater system needs is based on the lineal footage of the road layout shown in Figure 3. At this time, the local streets that support the land uses identified in Table 2 have not been included, nor has runoff from property adjacent to the public street system. This memorandum only includes the requirements to construct stormwater ponds for the collector roadways. Future land use applicants will be required to make provisions to meet their own stormwater management needs. The stormwater system will need to be designed to meet Clean Water Services’ development standards. It will be challenging to construct a stormwater treatment facility on existing slopes which range from 8 to 20% in locations.

Figure 5 illustrates the proposed stormwater management system improvements to provide service to both the David Hill and Purdin Road planning areas. This system typically follows the existing and/or proposed street system alignment and places stormwater ponds in areas that are topographically reasonable to collect the stormwater from roadway conveyance systems. Stormwater modeling will be required prior to final design to verify locations, sizes, and elevations of each facility. Each location has assumed that the facility can treat its own stormwater within the footprint of the facility and no retaining walls will be required.

General Stormwater Management System Design Assumptions and Conclusions

Specific observations, findings and recommendations with respect to the provision of future stormwater management service to the Westside Planning Area are summarized in the bullet points below:

- Stormwater from Roads 1, 2 and 3 may be conveyed to a treatment facility located adjacent to NW Thatcher Road. Stormwater from this facility would need to be released to an acceptable location to be determined during design engineering. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies. There are multiple options to engage in a comprehensive

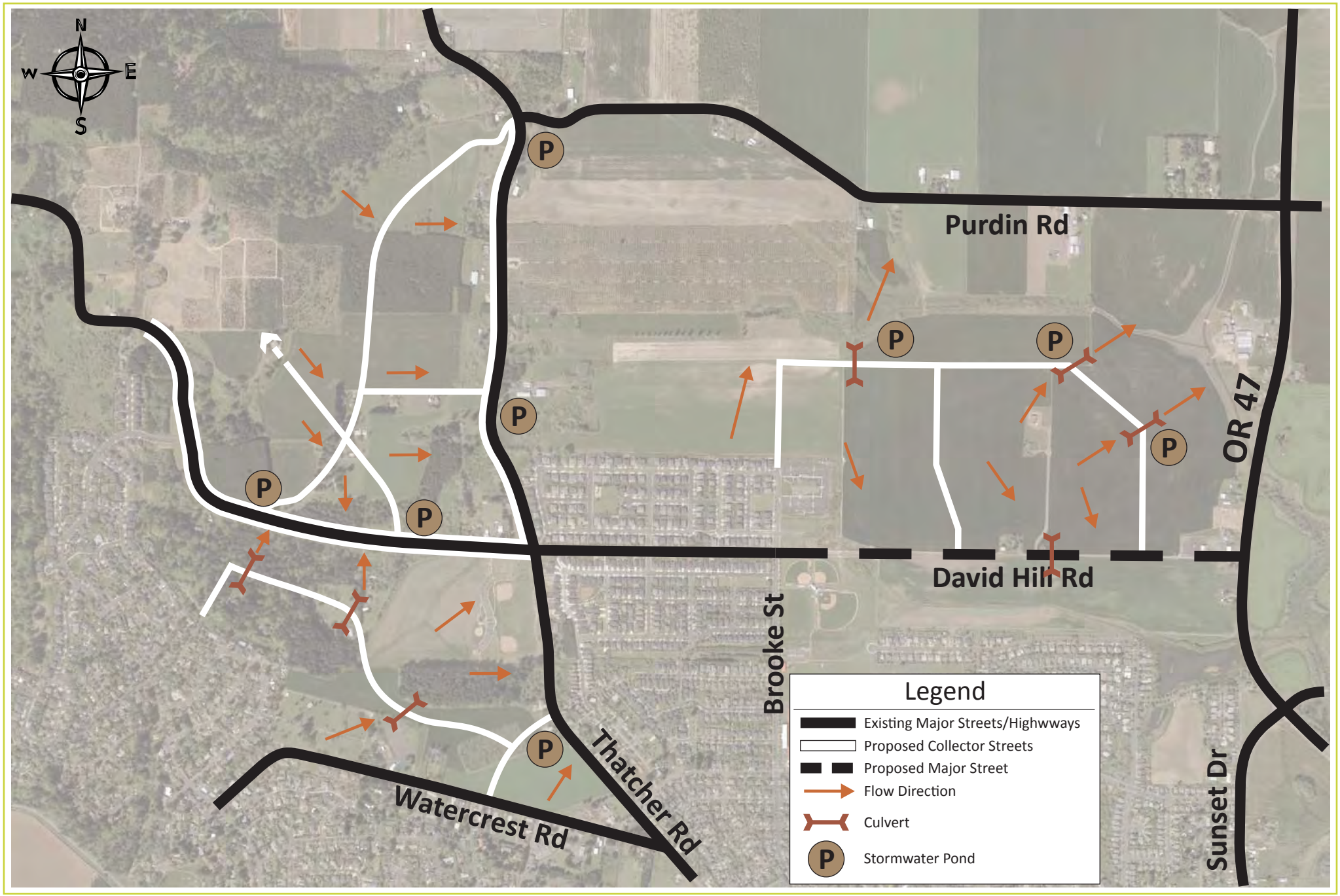

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Figure 5
Stormwater Utilities

Westside Planning Project
Forest Grove, OR

approach to overall stormwater management that must be developed during subdivision or general site design. Any facilities meeting a comprehensive public stormwater management need will be publicly owned and managed.

- Culverts may need to be installed under Road 2 in three locations.
- Stormwater from the south end of Road 4 would be conveyed to a treatment facility located adjacent to David Hill Road and released to an acceptable location to be determined during design engineering. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from north end of Road 4 would be conveyed to a treatment facility located adjacent to NW Thatcher Road and released to an acceptable location. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from Road 5 would be conveyed to a treatment facility located adjacent to NW Thatcher Road and released to an acceptable location. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from Road 6 would be conveyed to a treatment facility located adjacent to David Hill Rd and released to an acceptable location. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from Road 9 will be collected and conveyed to a treatment facility east of Roadway 5.
- Stormwater from Road 10 will be collected and conveyed to a treatment facility adjacent to Road 2.
- Stormwater from Road 7 may be detained in three treatment facilities and then released.
- Culverts may need to be installed under Road 7 in three locations.
- Stormwater from Road 8 may be detained in a treatment facility and then released.

It should be noted that the locations of the stormwater facilities in Figure 5 are only shown schematically. Based on details to be worked out during design for site development, it is expected that they would be located within public rights-of-way either on property dedicated to the City or County as part of a development-driven road construction or improvement project, or on property acquired by a jurisdiction. At the level of detail addressed in this memo, it cannot be precisely determined whether there is sufficient existing right-of-way along Thatcher Road to provide the stormwater treatment facilities indicated. Based on communications with the Oregon Department of Land Conservation and Development, construction and operation of stormwater treatment facilities in the Rural Reserve area along the east side of Thatcher Road is permitted under state statutes (OAR 660-033-130(10)(A).[2]

During discussions with Clean Water Services (CWS) it was generally accepted that the collector roadways will be constructed as part of the private developments and the stormwater facilities would

[2] Per email communication with Anne Debbaut of DLCD staff on May 23, 2016.

likely be handling stormwater from the collector streets, local streets and land uses. In doing so the private developers would be required to construct the stormwater facilities. For this report, we have only included an estimate of stormwater needs and costs for the collector streets.

All cities in urban Washington County, including the City of Forest Grove, use Clean Water Services' Design and Construction Standards (Standards) as their minimum requirements. The Standards identify how to manage both stormwater quality and quantity. These standards have been consulted during the development of the Westside stormwater management concept. The current CWS stormwater standards require stormwater to just be treated before being released downstream. It is also required to make sure the downstream conveyance is sufficient to handle the additional runoff. It should be noted that Clean Water Services (CWS) is currently making major modifications to these standards which may applicable as soon as 2016. These revisions are expected to require both water quality and quantity control will be the major focus during the upcoming modification process. Stormwater management strategies for collector streets, as well as local roads and individual properties should follow the CWS standards in place at the time of development.

Stormwater Management System Cost Estimates

Table 4 summarizes planning level cost estimates prepared for the proposed stormwater management system in the Westside Planning Area. These estimates include both facilities to address the quantity and quality of water flow. While they are identified separately in the table, they could be co-located when constructed. More detailed information is included in a cost estimate worksheet in the Appendix.

Table 4. Westside Project Planning Area Stormwater Management System Cost Estimates

No.	Description	Estimated Cost
Facilities to address management of stormwater quantity		
1	Road 1, 2, 3 Storm Pond	$75,000
2	Road 4 Storm Pond	$75,000
3	Road 5 and 9 Storm Pond	$100,000
4	Road 6 and 10 Storm Pond	$150,000
5	Road 7 Storm Pond	$200,000
6	Road 8 Storm Pond	$50,000
Facilities to address management of stormwater quality		
7	Road 1, 2, 3 Stormwater Treatment	$35,000
8	Road 4 Stormwater Treatment	$35,000
9	Road 5 and 9 Stormwater Treatment	$70,000
10	Road 6 and 10 Stormwater Treatment	$70,000
11	Road 7 Stormwater Treatment	$20,000
12	Road 8 Stormwater Treatment	$20,000
	Contingencies and Engineering	$675,000
	Totals	**$1,575,000**

As indicated in the table, the total estimated cost for constructing the proposed stormwater management system as required by Clean Water Services and City Code would be $1,575,000. It should

be noted that these cost estimates include construction and engineering only, and do not reflect the cost of any necessary right-of-way. It is to be assumed that developers will be required to dedicate additional land to construct the stormwater facilities. At this time, there is no anticipated public/private split of cost sharing for these facilities. If they are constructed as part of the private developments then the costs would be entirely private.

The Stormwater concept cost estimate is preliminary in nature and based best available information at the time of the report. Storm conveyance mains and pond locations are based on preliminary roadway locations and GIS topography information. No survey or field verifications have been completed as part of this analysis. All costs included in Table 4 are assumed to be private costs associated with providing the basic stormwater management infrastructure necessary for development.

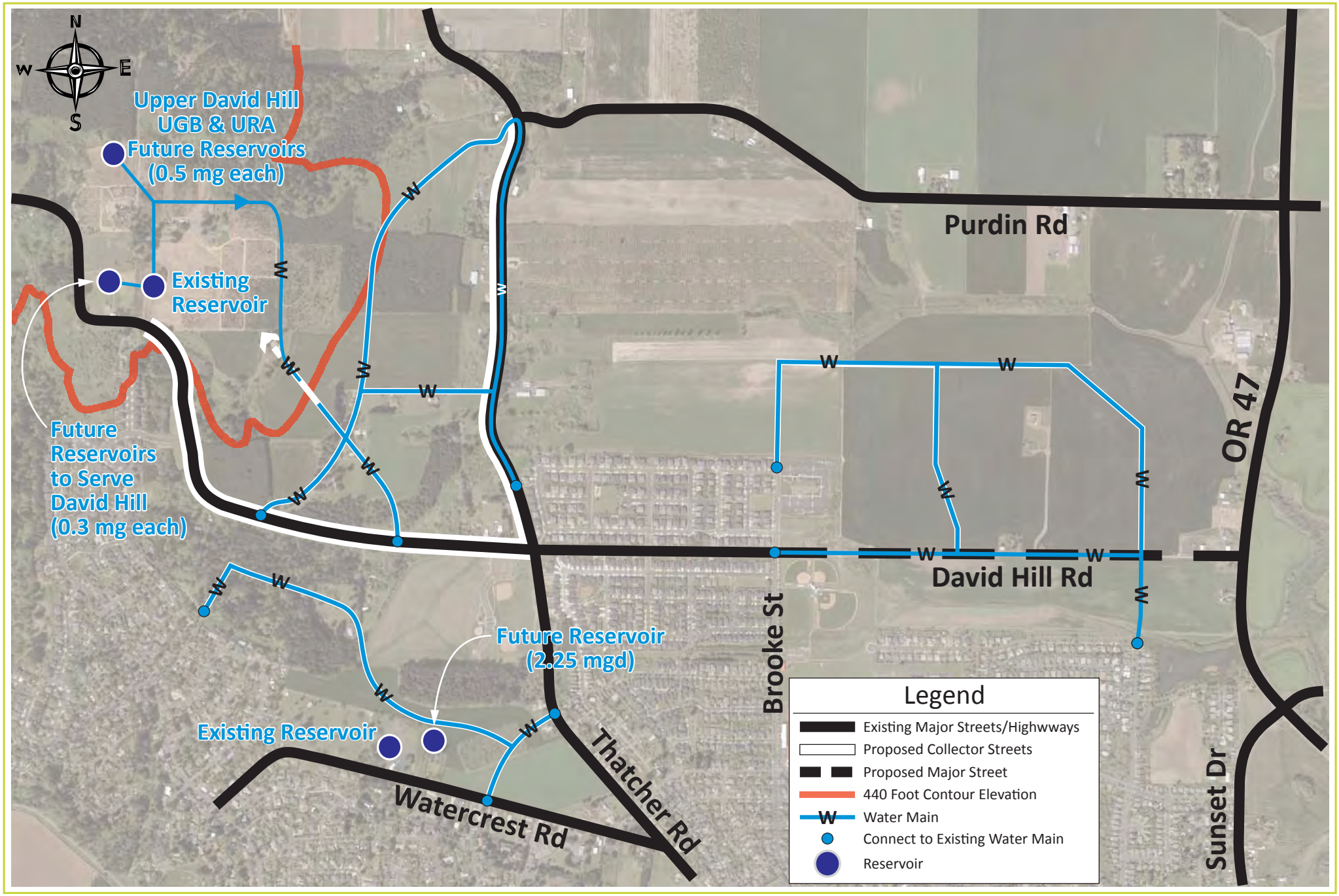
Water System

This section presents a discussion of the proposed water system to serve residential and other urban development in the Westside Planning Area. The analysis of water system needs is based on the development assumptions identified in Table 2 and uses the internal road layout shown in Figure 3. The water system will need to be designed to meet the City of Forest Grove's development standards. New reservoirs will be required to serve the David Hill UGB and Purdin Road UGB. The new reservoirs will include:

- 2.25 Million Gallon (MG) reservoir located near or adjacent to the existing 5.0 MG reservoir at the Treatment Plan. This reservoir will provide service to areas from elevation 155 to 250.
- Two 0.3 MG reservoirs located near or adjacent to the existing 1.0 MG David Hill reservoir. These reservoirs will provide service to areas from elevation 250 to 440.
- One 0.5 MG reservoir located outside of the David Hill UGB and URA. This reservoir will provide service to areas from elevation 440 to 615 within the David Hill UGB and a portion of the David Hill URA from elevation 190 to 615. A future second reservoir of the same size will provide service to the remaining David Hill URA demand from elevation 190 to 615. Cost estimates include both reservoirs (plus land acquisition, piping, pressure reducing valves, and a pump station) to accommodate equitable cost sharing between the UGB and the URA

A key element of providing water service to the westerly portion of the David Hill planning area will be the need to develop and connect to a new reservoir to be located west of the planning area and outside of the City's Urban Reserve Area. Service from a new reservoir is necessary for all properties located above 440-feet of elevation which cannot currently be served by the existing city water system. This approach was selected as constructing a dedicated reservoir to serve the David Hill UGB above elevation 440 was cost prohibitive and did not consider the demands of the development in the David Hill URA. A siting study and sizing analysis will be part of the FY18 Water Master Plan Update.

Figure 6 illustrates the proposed water system improvements to provide service to both the David Hill and Purdin Road planning areas. This system typically follows the existing and/or proposed street system alignment. The areas above 440-feet in elevation and a service connection to proposed new reservoir locations are indicated in the figure. The figure also illustrates potential new reservoir locations in the southern portion of the study area just north of Watercrest Road and near the existing treatment plant.



SCJ ALLIANCE
CONSULTING SERVICES

Figure 6
Water Utilities

Westside Planning Project
Forest Grove, OR

General Water System Design Assumptions and Conclusions

Specific observations, findings and recommendations with respect to the provision of future water service to the Westside Planning Area are summarized in the bullet points below:

- The water main size will need to be analyzed to determine the final required pipe sizing.
- A siting study will be needed to locate reservoirs and determine land value.
- Sizing of the reservoirs and pump station will need to be evaluated.
- The pressure zones will need to be reviewed for the system.
- The system wide capacity and flow will need to be reviewed.
- The placement of fire hydrants will need to be placed based on City code.

Water System Cost Estimates

Table 5 summarizes planning level cost estimates prepared for the proposed water system in the Westside Planning Area. More detailed information is included in a cost estimate worksheet in the Appendix. As indicated in the table, total estimated cost for constructing the proposed water system as required by City Code would be $8,533,000.

Table 5. Westside Project Planning Area Water System Cost Estimates

No.	Description	Linear Feet	Estimated Cost
1	Road 1 Water main	1,050	$63,000
2	Road 2 Water main	3,200	$192,000
3	Road 3 Water main	600	$36,000
4	Road 4 Water main	4,700	$282,000
5	Road 5 Water main	1,250	$75,000
6	Road 6 Water main	2,300	$138,000
7	Road 7 Water main	5,500	$330,000
8	Road 8 Water main	1,750	$105,000
9	Road 9 Water main	3,500	$525,000
10	Two 0.5 MG reservoirs [1]	EA	$500,000
11	Two 0.3 MG reservoirs [2]	EA	$1,950,000
12	One 2.25 MG reservoir near Watercrest Road [3]	EA	$680,000
	Contingencies and Engineering		$3,657,000
	Totals		**$8,533,000**

[1] One reservoir expected to be used by development within David Hill from 440 to 615 feet in elevation and portions of the David Hill URA between 190 and 615 feet. The other reservoir expected to be used to serve the remainder of the David Hill URA between 190 and 615 feet which is included herein to account for the shared costs of land acquisition, piping, pressure reducing values and a pump station. Approximately $500,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R10 zoning. If there is a reduction in the density permitted in this area to SR (1 du/acre) approximately $120,000 or 2.5% of the total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 24 dwelling units.

[2] A portion of these reservoirs will be used to serve the David Hill UGB between 250 and 440 feet. Approximately 67% of total costs would be associated with the David Hill Planning Area.
[3] Approximately 23% of the cost of this reservoir would be associated with the David Hill and Purdin Road Planning Areas.

It should be noted that cost estimates in this table for installation of the new reservoirs that will serve the Westside Planning Area were developed by City staff[3]. Reservoir costs in the table reflect only those costs allocated to the David Hill and Purdin Road UGBs for construction of new reservoirs , the pump station, piping, and pressure reducing valves needed to convey water from the existing David Hill 1.0 MG reservoir to the new reservoir, and land acquisition cost to serve the David Hill and Purdin Road UGBs. Total reservoir-related costs for these areas are $3.13 million which is a portion of the overall storage improvement costs (assuming 105 dwelling units with R10 zoning above elevation 440 feet). The total costs associate with growth for the construction of the reservoirs, pump station, piping, pressure reducing valves, and land acquisition will be paid for by the City using SDC funds.

The Water system cost estimate is preliminary in nature and based on best available information at the time of the report. Water main locations are based on preliminary roadway locations and GIS topography information. No survey or field verifications have been completed as part of this analysis.

Effect of Reduced Land Use Density on West Side of David Hill Planning Area

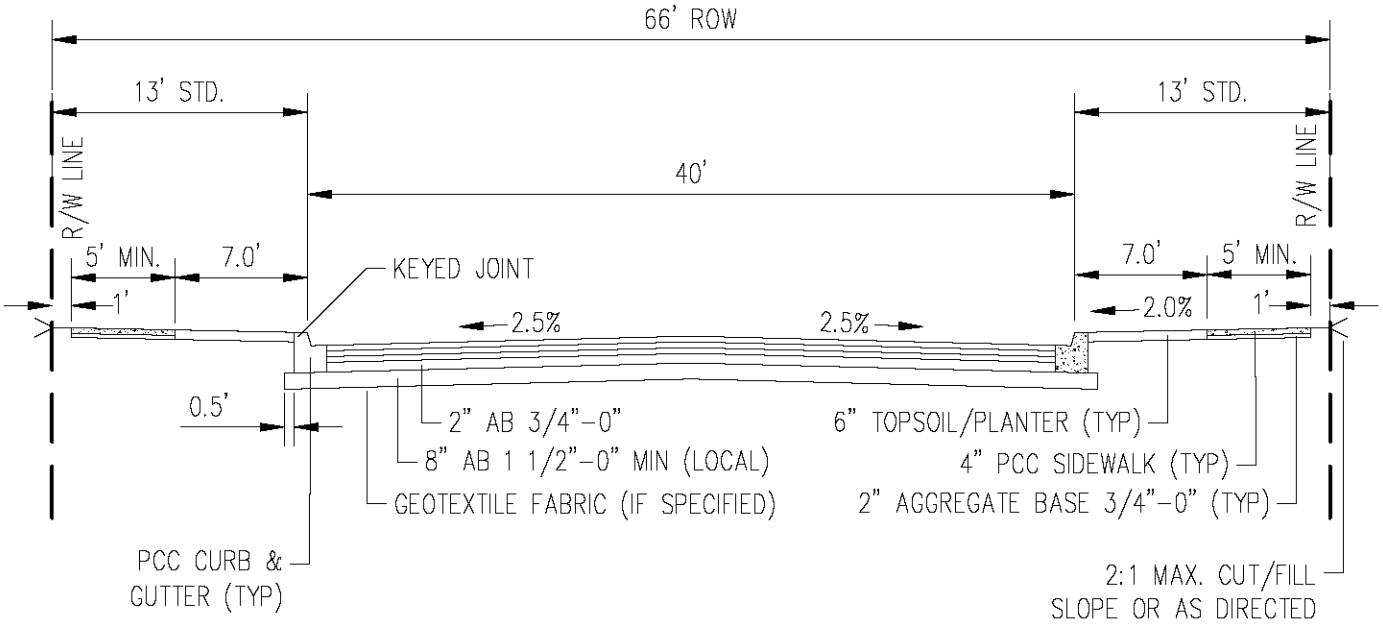
As noted previously, the analysis in this report assumes the land use types and intensities shown in Table 1 under “Revised Land Use Alternative” dated April 15, 2016. This includes medium density development in the western portion of the David Hill Planning Area, generally above 440 feet in elevation. The Planning Commission is proposing Suburban Residential (SR) at 1 dwelling unit per acre

The land use alternative used in this report would include approximately 105 dwelling units on 10,000 square foot lots in Area 13 (this area is assumed to generally represent the area above 440-feet within the Westside Planning Project area). If development intensity were retained at the existing Comprehensive Plan density of 1 unit / acre (SR), only 24 units could be developed. This represents a difference of 81 additional dwelling units between the two land use alternatives.

If the western portion of the David Hill Planning Area were developed at the level of intensity assumed in the Comprehensive Plan rather than the level assumed in Table 1 the cost for the needed reservoirs, their service mains and pump station would have to be borne by a lower number of units. The per unit cost for the added reservoirs would be $4,762 at R10 density ($500,000/105 units) and about $5,000 at SR density ($120,000/24). Some cost savings for the lower density development pattern would be realized for the localized system of roads, sewers and stormwater management facilities that must be borne by private developers. However, it is not expected that there would be a substantial reduction in the cost of collector roads (i.e., the portion of Road 6 leading to the temporary turn-around), or the major sewer, stormwater or water facilities that would serve the western portion of David Hill (as identified in Figures 4, 5 and 6). Private costs for these facilities would still need to be borne largely in their entirely. It should be noted that the value of development on a per unit basis would be higher at SR densities when compared with a R10 designation and have a greater capacity to absorb infrastructure costs. The concern is whether the higher per unit water cost for SR densities as noted above makes this option financially infeasible. This will be further explored as part of the financing program.

[3] Based on Tables 1 and 2 provided by City engineering staff on June 23, 2016.

APPENDIX



COLLECTOR ROADWAY SECTION

NTS

Oct 05, 2015 2:32:33pm – User lane.sater
N:\PROJECTS\0742 CITY OF FOREST GROVE\0742.01 FOREST GROVE WESTSIDE PLAN\PHASE 10 – WESTSIDE PLAN\CADD\EXHIBITS\742.01 EXH1.DWG

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CONSULTING SERVICES
8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516
P: 360-352-1465 F: 360-352-1509
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HORIZONTAL SCALE:	NTS
DATE:	9/14/15
JOB No.:	742.01
DRAWING FILE No.:	742.01 EXH1.dwg

ROADWAY SECTIONS

FOREST GROVE

EXHIBIT No:	EXH1
SHEET No:	1

Option **Roadway 1** **Length** **1050 LF**

Desc. **Watercrest Rd to Thatcher Rd** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 99,750.00	$ 99,750.00
2	HMAC	1000	TON	$ 110.00	$ 110,000.00
3	AGGREGATE BASE	2800	TON	$ 20.00	$ 56,000.00
4	12 INCH STORM PIPE	1400	LF	$ 40.00	$ 56,000.00
5	CONCRETE INLET	30	EACH	$ 1,500.00	$ 45,000.00
6	CURB AND GUTTER	2100	LF	$ 20.00	$ 42,000.00
7	SIDEWALK	1170	SY	$ 5.00	$ 5,850.00
8	PAVEMENT STRIPING	4200	LF	$ 0.50	$ 2,100.00
9	EARTHWORK	4000	CY	$ 20.00	$ 80,000.00
10	GEOTEXSTILE	5000	EACH	$ 1.50	$ 7,500.00
11	PLANTING STRIP	1600	SY	$ 20.00	$ 32,000.00
12	WATER QUALITY	1	LS	$ 1.00	
13	CLEARING AND GRUBBING	2.0	ACRE	$ 3,000.00	$ 6,000.00
14	SIGNING	1	LS	$ 3,150.00	$ 3,150.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 5,250.00	$ 5,250.00
16	SURVEYING	1	LS	$ 21,000.00	$ 21,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 571,600.00
	CONTINGENCY (40%)				$ 228,640.00
	PRELIMINARY ENGINEERING (10%)				$ 80,024.00
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 120,036.00
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 1,000,300.00

Option **Roadway 2** **Length** **3700 LF**

Desc. **Area 7 to Area 8** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 304,000.00	$ 304,000.00
2	HMAC	3600	TON	$ 110.00	$ 396,000.00
3	AGGREGATE BASE	8500	TON	$ 20.00	$ 170,000.00
4	12 INCH STORM PIPE	4000	LF	$ 40.00	$ 160,000.00
5	CONCRETE INLET	37	EACH	$ 1,500.00	$ 55,500.00
6	CURB AND GUTTER	6400	LF	$ 20.00	$ 128,000.00
7	SIDEWALK	3556	SY	$ 5.00	$ 17,777.78
8	PAVEMENT STRIPING	12800	LF	$ 0.50	$ 6,400.00
9	EARTHWORK	48000	CY	$ 20.00	$ 960,000.00
10	GEOTEXSTILE	18000	EACH	$ 1.50	$ 27,000.00
11	PLANTING STRIP	4700	SY	$ 20.00	$ 94,000.00
12	WATER QUALITY	1	LS	$ 1.00	$ -
13	CLEARING AND GRUBBING	6.0	ACRE	$ 3,000.00	$ 18,000.00
14	SIGNING	1	LS	$ 9,600.00	$ 9,600.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 16,000.00	$ 16,000.00
16	SURVEYING	1	LS	$ 64,000.00	$ 64,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 2,426,277.78
	CONTINGENCY (40%)				$ 970,511.11
	PRELIMINARY ENGINEERING (10%)				$ 339,678.89
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 509,518.33
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 4,245,986.11

Option **Roadway 3** **Length** **600 LF**

Desc. **Area 8 Connector** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 57,000.00	$ 57,000.00
2	HMAC	600	TON	$ 110.00	$ 66,000.00
3	AGGREGATE BASE	1600	TON	$ 20.00	$ 32,000.00
4	12 INCH STORM PIPE	800	LF	$ 40.00	$ 32,000.00
5	CONCRETE INLET	6	EACH	$ 1,500.00	$ 9,000.00
6	CURB AND GUTTER	1200	LF	$ 20.00	$ 24,000.00
7	SIDEWALK	667	SY	$ 5.00	$ 3,333.33
8	PAVEMENT STRIPING	2400	LF	$ 0.50	$ 1,200.00
9	EARTHWORK	9000	CY	$ 20.00	$ 180,000.00
10	GEOTEXSTILE	3000	EACH	$ 1.50	$ 4,500.00
11	PLANTING STRIP	900	SY	$ 20.00	$ 18,000.00
12	WATER QUALITY	1	LS	$ 1.00	$ -
13	CLEARING AND GRUBBING	2.0	ACRE	$ 3,000.00	$ 6,000.00
14	SIGNING	1	LS	$ 1,800.00	$ 1,800.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 3,000.00	$ 3,000.00
16	SURVEYING	1	LS	$ 12,000.00	$ 12,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 449,833.33
	CONTINGENCY (40%)				$ 179,933.33
	PRELIMINARY ENGINEERING (10%)				$ 62,976.67
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 94,465.00
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 787,208.33

Option **Roadway 4** **Length** **4700 LF**

Desc. **David Hill Road to Purdin Road** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 446,500.00	$ 446,500.00
2	HMAC	4500	TON	$ 110.00	$ 495,000.00
3	AGGREGATE BASE	12500	TON	$ 20.00	$ 250,000.00
4	12 INCH STORM PIPE	5900	LF	$ 40.00	$ 236,000.00
5	CONCRETE INLET	47	EACH	$ 1,500.00	$ 70,500.00
6	CURB AND GUTTER	9400	LF	$ 20.00	$ 188,000.00
7	SIDEWALK	5222	SY	$ 5.00	$ 26,111.11
8	PAVEMENT STRIPING	18800	LF	$ 0.50	$ 9,400.00
9	EARTHWORK	56000	CY	$ 20.00	$ 1,120,000.00
10	GEOTEXSTILE	22000	EACH	$ 1.50	$ 33,000.00
11	PLANTING STRIP	6800	SY	$ 20.00	$ 136,000.00
12	WATER QUALITY	1	LS	$ 1.00	$ -
13	CLEARING AND GRUBBING	9.0	ACRE	$ 3,000.00	$ 27,000.00
14	SIGNING	1	LS	$ 14,100.00	$ 14,100.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 23,500.00	$ 23,500.00
16	SURVEYING	1	LS	$ 94,000.00	$ 94,000.00
17	RETAINING WALLS	6000	SF	$ 50.00	$ 300,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 3,469,111.11
	CONTINGENCY (40%)				$ 1,387,644.44
	PRELIMINARY ENGINEERING (10%)				$ 485,675.56
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 728,513.33
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 6,070,944.44

Option **Roadway 5** **Length** **1250 LF**

Desc. **Area 13 Mid-Block Connection to Thatcher Road** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 118,750.00	$ 118,750.00
2	HMAC	1200	TON	$ 110.00	$ 132,000.00
3	AGGREGATE BASE	3400	TON	$ 20.00	$ 68,000.00
4	12 INCH STORM PIPE	1600	LF	$ 40.00	$ 64,000.00
5	CONCRETE INLET	13	EACH	$ 1,500.00	$ 19,500.00
6	CURB AND GUTTER	2500	LF	$ 20.00	$ 50,000.00
7	SIDEWALK	1389	SY	$ 5.00	$ 6,944.44
8	PAVEMENT STRIPING	5000	LF	$ 0.50	$ 2,500.00
9	EARTHWORK	7000	CY	$ 20.00	$ 140,000.00
10	GEOTEXSTILE	6000	EACH	$ 1.50	$ 9,000.00
11	PLANTING STRIP	1900	SY	$ 20.00	$ 38,000.00
12	WATER QUALITY	1	LS	$ 1.00	
13	CLEARING AND GRUBBING	3.0	ACRE	$ 3,000.00	$ 9,000.00
14	SIGNING	1	LS	$ 3,750.00	$ 3,750.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 6,250.00	$ 6,250.00
16	SURVEYING	1	LS	$ 25,000.00	$ 25,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 692,694.44
	CONTINGENCY (40%)				$ 277,077.78
	PRELIMINARY ENGINEERING (10%)				$ 96,977.22
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 145,465.83
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 1,212,215.28

Option **Roadway 6** **Length** **2300 LF**

Desc. **Area 13 to Temporary Turn-around** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 218,500.00	$ 218,500.00
2	HMAC	2200	TON	$ 110.00	$ 242,000.00
3	AGGREGATE BASE	6100	TON	$ 20.00	$ 122,000.00
4	12 INCH STORM PIPE	2900	LF	$ 40.00	$ 116,000.00
5	CONCRETE INLET	23	EACH	$ 1,500.00	$ 34,500.00
6	CURB AND GUTTER	4600	LF	$ 20.00	$ 92,000.00
7	SIDEWALK	2556	SY	$ 5.00	$ 12,777.78
8	PAVEMENT STRIPING	9200	LF	$ 0.50	$ 4,600.00
9	EARTHWORK	18000	CY	$ 20.00	$ 360,000.00
10	GEOTEXSTILE	11000	EACH	$ 1.50	$ 16,500.00
11	PLANTING STRIP	3400	SY	$ 20.00	$ 68,000.00
12	WATER QUALITY	1	LS	$ 1.00	$ -
13	CLEARING AND GRUBBING	5.0	ACRE	$ 3,000.00	$ 15,000.00
14	SIGNING	1	LS	$ 6,900.00	$ 6,900.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 11,500.00	$ 11,500.00
16	SURVEYING	1	LS	$ 46,000.00	$ 46,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 1,366,277.78
	CONTINGENCY (40%)				$ 546,511.11
	PRELIMINARY ENGINEERING (10%)				$ 191,278.89
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 286,918.33
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 2,390,986.11

Option **Roadway 7** **Length** **5500 LF**

Desc. **Brook Street to David Hill Road** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 522,500.00	$ 522,500.00
2	HMAC	5300	TON	$ 110.00	$ 583,000.00
3	AGGREGATE BASE	14600	TON	$ 20.00	$ 292,000.00
4	12 INCH STORM PIPE	6900	LF	$ 40.00	$ 276,000.00
5	CONCRETE INLET	55	EACH	$ 1,500.00	$ 82,500.00
6	CURB AND GUTTER	11000	LF	$ 20.00	$ 220,000.00
7	SIDEWALK	6111	SY	$ 5.00	$ 30,555.56
8	PAVEMENT STRIPING	22000	LF	$ 0.50	$ 11,000.00
9	EARTHWORK	16000	CY	$ 20.00	$ 320,000.00
10	GEOTEXSTILE	26000	EACH	$ 1.50	$ 39,000.00
11	PLANTING STRIP	8000	SY	$ 20.00	$ 160,000.00
12	WATER QUALITY	1	LS	$ 1.00	
13	CLEARING AND GRUBBING	11.0	ACRE	$ 3,000.00	$ 33,000.00
14	SIGNING	1	LS	$ 16,500.00	$ 16,500.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 27,500.00	$ 27,500.00
16	SURVEYING	1	LS	$ 110,000.00	$ 110,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 2,723,555.56
	CONTINGENCY (40%)				$ 1,089,422.22
	PRELIMINARY ENGINEERING (10%)				$ 381,297.78
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 571,946.67
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 4,766,222.22

Option **Roadway 8** **Length** **1750 LF**

Desc. **David Hill Road to Proposed Brook Street** **Roadway Section** **Collector**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 166,250.00	$ 166,250.00
2	HMAC	1700	TON	$ 110.00	$ 187,000.00
3	AGGREGATE BASE	4700	TON	$ 20.00	$ 94,000.00
4	12 INCH STORM PIPE	2200	LF	$ 40.00	$ 88,000.00
5	CONCRETE INLET	40	EACH	$ 1,500.00	$ 60,000.00
6	CURB AND GUTTER	3500	LF	$ 20.00	$ 70,000.00
7	SIDEWALK	1950	SY	$ 5.00	$ 9,750.00
8	PAVEMENT STRIPING	7000	LF	$ 0.50	$ 3,500.00
9	EARTHWORK	5000	CY	$ 20.00	$ 100,000.00
10	GEOTEXSTILE	9000	EACH	$ 1.50	$ 13,500.00
11	PLANTING STRIP	2600	SY	$ 20.00	$ 52,000.00
12	WATER QUALITY	1	LS	$ 1.00	$ -
13	CLEARING AND GRUBBING	4.0	ACRE	$ 3,000.00	$ 12,000.00
14	SIGNING	1	LS	$ 5,250.00	$ 5,250.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 8,750.00	$ 8,750.00
16	SURVEYING	1	LS	$ 35,000.00	$ 35,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 905,000.00
	CONTINGENCY (40%)				$ 362,000.00
	PRELIMINARY ENGINEERING (10%)				$ 126,700.00
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 190,050.00
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 1,583,750.00

Option **Roadway 9** **Length** **4050 LF**

Desc. **David Hill Road to Purdin Road** **Roadway Section** **1/2 Street Improvements**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 384,750.00	$ 384,750.00
2	HMAC	4100	TON	$ 110.00	$ 451,000.00
3	AGGREGATE BASE	5200	TON	$ 20.00	$ 104,000.00
4	12 INCH STORM PIPE	5100	LF	$ 40.00	$ 204,000.00
5	CONCRETE INLET	90	EACH	$ 1,500.00	$ 135,000.00
6	CURB AND GUTTER	4050	LF	$ 20.00	$ 81,000.00
7	SIDEWALK	2250	SY	$ 5.00	$ 11,250.00
8	PAVEMENT STRIPING	16200	LF	$ 0.50	$ 8,100.00
9	EARTHWORK	11000	CY	$ 20.00	$ 220,000.00
10	GEOTEXSTILE	10000	EACH	$ 1.50	$ 15,000.00
11	PLANTING STRIP	2300	SY	$ 20.00	$ 46,000.00
12	WATER QUALITY	1	LS	$ 1.00	$ -
13	CLEARING AND GRUBBING	4.0	ACRE	$ 3,000.00	$ 12,000.00
14	SIGNING	1	LS	$ 12,150.00	$ 12,150.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 20,250.00	$ 20,250.00
16	SURVEYING	1	LS	$ 81,000.00	$ 81,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 1,785,500.00
	CONTINGENCY (40%)				$ 714,200.00
	PRELIMINARY ENGINEERING (10%)				$ 249,970.00
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 374,955.00
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 3,124,625.00

Option **Roadway 10** **Length** **5100 LF**

Desc. **Thatcher Road to West of Area 9** **Roadway Section** **Modified Collector Street**

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	MOBILIZATION	1	LS	$ 484,500.00	$ 484,500.00
2	HMAC	4100	TON	$ 110.00	$ 451,000.00
3	AGGREGATE BASE	11000	TON	$ 20.00	$ 220,000.00
4	12 INCH STORM PIPE	6400	LF	$ 40.00	$ 256,000.00
5	CONCRETE INLET	110	EACH	$ 1,500.00	$ 165,000.00
6	CURB AND GUTTER	10200	LF	$ 20.00	$ 204,000.00
7	SIDEWALK	3400	SY	$ 5.00	$ 17,000.00
8	PAVEMENT STRIPING	10200	LF	$ 0.50	$ 5,100.00
9	EARTHWORK	13000	CY	$ 20.00	$ 260,000.00
10	GEOTEXSTILE	20000	EACH	$ 1.50	$ 30,000.00
11	PLANTING STRIP	0	SY	$ 20.00	$ -
12	WATER QUALITY	1	LS	$ -	$ -
13	CLEARING AND GRUBBING	8.0	ACRE	$ 3,000.00	$ 24,000.00
14	SIGNING	1	LS	$ 15,300.00	$ 15,300.00
15	TRAFFIC CONTROL FOR CONSTRUCTION	1	LS	$ 25,500.00	$ 19,517.65
16	SURVEYING	1	LS	$ 102,000.00	$ 102,000.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 2,253,417.65
	CONTINGENCY (40%)				$ 901,367.06
	PRELIMINARY ENGINEERING (10%)				$ 315,478.47
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 473,217.71
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 3,943,480.89

Road	Length	Cut	Fill	Total	CY/FT
1	1050	2200	1600	3800	3.6
2	3200	20000	27000	47000	14.7
3	1050			0	0.0
4	4700	33500	22500	56000	11.9
5	1250	5000	1500	6500	5.2
6	2300	14000	4000	18000	7.8
7	5500	9000	6500	15500	2.8
8	1750	3500	800	4300	2.5
9					
10					

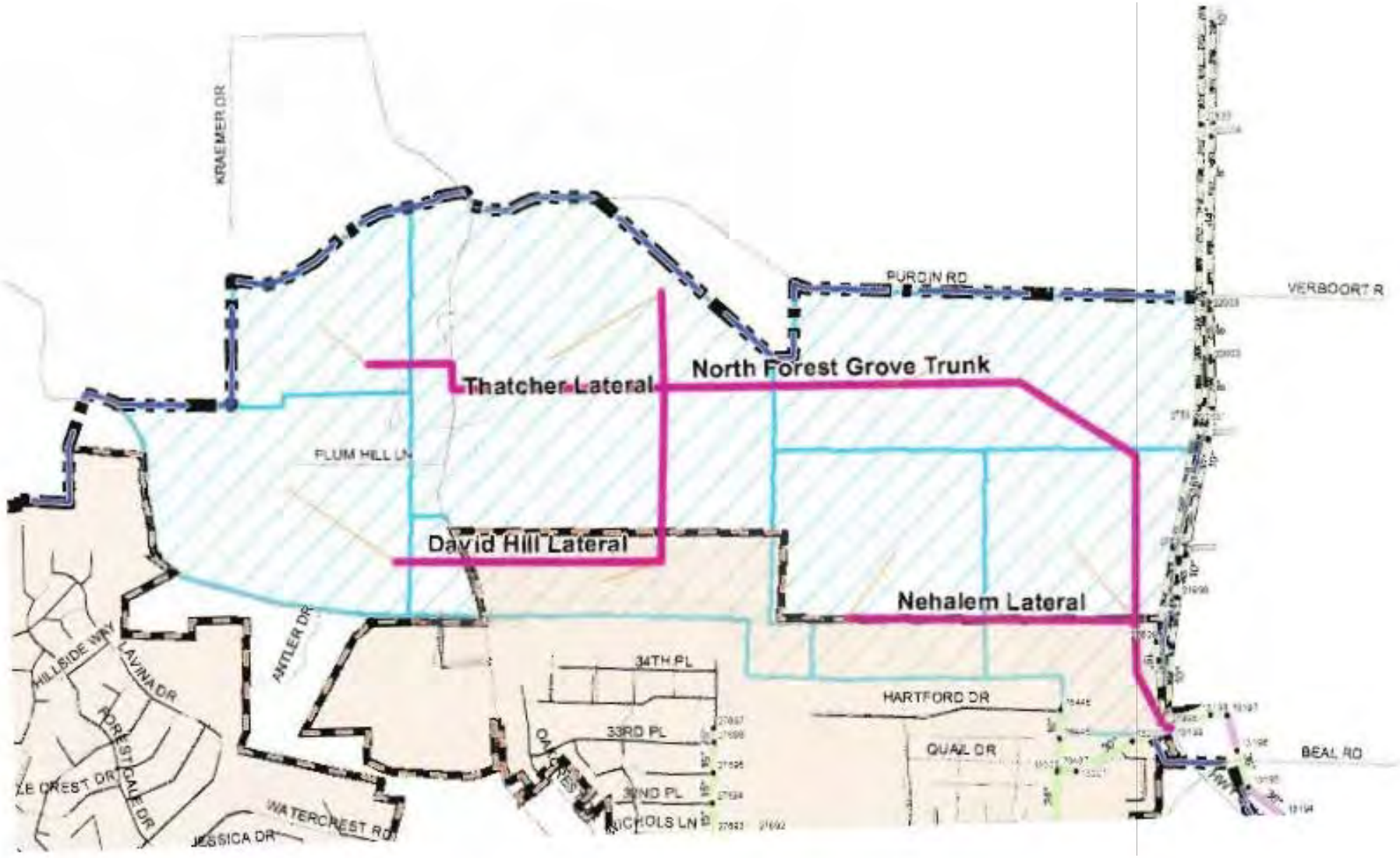
Stormwater Basin

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	Road 1,2,3 Storm Pond	1	EACH	$ 75,000.00	$ 75,000.00
2	Road 4 Storm Pond	1	EACH	$ 75,000.00	$ 75,000.00
3	Road 5 and 9 Storm Pond	1	EACH	$ 100,000.00	$ 100,000.00
4	Road 6 and 10 Storm Pond	1	EACH	$ 150,000.00	$ 150,000.00
5	Road 7 Storm Pond	1	EACH	$ 200,000.00	$ 200,000.00
6	Road 8 Storm Pond	1	EACH	$ 50,000.00	$ 50,000.00
7					$ -
8	Road 1,2,3 Stormwater Treatment	1	EACH	$ 35,000.00	$ 35,000.00
9	Road 4 Stormwater Treatment	1	EACH	$ 35,000.00	$ 35,000.00
10	Road 5 and 9 Stormwater Treatment	1	EACH	$ 70,000.00	$ 70,000.00
11	Road 6 and 10 Stormwater Treatment	1	EACH	$ 70,000.00	$ 70,000.00
12	Road 7 Stormwater Treatment	1	EACH	$ 20,000.00	$ 20,000.00
13	Road 8 Stormwater Treatment	1	EACH	$ 20,000.00	$ 20,000.00
					$ -
					$ -
					$ -
	RETAINING WALLS				
	ROADWAY CONSTRUCTION SUBTOTAL				$ 900,000.00
	CONTINGENCY (40%)				$ 360,000.00
	PRELIMINARY ENGINEERING (10%)				$ 126,000.00
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 189,000.00
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 1,575,000.00

Sewer

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	Road 1, 2 & 3 Sewer Line	3000	LF	$ 75.00	$ 225,000.00
2	Road 4 Sewer Line	4000	LF	$ 75.00	$ 300,000.00
3	Road 5 Sewer Line	1100	LF	$ 75.00	$ 82,500.00
4	Road 6 Sewer Line	2200	LF	$ 75.00	$ 165,000.00
5	Road 7 Sewer Line (10")	5400	LF	$ 75.00	$ 405,000.00
6	Road 8 Sewer Line (10")	3400	LF	$ 75.00	$ 255,000.00
7	Road 9 Sewer Line	3500	LF	$ 75.00	$ 262,500.00
8	Road 10 Sewer Line *	5100	LF	$ 75.00	$ 382,500.00
	ROADWAY CONSTRUCTION SUBTOTAL				$ 2,077,500.00
	CONTINGENCY (40%)				$ 831,000.00
	PRELIMINARY ENGINEERING (10%)				$ 290,850.00
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 436,275.00
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 3,635,625.00

Except from 2009 Sewer Master Plan



Water

				Engineer's Estimate	
Item No.	Bid Item Description	Quantity	Unit	Unit Price	Total
1	Road 1 Watermain	1050	LF	$ 60.00	$ 63,000.00
2	Road 2 Watermain	3200	LF	$ 60.00	$ 192,000.00
3	Road 3 Watermain	600	LF	$ 60.00	$ 36,000.00
4	Road 4 Watermain	4700	LF	$ 60.00	$ 282,000.00
5	Road 5 Watermain	1250	LF	$ 60.00	$ 75,000.00
6	Road 6 Watermain	2300	LF	$ 60.00	$ 138,000.00
7	Road 7 Watermain	5500	LF	$ 60.00	$ 330,000.00
8	Road 8 Watermain	1750	LF	$ 60.00	$ 105,000.00
9	Road 9 Watermain	3500	LF	$ 150.00	$ 525,000.00
10	2- 0.5 mg Water Reservoirs to serve David Hill (440-615 ft elevation)	1	LS	$ 500,000.00	$ 500,000.00
11	2- 0.3 mg Water Reservoirs to serve David Hill (250-440 ft elevation)	1	LS	$ 1,950,000.00	$ 1,950,000.00
12	1- 2.25 mg Water Reservoir to serve city (155-250 ft elevation)	1	LS	$ 680,000.00	$ 680,000.00
					$ -
					$ -
					$ -
					$ -
	RETAINING WALLS				
	WATER SYSTEM CONSTRUCTION SUBTOTAL				$ 4,876,000.00
	CONTINGENCY (40%)				$ 1,950,400.00
	PRELIMINARY ENGINEERING (10%)				$ 682,640.00
	ROADWAY CONSTRUCTION ENGINEERING (15%)				$ 1,023,960.00
	ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING				$ 8,533,000.00

Note: Reservoir costs include only those portions of total costs that are attributable to the Westside Planning Area (including David Hill and Purdin Road)

Forest Grove, Oregon

WESTSIDE PLANNING AREA FUNDING APPROACH

December, 2016

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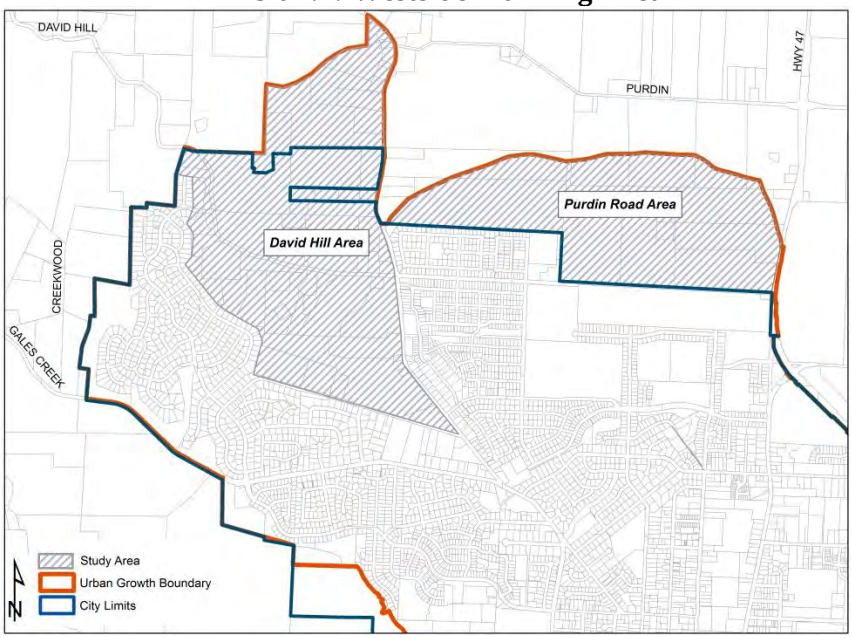
SECTION I: INTRODUCTION

This section describes the context and project approach upon which the body of this report is based.

A. PURPOSE

This Funding Approach document is intended to provide a course of action for the City to consider funding techniques that foster development within the Westside Planning Area (Area). The City of Forest Grove (City) has been working on a land use and infrastructure framework that will enable annexation of unincorporated areas known as the David Hill and Purdin Road areas. **Exhibit 1.1** shows the Westside Planning Area.

Exhibit 1.1: Westside Planning Area



The David Hill/Gales Creek planning area (also known as the David Hill planning area) has been included in the Forest Grove Urban Growth Boundary (UGB) for several years. According to forecasts prepared by Metro for regional planning purposes, it is anticipated that approximately 90% of the David Hill planning area could be developed by 2025. Purdin Road was included in the UGB in 2014 but is largely rural and has not yet been fully planned. For analysis purposes, it is assumed that the Westside Planning Area (including both David Hill and Purdin Road areas) will be fully developed over a 20-year time frame.

B. BACKGROUND

The City of Forest Grove (population 23,080 in 2015) is currently the 22nd largest city in Oregon and is at the west side boundary of the Metro regional planning area. Forest Grove was incorporated in 1872 and is located within 20 miles of Portland and 10 miles from Oregon's Silicon Forest (Hillsboro and unincorporated WA County).

The goal of the Westside Planning effort is to provide a land use framework and financing plan to promote a well-planned, mixed-use community. At build-out, the Area is zoned to accommodate approximately 2,050 dwellings and approximately 61,500 gross square feet of leasable commercial space. In addition, an elementary school site, a community park, and a fire station are planned in the Area. **Exhibit 1.2** shows the total buildout assumptions in acres and units.

Exhibit 1.2

Exhibit 1.2: Westside Planning Area Growth Forecast - Buildout

		Purdin		David Hill/Gales Creek		Total	
	Unit Type	Acres	Units	Acres	Units	Acres	Units
Single Family Detached	Dwelling Units	125.64	976	198.27	853	323.91	1,829
Single Family Attached	Dwelling Units	18.50	221	0.00	4	18.50	225
Retail	1,000 SF	4.20	46.5	2.90	15.0	7.10	61.5
School	1,000 SF	11.96	65.0	0.00	0.0	11.96	65.0
Park Acres	Acres	10.98	--	0.00	0.0	10.98	--
Fire Station	Employees	2.00	3.0	0.00	0.0	2.00	3.0
Total		173.28		201.17		374.45	

Source: Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP.

The dwelling unit growth assumptions provided above reflect estimates from the "Infrastructure Analysis" which reflects permitted zone density levels. The projected dwelling count, 2,054 in total, is higher than the Planning Commission recommendation of 1,895 units. The higher dwelling count is relied upon by engineers to ensure that the planned roads and infrastructure are designed to handle total allowable site development. In addition to infrastructure planning, the higher development forecasts also assume there will be flexibility through the public hearing review process to modify the land use designations to reflect current market and site development conditions. For example, the Infrastructure Analysis assumes the R-10 (Residential – 10,000 square foot lot size) zone is applied above the 440 foot elevation while the Planning Commission recommendation for that area is Suburban Residential, 1 unit per acre.

Aligning the growth forecast with project costs is critical to maintaining a rational nexus between the planned growth and the capital project costs contained in the local system development charge (SDC) methodology.

C. PROJECT APPROACH

Following this Introduction, there are four main sections in this report:

- **Funding Framework (Section II)**. In this section, potential funding sources for transportation, water, sewer, stormwater, and parks capital facilities are identified.

- **Capital Costs (Section III)**. This section documents capital improvement costs for public facilities required to serve the Westside Planning Area.
- **Funding Evaluation & Recommendations (Section IV).** This section includes an evaluation of potential funding sources to be considered for the Westside Planning Area. This section also includes recommends new funding sources needed to pay for facilities needed to serve future development in the Westside Planning Area.
- **Market Considerations (Section V)**. This final section discusses comparable development costs, SDCs, and home sales prices in and around the greater Portland Metro Region, with particular emphasis on Washington County.

While this report focuses on transportation, water, sewer, parks and stormwater capital facilities, the City intends to work with regional service providers to implement separate funding strategies for power/communication and other services.

SECTION II: FUNDING FRAMEWORK

This section identifies funding tools and techniques that are often used in Oregon.

When capital improvements are funded or financed by the local jurisdiction, service provider(s), or through development agreement(s) the funding options used in Washington County include:

- System Development Charge (SDC)
- Transportation Development Tax (TDT)
- Utility Fee
- Local Option Levy
- Local Improvement District (LID)
- Reimbursement District
- Urban Renewal District (Tax Increment Financing)
- Debt Financing
- Public Improvement Agreements

A summary of these local options is provided below. The preferred mix of funding and financing requires careful consideration of the timing of development and the phasing of specific projects so that public facilities can be provided in a manner that is generally concurrent with expected levels of market activity or absorption. Please refer to **Section IV** for an evaluation of potential funding sources.

A. SYSTEM DEVELOPMENT CHARGES

Oregon Revised Statutes (ORS) 223.297 to 223.314 authorize local governments to establish system development charges (SDCs), one-time fees on new development usually paid at the time of building permit issuance. SDCs are intended to recover a fair share of the capital improvements, including the cost of existing and planned facilities that provide capacity to serve future growth.

ORS 223.299 defines "capital improvements" as facilities or assets used for:

- Water supply, treatment, and distribution;
- Waste water collection, transmission, treatment, and disposal;
- Drainage and flood control;
- Transportation; and
- Parks and recreation.

If the required public facilities are included as a "qualified public improvement" per ORS 223.309, then the local government must have an ordinance or resolution that establishes or modifies an

improvement fee to provide credit against such fee for the construction of a qualified public improvement.

The City of Forest Grove currently charges SDCs for water and parks. The transportation, sewer, and stormwater SDCs are based on Washington County or Clean Water Services (CWS) methodologies.

B. TRANSPORTATION DEVELOPMENT TAX

Washington County implemented the Transportation Development Tax (TDT), a countywide tax consistent with SDC law, on all development within the County. The City of Forest Grove can use TDT revenues on transportation projects that are included in the TDT project list.

Approved by Washington County voters on November 4, 2008 (Measure No. 34-164), the TDT replaced the previous fee, known as the Traffic Impact Fee. The TDT went into effect on July 1, 2009. Because Forest Grove is located within Washington County, the city may decide to use Washington County Transportation Development Tax (TDT) revenues for roadway improvements that add capacity.

C. UTILITY FEES

Utility rates are a common way to raise local revenues for required infrastructure facilities and operations. They require approval and adoption by the city or service district as well as meet state and local regulations. Utility fees are paid for by customers within the service area and typically are included in monthly or bi-monthly utility bills for other services. Forest Grove currently imposes utility fees for sewer, water, and electrical services.

D. LOCAL OPTION LEVY

After full annexation of the Westside Planning Area, the City could adopt a resolution that would advance an election by voters (within the planning area or the city at large) to establish a local option levy for ad valorem taxes to fund capital improvements. The City can choose to use the levy for two types of costs, operational and capital costs. An operational levy is valid for 5 years and a capital levy for 10 years. Local option levies would have to be reapproved by voters in the future. Issues with tax compression may also arise under Measures 5 and 50, which limit taxable amounts local jurisdictions may assess each year. The City currently has a local option levy for operations.

E. LOCAL IMPROVEMENT DISTRICT

Cities in Oregon have the statutory authority to establish local improvement districts (LIDs) and levy special assessments on the benefited property to pay for improvements. These assessments are payable in annual installments for up to 30 years. LIDs are generally used for capital improvement projects that benefit numerous large tenants and/or private property owners.

The primary advantage of LIDs from the city's perspective is the ability to obtain a consistent level of revenue early in the development process. An LID can also provide the developer a certain degree of financial flexibility compared to SDCs. Financial intermediaries such as banks now view LIDs as a more reliable funding source than others (such as SDCs) and are more apt to provide loans based on future LID revenue streams.

F. REIMBURSEMENT DISTRICT

Similar to LIDs, cities can negotiate advance financing arrangements with developers where a developer or city agrees to front capital improvements/investment within a designated reimbursement district. The party that advances the financing is then partially reimbursed as new land use development approvals are granted within the district over a period that usually extends up to 15 years. With reimbursement districts there is no guarantee that future revenues will be as steady and reliable as with the LID or property tax assessments.

H. URBAN RENEWAL DISTRICT (URD)

The City currently has an urban renewal district (URD) in place that includes the Town Center and Pacific Avenue/19th Avenue corridor between the Town Center and generally Quince Street. There may be an opportunity to utilize funding from the creation of a new URD in the Westside Planning Area provided appropriate findings could be met. In many cases, URD funds are combined with other local funding sources to leverage non-local grants or loans to pay for needed infrastructure improvements. Additional analysis is required to determine whether a URD for the Westside Planning area is a viable option.

I. PUBLIC DEBT FINANCING

The City may incur debt to pay for capital facilities, such as roads, stormwater facilities, parks and other projects in areas annexed by the City. The most typical forms of financing public infrastructure are through bonds or loans. Bonds are a common means of financing projects whose benefits are not confined to a single local district. General obligation (GO) bonds are advantageous because their debt service is funded by a property tax levy that is outside the limits of Measure 5. While GO bonds require voter approval, revenue bonds and full faith and credit bonds do not.

Revenue bonds require an ongoing source of revenue that can be pledged to payment of debt service. A utility fee or local option levy and LID payments could serve this purpose. A reserve requirement on revenue bonds would commit the City to maintain a bond reserve, which could be used to meet payments in the event pledged revenues fall short. This reserve is often set at the least of (a) 10 percent of the issue price of all new and outstanding parity bonds, (b) maximum annual debt service on all new and outstanding parity bonds, and (c) 1.25 times average annual debt service on all new and outstanding parity bonds. The reserve requirement is dictated by the terms of the bond resolution.

A hybrid of these two bond types is the full faith and credit bonds. This type of bond represents an unsecured claim on all the revenue streams of an agency without the pledge of any particular revenue stream. Full faith and credit bonds do not require voter approval and they are not subject to debt service coverage requirements. However, like revenue bonds, an ongoing source of revenue would need to be pledged to protect the City's general fund from added risk.

The city may also utilize state loans to fund strategic capital facilities. State loan funds available from Business Oregon currently include the Special Public Works Fund and the Oregon Bond Bank. Special Public Works funds are available on a competitive basis to public jurisdictions and can fund projects up to $3.0 million in size but require well-secured loan guarantees from the applicants.

G. PUBLIC IMPROVEMENT AGREEMENTS

Forest Grove uses "Public Improvement Agreements" in cases where a developer is required to construct public facilities to city standard as a condition of development. The agreement also provides assurances to the City and to the developer that the regulations that apply will not change during the term of the agreement. Agreements usually identify provisions for reservation or dedication of land for public purposes; responsibilities for providing infrastructure and services; and construction expenditure provisions for public facility investments.

SECTION III: CAPITAL COSTS

This section describes Westside Planning Area public infrastructure capital costs. The capital costs are not comprehensive and reflect project improvements that will be 'conditioned on approval of new development' within the Area. For transportation, this generally includes collector facilities and excludes local neighborhood streets (which are also required to serve new development). For sanitary sewer and water facilities, this includes trunk line improvements and pump stations. Stormwater facilities cost elements reflect the projects needed to address water run off attributed to new transportation facilities and their impervious surface area. Finally, parks facilities are those identified in the Parks Master Plan that benefit the Westside Planning Area.

It should be noted that additional facilities will be required to handle on-site development impacts. Local neighborhood streets, water lines (connecting with trunk lines) and sewer lines below 12 inch diameter are expected to be constructed at the expense of developers.

A. CAPITAL COST SUMMARY

The City has identified infrastructure costs for transportation, water, sewer, stormwater, and parks facilities in the Westside Planning Area. **Exhibit 3.1** summarizes the total project costs by infrastructure type which equates to approximately $47.6 million, or about $127,179 per acre ($2.92 per SF of land area). Please refer to **Appendix A** for a summary of expected project costs and potential revenues under the current SDC rate structure by planning subarea (David Hill and Purdin Road).

A short-term investment of approximately $3.5 million is required to serve the David Hill area before development can occur.

Transportation is a large portion of total costs at $30.2 million. The next most expensive requirement is water at $8.5 million. It is assumed that the sanitary sewer facilities will cost $3.6 million, Stormwater facilities estimated at $1.6 million, and parks facilities estimated at $3.6 million. Please see **Section V** for detailed project infrastructure improvement and cost assumptions.

Exhibit 3.1

Westside Planning Area Infrastructure Cost Assumptions					
	Short Term Public Costs	Long Term Public Costs	Total Local Public Costs	Number of Projects	Avg. Cost per Acre
Transportation[1]	$1,454,000	$28,776,800	$30,230,800	11	$80,734
Water	875,000	7,658,000	8,533,000	13	$22,788
Sewer	1,128,750	2,506,850	3,635,600	8	$9,709
Stormwater	0	1,575,000	1,575,000	12	$4,206
Parks[2]	0	3,648,000	3,648,000	3	$9,742
Total	**$3,457,750**	**$43,760,650**	**$47,622,400**	**47**	**$127,779**

Source: Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP.

[1] Costs for transportation include only the collector road network and do not include local residential streets

[2] Parks costs are applicable only in the Purdin Road area.

B. CURRENT FUNDING FRAMEWORK

Major annexation areas require significant levels of capital investments in public infrastructure facilities. This section identifies the current funding framework for transportation, wastewater, water, and stormwater facilities.

- **Transportation**: The City currently charges the Washington County Transportation Development Tax, a countywide one-time tax on development.
- **Water**: The City currently owns and operates its own utility. The utility charges utility rates and levies system development charges (SDCs).
- **Sewer**: Clean Water Services (CWS) is the service provider for the City and the city has responsibility for maintaining gravity lines 12 inches or less in diameter. CWS sets the rates and SDCs, of which the City receives a portion. The City currently receives 20% of the revenue from the SDC and 80% goes to CWS. After July 2018, the City's share will drop to 4% of the SDC fee. We assume that the City will receive 4% of the SDC revenue. The City maintains an additional local sewer surcharge in addition to the CWS rates.
  - For all sewer pipes 8 inches or smaller in diameter, the City requires developers to build for local facilities. For pipes between 8 and 12 inches, it has been the City's policy to reimburse the developer for oversizing the line. In this analysis, we assume the City discontinues its reimbursement policy.
- **Stormwater**: Clean Water Services (CWS) is the service provider for the City and the City has responsibility for maintaining local stormwater quality/quantity facilities. CWS sets the rates and SDCs, of which the City receives a portion. The City receives shared stormwater SDCs similar to sewer. The City maintains an additional local stormwater surcharge fee to the CWS rates.
- **Parks**: The City currently charges an SDC to fund future parks and recreation facilities.

See **Exhibit 3.2** for a summary of current SDC rates and the City share of each rate. We have included only single family dwelling charges because, while multifamily units are levied a lower SDC, it is unclear how many will be constructed.

Exhibit 3.2

SDCs Charged in Forest Grove per Dwelling		
Infrastructure Type (with Oversight Jurisdiction)	**Total Rate Per Unit**	**City Share of Rate**
Transportation (Washington Co)*	$7,914	$7,914
Water (City)	$5,478	$5,478
Sewer (CWS)	$5,300	$212
Stormwater (City)	$510	$510
Parks (City)	$3,000	$3,000

Source: Clean Water Services, Washington County, and City of Forest Grove, compiled by FCS GROUP.
*Reflects blended rate of TDT which accounts for single family detached (~89% of development) and single family attached (~11% of development).

If we assume that the existing (status quo) SDCs are the only source of funding for Westside Planning Area infrastructure, we would expect the City to collect adequate revenues *over time* to meet capital requirements for water, sewer, and parks, but not enough revenues for transportation or stormwater facilities (see **Exhibit 3.3**).

Because major public facility improvements are needed before significant levels of development can be approved, and the fact that SDC revenues accrue with new development, the "pay as you go" approach is not a feasible solution for funding short-term capital projects.

Other local policy questions to address include:

- Should all development impact fees (SDC and TDT revenues) collected from development in the Westside Planning Area be dedicated to projects located in this plan district?
- What is the timing of revenues in relationship with the planned schedule of capital expenditures? If capital facilities are needed before development occurs and SDC revenues are collected in subsequent years, how will the City be able to advance fund the planned infrastructure?
- What funding alternatives should the City adopt to provide adequate funding in the short-term and long-term, particularly for transportation and stormwater facilities which are projected to have a major funding gap without adoption of new funding sources.
- Do certain capital projects have limited benefits to either Purdin Road or David Hill, the two components of the Westside Planning area?

These and other policy considerations are discussed in the next section.

Exhibit 3.3

Potential Revenue from Current SDCs Compared with Project Costs					
	Net New Dwelling Units	City Share of Rates	Total Projected Revenue	Total Local Public Costs	Total Local Public Costs
Transportation	2,054	$7,914	$16,254,437	$30,230,800	($13,976,363)
Water	2,054	$5,478	$11,251,812	$8,533,000	$2,718,812
Sewer	2,054	$212	$435,448	$3,635,600	($3,200,152)
Stormwater	2,054	$510	$1,047,540	$1,575,000	($527,460)
Parks	2,054	$3,000	$6,162,000	$3,648,000	$2,514,000
Source: Clean Water Services, Washington County, and City of Forest Grove, compiled by FCS GROUP.					
Note: Multifamily dwelling SDCs are approximately 70% of single family SDCs.					

B.1 Funding Scenarios

Three funding scenarios were evaluated that would dedicate varying levels of current SDC/TDT revenue to the Westside Planning Area: 18%, 40%, and 100%. The range in percentages reflects a low-end, high-end and middle range scenario. The 18% scenario reflects the estimated share of future growth (in population) of Westside Planning Area compared to current citywide population. The 100% scenario assumes that all SDC/TDT revenues collected in the Westside Planning Area are dedicated to projects in the Area. The 40% SDC/TDT allocation scenario represents an assumption that reflects the West Side Planning Area's share of total city-wide housing growth forecasts for the City of Forest Grove over the next 20 years.

SECTION IV: FUNDING EVALUATION

This section provides an evaluation of the funding tools that were identified previously.

A. FUNDING EVALUATION CRITERIA

An evaluation of funding options for each public facility type was conducted to ascertain the relative potential for implementing the potential funding measures identified above.

A.1 Equity

Equity is defined herein as the equitable distribution of cost/risk among three categories: existing city residents, future West Planning Area residents, and current developers/property owners.

A score was assigned to each funding scenario ranging from low cost/risk (3) to high cost/risk (1). The overall equity score for each funding scenario was determined based upon the average of the scores awarded in this category.

A.2 Reliability of Funds

Reliability of funds is an important consideration, especially if debt is used to advance funding for improvements. Funding sources such as SDCs and Reimbursement Districts do not generate a predictable revenue stream and have poor reliability scores. Secured revenue bonds, special districts, and LIDs tend to be far more reliable and less risky to the agency that takes on debt. A score of 1 (low) to 3 (high) was assigned to each funding scenario based on how reliable the funds were in each scenario.

A.3 Market Acceptance

Adequate public facilities must be provided (and funded) before major private development can occur. The ability for the public or private sector to fund necessary infrastructure to accommodate new private development is an important consideration. If there is an over reliance on private developers/property owners to fund all necessary public infrastructure, the development costs per unit of net development (housing units or commercial floor area) may drive up costs to a level that exceeds supportable market prices. However, if new public facilities are funded primarily using SDCs or General Funds, it is likely that the city would not invest in these facilities until adequate capital reserves are established which could take many years. A score of 1 (low) to 3 (high) was assigned to each funding scenario based on the relative potential it would have to facility development within the near-term, six years.

A.4 Ease of Implementation

Ease of Implementation refers to the process and administrative cost required to implement the funding sources identified. Some funding sources, such as utility rates and SDCs, do not require

public votes to enact and therefore are relatively easier to implement than funding sources that require a public vote or legal formation steps (such as a new local option levy or LIDs). A score of 1 (low) to 3 (high) was assigned to each funding scenario based on the relative ease of implementation to enact the relevant funding options.

A.5 Ability to Address Costs

Using the adopted facility master plans and the CIP, City staff was able to identify a preliminary list of facility improvements necessary to make development possible. Each improvement inherently entails additional capital costs that are to be incurred by the city, other major service providers (e.g., Washington County), or developers.

A score of 1 (low) to 3 (high) was assigned to each funding scenario based on the anticipated level of funds it would generate in comparison to the expected near-term and long-term capital cost requirements.

A.6 Total Evaluation Score

As shown in **Exhibit 4.1**, a total score was computed for each funding scenario using the overall equity score and the scores assigned for the ability to do the following: facilitate development, implement the funding scenario, address cost. The total score was then used to rank each funding scenario. The scenarios with the highest scores are identified as the preferred funding scenario for each public facility type. **The recommended funding options include a combination of area specific SDCs, utility fee surcharges for stormwater facilities, and local improvement districts (if necessary). Development Agreements are recommended for developments involving more than 7 lots, specifying private construction of sewer and water lines under 12 inches, and land to be dedicated for public facilities.**

Exhibit 4.1

Westside Plan District Evaluation of New Funding Options

Funding Option	Equity	Reliability of Funds	Market Acceptance	Ease of Implementation	Ability to Address Near-Term Costs	Ability to Address Long-Term Costs	Overall Score (sum of + s)	Funding Recommendation
Development Agreements	+	+++	++	+++	+++	++	14	✓
Utility Fees (Area Specific)	++	+++	+++	++	+	+++	14	✓
SDC (Area Specific)	++	+	+++	+++	+	+++	13	✓
Local Improvement District	++	+++	+	+	+++	++	12	✓
Bonding (LTGO)	+	+++	++	+	+++	+	11	
Utility Fees (citywide)	+	+++	+	++	+	+++	11	
Local Option Levy	++	++	+	+	+	+++	10	
SDC (citywide)	+	+	++	++	+	+++	10	
Reimbursement District	++	+	++	+	+	++	9	
Urban Renewal District	+	+	+	++	+	++	8	

Notes:
+ least positive
++
+++ most positive
Source: FCS GROUP

B. TRANSPORTATION FUNDING APPROACH

B.1 Capital Cost Requirements

The total transportation facility cost for the projects that are required to accommodate Westside Planning Area development is estimated at $30.2 million as shown in **Exhibit 4.2**. City staff

confirmed that these improvements are needed to serve planned growth created by trips to/from the Westside Planning Area. Hence, the capital costs should be borne by property developers and/or future property owners in the Westside Planning Area.

In the short-term (next 5-6 years) Project 9b (Thatcher Road improvements) must be constructed to provide adequate transportation to serve new growth in the David Hill area. Discussions with city staff determined that since this project will primarily benefit the David Hill area, its cost should be attributed to property developers and future property owners within the David Hill area. All other transportation projects are long term and benefit the Westside Planning Area as a whole.

Exhibit 4.2

Transportation Facility Cost Estimates						
No.	**Street Name**	**Limits**	**Description**	**David Hill Area Cost**	**Purdin Road Area Cost**	**Total Cost**
Short Term Projects						
9b	Thatcher Road	David Hill Road to Purdin Road	Full improvements to Council Creek crossing	$1,454,000		$1,454,000
Long Term Projects						
1	Road 1 - Gales Ck (Vista Drive)	Watercrest Road to NW Thatcher Road	Construct new 1,050-foot urban collector street	$1,000,300		$1,000,300
2	Road 2 - Gales Ck	Area 7 to Area 8	Construct new 3,200-foot urban collector street	$4,246,000		$4,246,000
3	Road 3 - Gales Ck	Area 8 Connector	Construct new 600-foot urban collector street	$787,200		$787,200
4	Road 4 - David Hill	David Hill Road to Purdin Road	Construct new 4,700-foot urban collector street	$6,409,200		$6,409,200
5	Road 5 - David Hill (Plum Hill Road)	Area 13 Mid-Block Connection to Thatcher Road	Construct new 1,250-foot urban collector street	$1,212,200		$1,212,200
6	Road 6 - David Hill	Area 13 to temporary turn-around	Construct new 2,300-foot urban collector street	$2,391,000		$2,391,000
7	Road 7 - Purdin	Brooke Street to David Hill Road	Construct new 5,500-foot urban collector street		$4,766,200	$4,766,200
8	Road 8 - Purdin	David Hill Road to Proposed Brooke Street	Construct new 1,750-foot urban collector street		$1,583,700	$1,583,700
9a	Road 9 - Thatcher	David Hill Road to Purdin Road	Half street reconstruction, 4,050-foot 1/2 street improvements. Excluding Council Creek Crossing	$2,437,500		$2,039,500
10	Road 10 - David Hill	Thatcher Road to West of Area 9	Full street reconstruction, 5,100-foot urban collector street	$3,943,500		$3,943,500
	Long Term Subtotal			*$22,426,900*	*$6,349,900*	*$28,776,800*
	Total			**$23,880,900**	**$6,349,900**	**$30,230,800**

Source: Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.

B.2 Funding Scenarios

Using these three scenarios described above, FCS GROUP calculated the level of funding required from the private sector necessary to cover 100% of the project costs. As mentioned previously, a new local funding source is required for the City to obtain adequate funds to construct the full transportation project list. The City also requires approximately $1.5 million in short-term funding to construct Thatcher Road (Project 9b) improvements.

Exhibit 4.3 shows the level of funding required based on how much TDT revenue is dedicated to the Westside Planning area. In each scenario, the total transportation capital improvement cost is $30.2 million, but the amount of TDT revenue dedicated to improvements within the Westside Planning Area ranges from $2.9 to $16.3 million. Hence, the resulting transportation funding gap is expected to range from $14 to $27 million.

Exhibit 4.3

Transportation Funding Costs			
	18% of Existing TDT Dedicated to Westside Planning Area	40% of Existing TDT Dedicated to Westside Planning Area	100% of Existing TDT Dedicated to Westside Planning Area
Total Costs	**$30,230,800**	**$30,230,800**	**$30,230,800**
TDT Revenue Based on Current Fee	$16,254,437	$16,254,437	$16,254,437
Less Revenue Dedicated to Area	**-$2,925,799**	**-$6,501,775**	**-$16,254,437**
Remaining Costs	**$27,305,001**	**$23,729,025**	**$13,976,363**

Source: FCS GROUP.

Exhibit 4.4 shows the fee amount the City needs to fully fund the remaining funding gap for transportation facilities. Each funding source shown below would be intended to address the funding deficiency. For example, if 40% of the TDT revenues are dedicated to transportation projects within the Westside Planning Area, the net funding gap is expected to be approximately $23.7 million. Given the level of planned development in the Westside Planning Area, this funding gap could be addressed though any of the following options:

- New transportation SDC of $11,553 per dwelling unit (one time charge); or
- New transportation utility fee surcharge of $96 per month; or
- New Local Option Levy of $1,749 per year for the average home; or
- New Local Improvement District with $23.7 million in principal and approximately $8.3 million in interest payments.

Exhibit 4.4

Transportation Funding Options			
	18% of Existing TDT Dedicated to Westside Planning Area	40% of Existing TDT Dedicated to Westside Planning Area	100% of Existing TDT Dedicated to Westside Planning Area
Costs			
Remaining Costs	**$27,305,001**	**$23,729,025**	**$13,976,363**
New Fee to Recover Remaining Costs in Full			
New SDC (per single family unit)	$13,294	$11,553	$6,804
Utility Fee (surcharge per month)	$110.78	$96.27	$56.70
Local Option Levy (per $1,000 AV)*	$6.71	$5.83	$3.43
Local Option annual cost/$300k home	$2,013	$1,749	$1,030
Local Improvement District**	$36,846,523	$32,020,949	$18,860,295

* assumes special levy applied to Westside Plan District over 10 years.

** assumes LID payments are financed at 6.5% over 10 years.

Source: FCS GROUP.

B.3 Selected Funding Approach

After discussion with city staff, a preliminary funding approach has been formulated. The funding approach would rely upon an allocation of up to 40% of TDT revenues to the Westside Planning Area combined with a new transportation SDC on new development in the Westside Planning Area, until any transportation financing obligations by the City are met. In this approach, the local transportation SDC would be approximately $11,369 per dwelling unit (plus administration charges). Note, actual charges would be higher for detached homes and lower for condos/townhomes and multifamily dwellings.

In light of the fact that SDC revenues would cumulate over time they would not be adequate to fully fund the short-term construction of the Thatcher Road project. Also, because David Hill is under multiple ownerships, it is unlikely that any single developer will be able to front the $1.5 million cost for Thatcher Road improvements on their own. In order to help spur development, the City would need to evaluate the feasibility of advance financing the cost of this improvement project using its LTGO bonding capacity or other financing method. If the City decides to advance financing for this project, the formation of an LID in the David Hill area is recommended.

If a $1.5 M LID is formed for the benefit area (includes David Hill and Gales Creek areas), the LID assessment would be approximately $7,456 per acre or $2,000 per allowable dwelling unit (assumes 90% absorption over 20 years or 771 net new dwelling units). Property owners would have the option of financing LID assessments over a 10 year (or longer) time frame.

City debt payment obligations would have a more secure stream of revenue from LID payments by properties within the David Hill area. In exchange for LID participation (secured by property liens until assessments are paid in full), a lower transportation SDC would be incurred in the David Hill area than in the Purdin Road area. It is recommended that this strategy be further evaluated by the City and subjected to property owner input prior to its refinement and implementation.

C. WATER FUNDING APPROACH

C.1 Capital Cost Requirements

The total water system infrastructure cost for the projects that are required to serve future development within the City and accommodate Westside Planning Area development is estimated at $23.5 million, of which $8.5 million is required for the Westside Planning Area, as shown in **Exhibit 4.5**.

According to city staff and engineering consultants, one major water supply project in the higher elevation areas of David Hill is required, a 500,000 gallon reservoir, prior to permitting new development. This short term project would cost approximately $4.2 million. According to engineering estimates, approximately $440,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R10 zoning. If there is a reduction in the density permitted in this area to SR (1 du/acre) approximately $120,000 or 2.5% of the total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 24 dwelling units.

Exhibit 4.5

Water Facility Cost Estimates					
No.	**Description**	**Linear Feet**	**Total Costs**	**Estimated Costs Attributed to Westside Planning Area**	**Area of Benefit**
Short Term Projects					
10a	One 0.5 MG reservoirs[1]	EA	$2,390,000	$500,000	David Hill
	Contingencies and Engineering		$1,792,500	$375,000	David Hill
	Short Term Subtotal		*$4,182,500*	*$875,000*	
Long Term Projects					
1	Road 1 Water main	1,050	63,000	$63,000	David Hill
2	Road 2 Water main	3,200	192,000	$192,000	David Hill
3	Road 3 Water main	600	36,000	$36,000	David Hill
4	Road 4 Water main	4,700	282,000	$282,000	David Hill
5	Road 5 Water main	1,250	75,000	$75,000	David Hill
6	Road 6 Water main	2,300	138,000	$138,000	David Hill
7	Road 7 Water main	5,500	330,000	$330,000	Purdin Road
8	Road 8 Water main	1,750	105,000	$105,000	Purdin Road
9	Road 9 Water main	3,500	525,000	$525,000	David Hill
	One 0.5 MG reservoirs[1, 4]	EA	$2,403,846	$0	David Hill URA
11	Two 0.3 MG reservoirs[2]	EA	$2,910,448	$1,950,000	Entire Area
12	One 2.25 MG reservoir near Watercrest	EA	$2,956,522	$680,000	Entire Area
	Contingencies and Engineering		$5,709,728	$3,282,000	Entire Area
	Long Term Subtotal		*$13,322,698*	*$7,658,000*	
	Total		**$17,505,198**	**$8,533,000**	

[1] One reservoir expected to be used by development within David Hill from 440 to 615 feet in elevation and portions of the David Hill URA between 190 and 615 feet. The other reservoir expected to be used to serve the remainder of the David Hill URA between 190 and 615 feet which is included herein to account for the shared costs of land acquisition, piping, pressure reducing values and a pump station. Approximately $500,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R10 zoning. If there is a reduction in the density permitted
in this area to SR (1 du/acre) approximately $120,000 or 2.5% of the total cost of these reservoirs would be attributed to serving the David Hill area above 440 feet which would include an estimated 24 dwelling units.
[2] A portion of these reservoirs will be used to serve the David Hill UGB between 250 and 440 feet. Approximately 67% of total costs would be associated with the David Hill Planning Area.
[3] Approximately 23% of the cost of this reservoir would be associated with the David Hill and Purdin Road Planning Areas.
[4] Cost of second 0.5 MG reservoir is shown for reference only and is not included in the Long Term Subtotal.
Source: Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.

C.2 Funding Scenarios

FCS GROUP calculated the level of funding required from the private sector necessary to cover 100% of the project costs. **Exhibit 4.6** shows the level of funding required based on how much SDC revenue is dedicated to the area. Another funding source is required for the City to construct the full project list unless the City devotes at least 76% of Westside Planning Area future SDC revenues to project capital costs.

Exhibit 4.6

Water Funding Costs	18% of Existing SDC Dedicated to Westside Planning Area	40% of Existing SDC Dedicated to Westside Planning Area	100% of Existing SDC Dedicated to Westside Planning Area
Total Costs	**$8,533,000**	**$8,533,000**	**$8,533,000**
SDC Revenue Based on Current Fee	$11,251,812	$11,251,812	$11,251,812
Less SDC Revenue Dedicated to Area	**-$2,025,326**	**-$4,500,725**	**-$11,251,812**
Remaining Funding Gap	**$6,507,674**	**$4,032,275**	**$0**

Source: FCS GROUP.

After identifying the remaining costs, **Exhibit 4.7** shows the fee amount the City must adopt to fully fund remaining costs. Each funding source shown below will address the full deficiency. The funding options include: an area specific SDC, utility surcharge, local option levy and a LID.

Exhibit 4.7

Water Funding Options	18% of Existing SDC Dedicated to Westside Planning Area	40% of Existing SDC Dedicated to Westside Planning Area	100% of Existing SDC Dedicated to Westside Planning Area
Costs			
Remaining Costs	**$6,507,674**	**$4,032,275**	**$0**
New Fee to Recover Remaining Costs in Full			
New SDC (per unit)	$3,168	$1,963	$0
Utility Fee (fixed charge per month)	$26.40	$16.36	$0.00
Local Option Levy (per $1,000 AV)*	$1.60	$0.99	$0.00
Local Option annual cost/$300k home	$480	$297	$0
Local Improvement District**	$8,781,730	$5,441,323	$0

* assumes special levy applied to Westside Plan District over 10 years.
** assumes LID payments are financed at 6.5% over 10 years.
Source: FCS GROUP.

C.3 Selected Funding Approach

The selected funding strategy for water relies upon the existing water system SDC and assumes that at least 76% of water SDC revenues collected in the Westside Planning Area will be used to meet capital improvement obligations attributed to the area. In this scenario, no additional SDC would be needed.

Similar to the issue of funding short-term transportation projects, the ability for the City to fund required short-term water reservoir improvements using SDC revenues is untenable. It is recommended that the City consider issuing revenue bonds (backed by water rates) or a new GO bond (requires voter approval) to pay for short-term water capital improvements. It is recommended that this strategy be further evaluated by the City and subjected to public input prior to its refinement and implementation.

D. SANITARY SEWER FUNDING APPROACH

D.1 Capital Cost Requirements

The total sewer system facility cost for the projects that are required to accommodate Westside Planning Area development is estimated at $3.6 million, as shown in **Exhibit 4.8**. For sewer lines smaller than 12 inches, the City generally requires private developers to construct and dedicate them prior to development. This means the City will likely require all sewer distribution lines to be built as a condition of development approval. However, there are two short-term sewer line projects totaling $1.1 million, which would only benefit the David Hill area. The $1.1 million construction cost would likely be too high for any one developer to afford on their own so some level of upfront public investment would be required.

Exhibit 4.8

Sewer Facility Cost Estimates			
No.	**Description**	**Estimated Cost**	**Area of Benefit**
Short Term Projects			
9	Road 9 Sewer Line	$262,500	David Hill
10	Road 10 Sewer Line (700 LF 12")	$382,500	David Hill
	Contingencies and Engineering*	$483,750	David Hill
	Short Term Subtotal	*$1,128,750*	
Long Term Projects			
1	Road 1, 2, 3, Sewer Line	$225,000	David Hill
4	Road 4 Sewer Line	$300,000	David Hill
5	Road 5 Sewer Line	$82,500	David Hill
6	Road 6 Sewer Line	$165,000	David Hill
7	Road 7 Sewer Line (10")	$405,000	Purdin Road
8	Road 8 Sewer Line (10")	$255,000	Purdin Road
	Contingencies and Engineering*	$1,074,350	Entire Area
	Long Term Subtotal	*$2,506,850*	
	Total	**$3,635,600**	

Source: Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.

*Contingencies allocated proportionately to developer or City/CWS

D.2 Funding Scenarios

Exhibit 4.9 shows the level of funding required based on how much sewer SDC revenue is dedicated to the area. Another funding source is required for the City to construct the full project list. There are additional timing considerations that require an up-front funding source for the project costs.

Exhibit 4.9

Sewer Funding Strategy Analysis	18% of Existing SDC Dedicated to Westside Planning Area	40% of Existing SDC Dedicated to Westside Planning Area	100% of Existing SDC Dedicated to Westside Planning Area
Total Costs	**$3,635,600**	**$3,635,600**	**$3,635,600**
SDC Revenue Based on Current Fee	$10,886,200	$10,886,200	$10,886,200
Less: CWS Revenue Share	$10,450,752	$10,450,752	$10,450,752
City SDC Revenue Share	$435,448	$435,448	$435,448
Less Net City SDC Revenue	**-$78,381**	**-$174,179**	**-$435,448**
Remaining Funding Gap	**$3,557,219**	**$3,461,421**	**$3,200,152**

Source: FCS GROUP.

After identifying the remaining costs, **Exhibit 4.10** shows the fee amount the City must adopt to fully fund remaining costs. Each funding source shown below will address the full deficiency. Because the City can require developers to build all projects on the list, we have included 'developer dedications' for the remaining project costs as the primary funding option.

Exhibit 4.10

Sewer Funding Options	18% of Existing SDC Dedicated to Westside Planning Area	40% of Existing SDC Dedicated to Westside Planning Area	100% of Existing SDC Dedicated to Westside Planning Area
Costs			
Remaining Costs	**$3,557,219**	**$3,461,421**	**$3,200,152**
New Fee to Recover Remaining Costs in Full			
Developer Dedications	$3,557,219	$3,461,421	$3,200,152
New SDC (per unit)	$1,732	$1,685	$1,558
Utility Fee (fixed charge per month)	$14.43	$14.04	$12.98
Local Option Levy (per $1,000 AV)*	$0.87	$0.85	$0.79
Local Option annual cost/$300k home	$262	$255	$236
Local Improvement District**	$4,800,262	$4,670,987	$4,318,420

* assumes special levy applied to Westside Plan District over 10 years.
** assumes LID payments are financed at 6.5% over 10 years.
Source: FCS GROUP.

D.3 Selected Funding Approach

The selected funding strategy for sewer relies primarily upon developer dedications of sewer lines below 12 inches and on existing sewer SDC revenues collected in the Westside Planning Area to be dedicated to Westside Planning Area improvements. Note, this strategy will require concurrence from CWS.

In light of the need for approximately $1.1 million in short-term sewer project construction to serve the David Hill area, the City should consider its ability to utilize available financing methods, such as its ability to borrow funds from the sewer fund, or the use of LTGO bonding capacity or other sources of debt financing. Debt payments can be secured by a local sewer rate surcharge, SDC payments, and LID or Reimbursement District payment by developers or property owners within the David Hill area. It is recommended that this strategy be further evaluated by the City and subjected to property owner and developer input prior to its refinement and implementation.

E. STORMWATER FUNDING APPROACH

E.1 Capital Cost Requirements

The total stormwater system facility cost for the projects that are required to address impacts of new roadway construction within the Westside Planning Area development is estimated at approximately $1.6 million as shown in **Exhibit 4.11**. The City does not have any short-term projects for stormwater. It should be noted that in addition to the improvements specified in Exhibit 4.11, developers will be required to mitigate stormwater impacts created by their proposed developments.

Exhibit 4.11

Stormwater Management Facility Cost Estimates			
Project No.	**Description**	**Estimated Cost**	**Area of Benefit**
Quantity 1	Road 1, 2, 3, Storm Pond	$75,000	David Hill
Quantity 2	Road 4 Storm Pond	$75,000	David Hill
Quantity 3	Road 5 and 9 Storm Pond	$100,000	David Hill
Quantity 4	Road 6 and 10 Storm Pond	$150,000	David Hill
Quantity 5	Road 7 Storm Pond	$200,000	Purdin Road
Quantity 6	Road 8 Storm Pond	$50,000	Purdin Road
Quality 7	Road 1, 2, 3, Stormwater Treatment	$35,000	Purdin Road
Quality 8	Road 4 Stormwater Treatment	$35,000	David Hill
Quality 9	Road 5 and 9 Stormwater Treatment	$70,000	David Hill
Quality 10	Road 6 and 10 Stormwater Treatment	$70,000	David Hill
Quality 11	Road 7 Stormwater Treatment	$20,000	David Hill
Quality 12	Road 8 Stormwater Treatment	$20,000	Purdin Road
	Contingencies and Engineering	$675,000	Entire Area
	Totals	**$1,575,000**	

Source: Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.

E.2 Funding Scenarios

Exhibit 4.12 shows the level of funding expected for each scenario. Because the current stormwater SDC is $510 and the City's share is small, existing SDCs do very little to cover capital costs, leaving a large funding gap.

Exhibit 4.12

Stormwater Funding Strategy Analysis			
	18% of Existing SDC Dedicated to Westside Planning Area	**40% of Existing SDC Dedicated to Westside Planning Area**	**100% of Existing SDC Dedicated to Westside Planning Area**
Total Costs	**$1,575,000**	**$1,575,000**	**$1,575,000**
SDC Revenue Based on Current Fee	$1,047,540	$1,047,540	$1,047,540
Less SDC Revenue Share	**$188,557**	**$419,016**	**$1,047,540**
Remaining Funding Gap	**$1,386,443**	**$1,155,984**	**$527,460**

Source: FCS GROUP.

After identifying the remaining costs, **Exhibit 4.13** shows potential methods considered to fully fund remaining costs. Each funding source shown below will address the full deficiency.

Exhibit 4.13

Stormwater Funding Options***			
	18% of Existing SDC Dedicated to Westside Planning	40% of Existing SDC Dedicated to Westside Planning	100% of Existing SDC Dedicated to Westside Planning
Costs			
Remaining Costs	$1,386,443	$1,155,984	$527,460
New Fees to Recover Remaining Costs in Full			
New SDC (per unit)	$675	$563	$257
Utility Fee (fixed charge per month)	$5.62	$4.69	$2.14
Local Option Levy (per $1,000 AV)*	$0.34	$0.28	$0.13
Local Option annual cost/$300k home	$102	$85	$39
Local Improvement District**	$1,870,925	$1,559,934	$711,777

* assumes special levy applied to Westside Plan District over 10 years.

** assumes LID payments are financed at 6.5% over 10 years.

*** City Staff, compiled by FCS Group.

Source: FCS GROUP.

E.3 Selected Funding Approach

The selected funding approach relies upon the existing SDC and includes a supplemental stormwater rate surcharge of approximately $7 per month for households within the Westside Planning area (plus administrative charges). This rate surcharge can be phased in over a period of five years and indexed with inflation. Stormwater improvements will likely be built in conjunction with roadway construction projects in the Westside Planning Area. If fund balances from rate surcharges are insufficient to cover the cost of new stormwater ponds, the City may establish reimbursement district(s) for a proportionate share of financing costs, with total charges limited to approximately $700 per dwelling unit.

F. PARKS FUNDING APPROACH

F.1 Capital Cost Requirements

The total parks cost for the three identified projects planned in the Westside Planning Area is estimated at $6.6 million as shown in **Exhibit 4.14**. The City does not have any short term projects.

Exhibit 4.14

Parks Cost Estimates for the Westside Planning Area						
Project No.	Description	Estimated Cost	Attributable to *Westside Planning Area*	Attributable to *Purdin Road Planning Area*	Attributable to *David Hill Planning Area*	Area of Benefit
1	Purdin Road Neighborhood	$3,000,000	$3,000,000	$3,000,000	$0	Purdin Road Planning
2	Thatcher Park Development	$3,400,000	$612,000	$349,799	$262,201	Westside Planning Area
3	Dog Park Enhancement	$200,000	$36,000	$20,576	$15,424	Westside Planning Area
	Totals	**$6,600,000**	**$3,648,000**	**$3,370,376**	**$277,624**	

Source: City staff, compiled by FCS GROUP. Costs shown are in 2016 dollars.

F.2 Funding Scenarios

Exhibits 4.15 and 4.15a shows the level of funding by tool. Provided that the City uses SDCs from the entire Westside Planning Area, it will need to dedicate 50% of the SDC revenues collected to have adequate funds to construct the neighborhood park project.

Exhibit 4.15

Parks Funding Strategy Analysis for the *Purdin Road Planning Area*	18% of Existing SDC Dedicated to Purdin Road Planning Area	50% of Existing SDC Dedicated to Purdin Road Planning Area	100% of Existing SDC Dedicated to Purdin Road Planning Area
Total Costs	$ 3,370,376	$ 3,370,376	$ 3,370,376
SDC Revenue Based on Current Fee	$ 3,522,000	$ 3,522,000	$ 3,522,000
Less SDC Revenue Dedicated to Area	$ 633,960	$ 1,761,000	$ 3,522,000
Remaining Funding Gap	**$ 2,736,416**	**$ 1,609,376**	**$ (151,624)**

City Staff, compiled by FCS Group.
Source: FCS GROUP.

Exhibit 4.15a

Parks Funding Strategy Analysis for the *David Hill Planning Area*	18% of Existing SDC Dedicated to David Hill Planning Area	50% of Existing SDC Dedicated to David Hill Planning Area	100% of Existing SDC Dedicated to David Hill Planning Area
Total Costs	$ 277,624	$ 277,624	$ 277,624
SDC Revenue Based on Current Fee	$ 2,640,000	$ 2,640,000	$ 2,640,000
Less SDC Revenue Dedicated to Area	$ 475,200	$ 1,320,000	$ 2,640,000
Remaining Funding Gap	**$ (197,576)**	**$ (1,042,376)**	**$ (2,362,376)**

City Staff, compiled by FCS Group.
Source: FCS GROUP.

After identifying the remaining costs, **Exhibits 4.16 and Exhibit 4.16a** show the fee amount the City would need to adopt to fully fund remaining costs. Although there is a funding deficiency for the Purdin Road area for parks facilities, there would be adequate amount of system development charges collected from the David Hill area to finance all the park related facilities. Thus, no other funding options are considered.

Exhibit 4.16

Parks Funding Strategy Analysis for the *Purdin Road Planning Area*	18% of Existing SDC Dedicated to Purdin Road Planning Area	50% of Existing SDC Dedicated to Purdin Road Planning Area	100% of Existing SDC Dedicated to Purdin Road Planning Area
Costs			
Remaining Costs	$2,736,416	$1,609,376	-$151,624
New Fees to Recover Remaining Costs in Full			
New SDC Purdin Road Planning Area (per unit)	$1,917	$1,127	$0

* City Staff, compiled by FCS Group.
Source: FCS GROUP.

Exhibit 4.16a

Parks Funding Strategy Analysis for the *David Hill Planning Area*			
	18% of Existing SDC Dedicated to David Hill Planning Area	50% of Existing SDC Dedicated to David Hill Planning Area	100% of Existing SDC Dedicated to David Hill Planning Area
Costs			
Remaining Costs	-$197,576	-$1,042,376	-$2,362,376
New Fees to Recover Remaining Costs in Full			
New SDC Westside Planning Area (per unit)	$0	$0	$0

* City Staff, compiled by FCS Group.

Source: FCS GROUP.

F.3 Selected Funding Approach

The selected funding approach for parks assumes the City will allocate all of the SDC revenues collected in the Westside Planning Area to identified parks projects. This funding approach assumes parks improvements are constructed after SDC revenues are sufficient to cover capital costs. It is possible that a developer may elect to construct and dedicate a neighborhood park to enhance amenities offered by their development. The ability of a developer to construct neighborhood parks can be enhanced if the City's parks SDC capital project list is amended to include such parks, and the City grants parks SDC credits based on the market value of dedicated land and allowable construction cost of the improvement (designed to city standards). City policies regarding the transferability of parks SDC credit also fosters private parks construction.

SECTION V: MARKET CONSIDERATIONS

This section provides an overview of market characteristics related to the near- and long-term development potential for the Westside Planning Area. In order to conduct this analysis, FCS GROUP evaluated current home sales prices in Forest Grove and the surrounding areas of Hillsboro. We also evaluated overall public facility infrastructure costs in comparison with other major annexation areas within the greater Metro Region.

A. INFRASTRUCTURE COST COMPARISON

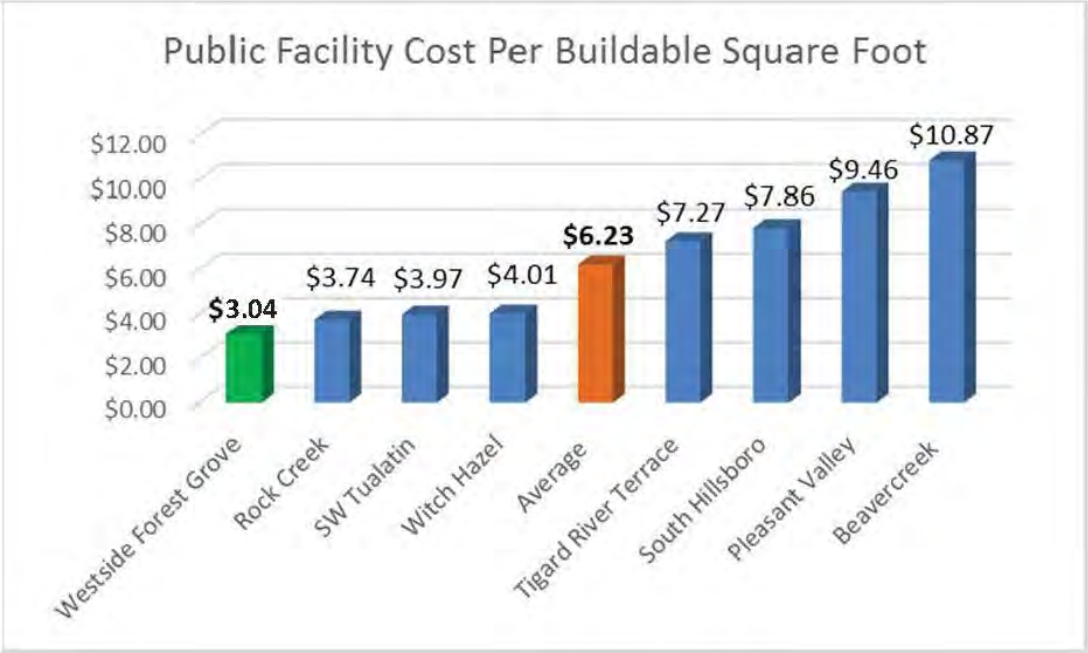
A.1 Developer Infrastructure Costs

Prior to annexation, the City would require Annexation and Development Agreements that would identify any on- and off-site public infrastructure improvements required to address impacts related to new development within the Westside Planning Area. While much of the David Hill area is annexed, remaining areas could be subject to Development Agreements or conditions of approval.

The public infrastructure cost to serve development within the 374-acre Westside Planning Area was includes projects listed in **Section IV**. The total common infrastructure cost in this analysis is estimated at approximately $45.7 million. This equates to approximately $3.04 per net buildable square feet of land area for infrastructure before accounting for credit eligible deductions.

When we compare the cost of required pubic infrastructure to serve major urbanizing areas around the metropolitan region, we find the $3.04 per net buildable square feet of land area estimate to be well below the average for seven other urbanizing areas shown in E**xhibit 5.1**. Hence, the preliminary common cost estimates appear to be on the low end of the range of other urbanizing areas in various stages of advanced planning or development. However, any additional fees would have a negative impact on the ability to accommodate subsidized housing in the area. Whether this planning area is the appropriate location for affordable housing is beyond the scope and purpose of this analysis.

Exhibit 5.1: Estimated Major Infrastructure Cost per Square Feet of Buildable Land Area

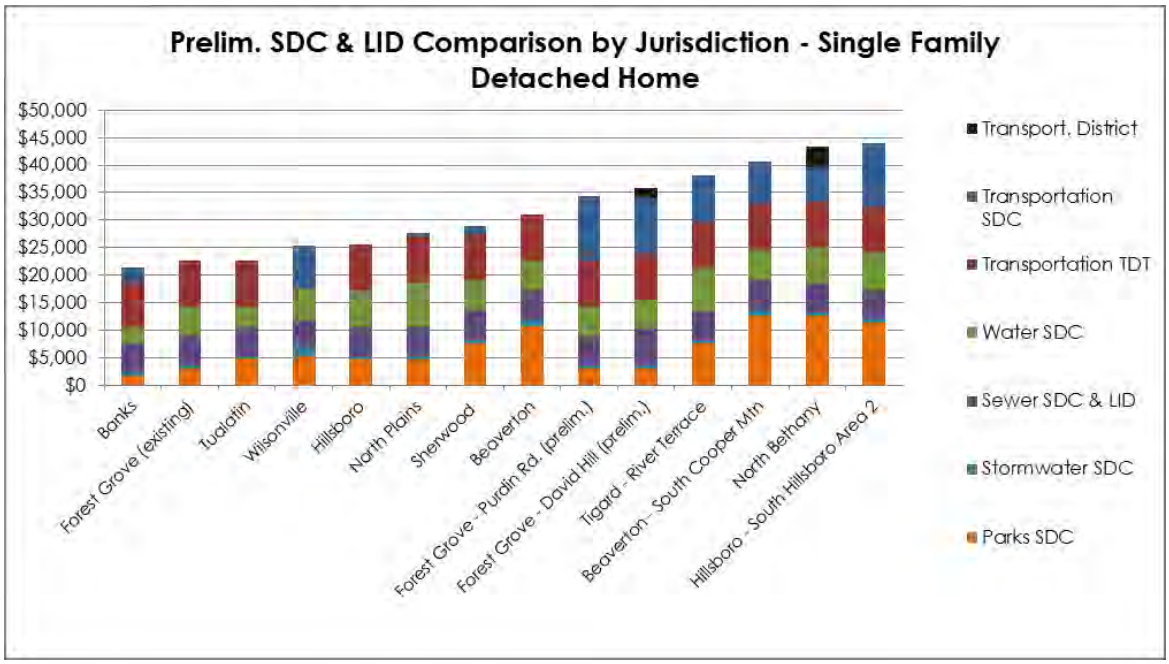


Source: analysis by FCS Group using assumptions contained in adopted concept plans and funding strategies for each area; adjusted to 2016 dollars.

A.2 SDC and TDT Costs

The baseline financial analysis assumes that the developer would pay SDC and TDT charges for transportation and receive credits for constructing credit-eligible improvements. Credit policies are assumed to follow the current City and Washington County practice. The 40% TDT revenue allocation and resulting SDCs and LID charges (before credits) are shown in **Exhibits 5.2 and 5.3**. Please note: these exhibits only show preliminary SDCs and LID assessments and exclude other permits and construction excise taxes associated with development.

Exhibit 5.2



Source: analysis by FCS Group as of August 2016.

Exhibit 5.3

Jurisdiction	Parks SDC	Stormwater SDC	Sewer SDC & LID	Water SDC	Transportation TDT	Transportation SDC	Transport. District	Total
Banks	1,800	510	5,300	2,825	8,278	2,704		21,417
Forest Grove (existing)	3,000	510	5,300	5,478	8,278	-		**22,566**
Tualatin	4,786	510	5,300	3,754	8,278	-		22,628
Wilsonville	5,374	1,628	4,849	5,842	-	7,695		25,388
Hillsboro	4,647	510	5,300	6,830	8,278	-		25,565
North Plains	4,725	510	5,300	8,169	8,278	638		27,620
Sherwood	7,669	621	5,295	5,592	8,278	1,506		28,961
Beaverton	10,800	1,104	5,300	5,512	8,278	-		30,994
Forest Grove - Purdin Rd. (prelim.)	3,000	510	5,300	5,478	8,278	12,084		**34,650**
Forest Grove - David Hill (prelim.)	3,000	510	6,727	5,478	8,278	10,084	2,000	**36,077**
Tigard - River Terrace	7,566	510	5,300	7,917	8,278	8,489		38,060
Beaverton - South Cooper Mtn	12,624	1,104	5,300	5,512	8,278	7,725		40,543
North Bethany	12,645	510	5,300	6,687	8,278	6,113	3,750	43,283
Hillsboro - South Hillsboro Area 2	$11,433	$510	$5,300	$6,830	$8,278	$11,731		$44,082

Source: survey conducted by FCS GROUP as of August 2016.

Current SDCs in Forest Grove are relatively low compared to other cities in the region. If the City implemented the recommended funding approach, the overall SDCs (and LID charges) would increase by approximately $13,400 per single family dwelling within the Westside Planning Area. The resulting Westside Planning Area SDCs would be similar to the new overlay areas for South Hillsboro, Tigard River Terrace, Beaverton South Cooper Mountain, and North Bethany.

A.3 Summary Recommendations

It is recommended that the City of Forest Grove pursue a funding approach as follows:

- **Transportation:** Allocate 40% of the TDT revenues collected in the Westside Planning Area to Area projects, and adopt a new local transportation SDC (Westside Planning Area only) of approximately $1,208 per average daily vehicle trip.[1] As indicated in the table below (lower fees would be required for multifamily dwellings and higher fees for detached dwellings). In the short-term, the City should also consider advance financing for the $1.5 million Thatcher Road improvement project, with repayment using a combination of TDT and SDC revenues and a LID within the David Hill area.

Existing and Proposed Transportation Charges in Forest Grove by Dwelling Type	Current TDT	Proposed Area SDC (prelim.)	Total (prelim.)
Single Family Detached	$8,278	$12,084	$20,362
Apartment	$5,415	$7,905	$13,320
Condo/Townhouse	$4,951	$7,227	$12,178

- **Water:** Allocate up to 76% of the water SDC revenues collected in the Westside Planning Area to Area projects. In the short-term the City should consider its means to finance a $4.5 million reservoir improvement (City wide benefit) using rate revenue bonds or hybrid bonds.
- **Sanitary Sewer**: With concurrence from CWS, require developers to construct sewer lines under 12 inches in diameter as a condition of approval. In the short-term the City should consider its means for advance financing $1.1 million for sewer truck line construction, using funds borrowed by its sewer fund and payments secured through either an LID or a reimbursement district in the David Hill area.
- **Stormwater**: Allocate 100% of the stormwater SDC revenues collected in the Westside Planning Area to Area projects and adopt a new local area specific stormwater rate of approximately $7 per month for customers within the Westside Planning Area. The City may need to consider formation of reimbursement districts in the future if fund balances are inadequate to construct new facilities as development occurs.
- **Parks**: Allocate 100% of the parks SDC revenues collected in the Westside Planning Area to Area projects.

When accounting for existing TDT and SDCs, and the recommended area-specific SDCs noted above, the total impact fees (TDT and SDCs) for Westside Planning Area development would equate to approximately $36,000 per single family dwelling unit. See **Exhibit 5.4** for a regional comparison of total SDCs. Note, these assumptions and findings are considered to be preliminary and subject to change and refinement once the City moves forward with a detailed SDC methodology report.

[1] This allocation of 40% of the TDT revenues collected in the Westside Planning Area to capital projects in the Planning Area reflects the expected growth in average daily vehicle trips that are expected to occur in the Planning Area as a share of the entire City of Forest Grove over the next 20 years; the residual 60% of TDT revenues would be available for citywide needs.

Exhibit 5.4

Total SDC & LID assessments per Single Family Detached Dwelling			
	Current/ Proposed SDCs & LIDs per Sq.Ft. of Floor Area [1]	Expected Home Sales Price per Square Foot**	SDCs & LIDs as a % of Current Sales Price
Forest Grove (existing)	$9.03	$140.72	6.4%
Beaverton - South Cooper Mountain	$16.22	$199.98	8.1%
Forest Grove - Westside Planning Area	$14.43	$161.83	8.9%
Hillsboro - South Hillsboro	$17.63	$171.76	10.3%

Note 1: Assumes 2,500 square foot house and assumes 15% price per square foot premium for housing in new master planned areas.

Note 2: Reflects sales price for homes built since 2010.

Compiled by FCS GROUP based on Zillow.com data.

Appendix A: Westside Planning Area Costs and Status Quo Revenues

Summary of Capital Infrastructure Costs and Expected Funding Gap Under Status Quo

Transportation Element			
Total Costs	**David Hill Area**	**Purdin Road Area**	**Combined Areas**
Total Costs	$23,880,900	$6,349,900	$30,230,800
Net Revenue Based on Current TDT*	$6,781,915	$9,472,522	$16,254,437
Remaining Costs	$17,098,985	-$3,122,622	$13,976,363

Water Element			
Total Costs	**David Hill Area**	**Purdin Road Area**	**Combined Areas**
Total Costs	$6,855,500	$1,677,600	$8,533,100
Net Revenue Based on Current SDC*	$4,694,646	$6,557,166	$11,251,812
Remaining Costs	$2,160,854	-$4,879,566	-$2,718,712

Sanitary Sewer Element			
Total Costs	**David Hill Area**	**Purdin Road Area**	**Combined Areas**
Total Costs	$2,480,600	$1,155,000	$3,635,600
Net Revenue Based on Current SDC*	$181,684	$253,764	$435,448
Remaining Costs	$2,298,916	$901,236	$3,200,152

Stormwater Element			
Total Costs	**David Hill Area**	**Purdin Road Area**	**Combined Areas**
Total Costs	$1,067,500	$507,500	$1,575,000
Net Revenue Based on Current SDC*	$436,824	$610,716	$1,047,540
Remaining Costs	$630,676	-$103,216	$1,533,098

Parks Element			
Total Costs	**David Hill Area**	**Purdin Road Area**	**Combined Areas**
Total Costs	$648,000	$3,000,000	$3,648,000
Net Revenue Based on Current SDC*	$2,571,000	$3,591,000	$6,162,000
Remaining Costs	-$1,923,000	-$591,000	-$2,514,000

** revenues are based on residential development only and conservatively excludes additional long-term SDC revenue from retail, schools and parks.*

FOREST GROVE OREGON

A place where families and businesses thrive.

CITY RECORDER USE ONLY:
AGENDA ITEM #: B.1-B.5
MEETING DATE: 8-14-17
FINAL ACTION: ord nos:

2017-04
2017-05
2017-06
2017-07
2017-08
as amended by CC

CITY COUNCIL STAFF REPORT

TO: *City Council*

FROM: *Jesse VanderZanden, City Manager*

MEETING DATE: *August 14, 2017*

PROJECT TEAM: *Jon Holan, Community Development Director, Rob Foster, Public Works Director, Richard Blackmun, Special Projects Engineer, Dan Riordan, Senior Planner*

SUBJECT TITLE: *Continuation of Public hearing and Second Reading of Ordinances adopting the Westside Refinement Plan and accompanying implementation actions as recommended by the Planning Commission; File No. 311-17-000013-PLNG*

ACTION REQUESTED:	X	Ordinance		Order		Resolution		Motion		Informational

X all that apply

ISSUE STATEMENT: City Council opened a public hearing on July 10, 2017, to provide opportunity for public comment on proposed ordinances pertaining to adoption of the Westside Refinement Plan and accompanying implementation actions. City Council continued the public hearing to August 14, 2017, for second reading of the proposed ordinances. This report summarizes the actions that Council must take if the Council decides to adopt the Westside Refinement Plan and implementation actions on August 14th.

BACKGROUND: The Planning Commission held public hearings on the Westside Refinement Plan and implementation actions on May 15, May 30, and June 5, 2017. After considering the public testimony provided and completing deliberations on the proposals, the Commission unanimously adopted recommendations on the Westside Refinement Plan and implementing actions for Council consideration. The Commission's recommendations were presented to City Council on July 10th. The Commission's recommendations are summarized further below.

If City Council chooses to adopt the Plan and implementation actions the Council must approve the following five ordinances:

- Ordinance 2017-04: adopting the Westside Refinement Plan;
- Ordinance 2017-05: adopting legislative Comprehensive Plan Map amendments to implement the Westside Refinement Plan;

- Ordinance 2017-06: adopting legislative Zoning Map amendments to implement the Westside Refinement Plan;

- Ordinance 2017-07: adopting legislative Development Code amendments to implement the Westside Refinement Plan; and

- Ordinance 2017-08: adopting legislative Transportation System Plan amendments to implement the Westside Refinement Plan.

Each ordinance is addressed individually and sequentially below:

Ordinance 2017-04 adopting the Westside Refinement Plan

Ordinance 2017-04 includes the following Planning Commission (PC) recommendations modifying the Westside Refinement Plan public hearing draft. If Council accepts the Planning Commission's recommendation for the Westside Refinement Plan, the only action needed is a vote on the motion already on the table approving Ordinance 2017-04. *If the Council wishes to eliminate either or both Commission recommended changes to the Plan, then a motion such as "Move to amend Ordinance 2017-04 to remove (specify the items to be removed)."*

- *PC Recommended Policy #1:* Through the next update of the City of Forest Grove Wastewater Management Plan, expected in 2018, evaluate the feasibility of implementing sanitary sewer systems such as Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) in the Westside planning area.

- *PC Recommend Policy #2:* As infrastructure costs are evaluated in future updates of facility master plan and the Transportation System Plan (TSP), these plans consider the following three approaches to pay for the infrastructure costs:

    1. Area-wide: David Hill (area west of Thatcher Road) and New Urban Growth Boundary Area (aka Purdin Road area).

    2. Divide the Westside Planning Area into two subareas:
        A. David Hill
        B. New Urban Growth Boundary Area

    3. Divide the Westside Planning Area into three subareas:
        A. New Urban Growth Boundary Area
        B. David Hill below the 440 foot contour elevation
        C. David Hill above the 440 foot contour elevation

Several questions for Council consideration pertaining to the Ordinance 2017-04 are presented below. Suggested amendments to the Plan addressing these questions follow. The suggested amendments are not included in Ordinance 2017-04. If Council desires to adopt the suggested amendments a motion to amend the ordinance is necessary to include the amendment into the Plan.

At the last meeting, a question was raised about the assurance that park and trail facilities in the area would be developed. Further, there is a concern about linking the multi-use trail with the David Hill Road development.

The Parks, Recreation and Open Space Master Plan shows a multi-use trail continuing from Forest Gale Drive to Highway 47. As a result of the construction of the David Hill Road extension, the trail exists from Thatcher Road to Highway 47. West of Thatcher Road, the location of the trail has not yet been determined and will not until a more specific study is conducted. The two general options are: follow the roadway or locate it near a stream corridor located west of David Hill Road. The stream corridor is a potential location because Clean Water Services would require a vegetative corridor next to the stream. A trail might be located on the outer edge of that corridor. If not, Development Code Section 10.8.205 F allows the City to require a developer to reserve land for park facilities. This would allow the City the opportunity to purchase the property for the trail within 18 months of final land use approval.

If the trail was to be developed adjacent to the roadway, the right-of-way would expand to 55 feet based on a potential cross section developed by staff. Staff has concern with the impact of this needed width in light of the steep topography of the area. It is staff's belief that the proper location should be determined through the more specific study noted above. Further, the Development Code currently provides the authority for the City to reserve the right-of-way as part of any proposed development even if the study is not yet completed.

To better assure all facilities proposed to be located in the Westside Planning area are taken into account as part of any development project, i.e., trails, parks, roads, sewer, etc., the following proposed Action 7.4.2 be considered to be added to the Plan:

- ***Council Question #1***: To assure all facilities proposed to be located in the Westside Planning area are taken into account, i.e. trails, parks, roads, sewer, etc., should a proposed action be included in the Plan to ensure the needed facilities are considered as part of any proposed development where applicable?

  To address this question, an action item could be included in the Plan to state: "All applicable master plans as they may be amended are incorporated by reference in the Westside Plan and facilities in those master plans shall be considered as part of any proposed development where it may apply." This would be Action 7.4.2 in the Plan.

  If Council desires to include Action 7.4.2 in the Plan the following suggested motion would accomplish this:

  > *Move to amend Ordinance 2017-04, to add Action 7.4.2 in the Westside Refinement Plan with the following wording: "All applicable master plans as they may be amended are incorporated by reference in the Westside Plan and facilities in those master plans shall be considered as part of any proposed development where it may apply."*

- ***Council Question #2***: Should the Plan include a policy statement to address concerns about wildfire risk in the Westside planning area? There is such a policy in the Comprehensive

Plan and a similar policy could be incorporated into the Westside Plan. This provides the basis for preparing Development Code amendments for Council consideration in the future.

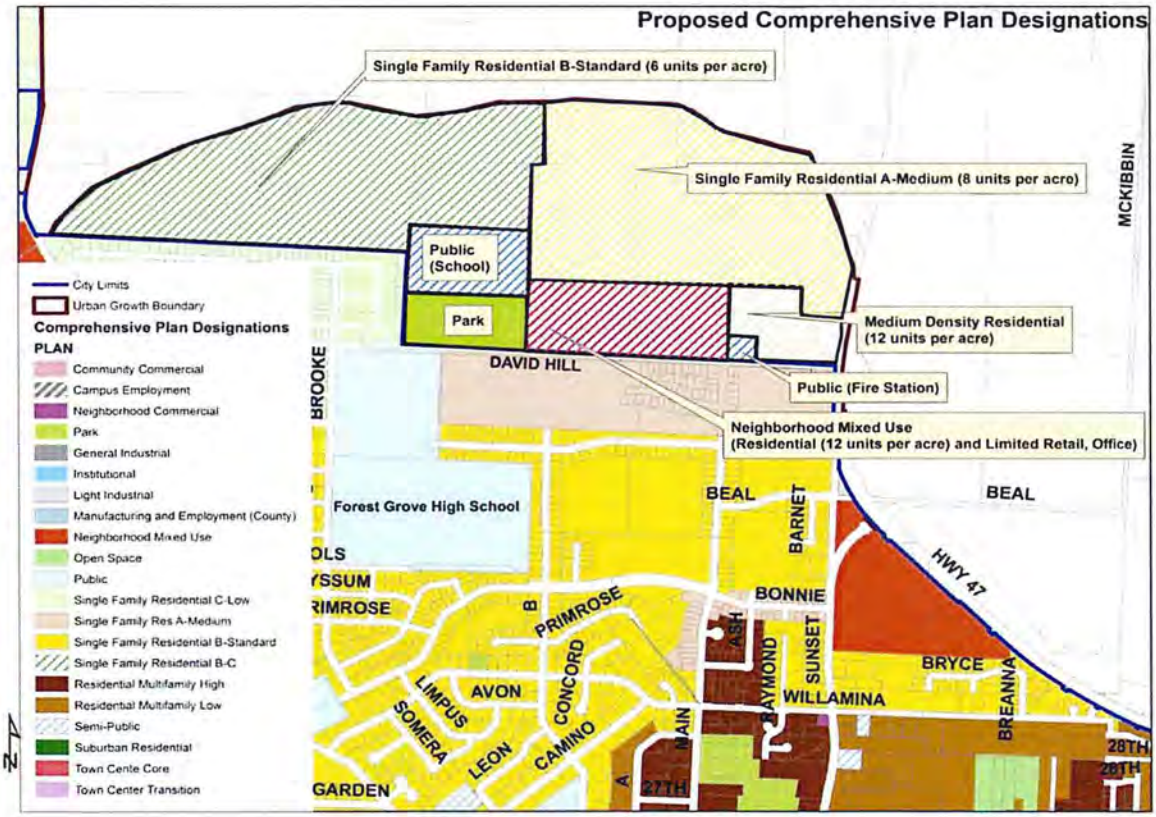
To address this question a policy could be included in the Plan to state: "Due to the presence of steep terrain (greater than 15% slope) and wooded areas, land use regulations should encourage, and where appropriate require, the use of fire resistant building materials and defensible space to minimize the risk of loss of life and damage to property from wildfires." This would be Policy 10.2 in the Plan.

If Council desires to include Policy 10.2 in the Plan the following suggested motion would accomplish this:

> *Move to amend Ordinance 2017-04 to add Policy 10.2 in the Westside Refinement Plan with the following wording: "Due to the presence of steep terrain (greater than 15% slope) and wooded areas, land use regulations should encourage, and where appropriate require, the use of fire resistant building materials and defensible space to minimize the risk of loss of life and damage to property from wildfires."*

Ordinance 2017-05 (Assignment of Comprehensive Plan Map Designations)

The map below shows the Comprehensive Plan Map designations recommended by the Planning Commission for the new urban growth boundary (aka Purdin Road area). The proposed designations shown below are incorporated into Ordinance 2017-05.

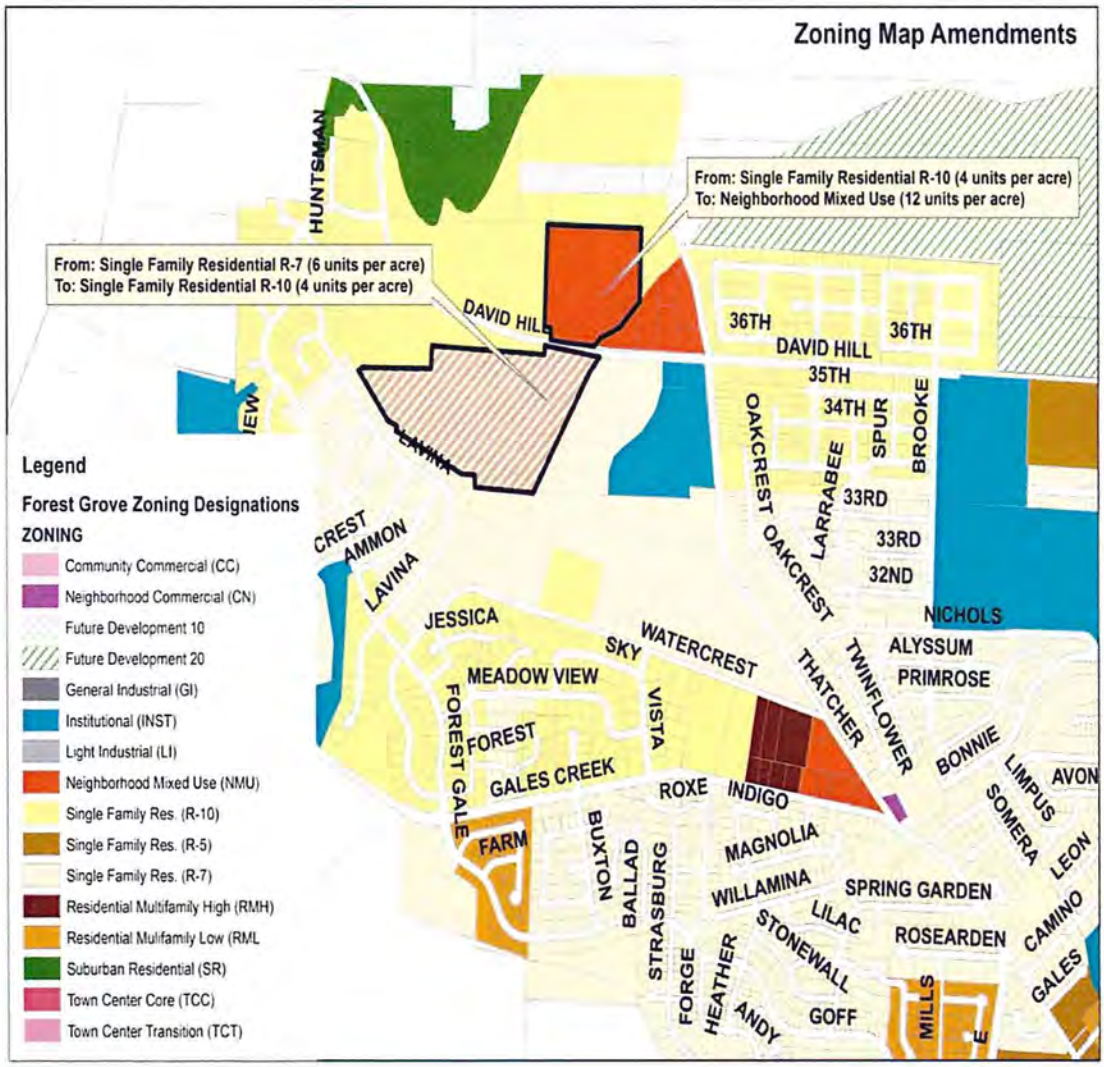


If Council accepts the Planning Commission's Comprehensive Plan Map recommendations for the new urban growth boundary area, the only action needed is a majority vote on the motion already on the table approving Ordinance 2017-05. If Council desires to modify the Planning Commission recommendation a motion amending Ordinance 2017-05 is needed describing the change. *Suggested wording for a motion <u>making a change</u> is provided below*:

> *Move to amend Ordinance 2017-05 making the following modifications to the Comprehensive Plan Map (Council to specify location and Comprehensive Plan Map designation).*

Ordinance 2017-06 (Re-Designation of Zoning Map Designations)

The map below shows the Zoning Map designations recommended by the Planning Commission for the Westside plan area. The designations shown below are incorporated into Ordinance 2017-06.



If Council accepts the Planning Commission's Zoning Map recommendations for the Westside area, the only action needed is a vote on the motion already on the table approving Ordinance 2017-06. If Council desires to modify the Planning Commission recommendation a motion amending Ordinance 2017-06 is needed describing the change. Suggested wording for a motion making a change is shown below:

> *Move to amend Ordinance 2017-06 making the following modifications to the Zoning Map (Council to specify location and Zoning Map designation).*

Ordinance 2017-07 (Development Code Amendments)

The Planning Commission recommended Development Code amendments summarized below are included in Ordinance 2017-07:

- Allow collector street grades with a maximum grade up to 15% for a maximum length of 250 feet if constructed with concrete;
- Require geotechnical and engineering analysis as part of development review in areas with slopes of 10% or more;
- Establish a maximum cap of 150,000 square feet of commercial space with no minimum requirement in the Neighborhood Mixed Use area north of David Hill Road in the Main Street area. Individual buildings would be limited to 50,000 square feet. Currently, the Development Code does not include any standards for this Neighborhood Mixed Use area.

If Council accepts the Planning Commission's recommendations for the Westside area, the only action needed is a vote on the motion already on the table approving Ordinance 2017-07. *If the Council wishes to eliminate any or all of the Commission recommended changes to the Development Code, then a motion is required to amend Ordinance 2017-07 to remove said items.*

Several questions for Council consideration pertaining to Development Code amendments remain. These questions are presented below. Suggested amendments to the Development Code addressing the questions are also presented below. Ordinance 2017-07 has not been modified to include the suggested amendments. *If Council desires to adopt the suggested amendments a motion to amend the ordinance is necessary to include the amendment into the Code.* Possible wording for a motion is provided for consideration.

- ***Council Question #3:*** Should a minimum square footage for commercial development of 25,000 to 50,000 square feet be established for the Neighborhood Mixed Use area north of David Hill Road in the Main Street area?

  To assist Council with considering whether to establish a minimum amount of commercial use in the new urban growth boundary area; the proposed Stonewood Center on Pacific Avenue east of Highway 47 includes three commercial buildings totaling 45,278 square feet. The space is proposed as follows

  Building 1: 13,910
  Building 2: 7,778
  Building 3: 11,795

Building 4: 11,795

The Stonewood Center site approximately 3 acres in size. A rendering of the proposed site layout is provided below.

For purposes of discussion, if the amount of commercial space in the Neighborhood Mixed Use area north of David Hill Road is limited to a minimum of 50,000 square feet, approximately 3.8 acres of land would be required. If the minimum commercial amount is 25,000 square feet, approximately 1.9 acres would be required. If the remaining land area is developed as residential the site could yield approximately 203 to 229 dwellings at a target density of 12 dwellings per net acre.

If Council desires to establish a minimum square footage for commercial development the following motion is necessary:

> *Move to amend Ordinance 2017-07 to modify Development Code Section 10.4.315 (Table 4-2) to establish (Council to determine) square feet as the minimum amount of required commercial development in the Neighborhood Mixed Use zone north of David Hill Road in the Main Street area.*

- ***Council Question #4***: Should the Development Code be amended to add GroveLink as a transit agency for purposes of notification when the City receives a development application in the Westside Planning area? This is not included in the Planning Commission recommendation.

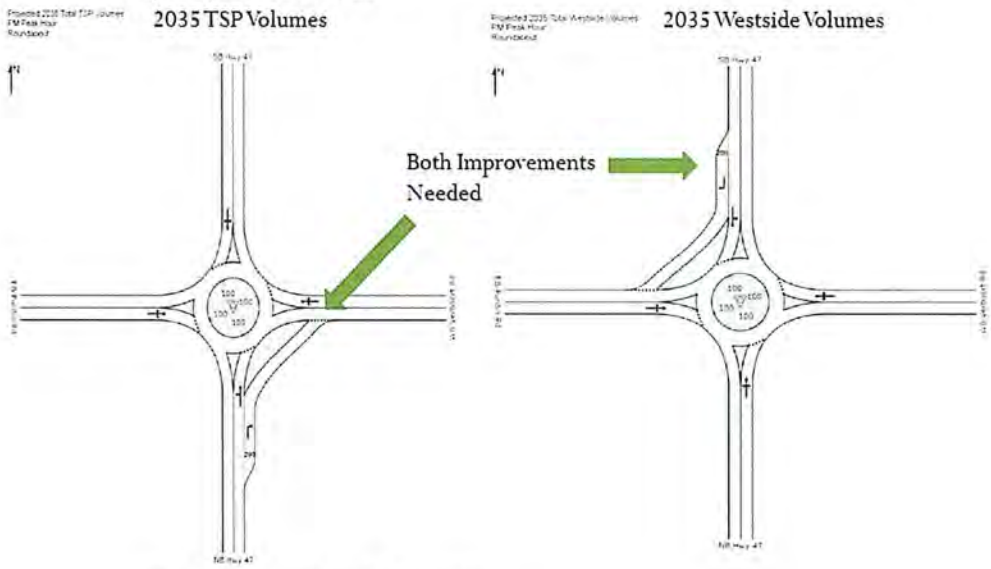
  If Council desires to include GroveLink as a party for notification of development proposals in the Westside plan area the following motion is needed:

Move to amend Ordinance 2017-07 to modify Development Code §10.8.110(E) to state the City shall submit all development proposals along existing and proposed collectors and arterials in the Westside Planning area to GroveLink for review and comment regarding facilities necessary to support transit.

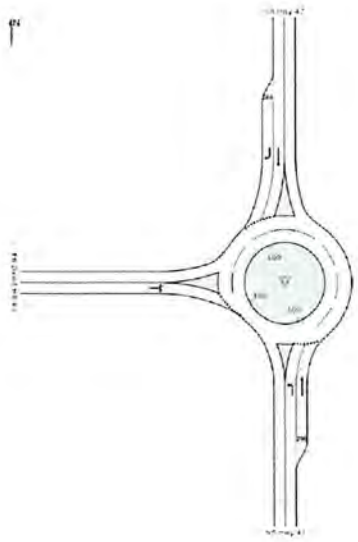
Ordinance 2017-08 (Transportation System Plan (TSP) Amendments)

Ordinance 2017-08 shows the Planning Commission recommended amendments to the Transportation System Plan for the Westside Plan. The Planning Commission recommended adding the conceptual collector street network to the TSP recognizing Plum Hill Lane may not be the preferred alignment for an east-west collector street. The Commission also recommended adding needed improvements to the Highway 47 roundabouts to the TSP financially constrained project list. These improvements are necessary to address future traffic volumes from growth in the new urban growth boundary area. The needed improvements are shown below.

- *Hwy 47/Purdin Road*



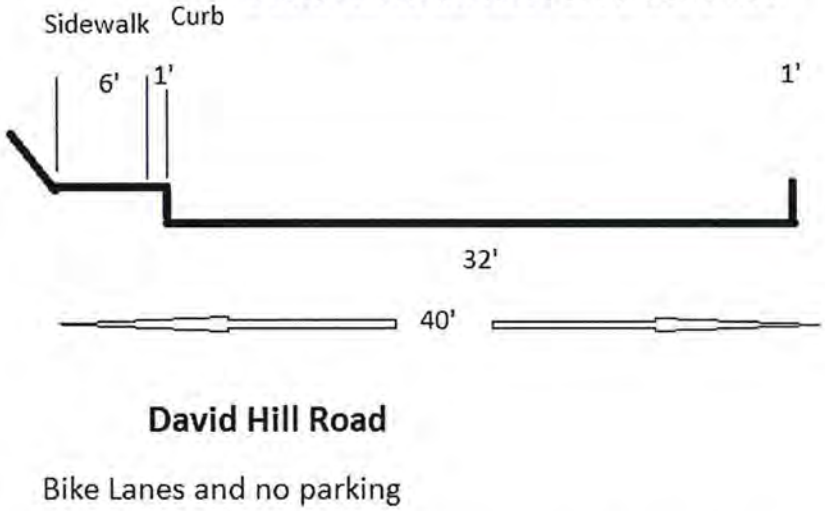
- *Hwy 47/David Hill Road*



If Council accepts the Planning Commission's recommendations for the Westside area, the only action needed is a vote on the motion already on the table approving Ordinance 2017-08. *If the Council wishes to eliminate any or all of the Commission recommended changes to the TSP, then a motion is required to amend Ordinance 2017-07 to remove said items.*

- ***Council Question #5***: The Planning Commission also recommended a reduced street cross-section for David Hill Road west of Thatcher Park. Upon a visual inspection by the Public Works and Community Development directors, such a reduction should occur west of Antler Drive rather than the park since topography would allow for the wider roadway east of Antler Drive. Thus, the right-of-way standard, should be as follows:

David Hill Road west of Antler Drive



Does Council wish to amend the Planning Commission's recommendation for the David Hill Road street cross-section to address the new information presented above? If Council desires to do so a motion to amend Ordinance 2017-08 is needed. Suggested wording for the motion is provided below:

> *Move to amend Ordinance 2017-08 to identify Antler Lane as the eastern point of beginning for the reduced David Hill Road east cross-section.*

To sum up, City Council has several alternatives available for the Westside Refinement Plan and implementation actions. These alternatives are described below:

1. Approve the necessary ordinances adopting the Westside Refinement Plan and implementation actions as originally proposed to the Planning Commission;

2. Approve the necessary ordinances adopting the Westside Refinement Plan and implementation actions as recommended by the Planning Commission as described in Planning Commission Findings and Decision 2017-09 previously provided to Council;

3. Approve the necessary ordinances adopting the Westside Refinement Plan and implementation actions adopting the necessary motions modifying the Planning Commission's recommendations as desired by City Council; or

4. Provide further direction to staff regarding additional information or actions wanted by Council pertaining to the recommendations.

STAFF RECOMMENDATION: Staff recommends that City Council select Alternative 3: Approve the necessary ordinances adopting the Westside Refinement Plan and implementation actions adopting the necessary motions modifying the Planning Commission's recommendations as desired by Council.

ATTACHMENT(s): A. PowerPoint Presentation

FOREST GROVE OREGON

Westside Refinement Plan & Accompanying Implementation Measures

Dan Riordan, Senior Planner
Jon Holan, Community Development Director
Jesse VanderZanden, City Manager

August 14, 2017

FOREST GROVE OREGON

Tonight's City Council Actions

- If Council desires to adopt the Plan and implementation actions Council must approve the following five ordinances:

1. Ordinance 2017-04: Adopting the Westside Refinement Plan: File No. 311-17-000013-PLNG
2. Ordinance 2017-05: Adopting legislative Comprehensive Plan Map amendments to implement the Westside Refinement Plan: File No. 311-17-000013-PLNG
3. Ordinance 2017-06: Adopting legislative Zoning Map amendments to implement the Westside Refinement Plan; File No. 311-17-000013-PLNG
4. Ordinance 2017-07: Adopting legislative Development Code amendments to implement the Westside Refinement Plan; File No. 311-17-000013-PLNG
5. Ordinance 2017-08: Adopting legislative Transportation System Plan amendments to implement the Westside Refinement Plan; File No. 311-17-000013-PLNG

Each of these ordinances will be addressed individually and sequentially throughout the presentation.

FOREST GROVE OREGON

Tonight's City Council Actions

There are several alternatives for Council consideration on this matter:

1. Adopt the necessary ordinances approving the Westside Refinement Plan and implementation actions. The ordinances currently on the table include the Planning Commissions recommendations, however, these recommendations will not be amended into the Westside Refinement Plan unless and until adopted by City Council.

2. Adoption can include a combination of these alternatives:
   - As originally proposed
   - As amended by the Planning Commission
   - As amended by the City Council

3. Provide further direction to staff regarding additional information or actions wanted by Council pertaining to the recommendations.

4. If the Council desires to modify the proposed Westside Area Plan, it would require a motion to amend the ordinance stipulating the policy change and a majority vote.

FOREST GROVE OREGON

#1: Westside Area Plan Decisions

Planning Commission Proposed Amendments

Ordinance 2017-04

The following Planning Commission (PC) policies are included in the proposed ordinance and therefore do not require a motion to amend the ordinance. *If the Council wishes to eliminate either or both Commission recommended changes to the Plan, then a motion such as "Move to amend Ordinance 2017-04 to remove (specify the items to be removed)."*

- PC Policy #1: Through the next update of the City of Forest Grove Wastewater Management Plan, expected in 2018, evaluate the feasibility of implementing sanitary sewer systems such as Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) in the Westside planning area.

- PC Policy #2: As infrastructure costs are evaluated in future updates of facility master plans and the Transportation System Plan (TSP), these plans consider the following three approaches to pay for the infrastructure costs:
  - Westside Area-wide (David Hill and New Urban Growth Boundary Area)
  - Divide Westside Area into two subareas:
    - Purdin Road Area (new urban growth boundary area); and
    - David Hill Area (area west of Thatcher Road);
  - Divide Westside into three subareas:

    Purdin Road Area

    David Hill below the 440 foot contour elevation;

    David Hill above the 440 foot contour elevation.

FOREST GROVE OREGON

#1: Westside Plan Decisions
Other Potential Amendments
Ordinance 2017-04

The following code amendments are not included in the proposed ordinance and therefore would require a motion to amend the ordinance to include the amendment into the Westside Plan.

Council Question: to assure all facilities proposed to be located in the Westside Planning area are taken into account, i.e., trails, parks, roads, sewer, etc., the following proposed Action 7.4.2 be considered:

- Potential Action Item: Action 7.4.2: All applicable master plans as they may be amended are incorporated by reference into the Westside Plan and facilities in those master plans shall be considered as part of any proposed development where it may apply.

- Suggested Motion: Move to amend Ordinance 2017-04, to add Action 7.4.2 in the Westside Refinement Plan with the following wording: "All applicable master plans as they may be amended are incorporated by reference into the Westside Plan and facilities in those master plans shall be considered as part of any proposed development where it may apply."

FOREST GROVE OREGON

#1: Westside Plan Decisions
Other Potential Amendments
Ordinance 2017-04

The following code amendments are not included in the proposed ordinance and therefore would require a motion to amend the ordinance to include the code amendment into the Westside Plan.

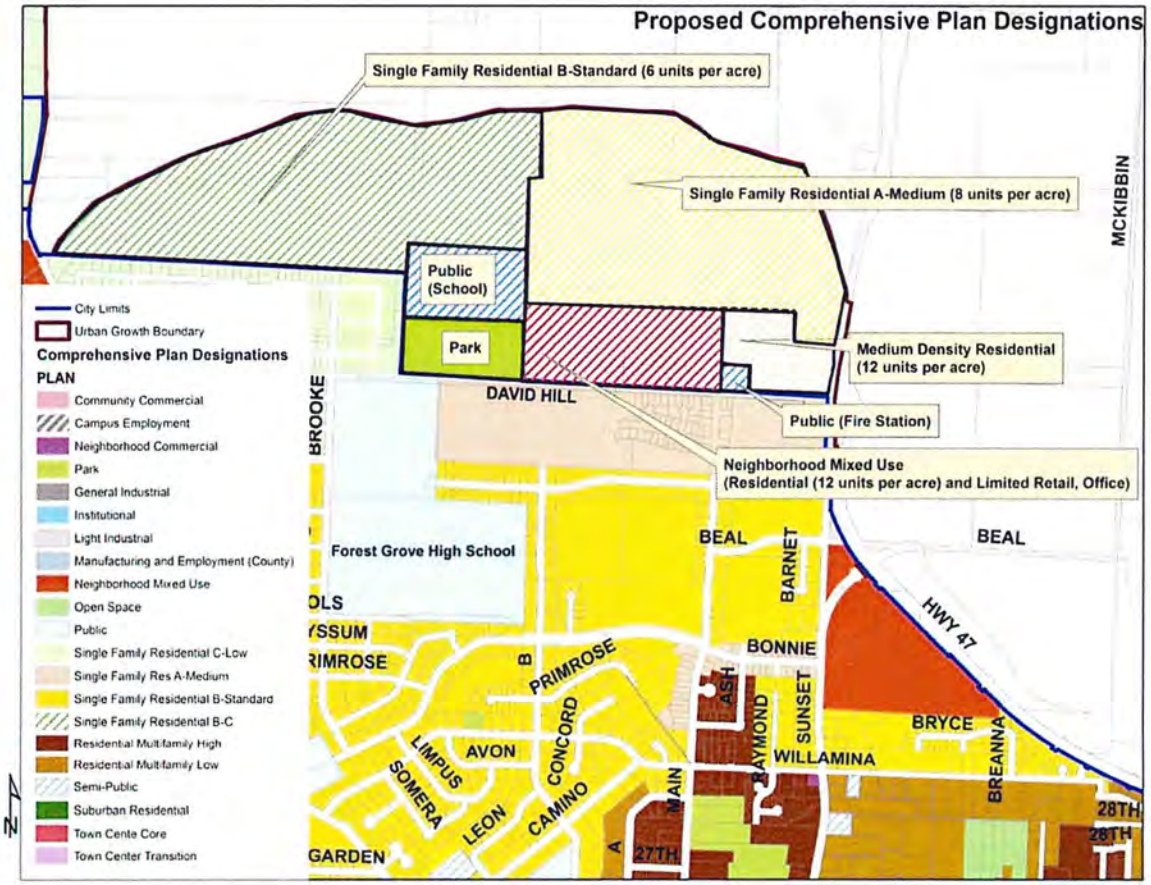
Council Question: Should the Westside Area Plan include a policy statement to minimize the risk of loss of life and damage to property from wildfires in the Westside planning area?

- Potential Policy Statement 10.2: Due to the presence of steep terrain (greater than 15% slope) and wooded areas, land use regulations should encourage, and where appropriate require, the use of fire resistant building materials and defensible space to minimize the risk of loss of life and damage to property from wildfires.

- Suggested Motion: Move to amend Ordinance 2017-04, to add Policy Statement 10.2 with the following wording: "Due to the presence of steep terrain (greater than 15% slope) and wooded areas, land use regulations should encourage, and where appropriate require, the use of fire resistant building materials and defensible space to minimize the risk of loss of life and damage to property from wildfires."

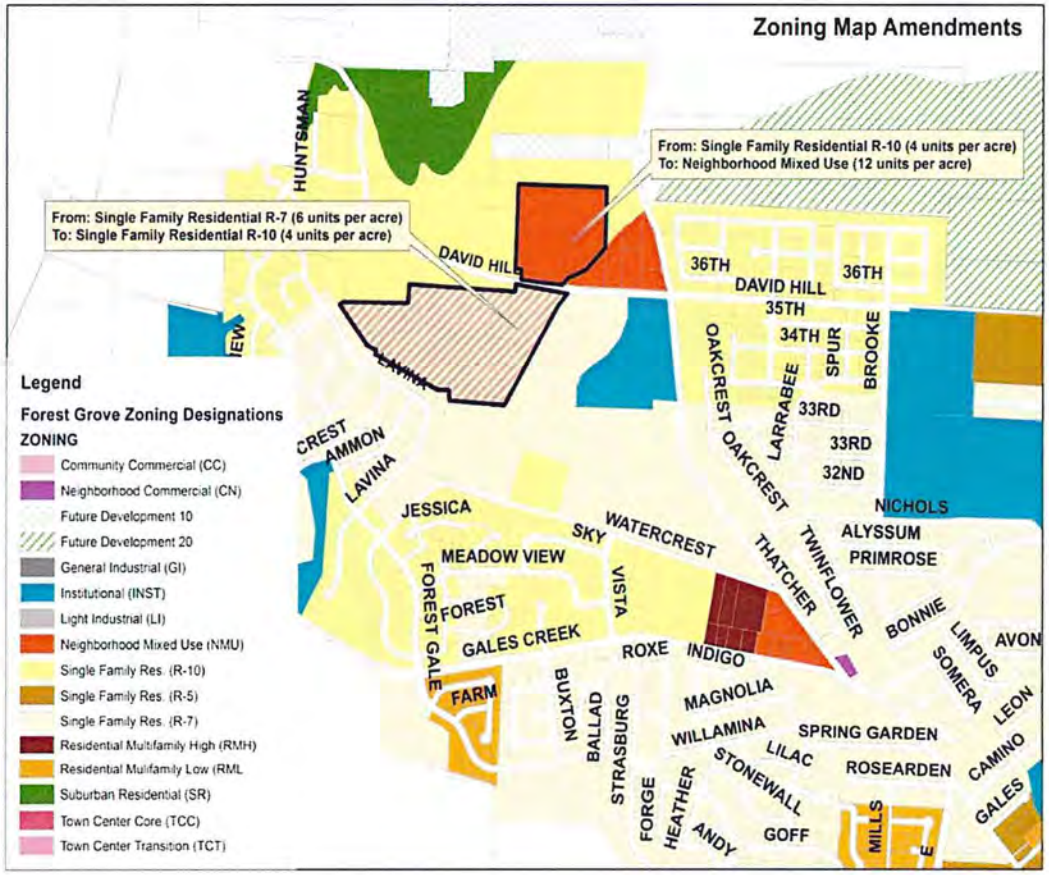
#2: Comprehensive Plan Map Decision
Ordinance 2017-05

- Motion to approve Ordinance 2017-05 assigning <u>Comprehensive Plan Map</u> designations to the new urban growth boundary area:



#3: Zoning Map Decision
Ordinance 2017-06

- Motion to approve Ordinance 2017-06 amending <u>Zoning Map</u> designations for the David Hill area:



FOREST GROVE OREGON

#4: Development Code Decisions
Planning Commission Recommendations

Ordinance 2017-07

The following Planning Commission (PC) code amendments are included in the proposed ordinance and do not require a motion to amend the ordinance. *If the Council wishes to eliminate Commission recommended changes to the Plan, then a motion such as "Move to amend Ordinance 2017-04 to remove (specify the items to be removed)."*

- Allow collector street grades with a maximum grade up to 15% for a maximum length of 250 feet if constructed with concrete;
- Require geotechnical and engineering analysis as part of development review in areas with slopes of 10% or more;
- Establish a maximum cap of 150,000 square feet of commercial space with no minimum requirement in the Neighborhood Mixed Use area north of David Hill Road in the Main Street area. Individual buildings would be limited to 50,000 square feet. (Currently, the Development Code does not include any standards for this Neighborhood mixed use area.)
  - Council Question: should a minimum square footage for commercial development of 25,000 to 50,000 square feet be established?
    - If Council decides to establish a minimum square footage for commercial development the following motion is necessary:
      - Move to amend Ordinance 2017-07 to modify Development Code Section 10.4.315 (Table 4-2) to establish (Council to determine) square feet as the minimum amount of required commercial development in the Neighborhood Mixed Use zone north of David Hill Road in the Main Street.

FOREST GROVE OREGON

#4: Development Code Decisions Other Potential Amendments Ordinance 2017-07

The following code amendments are not included in the proposed ordinance and therefore would require a motion to amend the ordinance to include the code amendment into the Westside Plan.

Council Question: Should the Development Code be amended to add GroveLink as a transit agency for purposes of notification when the City receives a development application in the Westside Planning Area?

- Potential amendment to Development Code Section 10.8.110(E):

Transit Agency Referral: The City shall submit all development proposals along the Pacific Avenue/19th Avenue transit corridor to Tri-Met <u>and along existing and proposed collectors and arterials in the Westside Planning area to GroveLink</u> for review and comment regarding facilities necessary to support transit. The following facilities may be required as a condition of a permit: 1. Walkways to transit stops; 2. Bus stop shelters or waiting areas; 3. Turnouts for buses.

- <u>Suggested Motion</u>: Move to amend Ordinance 2017-07 to modify Development Code Section 10.8.110(E) to state the City shall submit all development proposals along existing and proposed collectors and arterials in the Westside Planning area to GroveLink for review and comment regarding facilities necessary to support transit.

FOREST GROVE OREGON

#5: Transportation System Plan Amendments Ordinance 2017-08

The following Planning Commission (PC) policy is included in the proposed ordinance and therefore does not require a motion to amend the ordinance. *If the Council wishes to eliminate Commission recommended changes to the TSP, then a motion such as "Move to amend Ordinance 2017-08 to remove (specify the items to be removed)."*

- Planning Commission Recommendation: Add the conceptual collector street network to the TSP recognizing Plum Hill Lane may not be the preferred alignment for an east-west collector street;

FOREST GROVE OREGON

#5: Transportation System Plan Amendments

Ordinance 2017-08

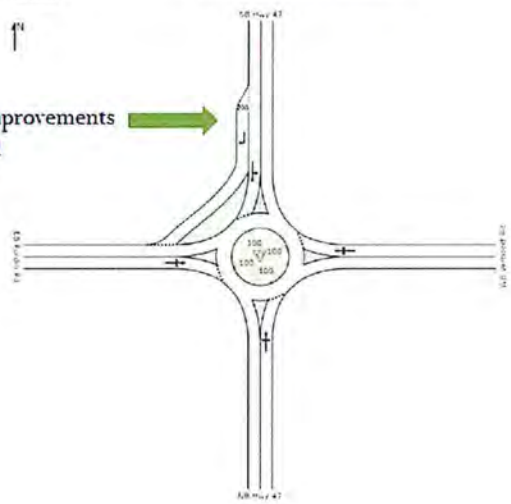
- Planning Commission Recommendation: Add the necessary Highway 47 roundabout improvements to the TSP's financially constrained projects list;

- *Hwy 47/Purdin Road*
- *Hwy 47/Purdin Road*

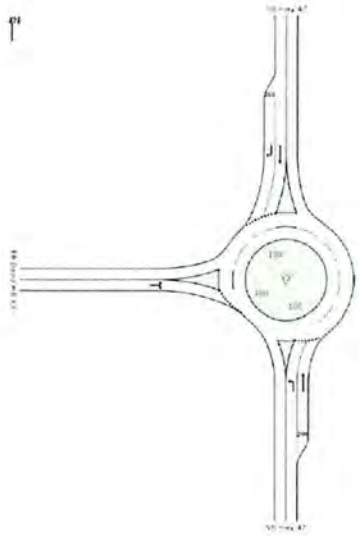
2035 TSP Volumes

Both Improvements Needed

2035 Westside Volumes



- *Hwy 47/David Hill Road*



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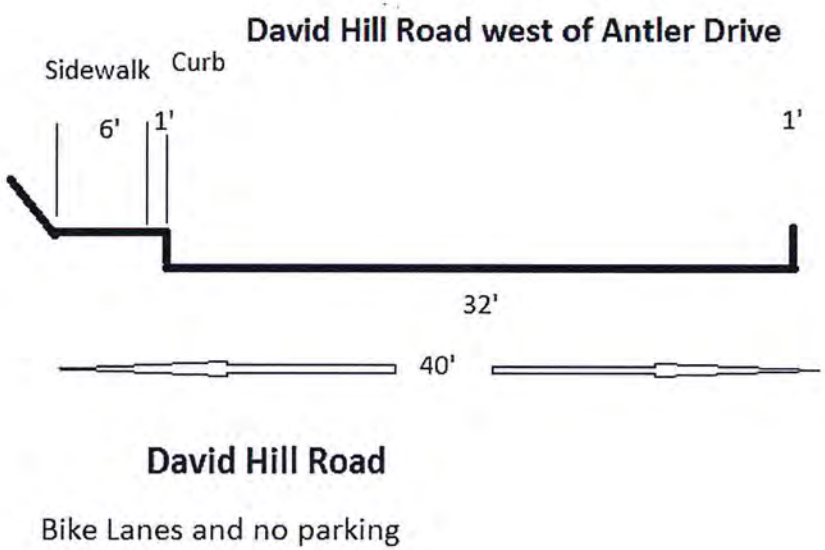
FOREST GROVE OREGON

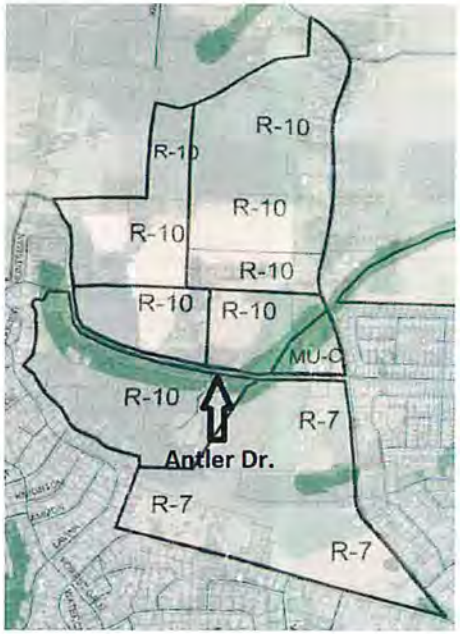
#5: Transportation System Plan Amendments

Ordinance 2017-08

The following TSP amendment is not in the proposed ordinance and therefore would require a motion to amend the ordinance to include the amendment into the TSP.

- Staff Recommendation: amend the reduced street cross-section for David Hill Road to start west of Antler Drive in lieu of west of Thatcher Park to reflect the constrained nature of the area.
- Suggested motion: Move to amend Ordinance 2017-08 to identify Antler Drive as the eastern point of beginning for the reduced David Hill Road street cross-section.





FOREST GROVE OREGON

Tonight's City Council Actions

- In conclusion, staff recommends City Council approve the necessary ordinances adopting the Westside Refinement Plan and implementation actions making any modifications to the recommendations desired by Council.

THE END

Date: August 14, 2017 **Agenda Item:** 8.1 – 8.5.

Subject: 8.1 CONTINUE PUBLIC HEARING FROM JULY 10, 2017: SECOND READING OF ORDINANCE NO. 2017-04 ADOPTING WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

8.2 SECOND READING OF ORDINANCE NO. 2017-05 ADOPTING LEGISLATIVE COMPREHENSIVE PLAN MAP AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

8.3 SECOND READING OF ORDINANCE NO. 2017-06 ADOPTING LEGISLATIVE ZONING MAP AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

8.4 SECOND READING OF ORDINANCE NO. 2017-07 ADOPTING LEGISLATIVE DEVELOPMENT CODE AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

8.5 SECOND READING OF ORDINANCE NO. 2017-08 ADOPTING LEGISLATIVE TRANSPORTATION SYSTEM PLAN AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

CITY COUNCIL MEETING
Request to Testify at Public Hearing

Public Hearings – Public hearings are held on each matter required by state law or City policy. Anyone wishing to testify should sign-in for the Public Hearing prior to the meeting. The Mayor or presiding officer will review the complete hearing instructions prior to testimony. The Mayor or presiding officer will call the individual or group by the name given on the sign-in form. When addressing the Mayor and Council, please move to the witness table (center front of the room). Each person should speak clearly into the microphone and must state their first and last name and provided a mailing address for the record. All testimony is electronically recorded. In the interest of time, Public Hearing testimony is limited to three minutes unless the Mayor or presiding officer grants an extension. Written or oral testimony is heard prior to any Council action.

Please sign-in below to testify.

PROPONENTS: *(Please print legibly)*

First & Last Name:	Address:	City, State & Zip Code:

OPPONENTS: *(Please print legibly)*

First & Last Name:	Address:	City, State & Zip Code:
Kerry VanderZanden	2603 NW Hwy 47	
John Wilson	1867 SW Springdown Rd.	

OTHERS: *(Please print legibly)*

First & Last Name:	Address:	City, State & Zip Code:
~~Steve~~ Brad Taylor	3351 NW Patchen Rd	

8/14/17
as amended

SECOND READING: 8.1.

ORDINANCE NO. 2017-04 add action 7.4.2.

ADOPTING THE WESTSIDE REFINEMENT PLAN
FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan complies with the provisions of ORS §197.200 and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the Westside Refinement Plan addresses the requirements of Metro Urban Growth Management Function Title 11 (Planning for New Residential Areas) and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the following background documents were prepared and provide the factual basis supporting the Westside Refinement Plan:

- Westside Infrastructure Overview, December 2014;
- Westside Transportation Baseline Report, January 2015;
- Westside Natural Resources Overview, January 2015;
- Geological and Geotechnical Assessment Report, February 2015;
- Revised Final Westside Water, Sewer, and Stormwater Infrastructure Report, June 2016;
- Infrastructure Funding Approach Report, December 2016; and
- Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative, March 2017; and

WHEREAS, the Westside Refinement Plan provided opportunities for community participation to influence preparation of recommendations; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Comprehensive Plan Map to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

_____

Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

_____

Peter B. Truax, Mayor

EXHIBIT A

WESTSIDE PLANNING PROGRAM REFINEMENT PLAN

PUBLIC HEARING DRAFT

FOREST GROVE OREGON

Metro

SCJ ALLIANCE
CONSULTING SERVICES

urbsworks

FCS GROUP
Solutions-Oriented Consulting

PBS
Engineering + Environmental

Preface

With a strong sense of place and community pride, the City of Forest Grove continues to experience steady and sustained development activity. The City is ideally situated at the western edge of the Portland region with recreational, employment and educational opportunities nearby making Forest Grove grove a wonderful place to live or start a business. As development continues and approved lots are built upon there will be pressure for new subdivision activity. This is especially true within the areas of the urban growth boundary north of David Hill Road. Little advance planning work has taken place within these areas. A framework to guide development is necessary to ensure future development meets community expectations and needed infrastructure is provided in a cost-efficient manner for both property owners and the City.

This Westside Refinement Plan provides a blueprint to guide public and private land use decisions and infrastructure investments in developable areas primarily north of David Hill Road. This includes decisions related to traffic circulation, water and sewer line sizes and locations, and zoning with an eye toward creating sustainable and complete neighborhoods. It is with this in mind that the Westside Refinment Plan provides a direction to further the City's Vision Statement and City Council goal to *"Promote Safe, Livable and Sustainable Neighborhoods and a Prosperous Dynamic Green City"*. This goal will be achieved in the Westside Planning area by:

- Supporting a land efficient development pattern that minimizes infrastructure cost and environmental impact as described in Chapter 4: Land Use and Chapter 12: Funding Strategy;
- Identifying opportunities to cluster development to increase development densities within the project area while minimizing environmental impacts of development as described in the Chapter 7: Natural Hazards and Chapter 14: Implementation Actions;
- Promoting a transportation network that minimizes out of direction travel and vehicle miles traveled and enables multiple modes of travel and described in the Chapter 8: Transportation;
- Providing opportunities so that residents are able to shop and work close to their place of residence if desired as described in Chapter 4: Land Use;
- Establish a land use pattern supportive of transit and described in the Chapter 4: Land Use and Chapter 8: Transportation; and
- Encourage a transition from outer-neighborhood suburban residential to a more walkable environment as described in the Chapter 8: Transportation.

The Westside Planning Program Refinement Plan also addresses regional planning requirements contained in the Metro Regional Urban Growth Management Funcitional Plan and Regional Transportation System Functional Plan. This includes planning for new collector roadways to serve development and identifing land use designations to guide development as property is annexed into the City.

The Westside Planning project was funded through a Metro planning grant. The City wishes to thank Metro for partnering with the City and funding this important project.

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Westside Refinement Plan

Chapter 1 – Introduction

Purpose

The Westside Refinement Plan provides a conceptual framework to guide public and private development decisions in two largely undeveloped areas within the urban growth boundary. The Refinement Plan also provides policy direction for implementation actions necessary to carry-out the Plan. The Plan addresses land use, natural resources, recreation, cultural and open space resources, natural hazards, transportation, and public services. In addition, the Plan includes an approach for funding the "backbone" infrastructure necessary to serve future development.

The Plan will be implemented through amendments to the Forest Grove Comprhensive Plan Map, zoning map, Development Code, Transportation System Plan and updates to the City's infrastructure master plans. A collective effort between property owners, developers, the City, Washington County and Metro is paramount to realizing the vision outlined in the Plan.

Setting

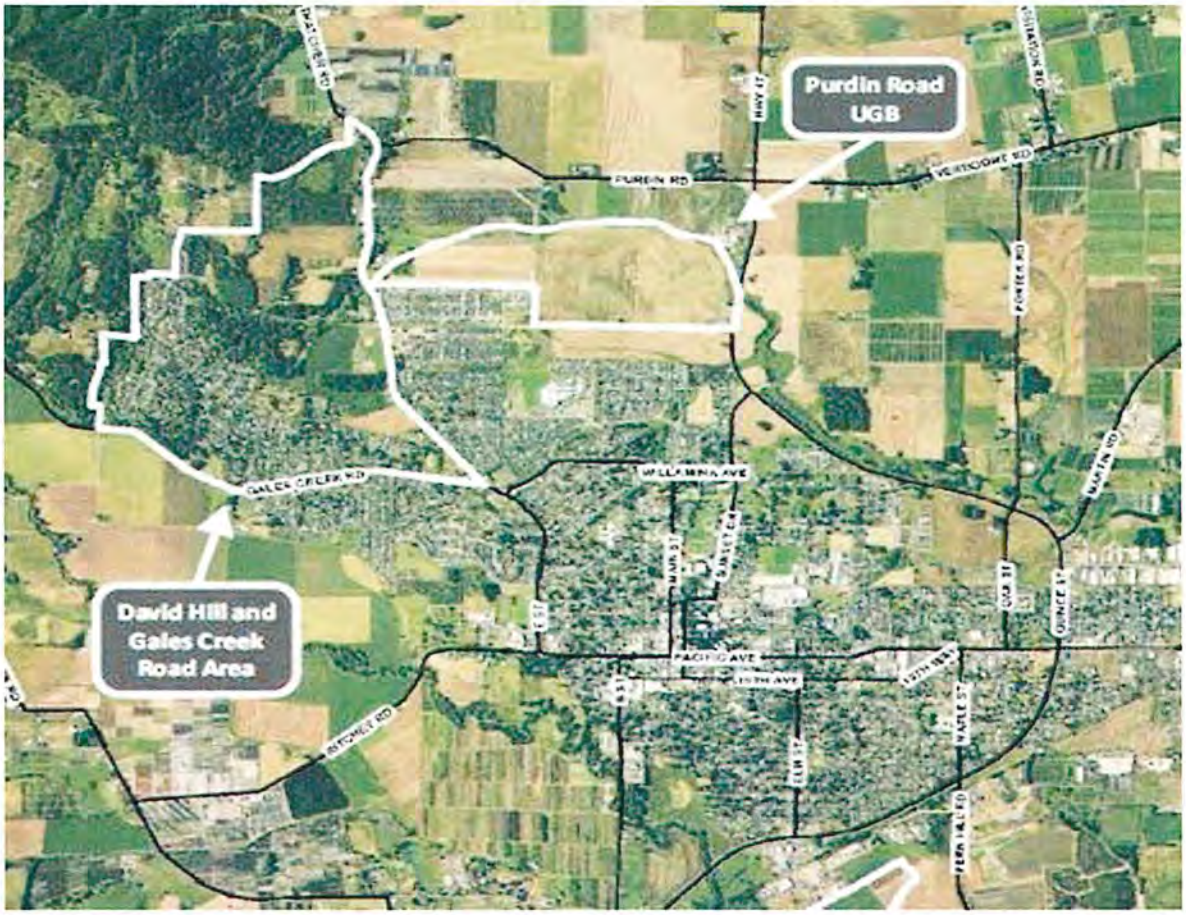
The "Westside" area includes two largely undeveloped areas north of David Hill Road. The Westside Plan area covers approximately 590 acres of which about 460 acreas are considered developable. The map on the next page shows the extent of the Westside planning area.

The Westside area is relatively flat north of David Hill Road between Highway 47 and Thatcher Road. This area is used for farming. An east-west drainage feeding into Council Creek and a vegetated corridor serves as the northern boundary of the planning area. This area was added to the urban growth boundary in 2014.

In contrast to the area between Thacther Road and Highway 47, the area west of Thatcher Road is hilly with forested tracts. Several tracts are also used for agricultural purposes. In addition, this area has several single family homes on large tracts of land. Although this area has a rural feel it's been in the urban growth boundary since 1980. Development in this area is constrained by steep slopes and lack of roads and infrastructure especially sanitary sewer.

The areas addressed by the Plan are shown on the map below.

Westside Planning Refinement Areas



The first area covered by this plan is generally located north of Gales Creek Road and west of Thatcher Road. This location, referred to as the "David Hill Planning Area" was included in the original urban growth boundary and the City's planning area going back to the 1980s. As the name suggests, the David Hill area is hilly with the highest elevations in the City. The developable area is approximately 350 gross acres and is one of the City's prime growth locations. The David Hill area is largely designated in the Forest Grove Comprehensive Plan for residential development. Metro development forecasts suggest that over 90% of the area could developed by 2025. Therefore, it's critical that the City establish a framework for necessary infrastructure improvements including a road network to support a desired land use concept for the area.

The second area is generally located west of Highway 47 and north of David Hill Road. This area is referred to as the "South of Purdin Road/Council Creek Urban Growth Boundary Area" and was added to the urban growth boundary by the Oregon Legislature in 2014. The Purdin area is approximately 240 gross acres in area and is generally flat making it suitable for a variety of land uses including residential, park, school and commercial uses. Since the area was recently added to the urban growth boundary little long range comprehensive planning has been done. This includes planning for desired land uses and identifying possible locations for

roads and other infrastructure including water and sewer lines. The Westside Refinement Plan is intended to address these needs. The Refinement Plan also provides an indication of the costs associated with providing the infrastructure necessary to serve the area and provides an approach for funding infrastructure needs.

To assist with this planning initiative, the City applied for and received a community planning grant from Metro to prepare this much needed refinement plan. Grant funds were used by the City to retain the consulting team of SCJ Alliance, PBS Environmental and Engineering, Urbsworks, and FCS Consulting. The team prepared the technical analysis supporting the Plan, facilitated public outreach, and developed an infrastructure funding approach. Infrastructure needs were developed by the consultants after assistance by staff and the Technical Advisory Committee, in particular Clean Water Services related to sewer and strom drainage.

The following chapters provide considerable detail on the land use concept underpinning the plan and infrastructure needed to support the vision for development in the David Hill and Purdin Road urban growth areas. The technical analysis prepared by the consulting team is attached as an appendix.

Chapter 2 – Planning Framework

Planning in Oregon and the Portland region is multifaceted and involves many partners. The Oregon Statewide Land Use Planning Program, Metro Regional Framework Plan, Metro Urban Growth Management Functional Plan, Metro Regional Transportation Functional Plan, and Forest Grove Comprehensive Plan all influence long range planning initiatives such as the Westside Refinement Plan.

As shown by the graphic below, the Oregon statewide planning program provides the foundation for the Refinement Plan. The Oregon planning program includes goals for public involvement, land use, housing, the economy, natural resource protection and urbanization to name a few. All city and county comprehensive plans in the state must address and demonstrate compliance with the Oregon planning goals. Adherence to the Statewide Planning Goals is addressed further in this chapter.

In addition to the Oregon statewide planning program, the Metro Regional Framework provides additional context to guide land use policy in the Portland region. Similar to the Oregon statewide planning goals the Metro Regional Framework plan has goals and objectives guiding land use, housing and the economy. Both the statewide planning program and Metro Regional Framework Plan provide a bais for the Forest Grove Comprehensive Plan which sets local goals and objectives for land use, housing and infrastructure such as transportation, the water system and sewer system. Taken together the Oregon statewide planning program, Metro Regional Framework Plan and Forest Grove Comprehensive Plan provide the foundation for the Westside Refinement Plan.

Planning Framework

The following sections of this chapter provide additional context to show how each of the elements of the planning framework work together to influence the Westside Refinement Plan.

The first section describes the Oregon Statewide Planning Program. This is followed by a brief overview of the Forest Grove Comprehensive Plan and Metro regional land use and transportation plans.

Oregon Statewide Land Use Planning Program

Oregon's land use planning system dates back to the 1970s with passage of Senate Bill 100 signed into law by Governor Tom McCall. The Oregon system established by Senate Bill 100 was unique in the United States by establishing statewide land use planning goals that cities and counties are required to address as part of their local comprehensive land use planning efforts. Statewide planning goals address topics such as housing, the economy (jobs and commerce), transportation, natural resource protection and the conversion of rural land to urban uses. The Westside Refinement Plan addresses the applicable goals in a variety of ways as described below.

Goal 1 - Citizen Involvement - Statewide Land Use Planning Goal 1 requires that local citizen involvement programs incorporate the following components:

- ✓ *Provide for widespread citizen involvement;*
- ✓ *Assure effective two way communication with citizens;*
- ✓ *Provide the opportunity for citizens to be involved in all phases of the planning process;*
- ✓ *Assure that technical information is available in an understandable form;*
- ✓ *Assure that citizens will receive a response from policy-makers; and*
- ✓ *Insure funding for the citizen involvement program*

Extensive amount of citizen input occurred during the course of this project. This includes placing all documents for review on the City's website. In addition, two planning charrettes and several Planning Commission work sessions were held to obtain citizen input on the background documents and potential land use alternatives. The charrettes provided an opportunity for a lively discussion on desired land uses of the area. The land use concept was revised several times in response to community input. In the end, a general consensus was reached which is reflected in the Plan. Details of the citizen involvement program are described in Chapter 3 (Citizen Participation).

Goal 2 - Land Use Planning – Goal 2 describes the basic procedures of Oregon's statewide planning program. It requires that land use decisions be made in accordance with a comprehensive plan. Goal 2 also requires that implementation ordinances be put in place to put the plan's policies into effect. Once adopted, the Westside Refinement Plan will become a component of the Forest Grove Comprehensive Plan. As part of adoption, the Comprehensive Plan Map will be amended to incorporate the adopted land use concept for the Westside area. The Forest Grove Development Code will also be amended as necessary to implement recommendations for development in the Refinement Plan area adopted by City Council. The land use component of the Westside Plan is described in detail in Chapter 4 (Land Use).

Goal 4 - Forest Lands – This goal requires an inventory of forest lands and the adoption of policies and ordinances to conserve forest lands for forest uses. The consulting team prepared a natural resource assessment for the Plan area which considered forest lands. The natural resource assessment is included in the technical appendix and is summarized in Chapter 5 (Natural Resources).

Goal 5 - Natural Resources – This goal focuses on scenic and historic areas, and open spaces. Goal 5 covers more than a dozen natural and cultural resources such as wildlife habitats and wetlands. Natural resources are also addressed in Chapter 5 (Natural Resources).

Goal 7 - Areas Subject to Natural Hazards – Goal 7 deals with development in places subject to natural hazards such as landslides. It requires that local jurisdictions apply appropriate safeguards when planning for development in areas subject to natural hazards. Consideration of potential natural hazards is especially important in the David Hill area. The David Hill area has locations that are steeply sloped and presence of a historic landslide area. The consulting team undertook a rigorous analysis of the David Hill area to document possible natural hazards. The results of this analysis are summarized in Chapter 8 (Transportation). The details are provided in the appendix.

Goal 8 - Recreational Needs – This goal calls for each community to evaluate its recreational areas and facilities and the projected demand for them. The land use concept for the Westside area included consideration of the recreational needs of residents as the area develops. It was fortunate that the City's Parks, Recreation and Open Space Master Plan was being updated during the Westside planning process. This provided an opportunity to include park needs for the Westside area in the Parks Plan. Specific recommendations for parks, recreation and open space are described in Chapter 6 (Recreational, Cultural and Open Space Resources) and Chapter 11 (Other City Services).

Goal 9 - Economic Development – This goal addresses economic activity including business creation, retention and employment. Goal 9 calls for local jurisdictions to project future commercial and industrial land needs and plan and zone enough land to meet those needs. The recommended land use concept described in the Refinement Plan responds to Goal 9 by identifying areas for commerce to serve the developing area. This is described in Chapter 4 (Land Use).

Goal 10 - Housing – Goal 10 requires that cities plan for and accommodate needed housing types, such as single family residential, multifamily and manufactured housing. Goal 10 requires each city to inventory its buildable residential land needs, project future needs, and plan and zone enough buildable land to meet those needs. The recommended land use concept for the Westside area addresses Goal 10 by identifying areas deemed suitable for a variety of housing types including large lot single family development, small lot development and attached housing. Chapter 4 (Land Use) shows areas recommended for residential development to meet housing needs over the next twenty years.

Goal 11 - Public Facilities and Services – Goal 11 calls for efficient planning of public services such as sewers, water, law enforcement, and fire protection. The goal's central tenant is that public services should be planned in accordance with a community's needs and capacities rather than be forced to respond to development as it occurs. A primary reason for preparing the Westside Plan is get ahead of development by identifying public services necessary to serve the preferred land use concept. Public facilities and services needed for the Westside planning area are described in a number of chapters including Chapter 8 (Transportation), Chapter 9 (Sewer), Chapter 10 (Water), Chapter 11 (Other City Services), and Chapter 12 (Funding Approach).

Goal 12 - Transportation - Goal 12 addresses the transportation system including roads,

sidewalks, multiuse trails and movement of goods. A robust transportation system accommodating a variety of travel options is a critical element of a livable neighborhood and city. The Westside Plan identifies a transportation network taking into account recommended land uses and topographic constraints. The recommended transportation network for the Westside area is described in detail in Chapter 8 (Transportation).

Goal 14 - Urbanization – This goal requires cities to estimate future growth and needs for land and then plan and zone enough land to meet those needs. Goal 14 also establishes criteria to be applied when undeveloped land within an urban growth boundary is to be converted to urban uses. The Refinement Plan identifies a land use concept to guide the conversion of undeveloped land to urban uses. The land use concept is described in Chapter 4 (Land Use).

Forest Grove Comprehensive Plan

The Forest Grove Comprehensive Plan is the City's coordinated policy document guiding the development of the City over a twenty year period. This Refinement Plan addresses and is consistent with several goals and policies of the Comprehensive Plan including:

Community Sustainability

Community sustainability is a cornerstone of the City's Vision Statement and has been an ongoing priority for the Forest Grove City Council. Chapter 3 of the Forest Grove Comprehensive Plan addresses community sustainability and is also reflected in the land use concept recommended for the Westside planning area.

A goal of the Forest Grove Comprehensive Plan is to:

- ✓ Create complete neighborhoods, through land use regulations, with housing, recreational opportunities, retail, services, and employment nearby and to promote transit supportive land uses. The land use concept described in Chapter 4 is based on the concept of complete neighborhoods by identifying opportunities for mixed-use development near residential areas as well as locations for parks, schools and support services such as a new site for a fire station.

The list below shows other recommendations in the Westside Plan intended to advance community sustainability including:

- ✓ Riparian enhancement along stream corridors;
- ✓ Landslide stabilization by replanting deep rooted vegetation on hillsides;
- ✓ Development regulations to preserve views from low elevations to David Hill to promote cluster development;
- ✓ Promote voluntary conservation measures and integration of built and natural systems; and
- ✓ Integrate storm water management with natural systems to improve water quality and wildlife habitat opportunities;

Land Use

Chapter 4 of the Forest Grove Comprehensive Plan addresses land use within the City's planning area – the area within the urban growth boundary adjacent to the Forest Grove city limits. The Westside Plan addresses a number of policies related to land use in the Comprehensive Plan including:

1. The City of Forest Grove will adopt a land use concept that promotes efficient use of land within the urban growth boundary.

3. The City of Forest Grove will support policies that encourage locating complementary land use in proximity to reduce demand on transportation systems [including use of transit] and improve the overall quality of life of the community.

The Chapter 4 of the Westside Plan identifies a land use concept accommodating a variety of land uses including residential and retail uses. A primary objective of the Plan is promoting long term community sustainability through private and public land use decisions. To this end the Plan strives to create complete neighborhoods. Complete neighborhoods are characterized by complementary land uses in proximity. This in turn reduces demands on the transportation system and supports cost-effective delivery of transportation services by reducing or eliminating the need to add capacity which is quite expensive.

Transportation

Transportation is one of the most important improvements provided by public agencies. Transportation affects land values, economic competitiveness, and the environment. How the transportation network is planned affects overall quality of life and influences community character. Chapter 11 of the Forest Grove Comprehensive Plan addresses transportation needs in the City's planning area including the preferred pedestrian, bicycle and roadway networks as well as a funding approach for these needs. The Forest Grove Comprehensive Plan contains the following goals and policies related to transportation:

Goal 4: Design and construct transportation facilities in a manner that enhances the livability of Forest Grove.

The infrastructure analysis for the Westside identifies a robust transportation system based on a collector street system. This transportation backbone will improve connectivity for all modes of transportation including pedestrians, bicycles, and vehicles.

Policy 4.1: Maintain the livability of Forest Grove through proper location and design of transportation facilities.

The proposed collector street network and recommended standards for the Planning Area are based on the topographic constraints of the Westside area to minimize necessary cut-and-fill and to minimize street grades. The Forest Grove Development Code limits collector street grades to a maximum 12%. Although care was taken to minimize collector street grades there are portions of segments where street grade exceeds 12%. Care was taken to minimize the length of these segements. An amendment to the Development Code is recommended to address this issue and would provide authority to the City Engineer to approve collector street grades exceeding to 12%.

Goal 6: Establish and maintain a context sensitive set of transportation design and development regulations.

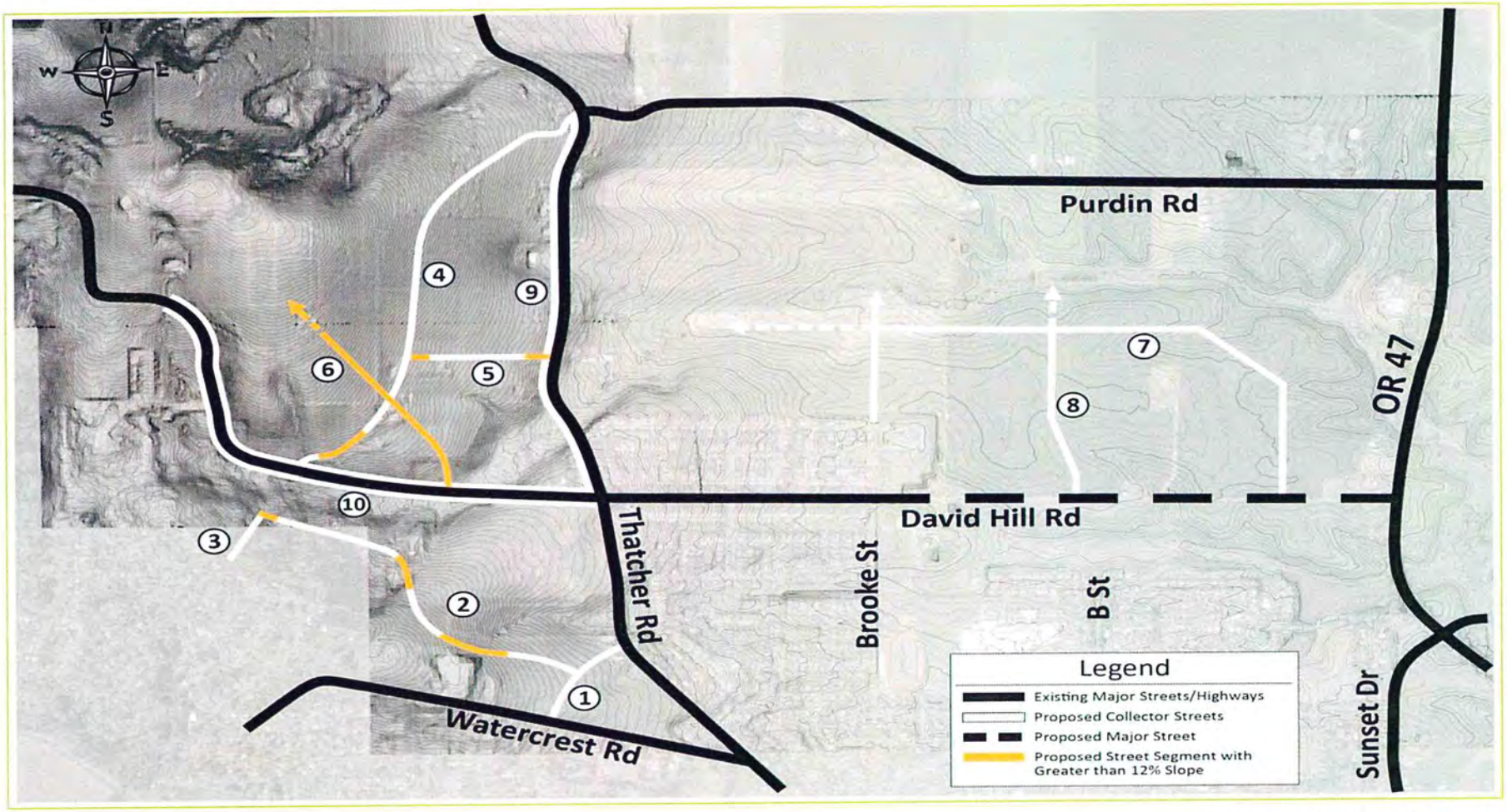
The proposed street network and recommended standards for the Planning Area are context sensitive and take into account topographic constraints of the area to minimize cut-and-fill and grades. The recommended street network is based on strategically placed collector roads providing needed circulation and access.

Policy 6.1: Streets should be designed to support their intended users.

The recommended street network is based on collector roads supporting autos, bicycles and pedestrians.

Policy 6.4: Promote context sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

The proposed street network for the Westside Planning Area is context sensitive and takes into account topographic constraints of the area to minimize cut-and-fill and grades. The recommended street network is based on strategically placed collector roads providing circulation and access as shown on the map below. The white lines show conceptual locations of collector roads. The orange shaded street segements are those with a slope exceeding 12%. This is significant since the Forest Grove Development Code limits grades for collector streets to 12%. An amendment to the Development Code is recommended to address this issue and would provide authority to the City Engineer to approve collector street grades exceeding to 12%.



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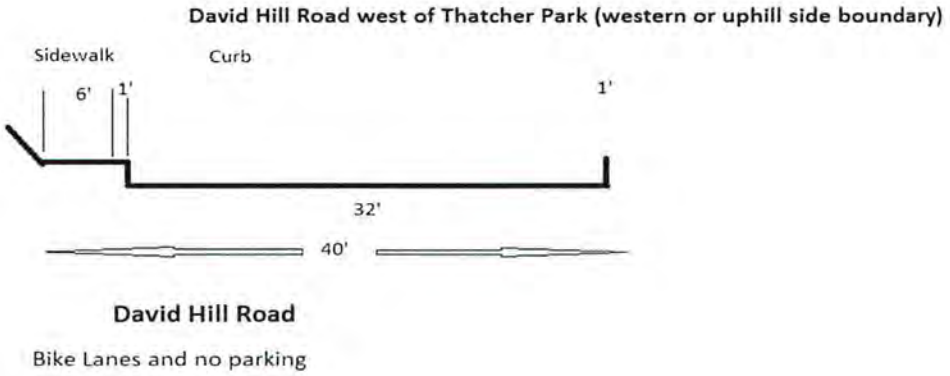
Proposed Street System

Westside Planning Project
Forest Grove, OR

Another consideration influencing the recommended street system for the David Hill area is topography along the David Hill Road segment west of Thatcher Road. David Hill Road is constrained by steep slopes and the presence of a stream south of the current roadway alignment. As a result it is recommended that the street cross-section for David Hill Road west of Thatcher Road be narrower than typically required for a collector roadway. The recommended cross-section includes 32 feet of pavement within a 40 foot right-of-way. A sidewalk on one side of the street would be accommodated within the right-of-way. The recommended cross-section for David Hill Road is shown below.



The cross-section above could also apply to other roadways with topographic constraints similar to David Hill Road west of Thatcher Road.

Estimated cost to develop the identified collector street system is approximately $ $30.2 Million. Of this amount, approximately $1.5 million is recommended for short term needs in the five- to six-year time frame to spur development. The primary short-term need is construction of Thatcher Road to urban standards north of David Hill Road.

Specific transportation projects recommended for the Westside are shown on the table below.

Transportation Projects

No.	Road Name	Project Limits	Description	Estimated Cost
1	Road 1 (Vista Drive Extension)	Watercrest Road to Thatcher Road	Construct new north-south 1,050 foot urban collector street	$1,000,300
2	Road 2	From Vista Drive Extension west 3,200	Construct new east-west urban collector street	$4,246,000

		feet		
3	Road 3 (Valley Crest Extension)	From terminus of Valley Crest Way north to Road 2	Construct new 600-foot urban collector street	$787,200
4	Road 4	David Hill Road north to Purdin Road	Construct new 4,700 foot urban collector street	$6,409,200
5	Road 5 (Plum Hill Improvement)	Existing Plum Hill Lane (privately-owned) to Road 4	Improve Plum Hill Lane to urban collector standards	$1,212,200
6	Road 6	David Hill Road to urban growth boundary	Construct new 2,300 foot urban collector street	$2,391,000
7	Road 7 (Brooke Street Extension)	Brooke Street to David Hill Road	Construct new 5,500 foot urban collector street	$4,766,200
8	Road 8 (B Street Extension)	David Hill Road to Brooke Street	Construct new 1,750 foot urban collector street	$1,583,700
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Full improvements to Council Creek crossing (short-term)	$1,454,000
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Half street reconstruction between David Hill Road to Purdin Road excluding Council Creek crossing (long-term)	$2,437,500
10	Road 10 (David Hill Improvement)	Thatcher Road to urban growth boundary	Full street reconstruction for 5,100 feet to urban collector street standards	$3,943,500
11	Improvement to David Hill Road/Highway 47 roundabout	David Hill Road/Highway 47 intersection	Addition of 2nd circulating lane to provide separate lanes for northbound left turn and northbound through traffic and separate lane for southbound right-turn	$2,500,000
12	Improvement to Purdin Road/Verboort Road/Highway 47 roundabout	Purdin Road/Verboort Road/Highway 47 intersection	Addition of northbound right-turn slip lane on the south leg of the roundabout and southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	$4,000,000
			TOTAL ESTIMATED COST	*$37,730,800*

In addition to the transportation projects identified above the Westside Plan includes the following recommendations related to the transportation system:

- Amend the Transportation System Plan to include a context-sensitive and cost-effective transportation system in the Westside Planning Area. This recommendation includes amending the TSP to include a narrower collector

street cross-section for David Hill Road west of Thatcher Road with forty feet of right-of-way, 32 feet of pavement and sidewalk on one side of the street.

- Ensure the conceptual transportation system identified for the Westside Planning Area meets the requirements of the Oregon Transportation Planning Rule and Metro Regional Transportation Functional Plan

- Amend the Development Code to allow for collector street grades of more than 12% with City Engineer approval.

- Amend the Development Code to allow for local or residential streets with grades of more than 15% for distances greater than 250 to minimize cut and fill with City Engineer approval.

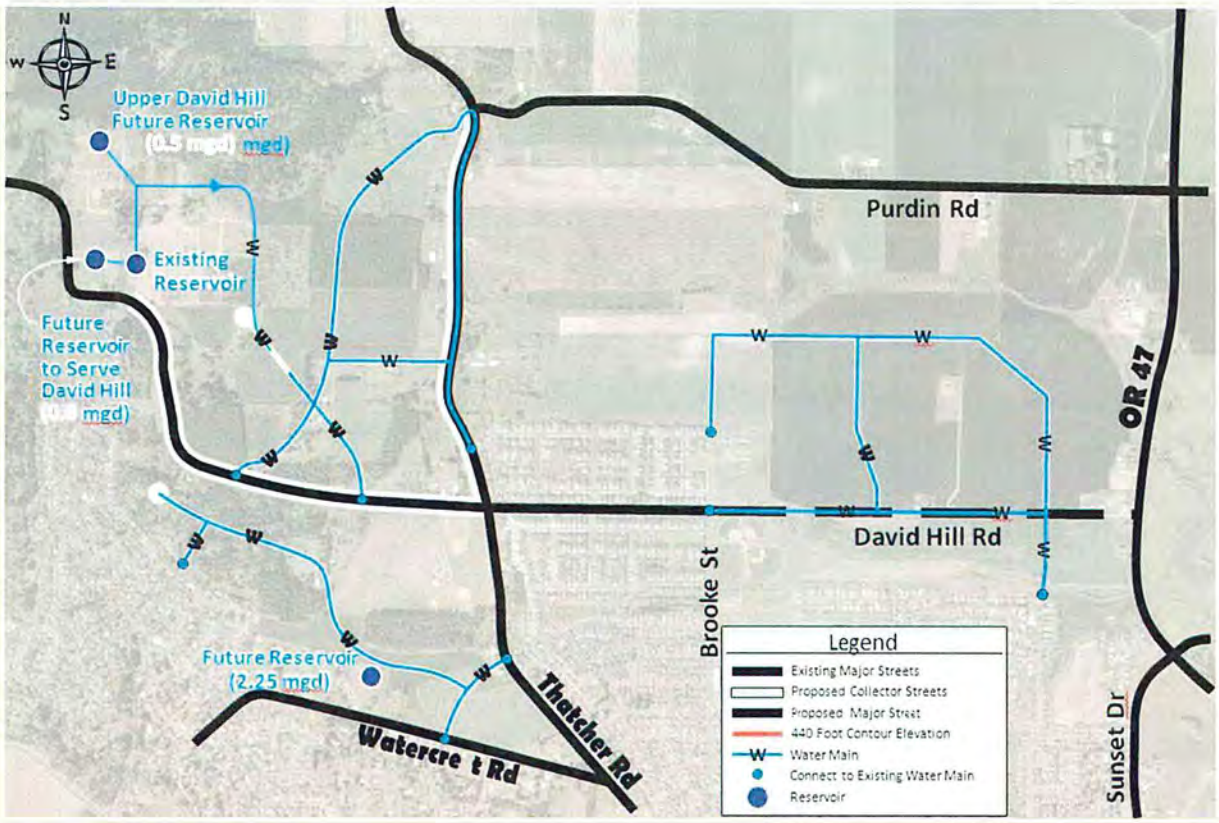
- Construct collector and arterial streets in the David Hill urban growth boundary area to allow for possible future extension into the David Hill urban reserve area.

Water System

In addition to transportation water is a critical public service. The Forest Grove Comprehensive Plan contains the following policy statements related to the water system:

1. Water facilities shall be designed and sized to serve the need of future land uses as designated in the Forest Grove Comprehensive Plan map.

The conceptual water system for the Refinement Plan area is shown on the map below. The map shows the general location of water lines and future reservoir locations.



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Water Utilities

Westside Planning Project
Forest Grove, OR

The estimated cost of the conceptual water system is approximately $8,865,500 including contingencies. The table below shows estimated costs by segment.

Water Facility Cost Estimates

Description	Linear Feet	Total Estimated Cost	Estimated Cost Westside Planning Area	Area of Benefit
Potential Short Term Project				
One 0.5 MG Reservoir[1]	EA	$4,182,500[2]	$875,000	David Hill UGB
Short Term Subtotal		$4,182,500	$875,000	
Long Term Projects				
Road 1 Water Main	1,050	$63,000	$63,000	David Hill UGB
Road 2 Water Main	3,200	$192,000	$192,000	David Hill UGB
Road 3 Water Main	600	$36,000	$36,000	David Hill UGB

[1] One reservoir required to serve development in the David Hill urban growth boundary area from 440 to 615 feet in elevation and portions of the David Hill urban reserve area between 190 feet and 615 feet. Approximately $500,000 or 10.4% of total cost is attributed to serving the David Hill urban growth boundary area above 440 feet which includes 105 dwelling units with Single Family Residential R-10 zoning or 24 dwelling units with Suburban Residential SR zoning.

[2] Including contingencies and engineering costs

Road 4 Water Main	4,700	$282,000	$282,000	David Hill UGB
Road 5 Water Main	1,250	$75,000	$75,000	David Hill UGB
Road 6 Water Main	2,300	$138,000	$138,000	David Hill UGB
Road 7 Water Main	5,500	$330,000	$330,000	Purdin Road UGB
Road 8 Water Main	1,750	$105,000	$105,000	Purdin Road UGB
Road 9 Water Main	3,500	$525,000	$525,000	David Hill UGB
Two 0.3 MG Reservoirs[3]	EA	$2,910,448	$1,950,000	Entire Area
One 2.25 MG Reservoir Near Watercrest Rd.	EA	$2,956,522	$680,000	Entire Area
Contingencies and Engineering		$5,709,728	$3,282,000	Entire Area
Long Term Subtotal		$13,322,698	$7,658,000	
TOTAL		*$17,505,198*	*$8,533,000*	

Source: Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS Group. Costs shown are in 2016 dollars.

Sanitary Sewer System

The Forest Grove Comprehensive Plan includes goals and policies guiding investments in the sanitary sewer system. These goals and policies are consistent with the Forest Grove Sanitary Sewer and Storm Drainage Master Plans. Specific policies include:

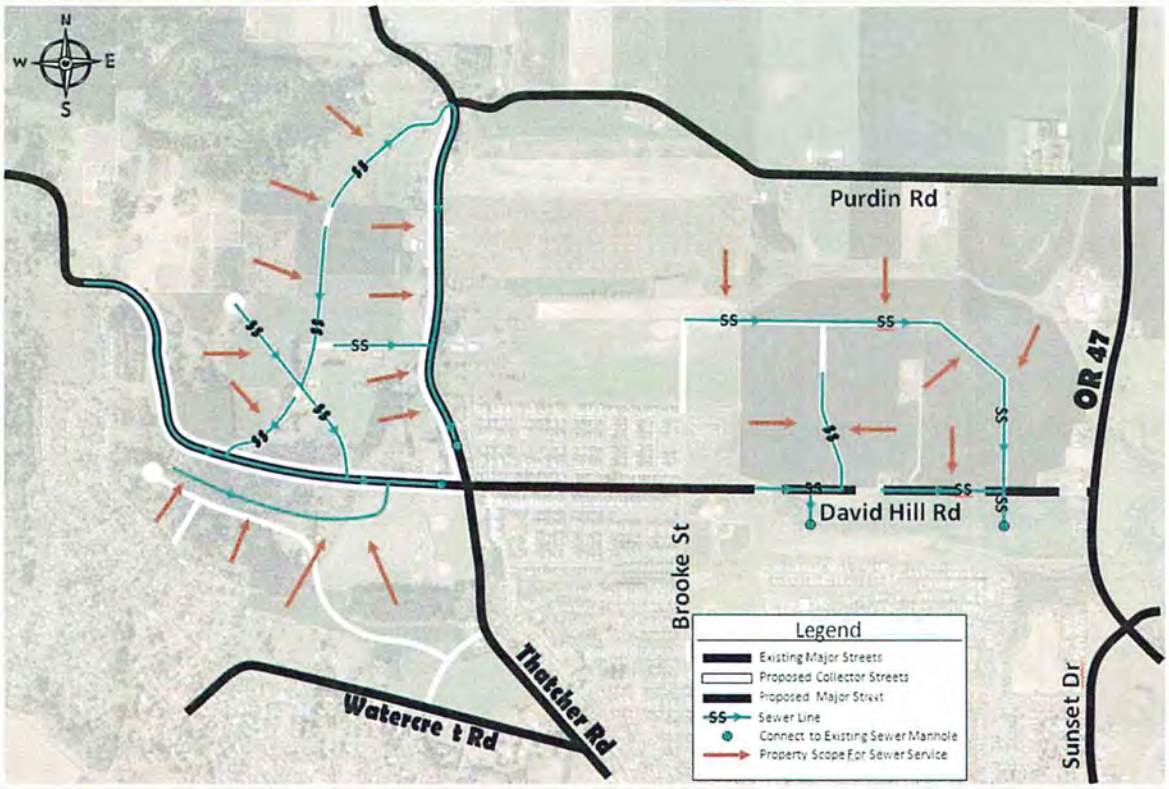
1. Sewer facilities shall be designed and sized to serve the need of future land uses as shown on the Forest Grove Comprehensive Plan Map.

2. Sewer facilities shall be located in a manner to complement other infrastructure improvements and reduce conflict with incompatible uses, be guided by existing uses and be subject to special review considerations.

The consultant team prepared a detailed infrastructure needs report for the Refinement Plan. The conceptual sewer network is shown on the map below. The system shown below only depicts sewer main lines and does not include sewer laterals necessary to serve specific development. These needs will be determined during the development review process. Construction of sewer laterals will be at developer expense.

The sewer system generally follows the street network and is designed to support gravity flows by taking advantage of topography. Designing the system to take advantage of gravity eliminates the need for pump stations which reduces system cost and improves overall system reliability.

[3] A portion of these reservoirs will be used to serve the David Hill UGB between 250 feet and 440 feet. Approximately 67% of total costs would be associated with the David Hill Planning Area.



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Sewer Utilities

Westside Planning Project
Forest Grove, OR

The estimated cost to construct the recommended sewer system is approximately $3,635,600. The table below shows estimated cost by street segment.

Sewer Facility Cost Estimates

Description	Estimated Cost	Area of Benefit
	Potential Short Term Projects	
Road 9 Sewer Line	$262,500	David Hill UGB
Road 10 Sewer Line (700 linear feet/12 inch line)	$382,500	David Hill UGB
Contingencies and Engineering	$483,750	David Hill UGB
Short Term Total	$1,128,750	
	Long Term Projects	
Road 1, 2, 3 Sewer Line	$225,000	David Hill UGB
Road 4 Sewer Line	$300,000	David Hill UGB
Road 5 Sewer Line	$82,500	David Hill UGB
Road 6 Sewer Line	$165,000	David Hill UGB
Road 7 Sewer Line (10 inch line)	$405,000	Purdin Road UGB
Road 8 Sewer Line (10 inch line)	$225,000	Purdin Road UGB
Contingencies and Engineering	$1,074,350	Entire Area
Long Term Total	$2,506,850	
TOTAL	*$3,635,600*	

Source: Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS Group. Costs shown are in 2016 dollars.

Storm Sewer System

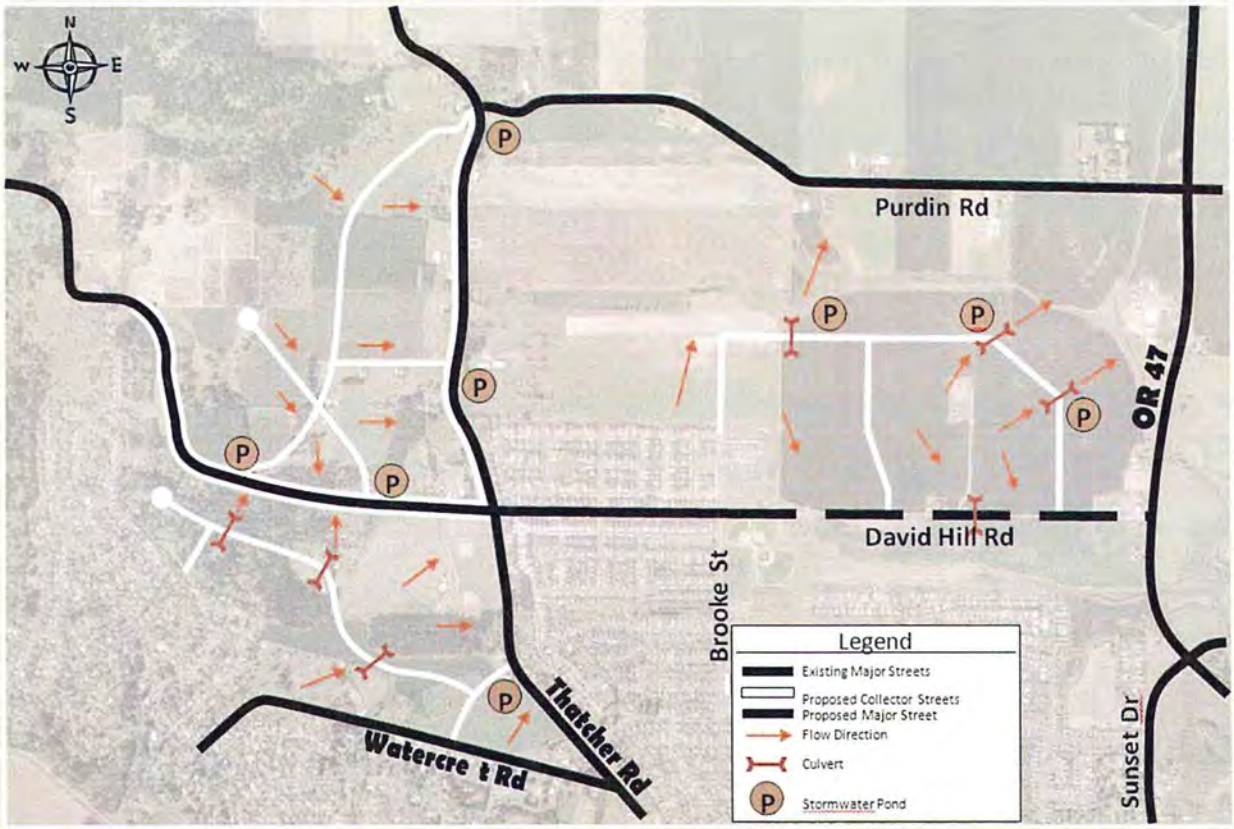
The Forest Grove Comprehensive Plan contains the following policies for the storm sewer system:

1. Storm sewer facilities should be designed to mitigate runoff conditions based on future land uses shown on the Forest Grove Comprehensive Plan map as determined by the City Engineer.

2. Storm sewer facilities should co-locate to complement other infrastructure facilities and to avoid conflicts. *The concept shows co-location of storm sewer facilities with other infrastructure facilities including roads.*

3. Design of storm water facilities shall support Comprehensive Plan land use designations.

The conceptual storm sewer system prepared for the Refinement Plan is shown on the map below. The map identifies the general direction of storm water runoff and conceptual locations of storm water ponds.



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Stormwater Utilities

Westside Planning Project
Forest Grove, OR

The estimated cost of the storm sewer system is approximately $1,575,000. Specific project cost estimates by segment are shown on the table below.

Stormwater Management Facility Cost Estimates

Description	Estimated Cost	Area of Benefit
Road 1, 2, 3 Storm Pond	$75,000	David Hill UGB
Road 4 Storm Pond	$75,000	David Hill UGB
Road 5 and 9 Storm Pond	$100,000	David Hill UGB
Road 6 and 10 Storm Pond	$150,000	David Hill UGB
Road 7 Storm Pond	$200,000	Purdin Road UGB
Road 8 Storm Pond	$50,000	Purdin Road UGB
Road 1, 2, 3 Stormwater Treatment	$35,000	David Hill UGB
Road 4 Stormwater Treatment	$35,000	David Hill UGB
Road 5 and Road 9 Stormwater Treatment	$70,000	David Hill UGB
Road 6 and 10 Stormwater Treatment	$70,000	David Hill UGB
Road 7 Stormwater Treatment	$20,000	David Hill UGB
Road 8 Stormwater Treatment	$20,000	Purdin Road UGB
Contingencies and Engineering	$675,000	Entire Area
TOTAL	*$1,575,000*	

Source: Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS Group. Costs shown are in 2016 dollars.

Public Facilities and Community Services

Chapter 7 of the Forest Grove Comprehensive Plan establishes goals, objectives and polices for public facilities and services. Key goals and policies for public facilities and community serves addressed by the Westside Plan include:

- ✓ Water System Performance Goal: Provide adequate water supply to meet the present and future water needs of the community. Recommendations for the water system necessary to provide adequate water supply for the Westside Planning area are described in Chapter 10 including an additional water reservoir.

- ✓ Water Service Goal 1: Water facilities shall be designed and sized to serve the need of future land uses as designated in the Forest Grove Comprehensive Plan map. Chapter 10 describes the recommended water facilities necessary to serve development in the Westside planning area. This includes a 12-inch water line along David Hill Road west of Thatcher Road and an additional water reservoir to supply the area and provide water pressure above the 440-foot contour elevation.

- ✓ Water Policy: The sizing of municipal water facilities shall follow land use plan designations and concentrate development cloes to the City Center. Chapter 10 includes an infrastructure analysis including assessment of water needs for the Westside planning area based on the land use designations described in Chapter 4 (Land Use).

- ✓ Storm Sewer Goal: Storm water facilities should co-locate to complement other infrastructure facilities and to avoid conflicts. The recommended storm water system is desiged to complement other infrastructure facilities and to avoid conflicts. The recommended storm water system is based on the constructed of ponds near proposed roadway locations.

- ✓ Storm Sewer Policy 2: Design of storm water facilities shall support Comprehensive Plan land use designations. Chapter 9 describes storm water facilities necessary for the collector roadway system required to serve development. Storm water facilities for private development will be assessed during the land use review process.

- ✓ Sanitary Sewer Goal 1: Sewer facilities shall be designed and sized to serve the need of future land uses as shown on the Forest Grove Comprehensive Plan map. Chapter 9 describes sanitary sewer facilities based on the land use concept recommended in Chapter 4.

- ✓ Sanitary Sewer Goal 2: Sewer facilities shall be located in a manner to complement other infrastructure improvements and reduce conflict with incompatible uses, be guided by existing uses and be subject to special review considerations. The recommended sanitary sewer facilities described in Chapter 9 are located to take advantage of proposed roadway locations and topography for gravity flow.

- ✓ Public Safety Goal 4: Recognize that land use and transportation policies influence emergency response needs. The recommended land use concept described in Chapter 4 identifies a site for a new fire station in the Purdin Road urban growth area. This site is situated to improve emergency response needs in this part of the community including along Highway 47.

- ✓ Parks Policy 1: Provide new neighborhood and community parks, additional open space and trails and new recreation facilities to meet the needs of Forest Grove residents as the population grows and resources allow. The land use concept described in Chapter 4 identifies a site for a new neighborhood park adjacent to a new elementary school site north of David Hil Road. This neighborhood park is intended to meet the recreational needs of future Forest Grove residents living in the Purdin Road urban growth area.

- ✓ Parks Policy 6: Recognize that community and neighborhood parks provide a sense of place for community residents. The recommended neighborhood park in the Purdin Road urban growth area is situated to provide a sense of place for future Forest Grove residents living in the Purdin Road urban growth area.

Parks, Recreation and Open Space

The Forest Grove Comprehensive Plan includes goals pertaining to park needs for the community. The Forest Grove Parks, Recreation and Open Space Master Plan is an element of the Comprehensive Plan. The Parks, Recreation and Open Space Master Plan was recently updated in 2016 and addresses recreational needs in the Westside Planning Area and the Comprehensive Plan policy to:

1. Provide new neighborhood and community parks, additional open space and trails and new recreation facilities to meet the needs of Forest Grove residents as the population grows and resources allow.

The following sections additional detail about identified park needs in the Westside Planning area.

Parks, Recreation and Open Space Master Plan

The Forst Grove Parks, Recreation and Open Space Master Plan was updated in 2016 and addresses needs in the Westside planning area including the area added to the urban growth north of David Hill Road and west of Highway 47. The Parks plan identifies a location for a new public neighborhood park to serve the recreational needs of future residents living in the new urban growth boundary area. The recommended park location is included in the recommended land use plan for the Westside area shown in Chapter 4. In addition to the new park the Parks Plan also identifies improvements to Thatcher Park.

The total parks costs for the three identified projects planned in the Westside Planning Area is estimated at $6.6 million. The estimated development costs for the Purdin neighborhood park includes property acquisition as well as development costs.

Description	Total Estimated Cost	Cost Attributable to Westside Area	Cost Attributable to South of Purdin Road/Council Creek Area	Cost Attributabl e to David Hill Area	Area of Benefit
South of Purdin/Council Creek Area Neighborhood Park	$3,000,000	$3,000,000	$3,000,000	$0	South of Purdin/Council Creek Area
Thatcher Park Improvements	$3,400,000	$612,000	$349,799	$262,201	Westside Planning Area
Thatcher Park Dog Park Improvements	$200,000	$36,000	$20,576	$15,424	Westide Plannng Area
Total Estimated Cost	*$6,600,000*	*$3,648,000*	*$3,370,376*	*$277,624*	

Chapter 6 provides additional information aobut recreational and open space resources and estimated park improvement costs.

Education and School Facilities

The Forest Grove Comprehensive Plan identifies education and school facility needs necessary to serve growth for the next twenty years. Education and school facility goals contained in the the Comprehensive Plan applicable to the Westside Plan include:

<u>Goals:</u>

Schools shall be located in residential and commercial areas.

Schools shall be located to serve residential neighborhoods.

Policies:

Cooperate with the School District to ensure opportunities for adequate school sites necessary to serve an expanding population.

Encourage the location of schools within the urban growth boundary and within walking distance of students.

School sites based on future growth and land use expectations shall be identified on the comprehensive plan map to serve existing and future neighborhoods.

The Forest Grove Comprehensive Plan (2014) identifies a need for one additional elementary school during twenty year planning period. Consistent with this recommendation, the land use concept described in Chapter 4 identifies a site for a possible elementary school in the Purdin Road urban growth area. The school site is about ten acres in area which is typical for elementary schools based on generally accepted planning guidelines.

The Forest Grove School District is proceeding with a long range planning process to assess school needs for the next ten years. If the District determines to accommodate school needs in contrary to the Westside Plan recommendations the City will reevaluate the recommended land use designation for the proposed school site in the Purdin Road area.

School costs were not considered in the infrastructure analysis and recommended funding approach. This is because the cost is the responsibility of the Forest Grove School District and is not considered a City development cost. However, a construction excise tax is collected at time of building permit issuance for each new residential and non-residential development permit. The tax is $1 per square foot for residential construction and $0.50 per square foot of non-residential construction. Revenue collected is provided to the District for new school development.

Natural Resources and Hazards

The following provisions of the Comprehensive Plan apply to natural resources and hazards:

- ✓ Areas with known geological hazards or soils which the Soil Conservation Service has rated as severe hazard soils including shrink-swell potential, weak foundation support (shear strength), and erosion hazard shall permit construction and densities only when adhering to recommendations made through engineering analysis, review and ordinances. A proposed implementation action identified in Chapter 13 is to require engineering analysis for development proposed on sites with a slope of 10% or greater. The current requirement is 20% or more slope. This change will help identify potential geological constraints affecting development in the David Hill area.

- ✓ Those involved in development will be required to address hazard conditions by the inclusion of basic environmental data (i.e. soil type, elevation of the flood plain, geological limitations, etc.) and related designs and for engineering solutions in the submittal requirements for the development. Article 8 of the Development Code

identifies requirements that must be addressed when development is proposed in areas with potential hazards including steeply sloped areas (currently defined as 20% or more slope). Requirements include submittal of a geological assessment addressing underlying geology, soil properties, and opinion as to stability of the site.

- ✓ Adopt as a provision in both the zoning and subdivision ordinances that an environmental report be prepared and certified by a qualified engineer for all development proposals in areas having natural physical hazards and/or limitations. As part of the environmental report, the engineer shall identify the intensity of urban development to be permitted based upon the carrying capacity of the land. Open space may be required within the development in order to protect the public health and safety. Article 8 of the Development Code requires submittal of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist. This requirement currently applies to development sites with slope of 20% or greater.

- ✓ Cluster development to accommodate needed housing while preserving larger blocks of forest land and open space. Article 5 of the Development Code allows for clustering of development on sites with identified natural resources areas including riparian and upland habitat areas. To minimize potential impacts on natural resource areas lot sizes may be reduced and density may be transferred to other locations on the development site that isn't constrained.

- ✓ Establish landslide mitigation measures including logging regulations on steep slopes, landscape requirements, drainage controls, and pre-development technical studies. Article 5 of the Development Code establishes restrictions on removal of trees on development sites prior to development. These restrictions apply regardless of slope. Article 5 also restricts removal of trees in natural resource areas.

Urbanization

The Comprehensive Plan contains the following policies for the transition of rural land to urban uses:

- ✓ Establish policies to ensure an orderly and efficient transition from rural to urban land use.

- ✓ Land shall be made available within the urban growth boundary to meet all local urban land use needs.

- ✓ Implement policies to create complete neighborhoods in areas undergoing urbanization.

The Westside Plan provides clear direction guiding the transition of rural land inside the urban growth boundary to an urban development pattern. Transition of rural land for urban uses is predicated on the interest among property owners to annex land into the City and availability of infrastructure (sewer and water).

The land use concept described in Chapter 4 includes residential and some retail uses. The land identified for residential development helps meet housing needs identified in the Economic Opportunity Analysis. The land use concept also identifies residential and complementary land

uses intended to create complete neighborhoods. Complementary land uses include retail areas, an elementary school location, park site, and fire station site.

Metro Regional Land Use and Transportation Plans

The Metro Regional Framework Plan establishes a general land use concept for the Portland region. This land use concept, referred to as Region 2040, identifies regional centers, town centers, corridors, and outer neighborhoods. Downtown Forest Grove is designated a Town Center, Pacific Avenue/19th Avenue is designated a Corridor and the David Hill area is designated as an outer neighborhood. In addition to the Region 2040 land use concept, the Metro Regional Framework Plan also addresses transportation, parks and open space, and natural hazards. Local land use plans must be consistent with the Metro Regional Framework Plan.

The Metro Urban Growth Management Functional Plan implements the Metro Regional Framework Plan and contains policies guiding changes to local comprehensive plans. The Urban Growth Management Function Plan implements regional goals and objectives for housing, water quality and flood management, employment areas, and planning for new urban areas. The Westside Refinement Plan addresses and is consistent with the Urban Growth Management Functional Plan as described in this plan.

The Metro Regional Transportation Functional Plan implements the Regional Transportation Plan (RTP). The RTP establishes goals, objectives and a funding approach for the regional transportation system. The Regional Transportation Functional Plan implements the goals and objectives described in the Regional Transportation Plan . This includes goals and objectives related to transportation system design, amendments to local transportation system plans, transportation project development, regional parking management and Metro review of city and county transportation system plans. The Metro Regional Transporation Functional Plan also establishes an outcomes-based framework guiding actions and investment decisions for transportation projects affecting the regional system. The Westside Refinement Plan addresses and is consistent with the requirements of the Regional Transportation Functional Plan as described in this plan.

Washington County Urban Planning Area Agreement

In 1988 the City of Forest Grove and Washington County entered into an agreement to define planning roles and responsibilities for unincorporated land within the regional urban growth boundary near Forest Grove. This agreement called the Washington County Urban Planning Area Agreement (UPAA) established an "urban planning area" within which the City and County both agreed to maintain an interest in comprehensive planning. The City's planning responsibilities include comprehensive planning in the incorporated and unincorporated portions of the City's urban planning area. This is largely the unincorporated area within the urban growth boundary adjacent to and near Forest Grove. The City is also responsible for designating in the comprehensive plan land uses within the planning area including sensitive natural areas and hazard areas. The UPAA also reiterates that the City is identified as the appropriate provider of local water, sanitary sewer, storm sewer, and transportation facilities within the urban planning area. Exceptions include services provided other service providers subject to the terms of intergovernmental agreements.

The Westside Plan addresses many aspects of the UPAA including establishing City Comprehensive Plan designations in the Purdin Road urban growth area. The Westside Plan also addresses provision of water, sanitary sewer, storm sewer and transportation facilitis within the Westside planning area.

Chapter 3 - Citizen Participation

A comprehensive public involvement approach was implemented for the Westside planning project. This approach included stakeholder interviews an in-depth 2 ½ day project charrette, two community open houses and multiple work sessions with the City Council and Planning Commission. The stakeholder interviews and design charrettes were facilitated by the consulting firm Urbsworks. The citizen participation opportunities are described more fully below.

Stakeholder Interviews

Sixteen stakeholder interviews were conducted in November 2014 for the the David Hill and Purdin Road planning areas. Interviewees included property owners in the study area, residents, a realtor, Planning Commission member, Parks and Recreation Commission member; Forest Grove School District representative, and a business owner. Interviewees were asked a series of questions including:

- ✓ Based upon your connection to the area, what are the most critical issues to consider in this planning effort?
- ✓ Based upon your connection to the area, what would you like to see improved or changed?
- ✓ Based upon your connection to the area, what should be preserved?
- ✓ Based upon your connection to the area, what would represent a "win" for your?
- ✓ How would you like to be involved in the design charrette?
- ✓ What is the best way to communicate with you about the planning process?

Many thoughts were expressed during the interviews including:

- Development in the area should preserve a sense of community;
- Housing in the study area should provide choice and be accessible to lower-income households;
- Density on David Hill should not be increased above what is shown on the Comprehensive Plan map;
- Property owner rights should be respected;
- Preserve wildlife and preserve agriculture in the area;
- Promote walkable mixed-use development;
- Develop hillsides before farmland;
- Buffer existing development from new development;
- Improve transportation connections;
- Create a neighborhood on the edge that contributes to the City;
- Connect the area with the City.

Project Charrettes

The project charrette provided an opportunity for interested persons to review and comment on initial land use and transportation system concepts. The charrette began with an evening

public event where existing baseline conditions and the results of the planning process to date were discussed.

On the first full day of the charrette, property owners, stakeholders, technical committee or Planning Commission members and others will be invited to attend and participate in working sessions with project team members to develop preliminary land use alternatives for the Westside planning area. The first charrette was held on the evening of April 20, 2015. It was held at the Forest Grove Community Auditorium. Approximately 34 people participated in the first charrette.

The first charrette provided an introduction to the project. Several land use options were presented for discussion. Specific questions were posed to charrette participants including:

- ✓ Considering the proposed principles for hillside development, do you agree with the following:
    - Should new roads be aligned with slope contours to minimize disturbance from grading?
    - Should development be clustered to minimize development impacts on David Hill?
    - Should development be strategically located to among forested areas to maintain natural views and buffer development?
    - Should building be limited?
    - Should vegetation along stream corridors be increased?

Charrette participants were also asked to provide their perspective on the location and scale of commercial development in the study area. To conclude the charrette participants were asked to think about the future of Forest Grove thirty years from now and if one of the land use alternatives best represents a successful outcome for the City.

Several common themes emerged from the first charrette including:

- Views must be conserved carefully;
- Street alignments should follow contours;
- Minimal retail is desired in the David Hill area;
- Cluster housing with common areas should be considered to protect views;
- Building heights should be limited;
- Stream corridor vegetation should be increased;
- Industrial development is not appropriate in the Purdin Road area;
- Preferred zoning is single family residential (R-7) and residential multifamily low (RML).

The second charrette was held on the evening of May 20, 2015. Approximately 32 people attended the second charrette. This charrette provided an opportunity to share the feedback provided on the project and land use alternatives. An objective of the second charrette was a consensus based land use alternative for presentation to the Planning Commission.

At times the discussion was tense but several themes emerged that are reflected in the recommended land use alternative. One theme was that the Purdin Road area should not include employment uses. Approximately 75% of the charrette participants expressed this viewpoint.

In general charrette participants were divided as to whether Suburban Residential zoning (one dwelling per acre) should be retained in the David Hill area. Approximately 55% of charrette participants supported retaining Suburban Residential zoning.

Detailed responses from the charrettes are included in the technical appendix.

Planning Commission Work Sessions

The Planning Commission held work sessions on the Westside Plan on multiple occasions. Work sessions were held on:

Date	Topic
October 6, 2014	Project Approach
July 6, 2015	Planning Commission direction on land use considerations
May 2, 2016	Discussion of David Hill area in UGB and Urban Reserve
February 6, 2017	Infrastructure Needs & Funding approach

City Council Work Sessions

The City Council held work sessions on the Westside Plan on:

Date	Topic
November 14, 2016	Land Use Direction
December 12, 2016	Infrastructure Needs & Funding Approach

Chapter 4 – Land Use

The Westside planning area is comprised of two subareas (David Hill urban growth area and South of Purdin Road/Council Creek urban growth area). The David Hill area was included in the urban growth boundary when adopted in 1980. As such, City comprehensive plan map designations were established to guide future development. The land use designations were modified as part of the update to 2014 update to the Forest Grove Comprehensive Plan to promote mixed-use development throughout the City.

In contrast to David Hill, the Purdin Road urban growth area was added to the urban growth boundary by the Oregon Legislature in 2014. Since the area was added to the urban growth boundary in 2014 no City Comprehensive Plan map designations have been assigned. A primary objective of the Westside planning process was preparation of a land use concept and recommendation of Comprehensive Plan designations for the Purdin Road area to guide future development.

Several land use concepts were developed for evaluation as part of Westside planning process. Land use concepts were evaluated based on the following guiding principles:

- ✓ Promote efficient use of developable land
- ✓ Minimize impacts to sensitive natural features
- ✓ Promote Sustainability
- ✓ Promote Complete Neighborhoods
- ✓ Support from Affected Property Owners

The initial land use concept for the Purdin Road urban growth boundary area was developed for the regional urban and rural reserves planning process. Initially much of the Purdin Road area was identified for industrial activities on sites greater than 25 acres. The emphasis on industrial activities was changed when the Oregon Legislature reduced the size of the Purdin Road urban reserve area. Initially, the boundary extended from the current city limit line to Purdin Road. The legislative action made the boundary Council Creek rather than Purdin Road reducing the area considerably and making industrial activities less feasible. Initially, most of the industrial area was envisioned along Purdin Road to allow for a buffer between residential uses adjacent to the current city limit line and industrial activities along Purdin Road. Modification to the extent of the Purdin Road urban growth area altered the approach to land use considerably. This is reflected in the recommended land use concept.

Prior to reaching a recommended land use concept several alternatives were developed to assess potential impacts especially related to traffic. This was called the "Worst Case Scenario". One alternative modified the area above the 440 foot elevation contour from Suburban Residential (one dwelling per acre) to Single Family Residential C-Low with a target density of 4.35 dwellings per acre). The "Worst Case Scenario" also included additional retail commercial and multifamily residential land in the Purdin Road urban growth area and a somewhat higher amount of development at the David Hill Road/Thatcher Road mixed-use area.

The recommended land use alternative is shown below. The recommended alternative reflects input provided during the public charrettes, open houses and work sessions. The recommended alternative strives to promote complete neighborhoods with housing, limited commercial and office uses nearby. The recommended land use alternative also attempts to balance potential

impacts including traffic. The recommended land use alternative is described in more detail below.

Recommended Land Use Alternative

The map below shows the recommended land use alternative for the David Hill and Purdin Road areas. Approximately 148 net acres is shown as residential on the map for the Purdin Road area. This represents approximately 86% of the total net area. The balance of the area is shown as commercial and institutional (school and park).

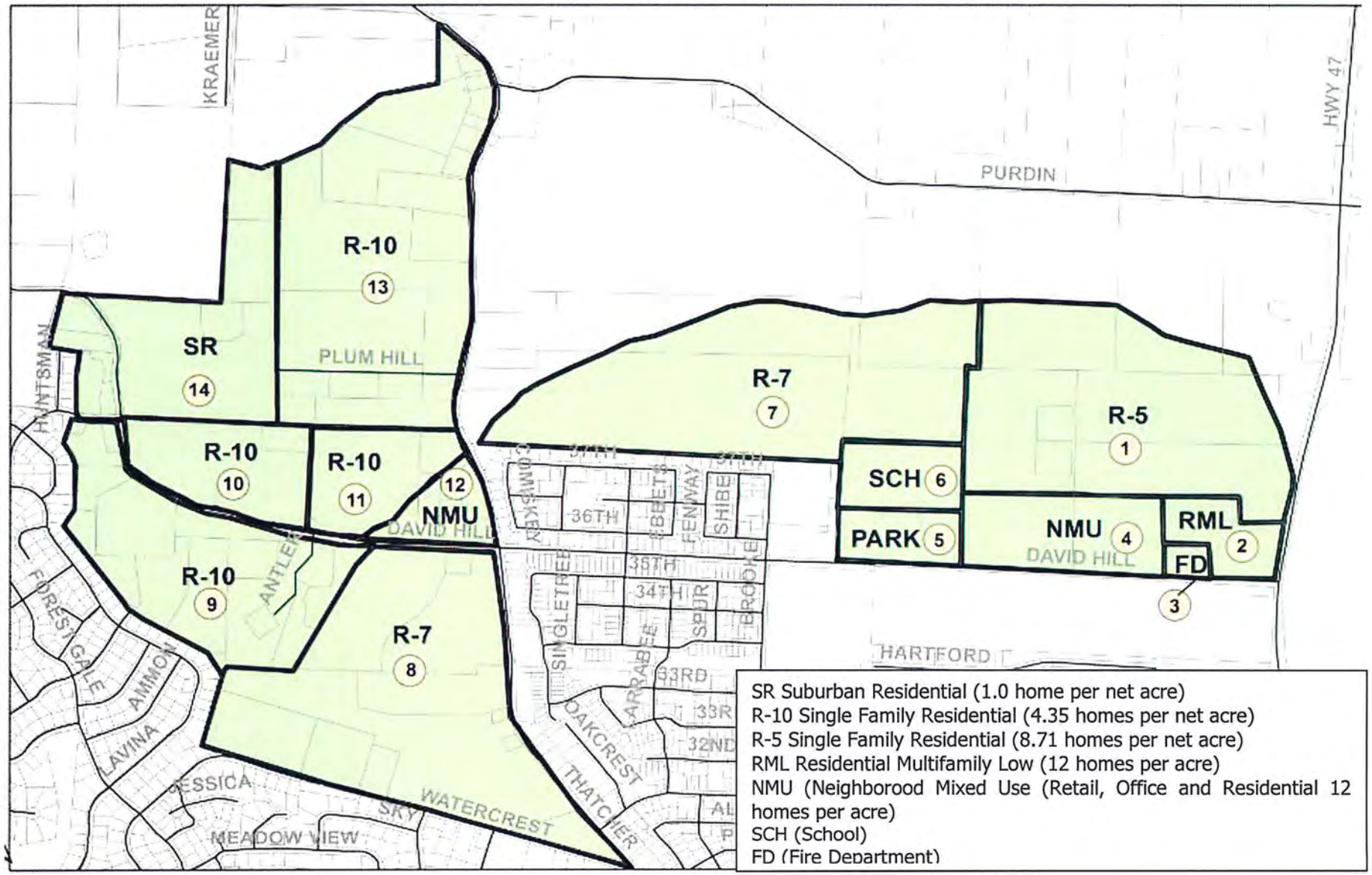
The David Hill area the same as shown on the current Comprehensive Plan map. The area shown as Suburban Residential is expanded slightly to follow property lines rather than elevation contours. The area shown as Residential Multifamily Low is currently designated as Neighborhood Mixed Use on the Comprehensive Plan map. This change is recommended to reflect public comment provided during the design charrettes.

The area south of David Hill Road, north of Watercrest Road and west of the Thatcher Road is shown as Single Family Residential R-10 and R-7. The R-10 area is larger than currently shown on the current zoning map. Much of this area is currently zoned R-7. This change reduces the density form 6.22 dwellings per net acre to 4.35 dwellings per net acre. This change takes into account the topography of the area and environment constraints including a historical landslide area.

Estimated Dwelling Yield

The table below provides an estimate of dwelling unit yield for the David Hill and Purdin Road areas based on the recommended land use alternative. The table also provides a comparison with estimated yield based on the current Comprehensive Plan designations for the area. The recommended land use concept would increase dwelling unit yield from 693 units to 1,950 units within the Refinement Plan area. This is an increase of 180% to housing capacity.

General Land Use Concept – Planning Commission Recommendation



Land Use Analysis
Planning Commission Recommended Alternative

Analysis Zone	Area	Gross Area (ac.)	Developable Area (ac.)	Net Area (ac.)	Slope Deduction	Current Dwelling Yield	New Dwelling Yield
1	Purdin (R-5)	86.18	71.60	57.28	0%	2	498
2	Purdin (RML)	10.82	10.82	8.66	0%	0	103
3	Fire Station (FD)	2.40	2.40	2.40	0%	0	0
4	Purdin (Mixed-Use/Commercial)	24.63	24.63	19.73(1)	0%	0	140
5	Purdin (Park)	6.00	6.00	6.00	0%	0	0
6	Purdin (School)	10.00	10.00	10.00	0%	0	0
7	Purdin (R-7)	98.62	87.02	69.62	0%	3	433
	Subtotal - Purdin	***238.65***	***212.47***	***173.69***		***5***	***1,174***
8	Watercrest (R-7)	99.75	70.63(2)	56.50	10%	221	316
9	South of David Hill (R-10)	57.38	12.99	10.39	20%	36	36
10	North of David Hill - West (R-10)	24.30	17.73	14.18	15%	52	52
11	North of David Hill - East (R-10)	21.42	15.06	12.05	15%	44	44
12	North David Hill (MU-Com)	8.50	3.60	2.90	0%	12	4
13	Thatcher (R-10)	98.66	95.81	76.65	10%	300	300
14	David Hill Suburban Residential (SR)	43.12	35.62	28.50	15%	24	24
	Subtotal – David Hill	***353.13***	***251.44***	***201.17***		***689***	***776***
	Grand Total	**591.78**	**463.91**	**374.86**		**694**	***1,950***

Metro Urban Growth Management Functional Plan Title 11

The section below focuses on the planning requirements contained in Title 11 of the Metro Urban Growth Management Functional Plan. Title 11 addresses planning for new urban areas added to the urban growth boundary. The Metro Urban Growth Management Functional Plan calls for long-range planning to ensure that areas brought into the UGB are urbanized efficiently.

A. City shall adopt comprehensive plan provisions and land use regulations for the area added to the UGB.

Purdin Road Area

The Refinement Plan includes recommended Comprehensive Plan provisions for the Purdin Road area added to the urban growth boundary by the Oregon Legislature in 2014. The recommended Comprehensive Plan designations include:

Designation	Density
B-Standard	6.22 dwellings per net acre
A-Medium	8.7 dwellings per net acre
Neighborhood Mixed Use	12.0 dwellings per net acre
Institutional (Park, School, Fire Station)	Not Applicable

David Hill Area

The David Hill area included in the Refinement Plan area has been in the urban growth boundary and already has City of Forest Comprehensive Plan designations. The designations include:

Designation	Density
Suburban Residential	1.0 dwelling per net acre
B-Standard	6.22 dwellings per net acre
C-Low	4.35 dwellings per net acre
Neighborhood Mixed Use	12.0 dwellings per net acre

B. Comprehensive plan provisions for the area shall include:

a. Specific plan designation boundaries

The boundaries for specific Comprehensive Plan designations within the Refinement Plan area are described in the Land Use Chapter.

b. Provision for annexation to a city and to any necessary service districts prior to or simultaneously with application of city land use regulations.

The Urban Planning Area Agreement (UPAA) between the City of Forest Grove and Washington County identifies planning responsibilities for the unincorporated David Hill area adjacent to Forest Grove within the urban growth boundary. Under the UPAA the City of Forest Grove is identified as appropriate service

provider of local water, sanitary sewer, storm sewer and transportation facilities within the urban planning area. Exceptions include facilities provided by other service providers subject to terms any applicable intergovernmental agreements. The UPAA stipulates that unincorporated urbanizable land shall not be converted to urban development prior to annexation to the City. The UPAA will be amended to include the Purdin Road and Elm Street urban growth boundary areas.

c. Provisions that ensure zoned capacity for the number and types of housing units.

Land annexed into the City is subject to Forest Grove Development Code. The Development Code establishes target, minimum and maximum densities for each residential zone. The minimum density is 80% of the target density. Maximum density is 115% of the target density except for the Suburban Residential and Single Family (R-10) zone which is 120% of the target density. The provisions of the Forest Grove Development Code ensure that zoned capacity is achieved.

d. Provision for affordable housing consistent with if the comprehensive plan authorizes housing in any part of the area.

The City of Forest Grove does not provide affordable housing directly. However, the housing element of the Forest Grove Comprehensive Plan includes policies for affordable that apply. These policies include:

- Provide and maintain an adequate supply of affordable housing opportunities.
    - Policy 4.1: Development and implement programs to offset the increasing cost of new housing construction.
    - Policy 4.2: Promote the provision of housing assistance to low and moderate income individuals in Forest Grove through the Washington County Community Development Block Grant and Home Investment Partnership programs.
    - Develop and implement programs to encourage the rehabilitation of older housing stock throughout the community.
    - Develop and support partnerships with local Community Development Corporations whose mission it is to construct and rehabilitate affordable housing in Forest Grove.
    - Implement a program to sell unneeded land owned by the City of Forest Grove for the construction of affordable housing in areas designated for residential development.
    - Continue policies to allow for manufactured dwellings on individual lots outside of designated historic districts and within manufactured home parks.

e. Provision for the amount of land and improvements for public school facilities sufficient to serve the area added to the UGB in coordination with affected school districts.

The Forest Grove Comprehensive Plan update completed in 2014 shows a need for an additional elementary school during the planning period. The recommended land use concept for the Purdin Road area shows a conceptual location for an elementary school. The site is approximately 10 acres in area.

f. Provision for the amount of land and improvements for public park facilities sufficient to serve the area added to the UGB in coordination with affected park providers.

The recommended land use concept for the Purdin Road area shows a conceptual location for a park to serve the area. The park site approximately 10 acres in area.

g. A conceptual street plan that identifies internal street connections and connections to adjacent urban areas to improve local access and improve the integrity of the regional street system.

The Refinement Plan includes a conceptual street for the plan area. This includes new collector roads improving traffic circulation. The street network for the Purdin Road area shows extensions of Main Street, B Street and Brooke Street into the Purdin Road urban growth boundary area. These streets tie into a new east/west collector street between David Hill Road and Council Creek which serves as the urban growth boundary.

The conceptual road network for the David Hill areas shows an extension of Plum Hill Lane to the west. The extension of Plum Hill Lane would connect with a new north/south collector street intersecting with Purdin Road and David Hill Road. In addition, the conceptual street plan includes a new collector street beginning approximately 1,250 feet west of the Thatcher Road and David Hill Road intersection. This new collector street would run general north/northwest from David Hill Road to the interior of the David Hill planning area.

North of Watercrest Road the conceptual street plan shows the extension of Vista Drive from Watercrest Road to Thatcher Road. This road would provide help to relieve congestion at the intersection of Thatcher Road with Gales Creek Road. The conceptual street plan for this area also shows a new east/west collector street connecting the extension of Vista Drive to a proposed extension of Valley Crest Way. This road would provide connectivity to potential future development along the south side of David Hill Road.

The conceptual street network, as proposed, addresses the requirements for roadway connectivity in the Metro Regional Transportation Function Plan. Street connectivity in the David Hill area was not addressed in the update to the Forest Grove Transportation Plan completed in 2014. The Forest Grove Transportation System Plan identified the David Hill area as a refinement area. The Westside Planning Program Refinement Plan provided an opportunity to address street connectivity in the David Hill and Purdin Road areas in the context of the Regional Transportation Functional Plan as described more fully below.

Title 1 of the Regional Transportation Function Plan addresses transportation system design. The provisions of Title 1 ensure that the street system is designed to improve safety, support adjacent land use and balance the needs of all users including bicyclists, transit vehicles, motorists, freight delivery vehicles and pedestrians. To improve connectivity the RTFP stipulates that, to the extent practicable, local TSPs include a network of major arterial streets at one-mile spacing and minor arterial streets or collector streets at half-mile spacing. The design of the network shall be based on:

- Existing topography;
- Presence of rail lines;
- Presence of freeways;
- Pre-existing development;
- Leases, easements and covenants in place prior to May 1, 1995;
- The requirements of Titles 3 and 13 of the Urban Growth Management Functional Plan;
- Arterial design concepts in Table 2.6 and Figure 2.11 of the Regional Transportation Plan; and
- Best practices and designs for protecting natural resources and natural areas.

Each of the considerations for design of the street network are described in turn below.

Existing Topography

The topography of the Westside Planning Program Refinement Area is varied. The Purdin Road subarea is relatively flat accommodating a robust street network to serve future development. Proposed collector streets in the Purdin Road area are space approximately 1/4 to 1/3 mile apart. Therefore, this provision of the Metro RTFP is met.

In contrast to the Purdin Road area, David Hill has areas with steep slopes making street connections more difficult. The primary constraint is adhering to maximum street slope allowed under the Forest Grove Development Code. Another constraint is amount of cut and fill likely required for some road segments.

A collector street is proposed paralleling Thatcher Road approximately 1/3 mile to the west of Thatcher Road. This meets the RTFP requirements.

h. Provision for the financing of local and state public facilities and services.

The Transportation System Plan and financing analysis prepared for the Refinement Plan identify potential sources of revenue for financing public facilities and services. Sources of revenue include system development charges (SDCs), Washington County Major Streets Transportation Improvement Program (MSTIP), and federal transportation dollars allocated by Metro.

i. A strategy for protection of the capacity and function of state highway interchanges.

Not applicable.

C. The city responsible for comprehensive planning shall submit to Metro a determination of the residential capacity of any area to allow dwelling units, using a method consistent with a Goal 14 analysis, within 30 days after adoption of new land use regulations for the area.

Estimated residential capacity is shown on the table below. The capacity is based on the recommended Comprehensive Plan designations, estimated net acreage, and target density of the recommended designation. Based on the recommended land use alternative estimated residential capacity increases from 693 units to 2,054 units.

Chapter 5 - Natural Resources

Forest Grove has a strong sense of place. This sense of place is largely attributable to the City's natural setting. Defining natural features include Council and Gales Creeks, the forested Coastal Mountain Range foothills, the urban forest with many oak and sequoia trees, and, of course, nearby farm fields. It stands to reason that natural features play a prominent role in a City named Forest Grove.

The importance of the City's natural resources is further reinforced in the City's Vision Statement:

> Forest Grove is a destination that offers visitors and residents: A rich heritage preserved by honoring the city's natural, cultural, and historic treasures while also embracing the future; and
>
> Forest Grove is a community recognized for its commitment to conserve, preserve, protect and restore our natural assets.

Honoring the Vision Statement in general and the importance of natural resources specifically is a critical component of the Westside Planning Program Refinement Plan. As such, the Plan promotes development activities that take into account our local natural resources and establishes a framework to guide sustainable development. This chapter of the Plan explains how to achieve this objective.

Overview

The City of Forest Grove is situated in the Tualatin River Watershed at the western edge of the Portland metropolitan area. The surface terrain transitions from broad, flat alluvial valley floors to the basalt foothills of the Coast Range. The Forest Grove planning area is bordered to the south by the Gales Creek sub-basin and to the north by the Council Creek system.

The David Hill area is characterized by steep slopes, seasonal drainage ravines, and landslide hazard areas that create challenges for road building and development. The David Hill area is characterized by rural residential development, forest land and agricultural uses.

The Purdin Road area is relatively flat but has fine-textured floodplain soils. The Purdin Road area is also bordered by riparian areas to the north and east. Existing land use is primarily agriculture.

<u>Gales Creek</u>

Gales Creek is a major riparian corridor system containing floodplains, wetlands, wildlife habitat. The floodplain adjacent to the creek is farmed degrading riparian, wetland and wildlife habitat functions.

Gales Creek meanders in a channel between farm fields. The creek's vegetated riparian corridor ranges between 80 to 250 feet in width. Wetlands in this area are ditched and drained to varying degrees.

Anadromous and resident fish habitat is poor in Gales Creek due to a lack of large woody debris, lack of clean spawning gravels, lack of rearing and overwintering habitat and high water temperatures. In some areas the creek bed is apparently dredged to reduce flooding or to mine gravel. Although degraded conditions exist, coho, steelhead and other resident fish are documented as being present in the Gales Creek system. Gales Creek is designated as a critical steelhead habitat by the State of Oregon.

Council Creek

The Council Creek system receives drainage from the David Hill and Purdin Road areas. The system meanders near developed neighborhoods or flows through ditches adjacent to farmed lands. There is no documentation of resident fish presence in the upper reaches of Council Creek.

Wetlands

The local wetland inventory was prepared in 1993 and reviewed in 2011 as part of the 2014 update to the Forest Grove Comprehensive Plan. The local inventory only includes land within the city limits and the review did not include the Purdin Road urban growth area. Jurisdictional wetlands may exist in areas recently added to the urban growth boundary.

Clean Water Services oversees storm water management and water quality for the urban portions of Washington County. Clean Water Services also focuses on habitat preservation and management. Clean Water Services reviews development proposals to assess potential impacts to wetlands and riparian areas. Clean Water Services review is required before the City accepts an application for land use approval.

Groundwater Resources

The Forest Grove drinking water system is supplied by five surface water intakes located on Clear, Roaring, Smith, Deep and Thomas Creeks. These creeks are tributaries to Gales Creek. In addition the City has water rights at the Tualatin River, Hagg Lake and Barney Reservoir.

The Westside planning area is not designated as a critical groundwater supply area.

The following Goal 5 resources exist in or near the planning area:

- ✓ Riparian corridors
- ✓ Wetlands
- ✓ Wildlife habitat
- ✓ Groundwater resources
- ✓ Oregon recreation trails
- ✓ Mineral and aggregate resources
- ✓ Cultural areas

Statewide Planning Goal 5 encourages local governments to adopt natural resource protection programs and to conserve scenic and historic areas and open space. The Refinement Plan complements the goals and objectives for protecting natural resources contained in the Forest Grove Comprehensive Plan:

- All development shall consider, take into account, and demonstrate suitability relative to the natural hazard limitations of the Forest Grove area;
- Floodplain areas shall be protected from incompatible uses to reduce potential for property damage;
- Maintain and improve community sustainability by promoting future economic activities that are environmentally desirable.

The Forest Grove Comprehensive Plan also includes specific policies related to protection natural resources:

- Areas with known geological hazards or soils which the Soil Conservation Service has rated as severe hazard soils including shrink-swell potential, weak foundation support (shear strength), and erosion hazard shall permit construction and densities only when adhering to recommendations made through engineering analysis, review and ordinances.
- Those involved with development will be required to address hazard conditions by the inclusion of basic environmental data (i.e. soil type, elevation of the floodplain, geological limitations, etc.) in the submittal requirements for the development.
- Adopt as a provision in both the zoning and subdivision ordinances that an environmental report be prepared and certified by a qualified engineer for all development proposals in areas having natural physical hazards and/or limitations. As part of the environmental report, the engineer shall identify the intensity of urban development to be permitted based upon the carrying capacity of the land. Open space may be required within the development in order to protect the public health and safety.
- Cluster development to accommodate needed housing while preserving larger blocks of forest land and open space.
- Establish landslide mitigation measures including logging regulations on steep slopes, landscape requirements, drainage controls, and pre-development technical studies.
- Minimize the risk of loss of life and damage to property from wildfires within the City and the urban growth boundary.
- Amend development standards in areas with potential landslide hazard to minimize potential landslides while allowing appropriate development.

Goals, objectives and policies of the Comprehensive Plan are implemented through the Forest Grove Development Code generally and Article 5 (Natural Resource Areas) specifically. Article 5 establishes standards to protect and improve the functions and values that contribute to wildlife habitat including upland areas. This includes:

- Large habitat areas
- Interior habitat
- Connectivity and proximity to water; and
- Connectivity and proximity to other upland habitat areas.

Article 5 also establishes clear and objective standards and a discretionary review process applicable to development in natural resource areas in accordance with Statewide Land Use Planning Goal 5.

Article 5 identifies habitat-friendly development practices to avoid or minimize development impacts on natural resource areas by allowing flexible site design. Habitat-friendly development practices are appropriate for the Westside planning area including:

- Building setback flexibility to avoid or minimize development within Natural Resource Areas.
- Flexible landscaping requirements to avoid or minimize development within Natural Resource Areas.
- Flexible site design (on-site density transfer) to avoid or minimize development within Natural Resource Areas.

Opportunities

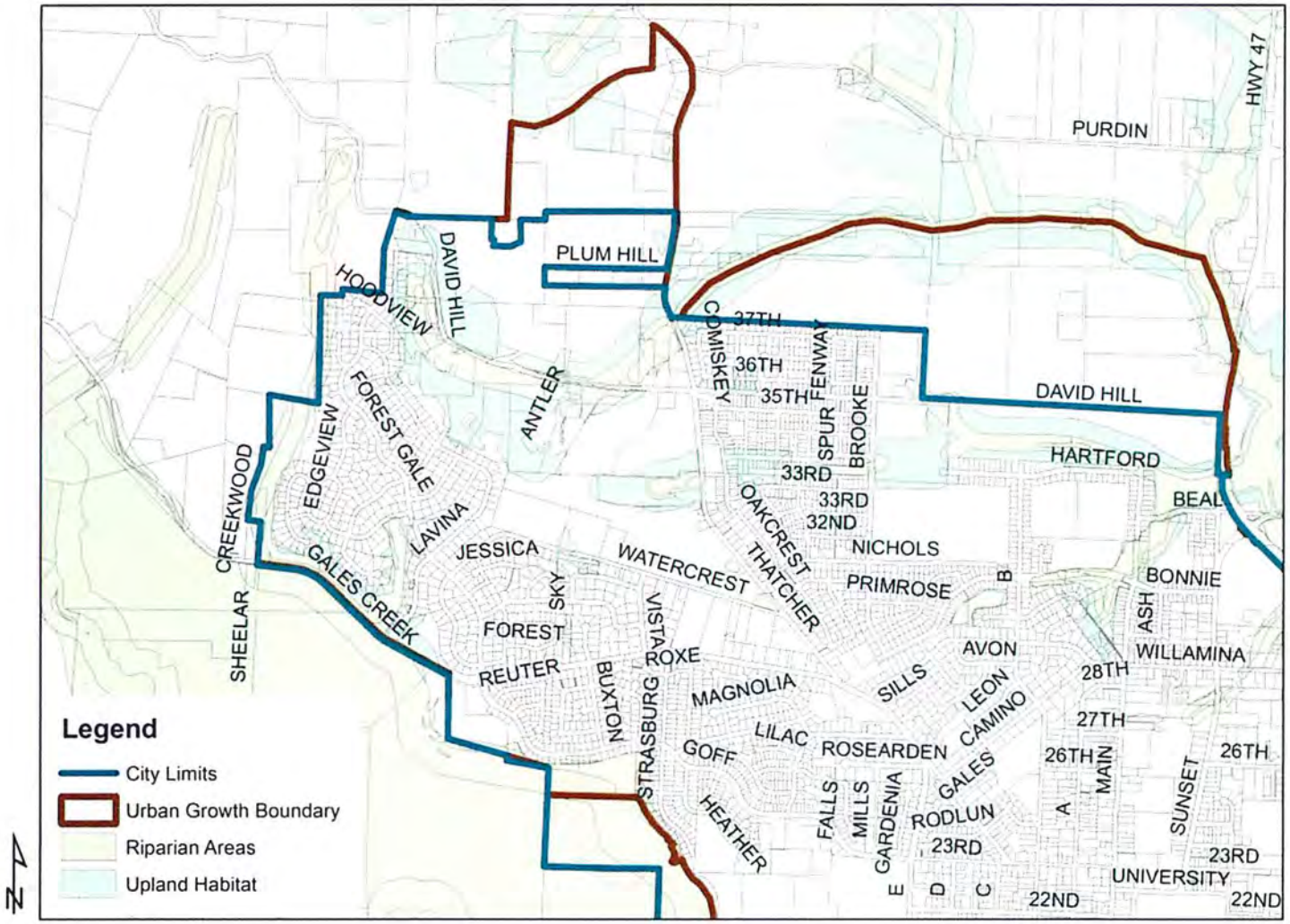
SCJ Alliance created a list of potential opportunities to protect and improve natural resource conditions in the Westside planning areas. A summary of general opportunities is provided below. The complete list of opportunities for each of the planning areas is included in the technical appendix.

- Update the 1993 Forest Grove Wetland and Stream Inventory using current definitions and mapping processes as needed;
- Blend storm water management with natural systems using constructed wetlands adjacent to natural systems to improve water quality and wildlife habitat opportunities;
- Remove invasive plants throughout the City's riparian and wetland areas to minimize invasive growth, reduce stream bank erosion and improve wildlife habitat;
- Develop new connections and cooperative efforts between landowners and other government agencies.

Natural Resource Areas

The Westside Refinement Plan area includes several natural resource areas including riparian areas and upland habitat. Development near natural resource areas are subject to the requirements of Development Code Article 5 which are based on the Metro regional model code.

Natural Resource Areas



Chapter 6 - Recreational, Cultural, and Open Space Resources

Recreational, cultural and open space resources is another element of makes Forest Grove the desirable place it is to live, raise a family, work or visit. The Westside planning is largely undeveloped and except for Thatcher Park, the area does not have recreational or cultural amenities. Existing and planned recreational and open space resources are described in more detail in the following sections of this chapter.

Recreational Resources

Thatcher Park is located at 750 David Hill Road just east of Thatcher Road. Thatcher is a community park complete with baseball fields, picnic shelter, picnic tables, playground, soccer field, softball fields, walking path and off-leash dog area. The park is approximately 15.4 acres in area. Thatcher Park affords views of the surrounding area and several Cascade Range peaks. The park is a jewel in the Forest Grove Parks and Recreation system.

Thatcher Park

Open Space Resources

The Westside Refinement Plan area includes open space resources including Thatcher Woods. The photo below shows the woods and the trail providing public access. The land comprising Thatcher Woods was donated to the City with the stipulation that the woods be retained as a community resource.

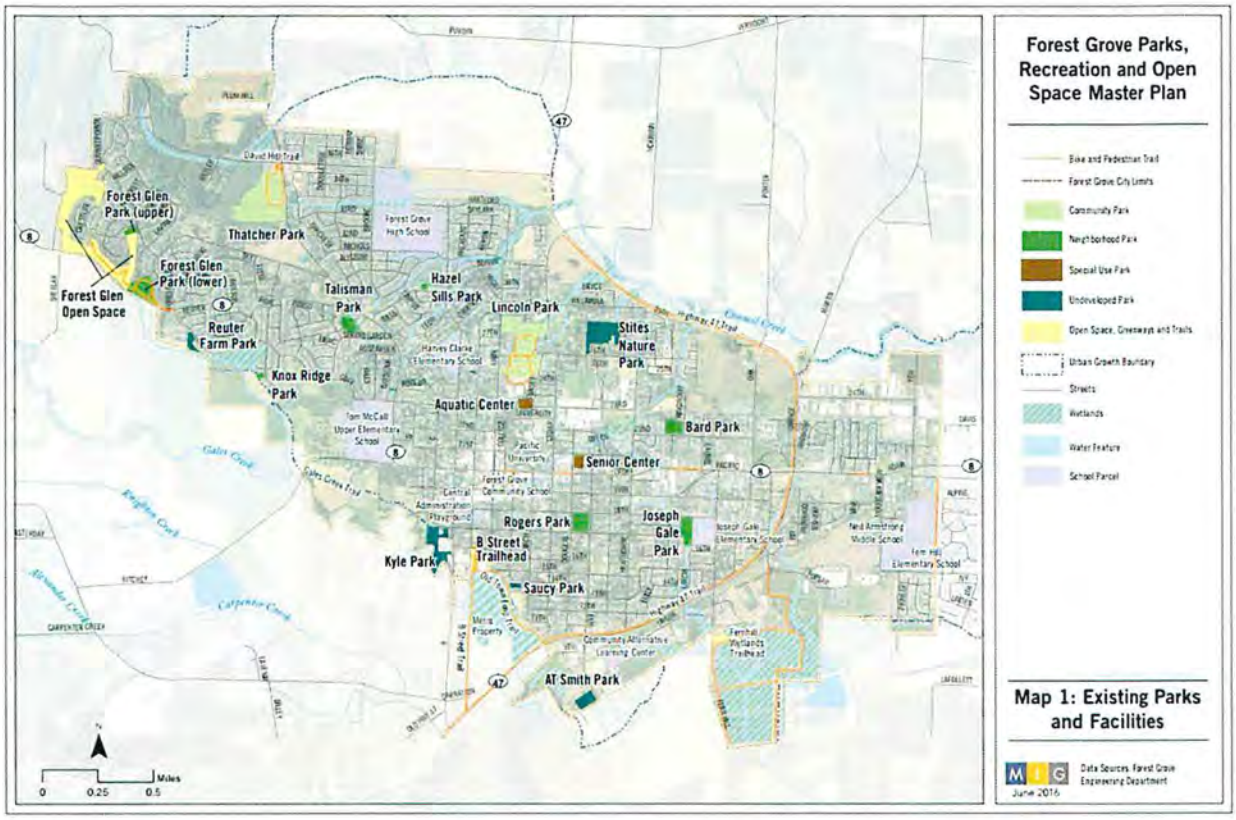
Thatcher Woods Trail

The City's Parks, Recreation and Open Space Master Plan, updated in 2016, establishes a vision for local investments in public park and recreation facilities contributing to the City's identity and livability. Parks are often the most memorable aspects of a community.

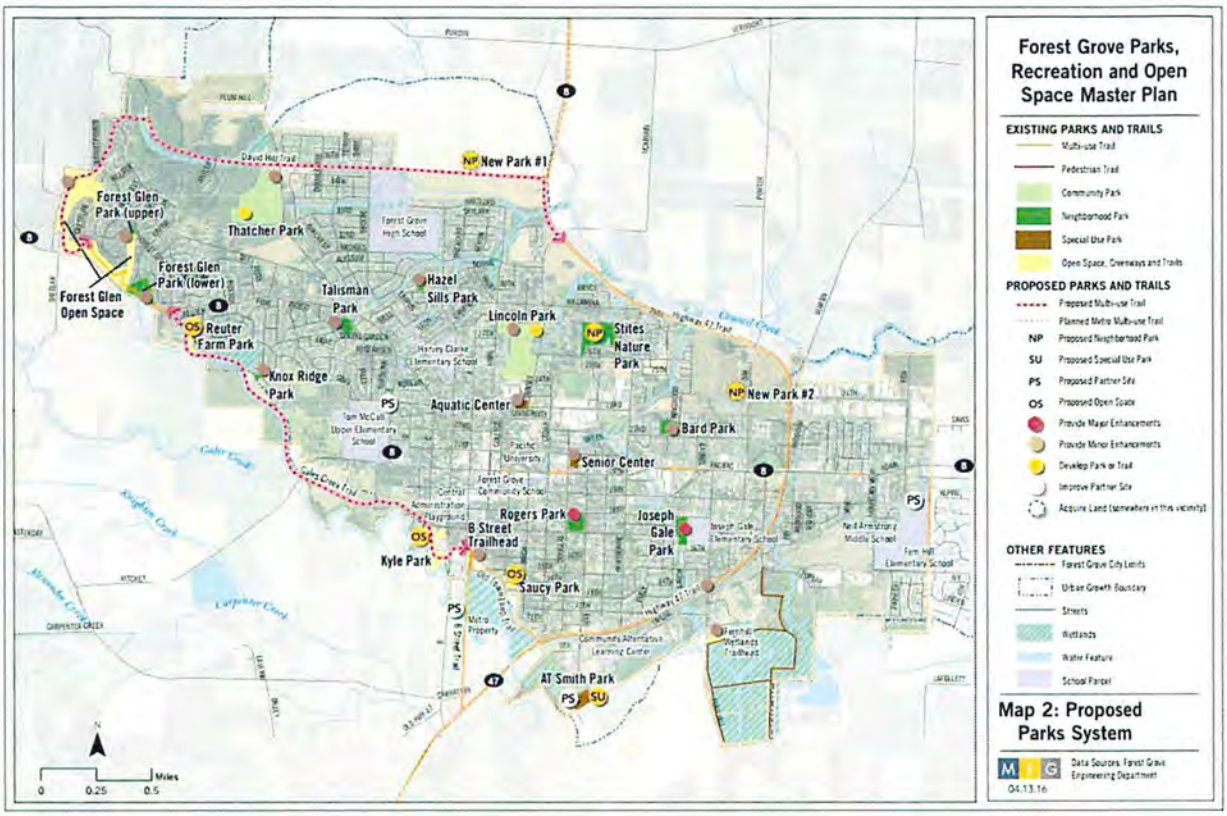
The Parks and Recreation Master Plan provides guidance for decisions regarding the acquisition, development renovation, maintenance and activating parks and recreation facilities. The Master Plan includes guidelines for the amount of desirable park land by park type. Park types include community park, neighborhood park, special use park, open space, greenways and trails.

The map below shows the locations of existing parks and recreation facilities. The City provides 68 park and recreation facilities on 158 acres of public park land. A jewel of the park and recreation system is Thatcher Park located within the Westside Plan area at the Thatcher Road

and David Hill intersection. Thatcher Park is a community park with many amenities including a dog park area, baseball field, a play area for children, covered picnic shelter and wooded hiking area.



The Purdin Road urban growth area is undeveloped and lacks urban amenities including public park land. The Purdin Road area is expected to accommodate approximately 1,200 homes and approximately 3,200 persons. Based on the desirable level of service guidelines contained the Park and Recreation Master Plan, the Purdin Road area should have a neighborhood park with at least 3.2 acres. As such, the land use concept for the Westside Planning Area includes a neighborhood park in the Purdin Road urban growth area. The identified location is approximately six acres in area and adjacent to the proposed elementary school site north of David Hill Road. This neighborhood park facility is identified in the Parks, Recreation and Open Space Master Plan as shown on the map below.



In addition to Thatcher Park and the proposed neighborhood park in the Purdin Road urban growth area, the Parks, Recreation and Open Space Master Plan identifies trails that will serve the Westside Planning Area This includes the David Hill Trail and Council Creek Trail.

Estimated Park Improvement Costs

The Parks, Recreation and Open Space Master Plan Update includes planning level cost estimates for project identified in the Plan including those in the Westside area. The table below shows estimated costs. The estimated development costs for the Purdin neighborhood park includes property acquisition as well as development costs.

Description	Total Estimated Cost	Cost Attributable to Westside Area	Cost Attributable to South of Purdin Road/Council Creek Area	Cost Attributable to David Hill Area	Area of Benefit
South of Purdin/Council Creek Area Neighborhood Park	$3,000,000	$3,000,000	$3,000,000	$0	South of Purdin/Council Creek Area
Thatcher Park Improvements	$3,400,000	$612,000	$349,799	$262,201	Westside Planning Area
Thatcher Park Dog Park Improvements	$200,000	$36,000	$20,576	$15,424	Westide Plannng Area
Total Estimated Cost	*$6,600,000*	*$3,648,000*	*$3,370,376*	*$277,624*	

Chapter 7 – Natural Hazards

PBS Engineering and Environmental prepared a geological and geotechnical assessment report for the Westside planning area. The assessment included review of aerial photography, light detection and ranging (LiDAR) imagery, geological and geo-hazard maps, and soil surveys. In addition, three geotechnical borings were completed on David Hill to provide data pertaining to slope stability issues, depth to groundwater and soil erosion potential. The complete report is included in the technical appendix.

David Hill has the highest elevation and steepest slopes in Forest Grove planning area. This topography presents opportunities as well as challenges. Opportunities include potential for innovate development design by taking advantage of topography to cluster housing in less steeply sloped areas to reduce development impacts or taking advantage of topography to maximize views. Challenges include overcoming constaints to efficient street layout and minimizing risk in areas with landslide potential.

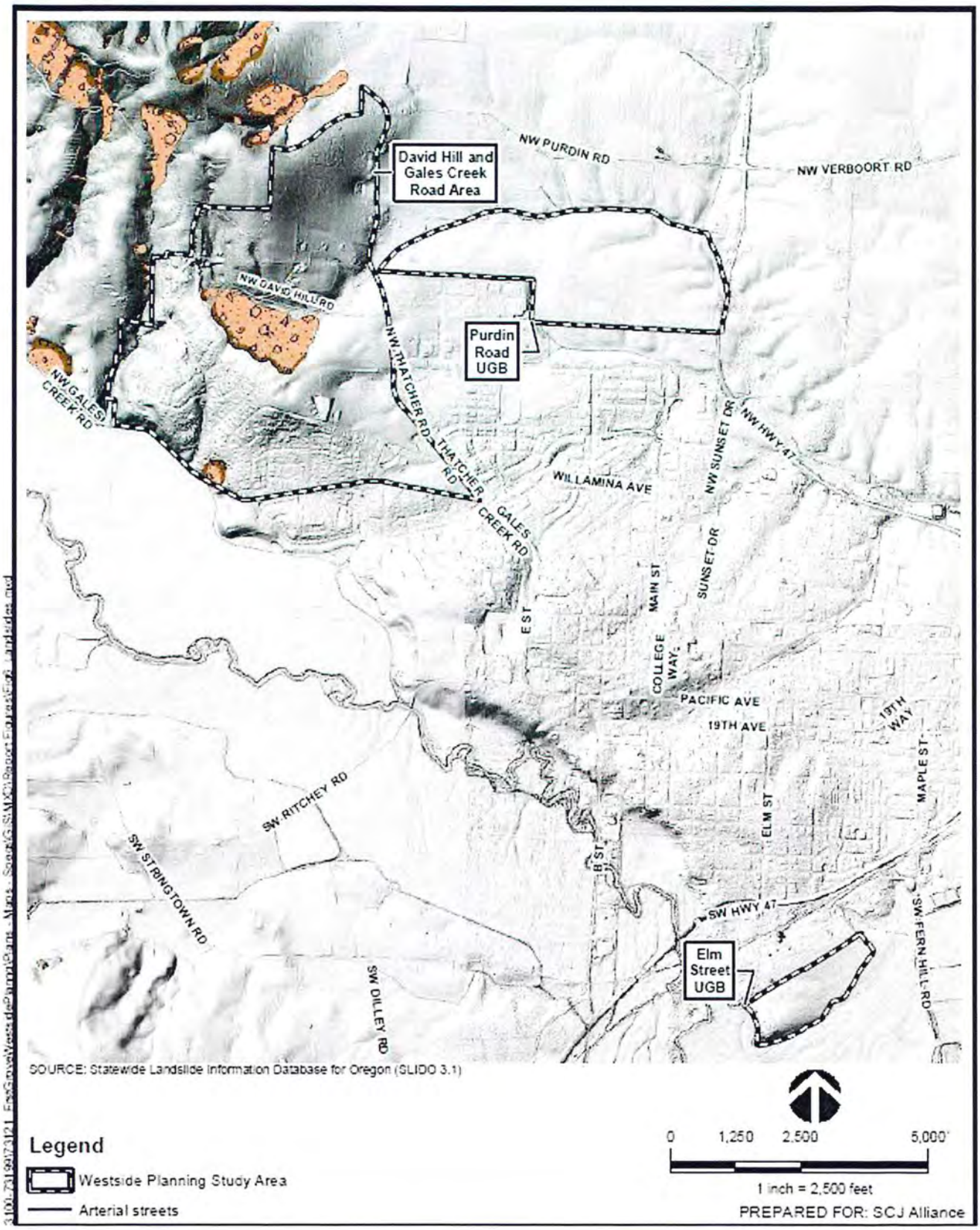
The table below shows the generalized slope characteristics for the Refinement Plan Area.

The assessment prepared by PBS indicates that certain areas of David Hill are prone to slope instabilities and historical landslides have occurred. In particular, the area between Forest Gale Drive and Antler Road is mapped by the Oregon Department of Geology and Mineral Industries as a landslide complex.

The primary geotechnical-related aspects to consider in the Westside planning project area include:

- Weak surface soils
- Slope stability
- Soil liquefaction during a seismic event
- Poorly draining soils
- Seismic ground shaking
- Shallow groundwater
- Potentially expansive soils
- Highly disturbed ground surface soil due to past farming practices

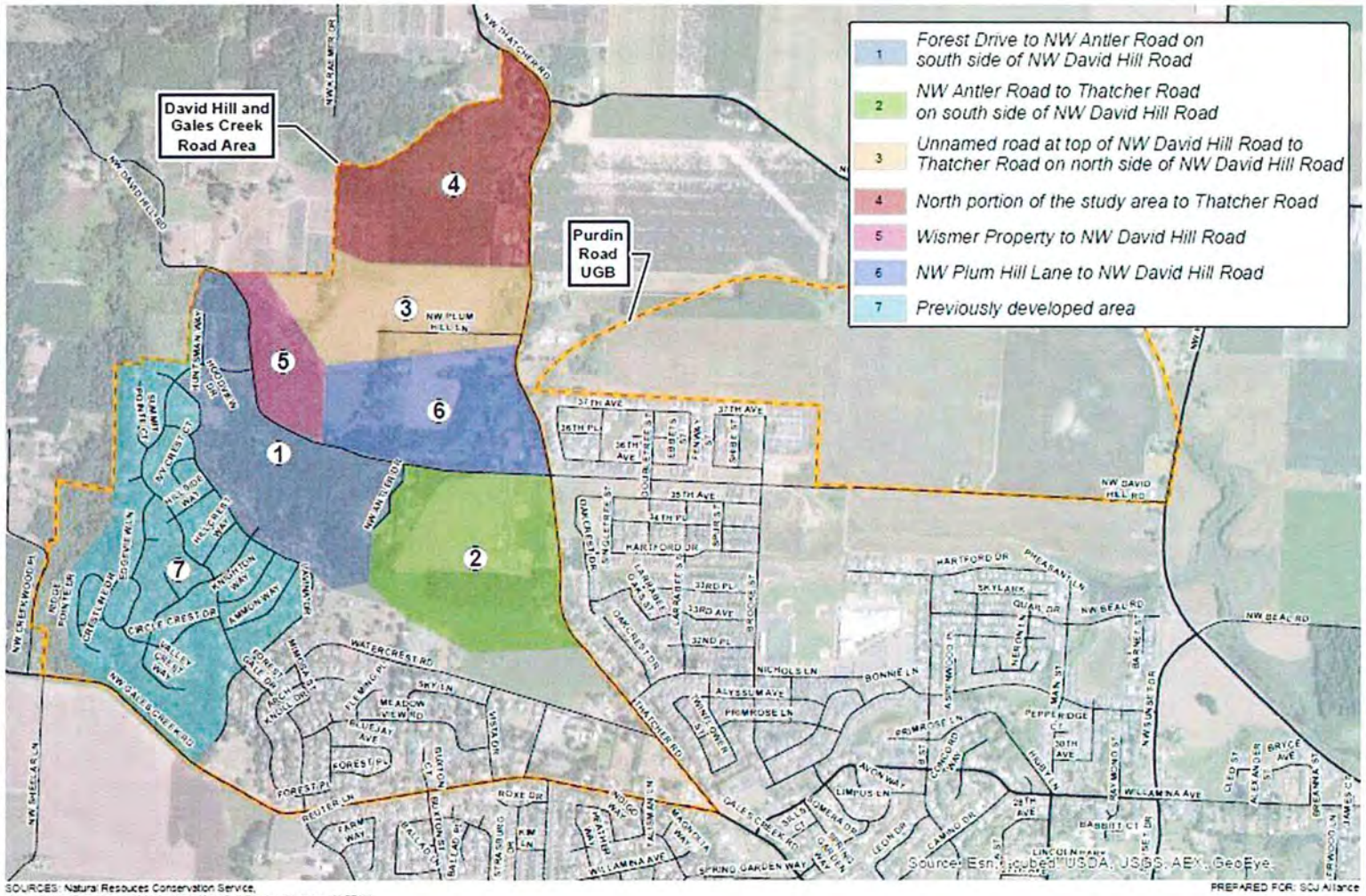
The geological analysis for the Westide planning area indicates portions of the study area are prone to slope instabilities. The location between Forest Drive and NW Antler Road is mapped by the Oregon Department of Geology and Mineral Industries as a landslide complex. In addition slopes adjacent to and within steep drainages show indications of ancient or historical instabilities. The map below shows the approximate location of the mapped landslide area.


David Hill and Gales Creek Road Area
Purdin Road UGB
Elm Street UGB
NW PURDIN RD
NW VERBOORT RD
NW DAVID HILL RD
NW GALES CREEK RD
NW THATCHER RD
THATCHER RD
GALES CREEK RD
WILLAMINA AVE
NW SUNSET DR
NW HWY 47
SUNSET DR
MAIN ST
E ST
COLLEGE WAY
PACIFIC AVE
19TH AVE
19TH WAY
MAPLE ST
ELM ST
B ST
SW HWY 47
SW FERN HILL RD
SW RITCHEY RD
SW STRINGTOWN RD
SW DILLEY RD
SOURCE: Statewide Landslide Information Database for Oregon (SLIDO 3.1)
Legend
Westside Planning Study Area
Arterial streets
0
1,250
2,500
5,000'
1 inch = 2,500 feet
PREPARED FOR: SCJ Alliance

The table below shows slope characteristics within specific area of the Refinement Plan area. The map area numbers are keyed to the map following the table.

Steeply Sloped Areas

Location	Map Area	Approximate Slope Trend	Slope Percent	Slope Instabilities
Forest Gale Drive to Antler Road on south side of David Hill Road	1	North	Max: 67 General: 33.5 to 17	Yes
Antler Road to Thatcher Road on south side of David Hill Road	2	North	Max: 17 General: 17 to 5	No
Unnamed Road at top of David Hill Road to Thatcher Road on north side of David Hill Road	3	East	Max: 25 General: 17 to 12	No
North portion of study area to Thatcher Road	4	East	Max: 25 General: 17 to 5	No
Wismer Property to David Hill Road	5	South	Max: 50 General: 17 to 10	Yes
Plum Hill Lane to David Hill Road	6	South	Max: 40 General: 25 to 12	Yes
Developed Area	7	Southwest and South		Yes



SOURCES: Natural Resouces Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed 11/07/14

PREPARED FOR: SOJ Alliance

Legend

Westside Study Areas — Streets — Arterial streets

IZED SLOPE AREAS

0 500 1,000 2,000 Feet
1 inch = 1,000 feet

PBS Engineering + Environmental
4412 SW Corbett Ave
Portland, OR 97239
503.248.1939 Main
866.727.0140 Fax
www.pbsenv.com

FOREST GROVE WESTSITE PLANNING PROJECT

FOREST GROVE, OREGON

PROJECT	73121.000
DATE	JAN 2015
FIGURE	10

Recommendations

The Westside planning process resulted in recommendations to address challenges associated with development in steeply sloped areas. One recommendation is that the Development Code Section 10.8.310 (Hazard Areas) be amended to require a geological assessment and geotechnical report prepared and stamped by a certified engineering geologist and geotechnical engineer in areas with a slope of 10% or greater rather than just areas with a slope of 20% or more. The required assessments should include 1) review of aerial photography and LiDAR imagery; 2) review of previous reports prepared for the subject property; 3) site reconnaissance including mapping of observable geological features and/or hazards; 4) laboratory testing of soils. The results of the required assessment shall be filed with the City.

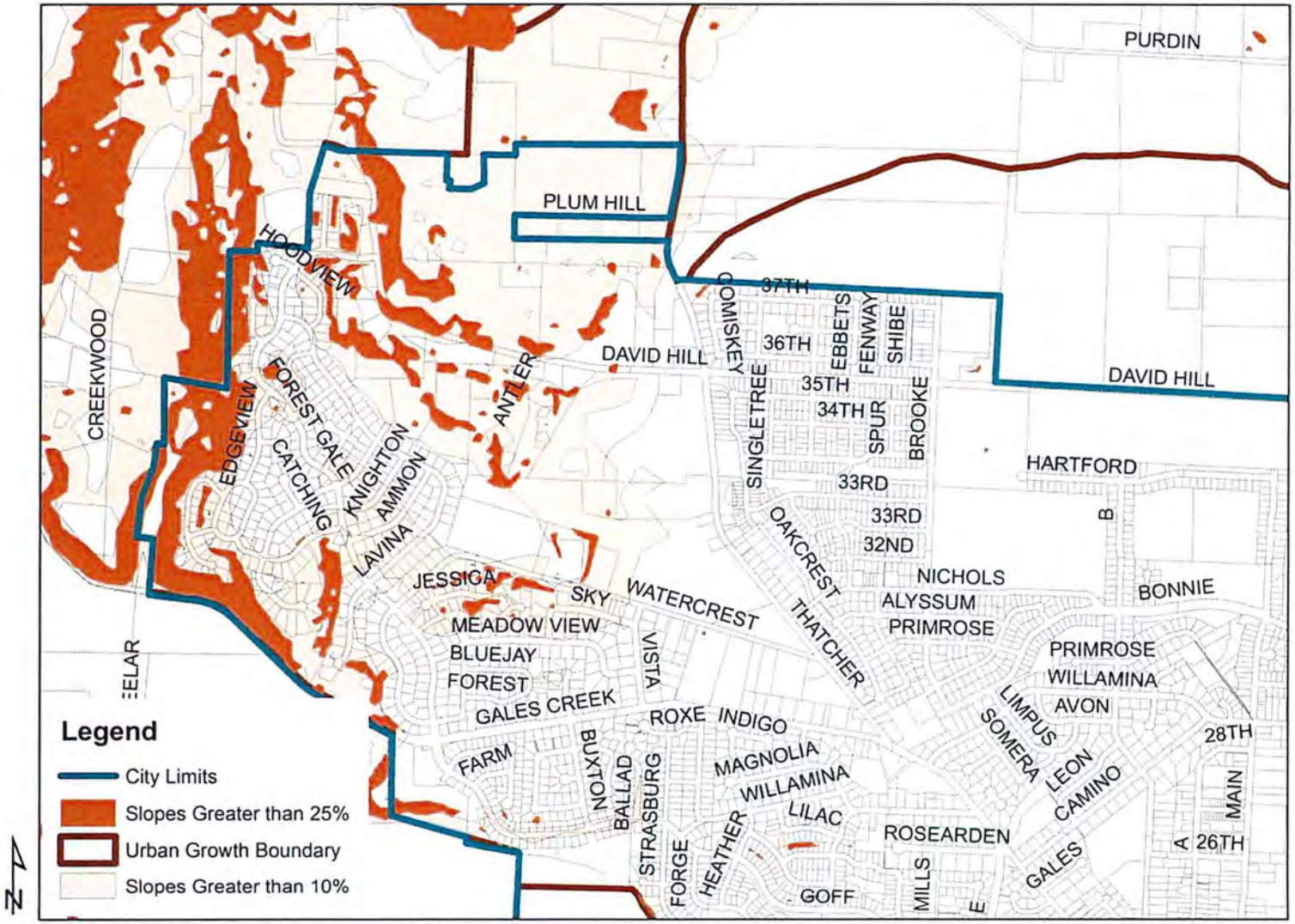
It is recommended that applicants proposing development on sites with 10% or more slope use the information developed through the geological and enginnering assessment to establish methods to minimize hazard risk by:

- Site design approaches that avoids development within the identified hazard area;
- Grading, erosion control and other site preparation technics to minimize hazard impacts;
- Methods to minimize impacts from utility installation and/or
- Techniques to minimize hazard impacts approved by the Building Official.

It is also recommended that for divisions of land, identified hazard areas be placed in an open space tract separate from areas intended for development. For development of land where a division of land is not proposed, an identified hazard area shall be held in common or placed within an easement precluding development. The tract or easement shall be restricted to open space. Utilities may be located within the tract or easement provided measures are identified to minimize hazard impacts.

The map below shows where these recommendtions would apply.

Slopes


PURDIN
PLUM HILL
HOODVIEW
CREEKWOOD
EDGEVIEW
FOREST GALE
CATCHING
KNIGHTON
AMMON
LAVINA
ANTLER
DAVID HILL
DAVID HILL
OMISKEY
37TH
36TH
35TH
34TH
33RD
33RD
32ND
SINGLETREE
EBBETS
FENWAY
SHIBE
SPUR
BROOKE
HARTFORD
B
OAKCREST
NICHOLS
ALYSSUM
PRIMROSE
BONNIE
THATCHER
JESSICA
SKY
WATERCREST
MEADOW VIEW
BLUEJAY
FOREST
GALES CREEK
VISTA
ROXE
INDIGO
PRIMROSE
WILLAMINA
AVON
LIMPUS
SOMERA
LEON
CAMINO
28TH
MAIN
A
26TH
FARM
BUXTON
BALLAD
STRASBURG
MAGNOLIA
WILLAMINA
LILAC
HEATHER
FORGE
ROSEARDEN
GOFF
MILLS
E
GALES
ELAR
Legend
City Limits
Slopes Greater than 25%
Urban Growth Boundary
Slopes Greater than 10%
N

Chapter 8 – Transportation

Transportation including roadways, sidewalks, pathways and transit are essential elements for creating sustainable and complete neighborhoods. Not only does the transportation system provide a means for travel it also accounts for a considerable amount of land needed for development. In many cases 20% or more of developable land area.

The Westside Planning Program Refinement Plan identifies a conceptual transportation network intended to serve the preferred land use concept described in Chapter 4. This conceptual transportation system will be incorporated into the Transportation System Plan. Recommended amendments are described in Chapter 13 (Implementation Actions).

The Forest Grove Transportation System Plan (TSP) update, completed in 2014, noted that a street network in the Westside planning area complying with Metro Regional Transportation Functional Plan could not be identified due to unresolved land use and natural resource issues known to exist. The TSP proposed that a future refinement plan be prepared to develop a local street plan subsequent to adoption of the TSP to guide future development of the David Hill area based on topographic constraints and desire to preserve vegetative corridors in the planning area.

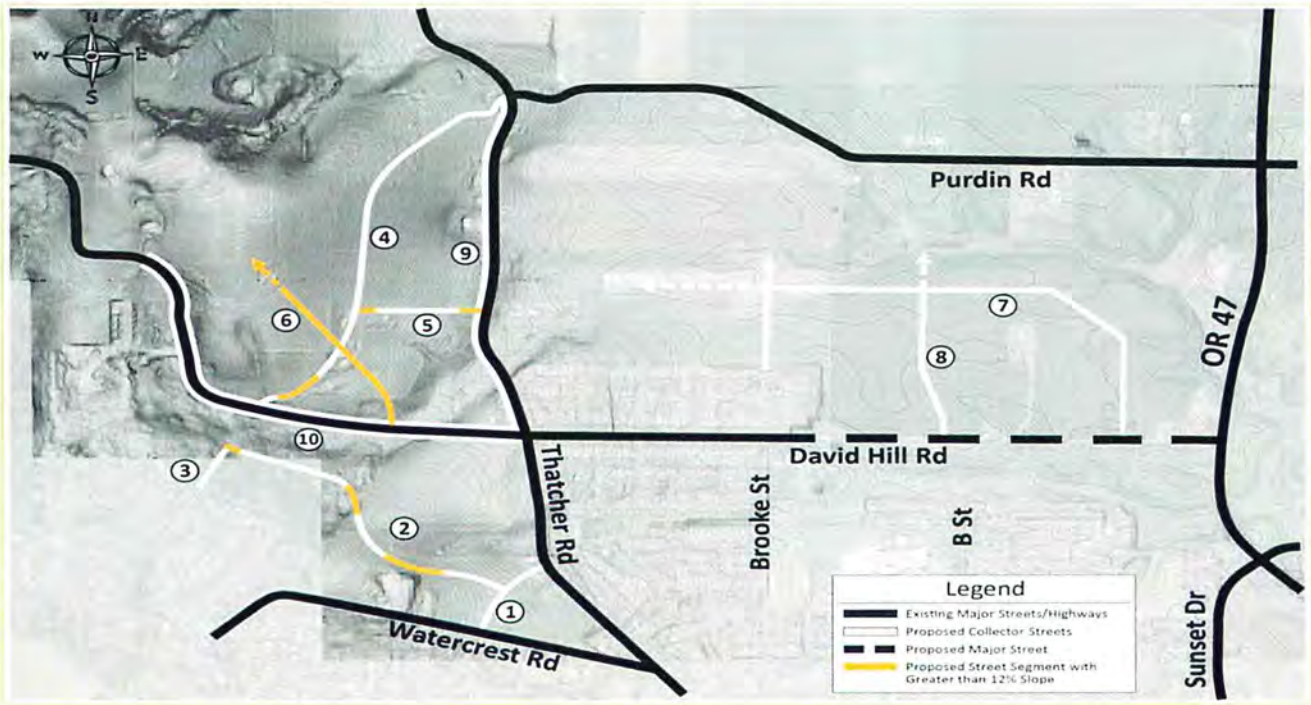
The proposed refinement areas are shown on the map below.

Future Refinement Areas

The TSP also noted a need to prepare a street connectivity plan to provide access to the new urban growth boundary area as well as circulation. The intent is to ensure that potential improvements within the planning area do not preclude creation of a logical and context-sensitive street system when the area is ultimately developed.

The consultant team identified the needed "grid" system for major roadways for the Westside area. The major roadway systems are composed of the collector network needed for traffic circulation for both the David Hill and Purdin Road areas. The street network shown below does not include local streets required for development.

Proposed Street System



SCJ ALLIANCE

Proposed Street System

Westside Planning Project
Forest Grove, OR

New Urban Growth Boundary Area

The proposed system for the Purdin Road Area shows an extension of Main Street and B Street north of David Hill Road to serve development in the Purdin Road area. The conceptual transportation network also includes an extension of Brooke Street north from its current terminus to serve the Purdin Road area. Main Street, B Street (Road 8) and Brooke Street will connect to a new east/west collector street (Road 7) located approximately half the distance between David Hill Road and Council Creek.

David Hill Area

The conceptual transportation network in the David Hill area is more complex than the Purdin Road area due to topography. The transportation network includes an extension of Plum Hill Lane (Road 5) west to a new collector street roughly parallel with Thatcher Road (Road 4). This new collector roadway will connect David Hill Road with Purdin Road.

The conceptual transportation system also includes a new roadway (Road 6) interesting with David Hill Road approximately 1,250 feet west of Thatcher Road. This location takes advantage of grades less steep than most locations along the north side of David Hill Road. From David Hill Road this new road will run approximately 2,900 feet north and west to serve the far western edge of the David Hill planning area.

The conceptual transportation also includes an extension of Vista Drive (Road 1) from Watercrest Road to Thatcher Road. This connection is currently in the Forest Grove Transportation Plan Update (2014). This new connection will relieve congestion at the intersection of Thatcher Road will Gales Creek Road. Road grade would be approximately 8% to 10%.

A new east/west road (Road 2) is proposed generally parallel to Watercrest and David Hill Road to improve connectivity as the area north of Watercrest Road develops. The road will be aligned to avoid Thatcher Park and Thatcher Woods. Valley Crest Way is proposed for extension to connect with Road 2. This will provide an alternative way to enter or exit the Forest Gale Heights area.

Traffic Operations Analysis

The consultant team prepared an analysis on the area roadways as a result of full build out of the Westside Planning Area. The analysis is included in the appendix and is considered a "worse case" land use scenario including 2,132 dwellings and 126,500 square feet of non-residential space. This compares with 1,950 dwellings and 172,000 square feet of non-residential space under the Planning Commission land use direction. (Both alternatives include 65,000 square feet for an elementary school.) A comparison of the overall Average Daily Trips (ADT) for the two scenarios would be 23,219 for the worse-case scenario and 24,155 for the Planning Commission alternative. The analysis, however, is based on peak hourly trips rather than ADT. This results in a difference of 64 more two way trips for the Planning Commission scenario. This is not a significant, particularly considering that these trips would be distributed over the entire circulation system.

The following table is the current TSP analysis for the area roads. While this analysis includes the David Hill area for development, it does not include the added traffic from the Purdin Road area since the Purdin area was not yet added to the urban growth boundary by the Oregon Legislature. Further, the assessment was based on no traffic circles for the David Hill and Purdin road intersections with Highway 47.

2035 Transportation Impacts from Current TSP

No.	Intersection	Operational Standard	Level of Service (LOS) [1]	Average Delay* (Seconds)	Volume / Capacity (V/C)
	Unsignalized Intersections				
1	Thatcher Road/Watercrest Road	LOS E/0.99	A/C	17.2 [2]	0.09 [2]
2	Gales Creek Road/Thatcher Road	LOS E/0.99	A/B	11.6 [2]	0.24 [2]
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
5	Highway 47/Martin Road	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
	Signalized Intersections				
4	Highway 47/Sunset Drive	V/C=0.99	B	16.1	0.50
6	Pacific Avenue/Quince Street	V/C=0.99	D	53.4	0.97

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

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[1] *Oregon Highway Plan, Policy Element*, Table 7, Oregon Department of Transportation, 1999.

[2] *Washington County 2020 Transportation System Plan*, Washington County, 2002.

To determine traffic impacts associated with the revised land use alternative and to identify any potential roadway improvement needs, the expected traffic volumes associated with this development must be forecast and analyzed. The process used to prepare Westside traffic projections is described in the following pages. For consistency with the adopted Transportation System Plan, the 2035 PM peak hour was used for the analysis.

The process of moving from TSP forecasts to forecasts based on the Westside land use alternative involved the following steps:

- Comparison of Land Use Projections: The household and employment forecasts that are consistent with the 2014 Comprehensive Plan and provide the basis for the Transportation System Plan were compared estimated dwelling unit and employment forecasts for the Westside area in the modified regional travel demand model.
- Calculation of Land Use Growth: Estimates of new growth in household and employment forecasts over the Transportation System Plan baseline were allocated to specific locations.
- Development of Trip Generation Estimates: Trip end estimates consistent with the Transportation System Plan were obtained from the Metro regional model for zones including the Westside planning area. These estimates were factored up or down by location consistent with the new dwelling unit and/or employment growth based on the Westside land use alternative. For the Gales Creek and David Hill areas, the trips with Westside land use alternative are expected to decrease slightly in comparison with the Transportation System Plan. This is because the number of dwelling units increased

with the Westside land use alternative and the regional transportation model originally included trips related to future employment in these areas. Since the Westside land use alternative includes only minor growth in employment in the David Hill and Gales Creek areas the net growth in trip-making in comparison to the TSP would likely decrease.

Total trips for the Purdin Road planning area are expected to increase significantly compared to the Transportation System Plan baseline because this area was not included in the urban growth boundary at the time the TSP was developed. Trip generation rates were added to the TSP 2035 PM peak hourly traffic volumes for the Purdin Road area.

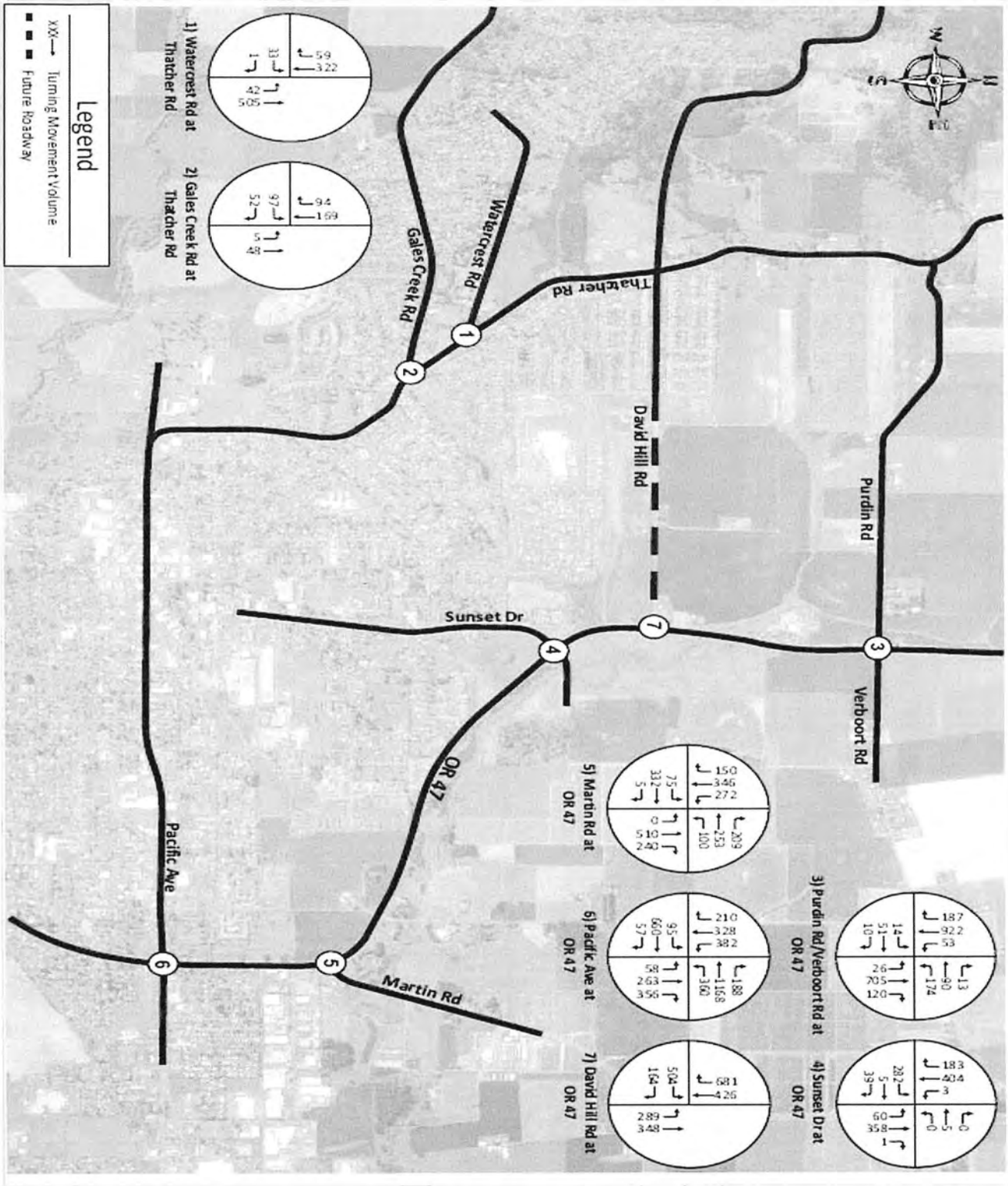
- Identification of Trip Distribution Patterns: Distribution of projected increased trips were developed through review of traffic patterns from several runs of the Metro regional transportation model. This analysis included new roadway connections included in the TSP. The anslysis indicates that there is strong attractiveness from the Purdin Road planning area to and from the north and east linking Forest Grove with Hillsboro and Portland. Approximately 47 percent of new net trips are expected to travel in this direction. Approximately 25 percent of trips are expected to travel to the west and southwest and about 23 percent of trips are project to travel to the southeast. About five percent of trips are estimated to travel south. Highway 47 is an attractive route for these trips as is David Hill Road and Thatcher Roads.
- Preparation of Trip Assignment: Trips from the Westside planning areas were assigned to the street system consistent with the modeled distribution pattern.

The following roadway improvements were considered in developing the traffic forcasts for the Westside planning area. These improvements are identified in the Transportation System Plan.

- David Hill Road: The extension of David Hill Road to Highway 47. A single lane roundabout was assumed for this intersection.
- Vista Drive/Talisman Lane: The addition of the Vista Drive and Talisman Lane extensions between Gales Creek and Thatcher Roads are included in the analysis. With these improvements a significant volume of existing and projected future traffic would be diverted away from the Gales Creek Road and Thatcher Road intersection. Without these improvements it will be necessary to signalize or otherwise improve traffic operations at this intersection.
- Highway 47 at Verboor Road/Purdin Road: A single lane roundabout was included in the analsysis. This improvement to the intersection and extension of David Hill Road are expected to draw some traffic away from the Highway 47/Martin Road intersection. Highway 47 at Martin Road: As noted in the Transportation System Plan, Martin Road expected to connect with a future roadway across Highway 47. This connection may reduce traffic volumes along Highway 47 but could worsen traffic operations at the intersection with Martin Road. This may result in the need for future intersection improvements that could include signalization.
- Main Street and B Street Extensions: The recommended street system for the Purdin Road planning area includes connections via Main Street and B Street. Extensions of these two streets are identified in the TSP between Hartford Drive and Martin Road and will be constructed as part of the Silverstone planned residential development.

2035 PM Peak Hour Turning Movement Projections

The figure below shows the 2035 PM peak hour turning movement projections for the Westside planning area.



2035 PM Peak Hour Operations Analysis Results

To assess the magnitude of traffic impacts associated with the Westside land use alternative a comparison was made with the 2035 PM peak hour traffic operations contained in the Transportation System Plan. These forecasts assume the roadway connections and improvements identified above.

The table below shows estimated 2035 PM Peak Hour Intersection Operations with TSP land uses and streets.

Figure 2 - 2035 PM Peak Hour Intersection Operations

(TSP Land Use and Streets)

No.	Intersection	Mobility Standard	Level of Service [1]	Average Delay (Sec)*	Volume / Capacity
	Unsignalized Intersections				
1	Thatcher Road/Watercrest Road	LOS E/0.99	A/C	17.2 [2]	0.09 [2]
2	Gales Creek Road/Thatcher Road	LOS E/0.99	A/B	11.6 [2]	0.24 [2]
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
5	Highway 47/Martin Road	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
	Signalized Intersections				
4	Highway 47/Sunset Drive	V/C=0.99	B	16.1	0.50
6	Pacific Avenue/Quince Street	V/C=0.99	D	53.4	0.97

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken

As indicated in the table above, the Highway 47 at Purdin/Verboort Road and Highway 47 at Martin Road are expected to fail by 2035 during the PM peak hour.

The Oregon Transportation Planning Rule (TPR) requires coordination between land use plans and transportation plans. Under the TPR, when an amendment to a comprehensive plan is proposed a determination must be made by the local jurisdiction as to whether land uses allowed by the plan will significantly impact an existing transportation facility. Impact is measured at the end of the planning period identified in the adopted TSP. For Forest Grove this is 2035. Further discussion with ODOT is needed to address potential traffic impacts from the land uses in the Purdin Road planning area on the Highway 47 intersections with David Hill Road and Purdin Road since there will be a significant impact. The issue is whether this impact will occur before 2035 and if so how the impact will be mitigated (i.e. adding channelization to the roundabouts).

The table below shows projected intersection operations with mitigation measures. The table indicates the two roundabouts would meet be level of service and volume/capacity standards once the mitigation measures are implemented.

No.	Intersection	Mobility Standard	Level of Service [1]	Average Delay (Sec)*	Volume / Capacity
Analysis Based on TSP Traffic Volumes					
Without Roundabout (Unsignalized)					
3	Highway 47/Verboort & Purdin	V/C=0.99	**A/F**	**>200** [2]	**>2.00** [2,3]
7	Highway 47/David Hill Road	V/C=0.99	**-/F**	**>200** [2]	**1.54** [2,4]
With Proposed Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	**C**	**27.5**	**1.06**
7	Highway 47/David Hill Road	V/C=0.99	A	7.8	0.81
With Mitigated Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	A	9.3 [6]	0.89 [6]
Analysis Based on Westside Traffic Volumes					
With Proposed Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	**F**	**87.4** [5]	**1.34** [5]
7	Highway 47/David Hill Road	V/C=0.99	**F**	**91.4** [5]	**1.33** [5]
With Mitigated Roundabout					
3	Highway 47/Verboort & Purdin	V/C=0.99	B	12.4 [7]	0.92 [7]
7	Highway 47/David Hill Road	V/C=0.99	B	14.6 [8]	0.95 [8]

* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

5 Pending single lane roundabout intersection improvements are assumed here.

6 Mitigation is addition of NB right-turn slip lane

7 Mitigation is addition of SB right-turn slip lane

8 Mitigation is addition of 2nd circulating lane to provide separate lanes for NB left-turn and NB through, as well as separate lane for SB right-turn.

Estimated Transportation Costs

The table below shows planning level cost estimates the street shown on the map above. More detailed information about the cost and methodology for preparing the estimates is provided in the appendix. As indicated in the table the total estimated cost for constructing the collector street system is approximately $37.7 Million. This amount does not include local street construction. All costs included in the table are expected to be private costs associated with providing access for development or traffic impact mitigation.

Identified Street Projects

No.	Road Name	Project Limits	Description	Estimated Cost
1	Road 1 (Vista Drive Ext.)	Watercrest Road to Thatcher Road	Construct new north-south 1,050 foot urban collector street	$1,000,300
2	Road 2	From Vista Drive Extension west 3,200 feet	Construct new east-west urban collector street	$4,246,000
3	Road 3 (Valley Crest Extension)	From terminus of Valley Crest Way north to Road 2	Construct new 600-foot urban collector street	$787,200
4	Road 4	David Hill Road north to Purdin Road	Construct new 4,700 foot urban collector street	$6,409,200
5	Road 5 (Plum Hill Improvement)	Existing Plum Hill Lane (privately-owned) to Road 4	Improve Plum Hill Lane to urban collector standards	$1,212,200
6	Road 6	David Hill Road to urban growth boundary	Construct new 2,300 foot urban collector street	$2,391,000
7	Road 7 (Brooke Street Extension)	Brooke Street to David Hill Road	Construct new 5,500 foot urban collector street	$4,766,200
8	Road 8 (B Street Extension)	David Hill Road to Brooke Street	Construct new 1,750 foot urban collector street	$1,583,700
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Full improvements to Council Creek crossing (short-term)	$1,454,000
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Half street reconstruction between David Hill Road to Purdin Road excluding Council Creek crossing (long-term)	$2,437,500
10	Road 10 (David Hill Improvement)	Thatcher Road to urban growth boundary	Full street reconstruction for 5,100 feet to urban collector street standards	$3,943,500
11	Improvement to David Hill Road/Highway 47 roundabout	David Hill Road/Highway 47 intersection	Addition of 2nd circulating lane to provide separate lanes for northbound left turn and northbound through traffic and separate lane for southbound right-turn	$2,500,000
12	Improvement to Purdin Road/Verboort Road/Highway 47 roundabout	Purdin Road/Verboort Road/Highway 47 intersection	Addition of northbound right-turn slip lane on the south leg of the roundabout and southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	$4,000,000
			TOTAL ESTIMATED COST	*$37,730,800*

Transportation Funding Options

The project team explored several options for funding the identified backbone/collector street network necessary to serve future development. Unlike other developable areas in City's planning area, the Westside area is devoid of any internal street system. Considering the topography of David Hill the collector street network presents engineering challenges which adds to project costs.

Although the new urban growth boundary area does not have the topographic considerations David Hill does there are challenges. The primary challenge is the traffic capacity of the two roundabouts on Highway 47 at David Hill Road and Purdin/Verboort Road. When the Forest Grove Transportation System Plan was adopted in 2014 it was not envisioned the area would be added to the urban growth boundary by the Legislature. The area was identified as an urban reserve and was anticipated to remain agricultural for at least the next fifty years. Traffic volumes contained in the TSP reflect this expectation. Since the area is now in the urban growth boundary and the City must assign urban Comprehensive Plan designations to the area traffic impacts must also be considered. Addressing traffic impacts associated with Comprehensive Plan amendments is a requirement of the Oregon Transportation Rule. Traffic associated with development in the new urban growth boundary area will significantly impact the roundabouts and degrade operations below acceptable levels as explained below. As such, the costs for improving the roundabouts to ensure acceptable operations must be considered as part of the adopting the Westside Refinement Plan. This includes identifying a potential source, such as a supplemental transportation system development charge, to fund the needed improvements. This is explored further below.

Adding a supplemental transportation system development charge to the current countywide Transportation Development Tax is one way to address transportation project costs. The amount of any supplemental transportation system development charge requires further evaluation based on a determination of total project costs, area of benefit, and estimated per unit charge. It is suggested that the funding strategy be evaluated further and include additional discussion with property owner and develop input prior to refinement and implementation. To guide this discussion and further evaluation several options for a supplemental transportation system development charge are identified below.

The current (FY 2016-2017) transportation system development tax (TDT) is $8,278 for single family detached homes and $5,425 for apartment units. The blended rate based on the estimated number of single family detached and attached units from the land use concept for the Westside area is $7,914 per unit. Based on dwelling unit yield of 1,950 units in the Westside area the total TDT revenue would amount to approximately $15.4 million. Since total estimated transportation costs for the collector street system identified above is approximately $37.7 million there is a revenue shortfall of about $22.3 million. Policy options for addressing this shortfall are described below.

Transportation Funding Policy Option 1:
(Area Wide TDT with All Projects Funded with TDT Revenue)

One policy option is to establish a supplemental TDT for the entire Westside Planning area. That is one rate for the entire area. Under this approach, a TDT amounting to $11,435 would be necessary to fill the funding gap for transportation projects in the Westside plan area. Adding the supplemental charge to the current TDT the total transportation fee would be $19,349 based on the blended rate.

This approach creates some equity issues since traffic impacts are not spread evenly throughout the planning area. For instance, development in the new urban growth boundary area north of David Hill Road requires improvement of the two Highway 47 roundabouts over time. In the David Hill area west of Thatcher Road improvement to David Hill Road and Thatcher Road is necessary as well as construction of a north-south collector street west of Thatcher Road. None of the improvements provide benefit to the new urban growth boundary area.

Transportation Funding Policy Option 2:
(Area Wide TDT with Some Projects Funded by Outside Sources:

The second policy option assumes that improvements to the Highway 47 roundabouts. David Hill Road west of Thatcher Road and Thatcher Road north of David Hill Road are all funded by outside sources. This reduces the total cost of TDT funded projects by approximately $15.3 million. If this approach is taken the supplemental TDT would be approximately $3,571 per dwelling unit. The total combined TDT would be $11,485. This amount is $7,864 less than Option 1.

Transportation Funding Policy Option 3:
(TDT Revenues and Project Costs Allocated by Subarea):

Policy option 3 looks at dividing transportation revenues and costs by project subarea. One project subarea is David Hill north of Watercrest and west of Thatcher Road. The other project subarea is the new urban growth boundary area north of David Hill Road between Highway 47 and Thatcher Road. This is explored further below.

Option 3A. David Hill Subarea: If 100% of TDT revenue generated in the David Hill Area is used to fund improvements west of Thatcher Road the supplemental system development charge would be approximately $22,860 for a total fee of $30,775. This fee could be prohibitive with result potentially being little development in the David Hill subarea. To mitigate some projects could be funded with outside sources. For example, if the Thatcher Road improvements are funded by an outside source the supplemental charge would be $11,459 and the total fee would be $19,374.

Option 3B. New Urban Growth Boundary Area: If 100% of the TDT revenue generated in the new urban growth boundary area is used to fund improvements in the new urban growth boundary area the supplemental charge would be approximately $3,883. The total fee would be approximately $11,797. If the Hwy 47 roundabout improvements were funded through an outside source there wouldn't be a need for a supplemental TDT.

This is because TDT revenue based on development in the new urban growth boundary area would exceed the cost of transportation costs in the new urban growth boundary area by approximately $2.9 million.

The table below summarizes the identified policy options for consideration by the Planning Commission.

Transportation Development Tax Summary Table

Policy Option	Description	Current TDT Blended Rate	Supplemental TDT Required	Total TDT
1	Area Wide TDT – All Projects Funded With TDT	$7,914	$11,435	$19,349
2	Area Wide TDT – Some Projects Funded with Outside Sources	$7,914	$3,571	$11,485
3A	David Hill Subarea TDT	$7,914	$22,860	$30,775
	David Hill Subarea TDT – Thatcher Road Funded by Outside Source	$7,914	$11,459	$19,374
3B	New Urban Growth Boundary Subarea TDT	$7,914	$3,883	$11,797

One last thought on the policy of establishing a supplemental transportation system development charge. Washington County established supplemental transportation system development charges for the Bonnyslope and North Bethany areas. Due to concerns raised by homebuilders over the amount of the supplemental charge needed; the County adopted a policy to limit the supplemental charge to 95%of the current Transportation Development Tax. If this same policy applied to the Westside planning area the supplemental charge would be limited to $7,839. This amount is based applying the 95% factor to the blended TDT rate of $7,914. Under this approach only policy options 2 and 3B are viable since the amounts are lower than $7,839.

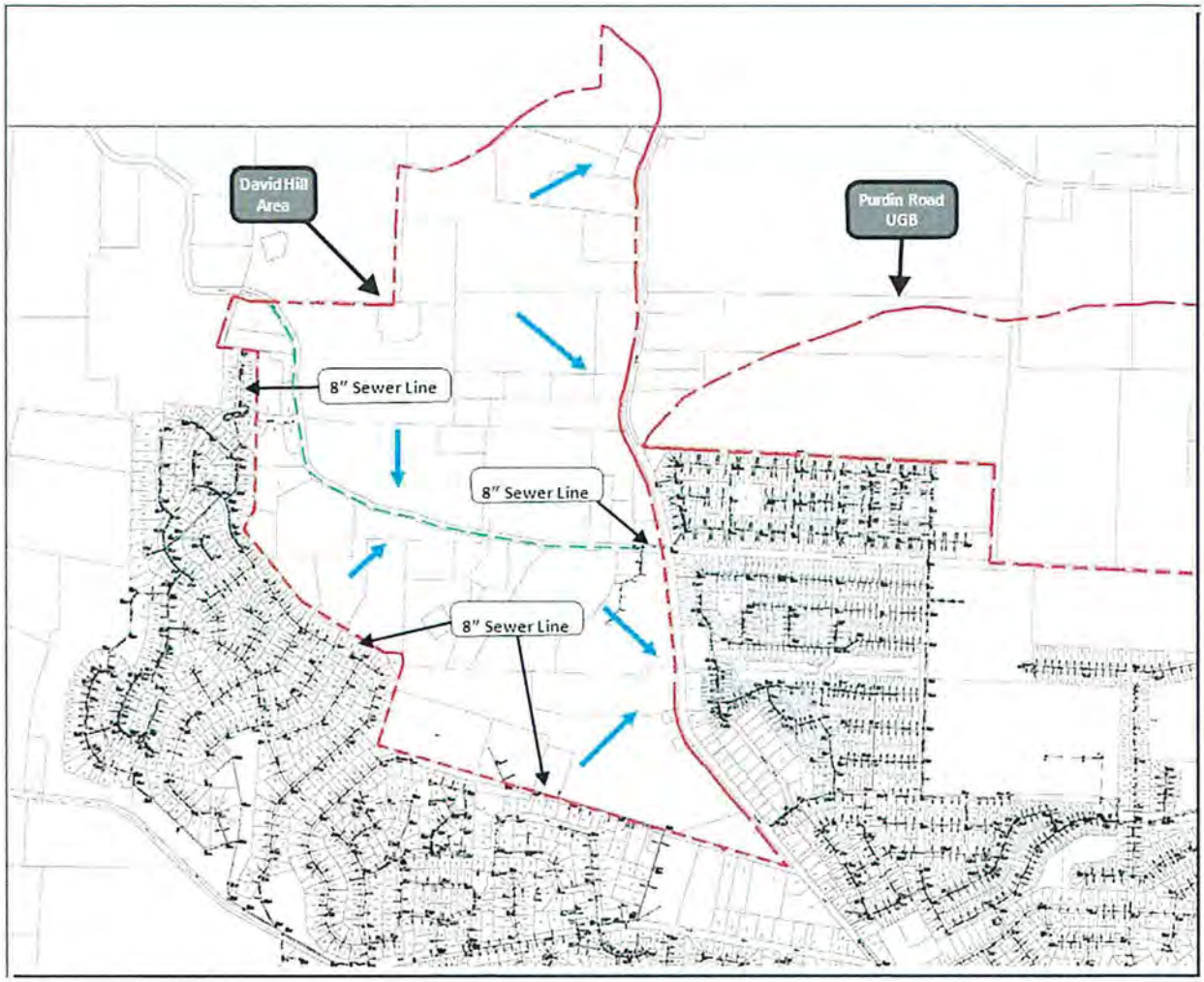
Chapter 9 – Sewer

Sanitary and storm services are provided by through a partnership between the City and Clean Water Services. Under the intergovernmental agreement the City is responsible for collection lines smaller than 21 inches in diameter as well as all manholes. Clean Water Services is responsible for the regional sewer system including large conveyance pipes and the waste water treatment plants. Anticipated revised agreements will lower the division of responsibility to lines 12-inches or less being the City's responsibility and larger lines being Clean Water Service's responsibility.

Long term investments to the sanitar sewer system is guided by the City's Wastewater System Master Plan and Clean Water Services Sewer Maste Plan. The City's Wastewater System Master Plan was last updated in 2007. The Clean Water Services Sewer Master Plan Update was last updated in 2009.

David Hill Area

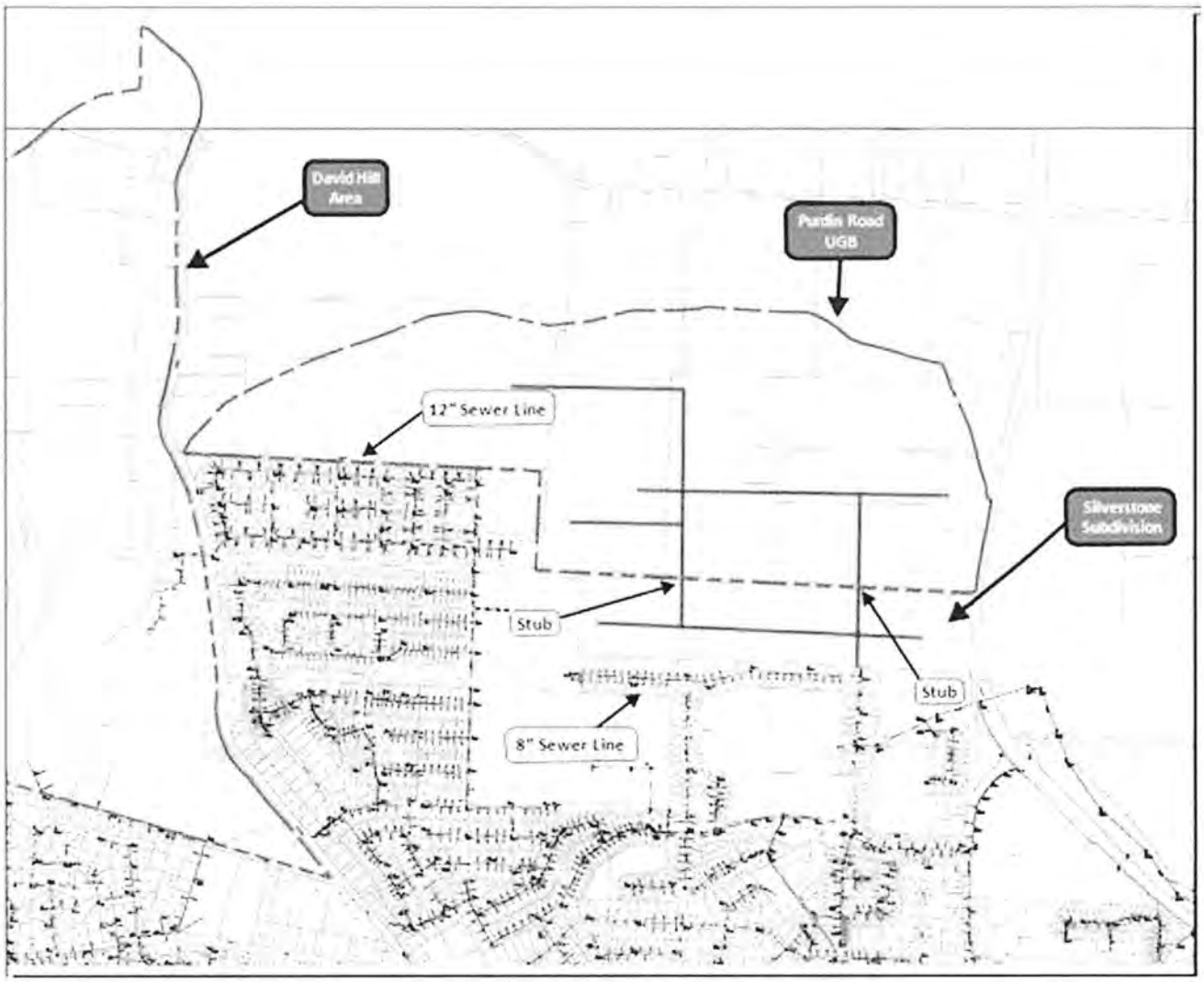
As the map below shows, the David Hill area is largely unserved by public sanitary sewer. There is an 8 inch sewer line located on David Hill Road west of Thatcher Road. This line extends approximately 200 feet west of Thatcher Road. There is a 12 incline from The Parks Development that terminates to a point on Thatcher Road approximately 550 feet north of David Hill Road.



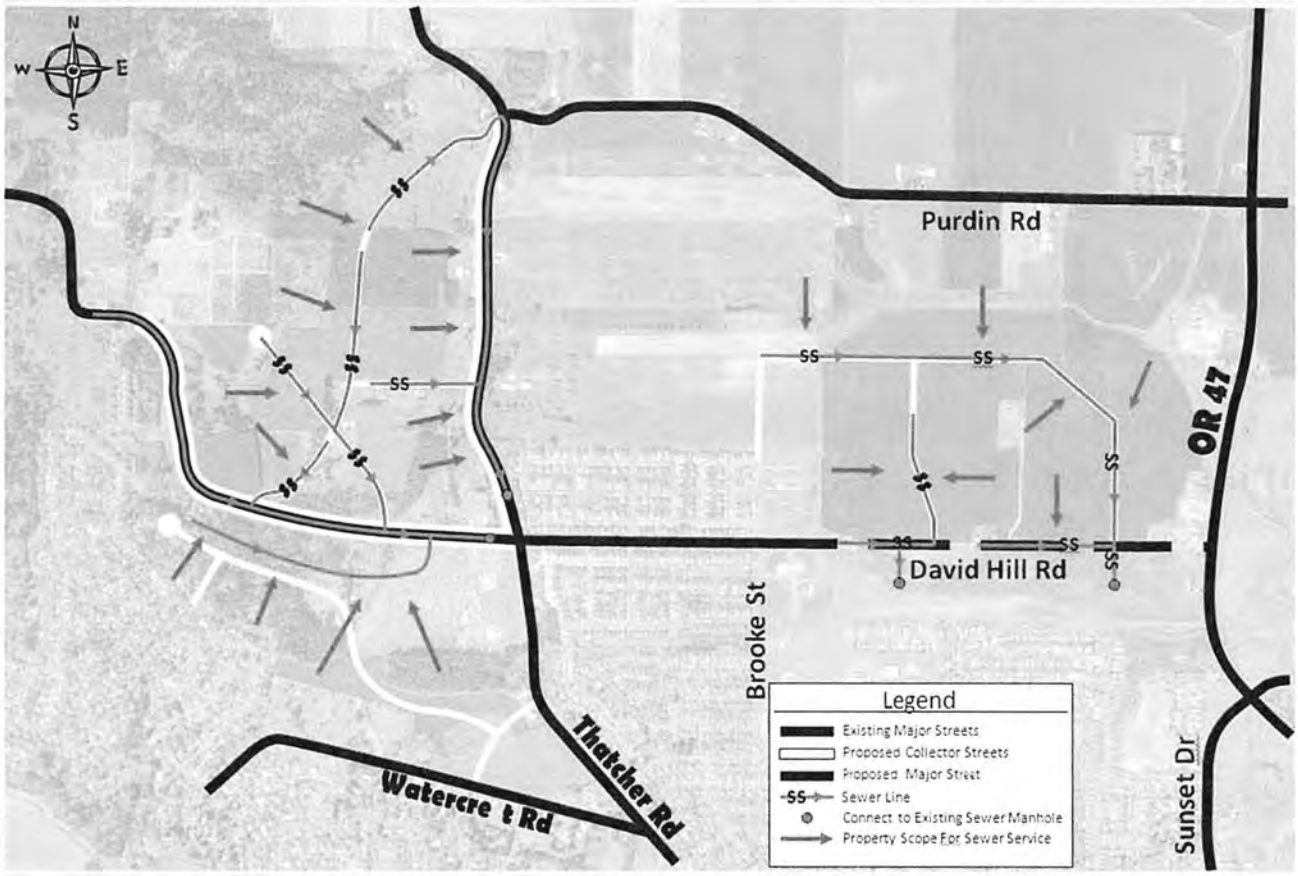
According to the Forest grove Sanitary Sewer Master Plan, it is expected that two trunk lines will serve development in the David Hill area. One line would be located on David Hill Road and the other line would be located Thatcher Road. Due to topography the line on David Hill Road should be constructed deep enough so that the collection system could be extended to the south below a small ravine. Both the David Hill and Thatcher trunk lines require a diameter of 12 inches.

Purdin Road Area

Since the Purdin Road area was added to the urban growth boundary in 2014 and all of the area is outside the city limits little consideration hase been given to how this area could be served by the public sewer system. The Westside Plan helps overcome this issue. Recommendations for sanitary sewer lines needed to serve development are shown on the maps below. The maps only show the main sewer lines and not the lines needed to serve individual homes or development.



The maps below show the proposed conceptual sanitary and storm sewer systems to serve the David Hill and Purdin Road urban growth areas. The lines generally follow the street network for efficiency and to accommodate gravity flows.



SCJ ALLIANCE

Sewer Utilities

Westside Planning Project
Forest Grove, OR

The following map shows improvements necessary to accommodate storm water drainage needed for the collector roadway system. The map also shows the general direction for storm water flows. The map does not show storm water/drainage improvements needed for individual developments. Improvements needed for indivudal developments will be considered during the development review process based on Clean Water Services standards and design guidelines.

SCJ ALLIANCE

Stormwater Utilities

Westside Planning Project
Forest Grove, OR

The table below shows the estimated costs for constructing the necessary sanitary sewer system. Total costs are approximately $3.6 Million including contingencies and engineering costs.

Sanitary Sewer Estimated Costs

No.	Segment	Estimated Cost
1	Road 1, 2, 3 Sewer Line	$225,000
4	Road 4 Sewer Line	$300,000
5	Road 5 Sewer Line	$82,500
6	Road 6 Sewer Line	$165,000
7	Road 7 Sewer Line (10")	$405,000
8	Road 8 Sewer Line (10")	$255,000
9	Road 9 Sewer Line	$262,500
10	Road 10 Sewer Line (700 LF 12")	$382,500
	Contingencies and Engineering	$1,558,100
	Totals	*$3,561,350*

The table below shows estimated costs to construct the storm sewer/drainage system. Total estimated cost is $1,575,000.

Storm Sewer Estimated Costs

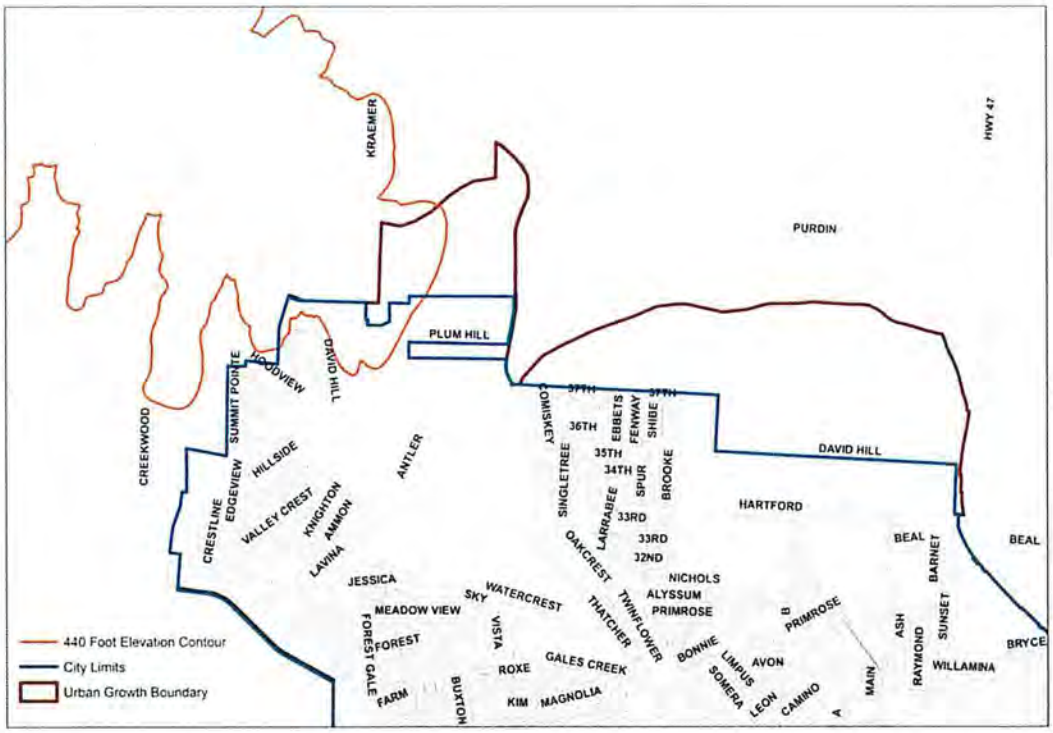
No.	Segment	Estimated Cost
1	Road 1, 2,3 Storm Pond	$75,000
2	Road 4 Storm Pond	$75,000
3	Road 5 and 9 Storm Pond	$100,000
4	Road 6 and 10 Storm Pond	$150,000
5	Road 7 Storm Pond	$200,000
6	Road 8 Storm Pond	$50,000
7	Road 1, 2 3 Stormwater	$35,000
8	Road 4 Stormwater Treatment	$35,000
9	Road 5 and 9 Stormwater	$70,000
10	Road 6 and 10 Stormwater	$70,000
11	Road 7 Stormwater Treatment	$20,000
12	Road 8 Stormwater Treatment	$20,000
	Contingencies and Engineering	$675,000
	Totals	*$1,575,000*

Chapter 10 – Water

The first public water system serving Forest Grove was built circa 1908. A water intake was constructed on Clear Creek, a tributary of Gales Creek. A transmission line was constructed using ten-inch logs with a hole bored in the center. Water was conveyed from the water intake to the present site of the water treatment facility.

In addition to Clear Creek, Forest Grove has water rights from Gales Creek, Roaring Creek, the Tualatin River, Hagg Lake and stored water at Barney Reservoir. In 1976 Forest Grove and Hillsboro formed the Joint Water Commission (JWC) to address growing water needs. Members of the Joint Water Commission now include Forest Grove, Hillsboro, Beaverton and the Tualatin Valley Water District. The JWC now provides potable water supply for approximately 50% of the City's water needs on an annual volume basis. Most of the JWC supply is used during the peak water demand season from May through September.

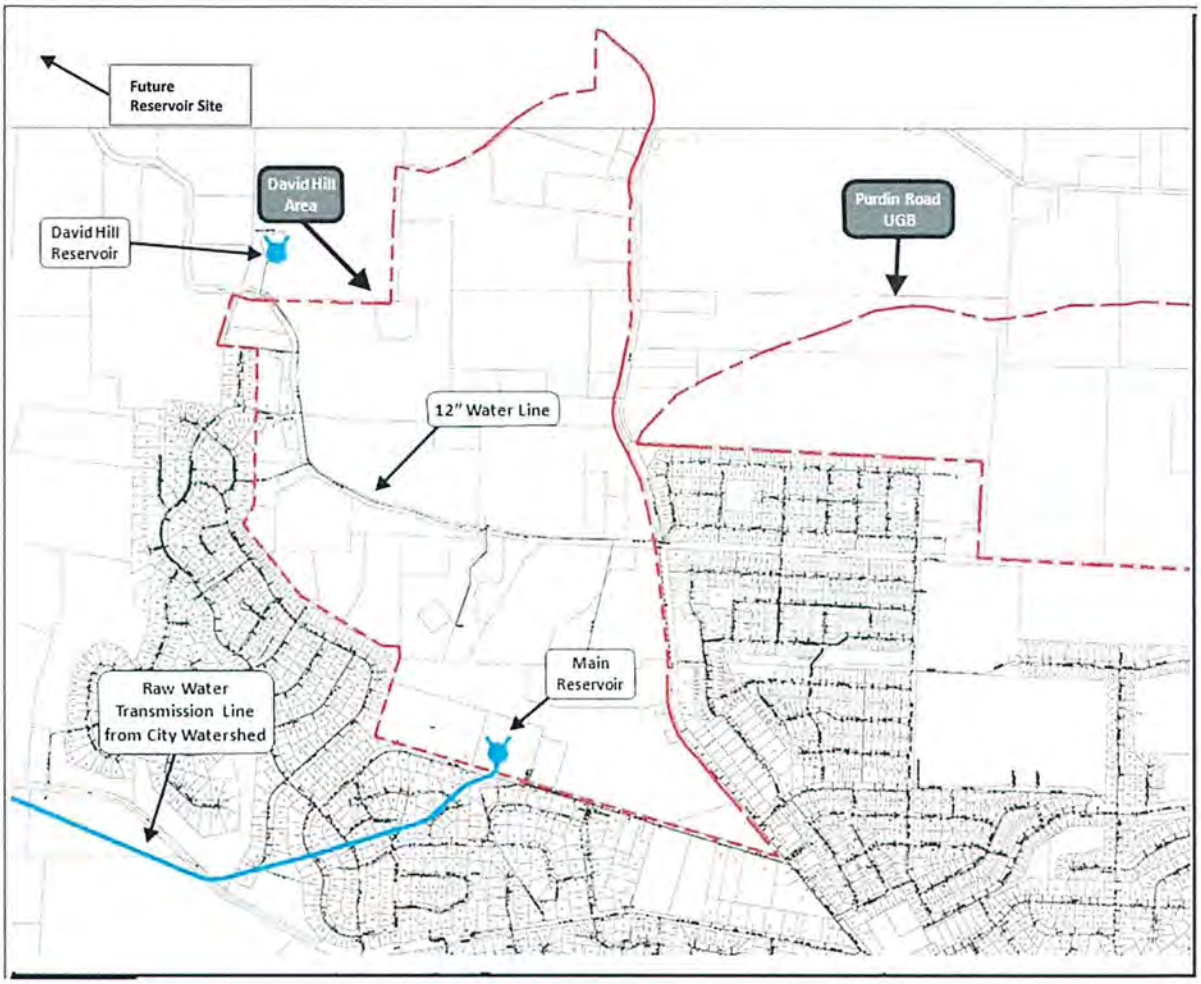
Currently, the David Hill area is served by a 12-inch water line running along David Hill Road. Most residents in the area, however, rely on well water. Based on a review of the Water Master Plan several factors are present that could affect development in the David Hill area. One factor is the existing water system cannot supply water above an elevation 440 feet above sea level (shown as the orange line on the map below) with adequate pressure.



To address this issue the Water Master Plan includes as a project installation of a new reservoir that will provide water with adequate pressure above the 440 elevation.

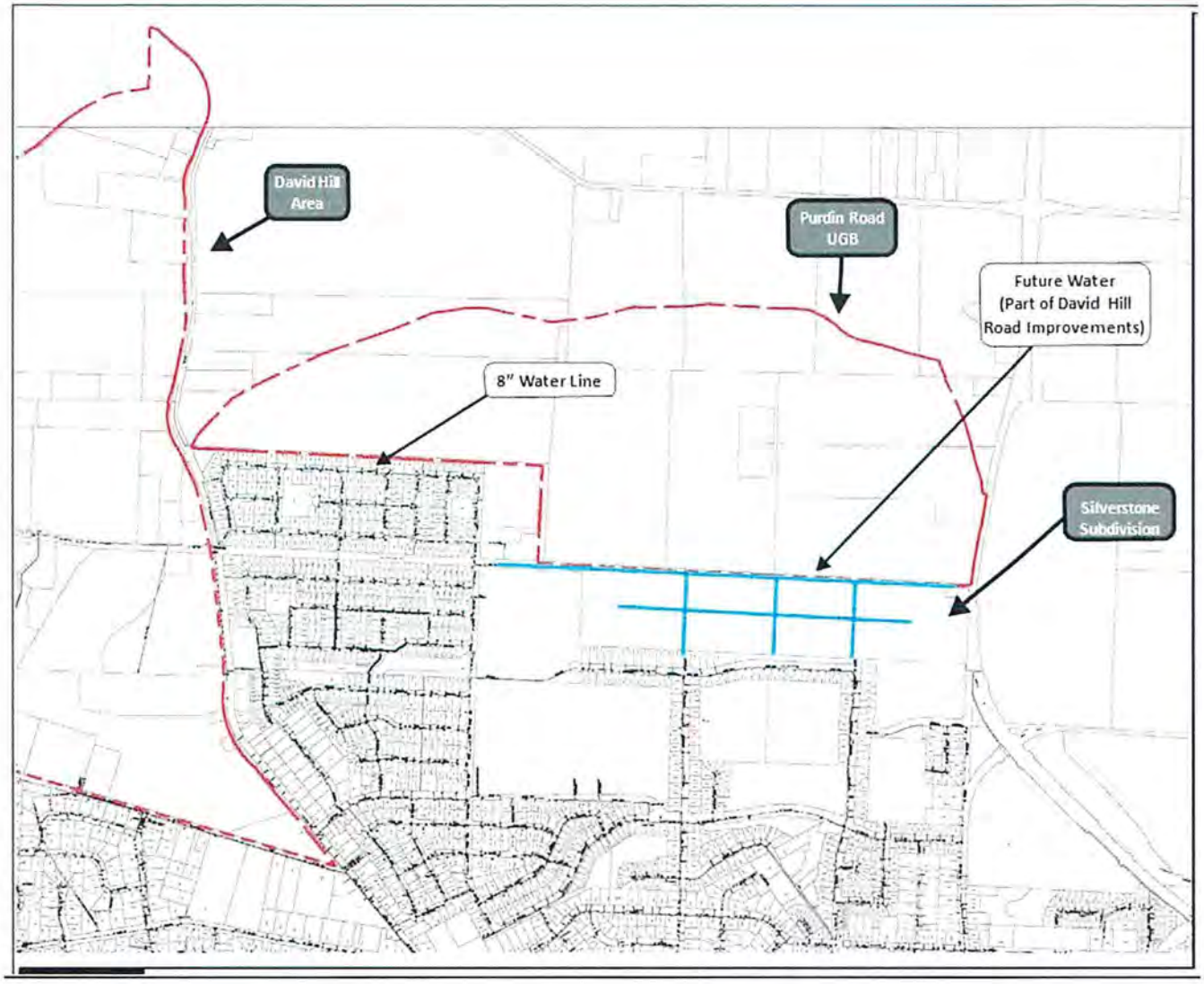
The Water Master Plan recommends building new storage at an elevation higher than the current reservoir to serve the David Hill urban growth boundary and urban reserve areas area. A reservoir elevation of approximately 690 feet above sea level is identified. The Water Master

Plan also includes a 12-inch water line extending from the existing line along David Road through the planning area.



According to the Water Master Plan water storage serving the Purdin Road UGB area includes 4.27 million gallons at the City's water treatment plant and 2.8 million from the Joint Water Commission facility.

The map below shows water mains for the Silverstone subdivision located south of David Hill and west of Thatcher Road. The lines shown in the approximate location of the B Street and Main Street extensions could be extended further to serve the Purdin Road area.



Based on review of Water Master Plan and the consultant team analysis with input from the City's Engineering Division additional water service capacity is needed to serve the Westside area. The needs are primarily based on providing adequate water pressure above the 440 foot contour elevation, meeting fire flow requirements, and cumulative future City-wide needs.

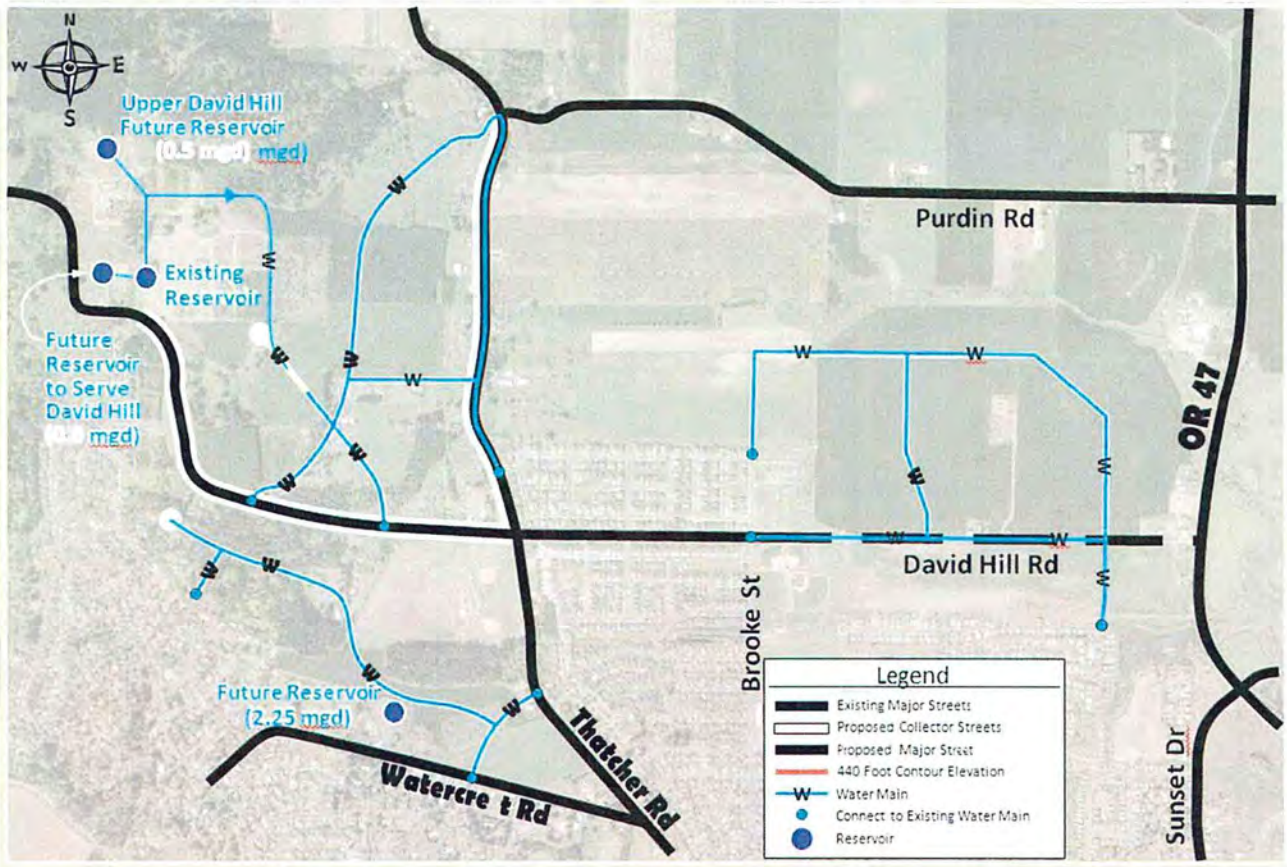
To address the needs described above, the following reservours have been identified:

- One 0.5 Million gallon reservoir for the David Hill urban growth boundary area between the 440 and 615 foot elevation;
- One 0.5 Million gallon reservoir for the David Hill urban reserve area between the 190 to 615 foot elevation;
- Two 0.3 Million gallon reservoirs for the David Hill urban growth boundary area between 250 to 440 foot elevation based on the current Water Master Plan. If the 0.5 Million gallon reservoir for the urban growth boundary is expanded to 0.6 Million gallons the two 0.3 Million gallon reservoirs would not be necessary; and
- One 2.25 Million gallon reservoir at the current water treatment plant to serve City-wide needs.

Reservoir needs could be modified when the Water Master Plan is updated. The next update is anticipated in 2018. For example, the construction of 1.0 Million gallon reservoir to serve both

the urban growth boundary and urban reserve areas could be constructed rather than the two 0.5 Million gallon reservoirs. However, other issues such as water turnover need to be evaluated as part of the Master Plan update.

The map below shows the conceptual water system proposed for the Westside area.



SCJ ALLIANCE
CONSULTING SERVICES

Water Utilities

Westside Planning Project
Forest Grove, OR

The table below shows estimated costs to construct the recommended water system need to serve the Westside area.

Water System Estimated Costs

No.	Description	Linear Feet	Total Estimated Cost	Estimated Cost Attributable to Westside Planning Area	Area of Benefit
1	Road 1 water main	1,050	$63,000	$63,000	David Hill
2	Road 2 water main	3,200	$192,000	$192,000	David Hill
3	Road 3 water main	600	$36,000	$36,000	David Hill
4	Road 4 water main	4,700	$282,000	$282,000	David Hill
5	Road 5 water main	1,250	$75,000	$75,000	David Hill
6	Road 6 water main	2,300	$138,000	$138,000	David Hill
7	Road 7 water main	5,500	$330,000	$330,000	Purdin Road
8	Road 8 water main	1,750	$105,000	$105,000	Purdin Road
9	Road 9 water main	3,500	$525,000	$525,000	David Hill
10	One 0.5 MG reservoir (1)	EA	$4,182,500	$875,000	David Hill
11	Two 0.3 MG reservoir	EA	$2,910,448	$1,950,000	Entire Area
12	One 2.25 MG reservoir near Watercrest	EA	$2,956,522	$680,000	Entire Area
	Contingencies and Engineering		$5,709,728	$3,282,000	Entire Area
	TOTAL		*$17,505,198*	*$8,533,000*	

(1) One reservoir expected to be used by development within David Hill from 440 to 615 feet in elevation and portions of the David Hill Urban Reserve Area between 190 and 615 feet. An additional reservoir is expected to serve the remainder of the David Hill Urban Reserve Area between 190 and 615 feet which is included herein to account for the share costs of land acquisition, piping, pressure reducing valves and a pump station. Approximately $500,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R-10 zoning. If there is a reduction in density permitted in this area to SR (1 du/acre), approximately $120,000 or 2.5% of the total cost of the reservoirs would be attributable to serving the David Hill area above 440 feet which would include an estimated 24 dwelling units.

Chapter 11 – Other City Services

Forest Grove is a full service city providing police, fire and rescue services, parks and recreation, light and power, water and sewer services in partnership with Clean Water Services. In addition, the City provides building permitting and planning services. Library services are provided through a partnership between the City and Washington County Cooperative Library Services (WCCLS).

City services are funded through a variety of sources including property taxes, fees such as system development charges for infrastructure, and intergovernmental revenues from the federal, state, regional and county levels of government.

The City's total tax rate is $5.56 per $1,000 of taxable assessed value consisting of $3.96 for the City's permanent rate and $1.60 for the local option levy passed by the voters in 2012. The local option levy is set to expire in 2018.

The City's total proposed budget for 2016 for all activities is $98.25 million. This amount includes ending cash balances and contingencies. General Fund resources total approximately $17.06 million.

As exemplified by the City Council's FY 2016-2017 goals, the City of Forest Grove is committed to promoting a prudent financial plan to maintain effective service levels of a full-service city. The adopted budget for Fiscal Year 2016-2017 allows the City to maintain and enhance services as a full-service City. Over the course of the upcoming year the community is expected to begin a discussion on what it means to be a full-service city. This includes identifying the community standards and expectations for "full-service" and assessing potential implications on future City budgets.

Fire Service

Currently, a one acre parcel has been reserved for a fire station at Thatcher Park. The Fire Department indicates the site is poorly located and there is a need for a two-acre fire station and training area near Highway 47 and David Hill. The rational for this location includes:

1. This location provides better coverage for a primary response area for current and future development in Forest Grove.

2. Secondary response to simultaneous calls is a critical consideration. The proposed location is ideally suited to provide that secondary response – the Thatcher Park location is the worst location for this consideration according to the Fire Department.

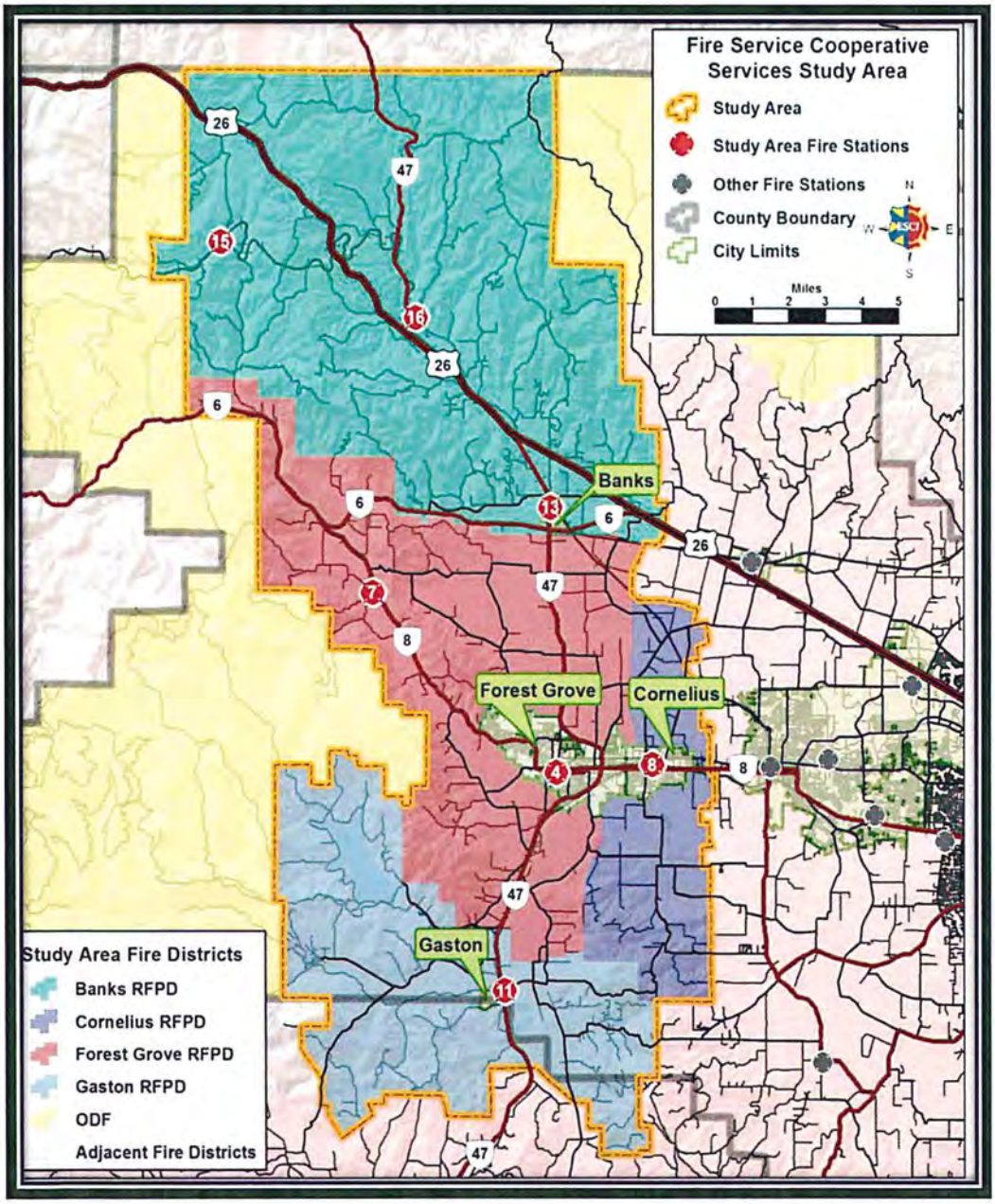
3. Response to fires requires not just to dispatch the closest unit, but to assemble an effective response force in a minimal amount of time. The Thatcher Park location is a poor location for this criterion.

4. The proposed location provides better coverage for the north end of our Rural Fire District.

5. In consideration of future fire service consolidation planning, which is supported by the recent Cooperative Fire Services Study, the proposed location will provide better coverage, operational, and logistical response for all of the proposed models.

6. The Thatcher Park location is inadequately sized for fire station needs, and is situated at a low-visibility intersection. There is a need a two-acre lot to accommodate training areas for this new station – Station 4 training area is severely limited currently.

7. The Thatcher Park location is currently being utilized as a dog park, which is a highly utilized and popular parks resource.



Chapter 12 – Funding Approach

Identifying road, water, sewer and other service needs required for development tells only a limited part of the story. Other parts include the cost of required services, how the services are paid for, who pays for the services and timing. This chapter of the Westside Plan charts a course of action for addressing these considerations.

SCJ Alliance partnered with FCS Group to prepare a funding approach that identifies ways to foster development in the Westside Planning Area based on the land use and infrastructure concepts described in the Westside Plan. This approach includes a funding framework, including tools and techniques commonly used in Oregon, identification of planning level capital costs for public facilities required to serve the Westside Planning Area, Funding evaluation and recommendations and overview of market considerations. Each of these elements are described in more detail below.

Funding Framework

When capital improvements are funded or financed by municipalities, service providers, or through development agreements funding options in Washington County generally include:

- System Development Charge (SDC)
- Transportation Development Tax (TDT)
- Utility Fee
- Local Option Levy
- Local Improvement District (LID)
- Reimbursement District
- Tax Increment Financing (Urban Renewal District)
- Debt Financing
- Public Improvement Agreements

A general overview of these tools is provided below.

System Development Charge (SDC)

State law allows for establishment of system development charges, a one-time fee, on new development paid at the time of building permit issuance. SDCs are charged to recover a fair share of the cost of capital improvements, including the cost of existing and planned facilities that provide capacity to serve future growth.

Under state law SDCs may be used for the following capital improvements:

- Water supply, treatment, and distribution;
- Waste water collection, transmission, treatment, and disposal;
- Drainage and flood control;
- Transportation; and
- Parks and recreation

Transportation Development Tax (TDT)

The Transportation Development Tax is a county-wide tax consistent with state SDC law. The TDT was approved by County voters in 2008 and is imposed on all development within the County. The City may use TDT collections on transportation projects included on the adopted TDT project list including projects that add roadway capacity.

Utility Fees

Utility fees are paid by customers within a service area and are usually included on utility billing statements. The City of Forest Grove charges utility fees for sewer, water and electrical service. Utility fees are commonly used to help pay for required infrastructure facilities and operations.

Local Option Levy

A local option levy is a tax on property to fund capital improvements or operations. A capital levy is valid for ten years whereas an operations levy is valid for five years. A local option levy must be approved by voters. The City currently has a local option levy for operations.

Local Improvement District (LID)

The local improvement district is a common tool used by municipalities in Oregon for capital improvement projects benefitting specific property. The LID is a special assessment on property typically payable in annual installments for up to 30 years. LIDs are generally used for capital improvement projects that benefit property owners over a certain identifiable area.

Reimbursement District

A reimbursement district is similar to the LID described above. A reimbursement district is used when a specific party such as a municipality or developer agrees to pay for capital improvements up front ahead of development within a geographic area. The party that advances the funds is partially reimbursed was development occurs usually over a fifteen year period.

Tax Increment Financing (Urban Renewal District)

Tax increment financing is a tool used throughout Oregon to pay for projects intended to revitalize a specific area of a community. Tax increment financing is often used to repay public indebtedness used to finance capital improvements such as roads, water lines or sewer lines. The term tax increment comes from the way tax revenue is distributed to an urban renewal agency based on changes to taxable property value of property within an urban renewal district after the district is established.

Public Debt Financing

Public debt financing is a common method of financing the construction of roads, stormwater facilities, water and sewer lines, and parks. An example of public debt financing is the General Obligation or GO bond. Property tax collections are used to repay the bonds over time typically 20 or 30 years. GO bonds require voter approval. Other types of bonds including revenue and full faith and credit bonds, described below, do not.

Revenue bonds require an ongoing source of revenue pledged to payment of debt service. A utility fee, local option levy or LID payments could serve this purpose.

Full faith and credit bonds are a hybrid of GO and revenue bonds. Full faith and credit bonds called that because they are an unsecured claim on all the revenue streams of a municipality without the pledge of any particular revenue stream. Full faith and credit bonds do not require voter approval.

Public Improvement Agreements

Public Improvement Agreements are used when a developer is required by the City to construct public facilities to City standard as a condition of development approval. The Public Improvement Agreement provides assurances to the parties that regulations affecting construction of the improvements will not change during the term of agreement.

Estimated Capital Costs

A key objective of the Westside Plan is the identification of collector roads, sewer and water trunk lines, pump stations, and stormwater facilities needed to serve the land use concept. This section summarizes estimated conceptual, planning level cost estimates for these facilities. Additional detailed information is provided in the Westside Planning Area Funding Approach report dated December 2016 and included as an appendix to this plan.

The table below shows total estimated project costs by facility type. Total costs amount to approximately $47.6 Million in 2016 dollars. Of this amount, costs for constructing the collector street system amounts to $30.2 Million or about 64% of total infrastructure costs. Water facilities represent the second largest cost item at approximately $8.5 million. Sanitary sewer costs are estimated at $3.6 Million. Stormwater improvements are estimated to cost $1.6 Million. A neighborhood park identified to serve the Purdin Road urban growth area is estimated to cost approximately $3.6 Million.

Westside Planning Area Infrastructure Cost Assumptions

Facility Type	Estimated Cost	Percentage
Collector Streets	$37.7 Million	68.5%
Water System	$8.5 Million	15.5%
Sanitary Sewer System	$3.6 Million	6.5%
Stormwater System[4]	$1.6 Million	2.9%
Park	$3.6 Million	6.5%
Total	*$55.0*	*100%*

[4] Associated with collector street system

Funding Evaluation

Funding options were evaluated for each facility type as part of preparing the Westside Plan. This evaluation provided an assessment of the potential for implementing the recommended funding approach. The assessment included consideration of the following criteria:

- Equity
- Reliability of Funds
- Market Acceptance
- Ease of Implementation
- Ability to Address Costs

Each of criterion is described in more detail below.

Equity

Equity is defined to mean distributing risks and costs among different groups in an evenhanded manner. For purposes of the Westside Plan equity was evaluated based on distributing costs for infrastructure among existing City residents, future Westside Planning Area residents, current property owners, and future developers.

Reliability of Funds

Reliability of funds is an important consideration for funding infrastructure especially if debt financing is used. Funding sources such as system development charges and reimbursement districts do not provide a predictable revenue stream because revenue from these sources is contingent on when and how much development occurs. In contrast, revenue bonds secured by property taxes and local improvement districts tend to be far more reliable and less risky to the agency that takes on the debt.

Market Acceptance

Timing and responsibility for provision of adequate public facilities is a significant determinant influencing when private development occurs. Over reliance on developers to fund needed public facilities upfront may drive up development costs to a level that exceeds supportable market prices. In contrast, if the City funds needed infrastructure upfront using only system development charges the City is unlikely to invest in these facilities until adequate capital reserves are established which could delay development.

Ease of Implementation

This criteria refers to adopting and administering the funding approach. Funding sources such as utility fees and system development charges do not require approval at an election to enact which adds cost and time to the implementation effort. Other funding sources such as reimbursement districts require ongoing monitoring which increases administrative costs.

Ability to Address Costs

The recommended funding approach must provide sufficient revenue to fund needed infrastructure improvements required by expected development based on the adopted land use plan. The funding approach must also provide adequate short-term and long-term funding for infrastructure needs.

Recommended Funding Approach

The recommended funding approach is described below. The recommended approach takes into account the recommended land use plan, identified infrastructure needs, and the evaluation criteria identified above.

Transportation

The City of Forest Grove currently collects the Washington County transportation development tax (TDT) for each new residential dwelling constructed. The current TDT is $8,278 for each new single family unit and $5,415 for each new multifamily unit. The blended rate based on the land use concept concept for the Westside area is $7,914. Based on projected development in the Westside Planning area it is estimated the TDT will generate approximately $15.4 Million. Of this amount the City retains 100% of the revenue for transportation projects in the City identified on the TDT project list.

Total cost for the collector roadway system necessary for the Westside planning area is estimated at $37.7 Million. System development charge revenue is expected to generate approximately $16.3 million in revenue based on the current fee. This results in a revenue shortfall of approximately $22.3 million. Furthermore, system development charge revue would not be available to fund the short-term improvements such as for Thatcher Road to serve development. Policy options for addressing this shortfall are described below.

<u>Transportation Funding Policy Option 1 (Area Wide TDT with All Projects Funded with TDT Revenue)</u>

One policy option is to establish a supplemental TDT for the entire Westside Planning area. Under this approach a TDT amounting to $11,435 is necessary to fill the funding gap. The total TDT would then become $19,349 based on the blended rate.

This approach creates some equity issues since traffic impacts are not spread evenly throughout the planning area. For instance, development in the new urban growth boundary area north of David Hill Road requires improvement of the two Highway 47 roundabouts over time. In the David Hill area west of Thatcher Road improvement to David Hill Road and Thatcher Road is necessary as well as construction of a north-south collector street west of Thatcher Road. None of the improvements provide benefit to the new urban growth boundary area.

<u>Transportation Funding Policy Option 2 (Area Wide TDT with Some Projects Funded by Outside Sources:</u>

The second policy option assumes that improvements to the Highway 47 roundabouts. David Hill Road west of Thatcher Road and Thatcher Road north of David Hill Road are all funded by outside sources. This reduces the total cost of TDT funded projects by approximately $15.3

million. If this approach is taken the supplemental TDT would be approximately $3,571 per dwelling unit. The total combined TDT would be $11,485. This is $7,864 less than Option 1.

Transportation Funding Policy Option 3 (TDT Revenues and Project Costs Allocated by Subarea):

Policy option 3 looks at dividing TDT revenues and costs by project subareas. One project subarea is David Hill north of Watercrest and west of Thatcher Road. The other project subarea is the new urban growth boundary area north of David Hill Road between Highway 47 and Thatcher Road.

Option 3A. David Hill SDC: If 100% of TDT revenue generated in the David Hill Area is used to fund improvements west of Thatcher Road the supplemental TDT would be approximately $22,860 for a total TDT of $30,775. If the Thatcher Road improvements are funded by an outside source the supplemental TDT would be $11,459 and the total TDT would be $19,374

Option 3B. New Urban Growth Boundary Area TDT: If 100% of the TDT revenue generated in the new urban growth boundary area is used to fund improvements in the new urban growth boundary area the supplemental TDT would be approximately $3,883. The total TDT would be approximately $11,797. If the Hwy 47 roundabout improvements were funded through an outside source there wouldn't be a need for a supplemental TDT. This is because TDT revenue based on development in the new urban growth boundary area would exceed the cost of transportation costs in the new urban growth boundary area by approximately $2.9 million.

Transportation Development Tax Summary Table

Policy Option	Description	Current TDT Blended Rate	Supplemental TDT Required	Total TDT
1	Area Wide TDT – All Projects Funded With TDT	$7,914	$11,435	$19,349
2	Area Wide TDT – Some Projects Funded with Outside Sources	$7,914	$3,571	$11,485
3A	David Hill Subarea TDT	$7,914	$22,860	$30,775
	David Hill Subarea TDT – Thatcher Road Funded by Outside Source	$7,914	$11,459	$19,374
3B	New Urban Growth Boundary Subarea TDT	$7,914	$3,883	$11,797

To fund short term transportation needs (i.e. funding improvements to Thatcher Road) creation of a local improvement district is an option. Under this approach benefitting property owners would be assessed for the cost of the improvement. The estimated assessment would be approximately $7,456 per acre or $2,000 per allowable dwelling unit assuming 90% absorption over 20 years resulting in approximately 771 new dwelling units. Benefitting property owners could finance local improvement district assessments over a 10 year (or longer) time frame.

Water System

The City of Forest Grove currently collects a water system development charge of $5,478 for each new residential dwelling constructed. Based on projected development within the Westside Planning area it is expected the water system development charge will generate approximately $11.3 Million. Of this amount the City retains 100% of the revenue.

To total estimated water infrastructure cost for projects necessary to serve future development within the City and accommodate Westside Planning Area development is $23.5 Million of which $8.5 Million is required for the Westside Planning Area. A new 500,000 gallon water reservoir, above the current David Hill reservoir elevation, is necessary to serve future development in the Planning Area. This project is needed in the short term to ensure adequate capacity for water supply including meeting daily demand, fire, and emergency needs. This improvement is needed in the short term and is estimated to cost approximately $4.2 Million. According to engineering estimates, approximately 10.4% of the cost of the new reservoir could be attributed to meeting needs of the David Hill area above the 440 foot elevation where inadequate water pressure exists for development.

The recommended funding approach for long term water infrastructure is to use a portion of the water system development charge (up to 76%) collected in the Westside Planning Area for capital improvement needs in the area. No supplemental system development charge is needed nor recommended.

For short term capital needs (i.e. constructing a new 500,000 gallon reservoir) it is recommended the City issue revenue bonds backed by water rates or a new General Obligation bond to fund such needs. Voter approval is required for a General Obligation bond.

Sanitary Sewer System

The City of Forest Grove currently collects a sanitary sewer system development charge (SDC) of $5,300 for each new residential dwelling constructed. Clean Water Services sets the amount of the SDC. Of the amount collected the City retains $212 per unit. The sanitary sewer system development charge could generate approximately $435,000 based on expected development in the Westside Planning area. Clean Water Services uses SDC revenue to fund regional SDC eliglble projects in areas with the greatest need. Regional need is defined as lines larger than 12-inches while lines smaller than 12-inches are considered a local need.

The intergovernmental agreement between Clean Water Services and the City places responsibility for *maintenance* of lines less than 24-inches on the City. *Construction* of lines 12-inches or smaller is also a City requirement. Extending and constructing sewer lines to serve development is a developer responsibility addressed through the development review process. Clean Water Services has responsibility for construction of lines larger than 12-inches or larger as well as treatment facilities.

The estimated City obligation for constructing needed sanitary sewer capital improvements is approximately $3.6 Million. The recommended strategy for funding these local costs relies primarily on developer's constructing and dedicating sewer lines 12-inches or less and using sanitary sewer system development charges collected in the Westside Planning Area for these costs. Further discussion is required with Clean Water Services about allocating a portion of the SDC revenue collected in the Westside Planning Area for Westside sewer infrastructure needs. It is recommended this discussion occur as part of the next update to the City Wastewater System Master Plan.

Stormwater/Drainage System

The City currently collects a stormwater/drainage system development charge of $510 for each new residential dwelling constructed. Of this amount the City retains 100% of the revenue

collected. The stormwater system development charge is expected to generate $1.0 Million for the City based on development in the Westside Planning area.

The Westside Plan identifies stormwater/drainage improvements needed for the collector street system. The estimated cost for such improvements is $1.6 Million. In addition to the stormwater improvements needed for the collector road projects developers will be required to mitigate stormwater impacts created by development as required under Clean Water Services standards.

The funding approach for stormwater relies upon using the existing stormwater system development charge and a supplemental stormwater rate surcharge of approximately $7 per month for households within the Westside Planning area.

Parks, Recreation and Open Space

The City currently collects a parks and recreation system development charge of $3,000 for each new residential dwelling constructed. Of this amount the City retains 100% of the revenue collected. The parks and recreation system development charge is expected to generate approximately $6.1 Million based on expected development in the Westside Planning Area.
Parks and Recreation projects identified in the Parks and Recreation Master Plan Update (2016) include improvements at Thatcher Park including upgrades to the dog park area. The Parks and Recreation Master Plan Update also includes a new six acre neighborhood park serving the Purdin Road urban growth area.

Conclusions

The infrastructure funding analysis reveals the following conclusions:

- Further discussion of the recommended funding approach with property owners, developers and the City needs to be made before implementation.
- Infrastructure needed for development in the Westside Planning Area include collector streets, sanitary sewer, stormwater/drainage, and parks.
- The recommended collector street network needs to be added to the City's Transportation System Plan and Transportation Development Tax (TDT) project list to allow use of TDT in the Westside area.
- Total infrastructure cost for the Westside Planning Area is $47,622,500. Projects in the David Hill area amount to $34,932,500 and for the Purdin Road area the amount is $12,690,000.
- Current system development charge (SDC) revenue could fund water system and park improvements with residual revenues available to fund other related improvements in the City.
- Current SDC revenues are deficient to fund needed road, sewer, and stormwater improvements in the their entirety.
- To address the deficiency the recommendation is to use supplemental SDC revenues coupled with a monthly fee for stormwater over a five year period.
- The recommended approach is feasible and the cost is less on a square footage basis than other developing areas in Washington County.
- Further evaluation is needed on the following items:

- Water reservoirs
- The percentage of SDC revenues to use for improvements
- Whether up-front improvements should be considered to encourage development.

Chapter 13 – Policy Direction

This chapter contains goals, policies and actions recommended by the Westside Refinement Plan. The goals, policies and actions address land use, public faciliites, natural resources, natural hazards, transportation and funding needed infrastructure to support the recommended land use concept described in the plan. The policy framework described below is based on the analyses supporting the plan. The analyses is generally described throughout this plan document and in detail in the plan's appendices.

Policies for funding needed infrastructure are based on development paying for needed improvements. The City will seek outside funding for infrastructure needs as appropriate especially for transportation improvements.

Land Use

Goal 1.1: Establish land use designations for the Westside planning area based on the physical limitations of the land.

Policy 1.1.1: Land use designations for the Westside planning area should be based on identified environmental constraints including steep slopes and mapped landslide areas.

Action 1.1.1: Amend the Forest Grove Comprehensive Plan Map and Official Zoning map to implement the preferred land use concept for the Westside Planning area which takes into account physical limitations of the land.

Policy 1.2.1: The physical limitations of the land should be the basis for determining the density, location and type of development in the Westside planning area.

Action 1.2.1: Amend the Forest Grove Development Code to ensure the physical limitations of the land in the Westside planning area are considered during the development review process.

Policy 1.3.1: A mapped landslide area is identified in the area south of David Hill Road between Forest Drive and Antler Lane. Development within the mapped landslide area should be avoided.

Action 1.3.1: Amend the Development Code to allow for the transfer of density from environmentally constrained areas to unconstrained locations with the approval of the Planning Commission.

Policy 1.4.1: A geological and engineering assessment for development north of David Hill Road and west of Thatcher Road shall be required to ensure suitability of proposed development from an engineering perspective.

Action 1.4.1: Amend the Forest Grove Development Code to require submittal of a geological and engineering assessment prepared by a certified engineering geologist for any development site with an average cross-slope of 10% or more or areas likely to have adverse soils. The results of the geological assessment

should provide the basis for appropriate mitigation measures needed to address geological and soil constraints.

Goal 1.2: Establish land use designations for the Westside planning area that provides opportunities for a variety of land uses including residential, commercial, educational and recreational.

Policy 1.2.1: Land use designations adopted for the Westside planning area should provide opportunities for a variety of land uses including residential, commercial, educational and recreational.

Action 1.2.1: Amend the Forest Grove Comprehensive Plan Map and Zoning map to implement the preferred land use concept for the Westside planning area which provides opportunities for a variety of land uses.

Goal 2.1: Promote efficient and cost-effective land development in the Westside planning area.

Policy 2.1.1: Establish land use designations and development densities for the Westside planning area taking into account the cost of providing and funding urban services including future repair and replacement costs.

Action 2.1.1: Amend the Forest Grove Development Code planned and subdivision regulations as appropriate to encourage clustering development to minimize infrastructure cost.

Policy 2.1.2: Encourage the efficient use of developable land through techniques such as clustering housing and providing a variety of housing types within neighborhoods including cottage housing, accessory dwelling units and attached housing on corner lots.

Action 2.1.2: Amend the Forest Grove Development Code planned development and subdivision regulations as appropriate to promote the efficient use of developable land through techniques such as clustering housing, cottage housing, accessory dwellings and attached housing on corner lots in subdivisions.

Goal 2.2: Promote an orderly transition from rural to urban land use within the urban growth boundary.

Policy 2.2.1: Establish land use designations in the Westside planning area to promote an orderly transition from rural to urban land use within the urban growth boundary.

Action 2.2.1: Amend the Forest Grove Comprehensive Plan Map and Official Zoning map to implement the preferred land use concept for the Westside planning area.

Goal 3.1: Promote complete neighborhoods where a variety of land uses and activities are located in proximity with residential areas.

Policy 3.1.1: Identify locations on the Forest Grove Comprehensive Plan Map and Official zoning map for non-residential land uses including retail, office, park land, an elementary school, and a fire station.

Action 3.1.1: Amend the Forest Grove Comprehensive Plan Map and Official Zoning to implement the preferred land use concept for the Westside planning area.

Goal 4.1: Encourage a variety of housing types throughout the Westside Planning area.

Policy 4.1.1: Establish development regulations for planned developments to encourage a variety of housing types within individual developments.

Action 4.1.1: Amend the Forest Grove Development Code to encourage a variety of housing types within individual developments.

Goal 5.1: Provide opportunity for affordable housing types in the Westside planning area.

Policy 5.1.1: Establish development regulations to provide incentives for housing types affordable to households and families earning 80% or less of the Forest Grove area median income as defined by the U.S. Department of Housing and Urban Development.

Action 5.1.1: Amend the Forest Grove Development Code to provide incentives for housing affordable to households earning 80% or less of the Forest Grove area median income as defined by the U.S. Department of Housing and Urban Development.

Goal 6.1: Ensure land development on David Hill considers the visual impacts of development from lower elevation view corridors especially the Town Center.

Policy 6.1.1: Minimize visual impacts of development on David Hill as viewed from lower elevation view corridors especially the Town Center.

Action 6.1.1: Amend the Forest Grove Development Code to require a visual impact assessment and mitigation measure for development proposals west of Thatcher Road.

Public Facilities

Goal 7.1: Ensure that adequate public utilities needed to serve development in the Westside Planning area are provided in an equitable and cost-effective manner.

Policy 7.1.1: The physical limitations of the land should be a basis for determining the location of utility connections so as to provide utilities in a cost effective manner and to minimize development impacts.

Action 7.1.1: Amend the Forest Grove Development Code and Public Works Design Standards to ensure that the physical limitations of the land serve as a

basis for determining the location of utility connections to reduce the costs and development impacts.

Policy 7.2.1: Undertake studies and update the City's infrastructure facility plans to incorporate recommendations from the Westside Refinement Plan.

Action 7.2.1: Undertake a siting study to identify possible locations for future water reservoir(s) needed to serve development in the planning area.

Action: 7.2.2: Amend the Forest Grove Water System Plan to include the water system recommendations contained in the Westside Refinement Plan.

Action 7.2.3: Amend the Forest Grove Storm Drainage Master Plan should be updated to incorporate recommendations of the Westside Refinement Plan.

Action 7.2.4: Amend the Forest Grove Sanitary Sewer Master Plan should be incorporated to incorporate the recommendations of the Westside Refinement Plan.

Policy 7.3.1: Low impact design techniques for storm water drainage north of David Hill Road and west of Thatcher Road should be avoided due to poor soil infiltration characteristics in the planning area.

Action 7.3.1: Amend the Forest Grove Development and Public Works Design Standards to restrict the use of low impact design techniques for storm water drainage north of David Hill Road and west of Thatcher Road due to poor soil infiltration characteristics.

Policy 7.4.1: Opportunities for needed public facilities including an elementary school and neighborhood park consistent with the Parks and Recreation Master Plan shall be provided in the Westside planning area.

Action 7.4.1: Recreation needs anticipated from development in the Westside planning area should be included in the Forest Grove Parks, Recreation and Open Space Master Plan and locations of public park land shall be identified on the Forest Grove Comprehensive Plan Map.

Transportation

Goal 8.1: Establish a context sensitive street network addressing the characteristics of the Westside planning area.

Policy 8.1.1: Required cut and fill for streets should be minimized to reduce cost and environmental impacts.

Action 8.1.1: Amend the Forest Grove Development Code to allow for collector street segments exceeding 12% slope to minimize required cut and fill and environmental impacts.

Action 8.1.2: Amend the Forest Grove Transportation System Plan and Development Code to reduce the minimum right-of-way and street cross-section requirements in areas with environmental constraints.

Policy 8.2.1: Local streets serving individual homes should follow slope contours to minimize necessary cut and fill and avoid street segments exceeding 12% slope.

Action 8.2.1: Amend the Forest Grove Development Code

Goal 8.2: Establish a transportation system that meets regional transportation planning requirements for transportation facility type and function.

Policy 8.2.1: The collector street network serving the David Hill planning area should strive to meet the Metro Regional Transportation Functional Plan requirements for collector road spacing.

Action 8.2.1: Amend the Forest Grove Transportation System Plan to identify the preferred collector street network for the Westside planning area.

Goal 8.3: Seek funding for needed transportation related improvements necessary to serve development and the wider transportation needs of the City.

Policy 8.3.1: The City should explore the jurisdictional transfer of Thatcher Road to the City and potential funding for improvement to urban standards through the Washington County Major Streets Transportation Improvement Program and regional transportation funding programs.

Action 8.3.1: Initiate discussions with Washington County for jurisdictional transfer of Thatcher Road from Gales Creek Road to Purdin Road.

Action 8.3.2: Pursue funding for improvement of Thatcher Road to City standards through County and regional transportation funding programs such as the Washington County Major Street Transportation Improvement Program and Metro Regional Flexible Funds program.

Goal 8.4: Address local and regional street network capacity constraints anticipated from development.

Policy 8.4.1: Address identified capacity constraints at Highway 47 intersections due to anticipated development in the Westside Planning area.

Action 8.4.1: when updated to address amendments the Regional Transportation Plan, amend the Forest Grove Transportation System Plan to include mitigation measures necessary to address capacity constraints at the David Hill Road/Hwy. 47 and Purdin Road/Hwy. 47 intersections due to development in the Westside planning area.

Goal 9.1: Minimize development impacts on natural resources.

Policy 9.1.1: Strive to preserve tree stands over one acre to the maximum extent possible.

Action 9.1.1: A tree inventory and tree protection management plan should be prepared by a certified arborist prior to development activity.

Action 9.1.2: The tree protection management strategy should be reviewed by the Community Forestry Commission for recommendations as part of the development review process.

Policy 9.3.1: Priority should be given to clustering development to accommodate needed housing while preserving large blocks of forest land.

Action 9.3.1: Amend the Forest Grove Development to provide incentives for clustering development to avoid impacts on natural resources including forested land.

Natural Hazards

Goal 10.1: All development shall demonstrate suitability relative to the natural hazard limitations of the Westside planning area.

Policy 10.1: Applications for development north of David Hill Road and west of Thatcher Road shall include data verifying locations of potential slope and soil instabilities prior to development.

Action 10.1.1: Development regulations shall require field verification of areas with potential slope and soil instabilities prior to development in order to assess potential impacts of development and risk to the site and other properties. The field verification shall be the basis for determining appropriate mitigation measures including avoidance of the area.

Policy 10.2: Applications for development in the Westside planning area shall include a liquefaction analysis for areas susceptible to liquefaction during an earthquake event. Techniques to mitigate potential impacts shall be recommended by the Geotechnical Engineer of Record.

Action 10.2.1: Amend the Forest Grove Development Code to require a liquefaction analysis based on the relevant Oregon Structural Specialty Code prior to development in areas susceptible to liquefaction during an earthquake event.

Funding Approach

Goal 11.1: Establish an equitable funding approach for needed infrastructure serving the Westside planning area.

Policy 11.1: Funding for needed infrastructure in the Westside Planning area may require a variety of funding sources including system development charges, local improvement districts, reimbursement districts, utility fees, or other funding approaches authorized by state law.

Action 11.1.1: Work with affected property owners to implement a fair and equitable funding approach for needed infrastructure.

Policy 11.2: The funding approach for needed infrastructure in the Westside planning area shall consider equity including a fair distribution of cost among property owners, developers, future Westside area residents and existing City residents.

Action 11.2.1: Work with affected property owners to implement a fair and equitable funding approach for needed infrastructure.

Policy 11.3: The funding approach for needed infrastructure in the Westside planning area shall consider timing and reliability of revenue in relationship to the planned schedule of capital expenditures.

Action 11.3.1: Amend City codes as necessary to implement a funding approach for needed infrastructure in the Westside planning area taking into account timing and reliability of revenue.

Policy 11.4: Seek outside funding for these road improvements: Thatcher Road north of David Hill Road, David Hill Road west of Thatcher Road, new collector road connecting David Hill Road with Purdin Road, Highway 47/David Hill Road roundabout improvement, Highway 47/Purdin Road/Verboort Road improvement.

Action 11.4.1: Add the transportation improvements identified above to the Forest Grove Transportation System Plan and Washington County Transportation Development Tax projects list.

Action 11.4.2: Seek adding the projects identified above to the Regional Transportation System Plan projects list.

Action 11.4.3: Apply for funding of road improvements through the Washington County Major Street Transportation Improvement Program (MSTIP), Metro Regional Flexible Funds Program, and State Transportation Improvement Program.

Policy 11.5: Work with Clean Water Services to use a share of sanitary sewer system development charge revenue to fund sewer lines in the Westside planning area.

Action 11.5.1: Initiate discussions with Clean Water Services to use a portion of sanitary sewer system development charge revenue for regional needs to fund sanitary sewer fund improvements in the Westside Planning Area.

Policy 11.6: Establish system development charges for needed infrastructure improvements in the Westside planning area as part of updates to the City's facility master plans beginning in 2018.

Action 11.6.1: Incorporate system development charge funding needs when facilities master plans are updated including the Transportation System Plan, Sanitary Sewer Master Plan, Water Master Plan and Storm Water and Drainage Master Plan.

Policy 11.7: Pursue a storm water rate surcharge to fund needed storm water facility improvements in the Westside planning area.

Action 11.7.1: Draft a resolution for City Council approval to establish a storm water rate surcharge if needed to fund storm water facility improvements in the Westside planning area.

Chapter 14 – Implementation Actions

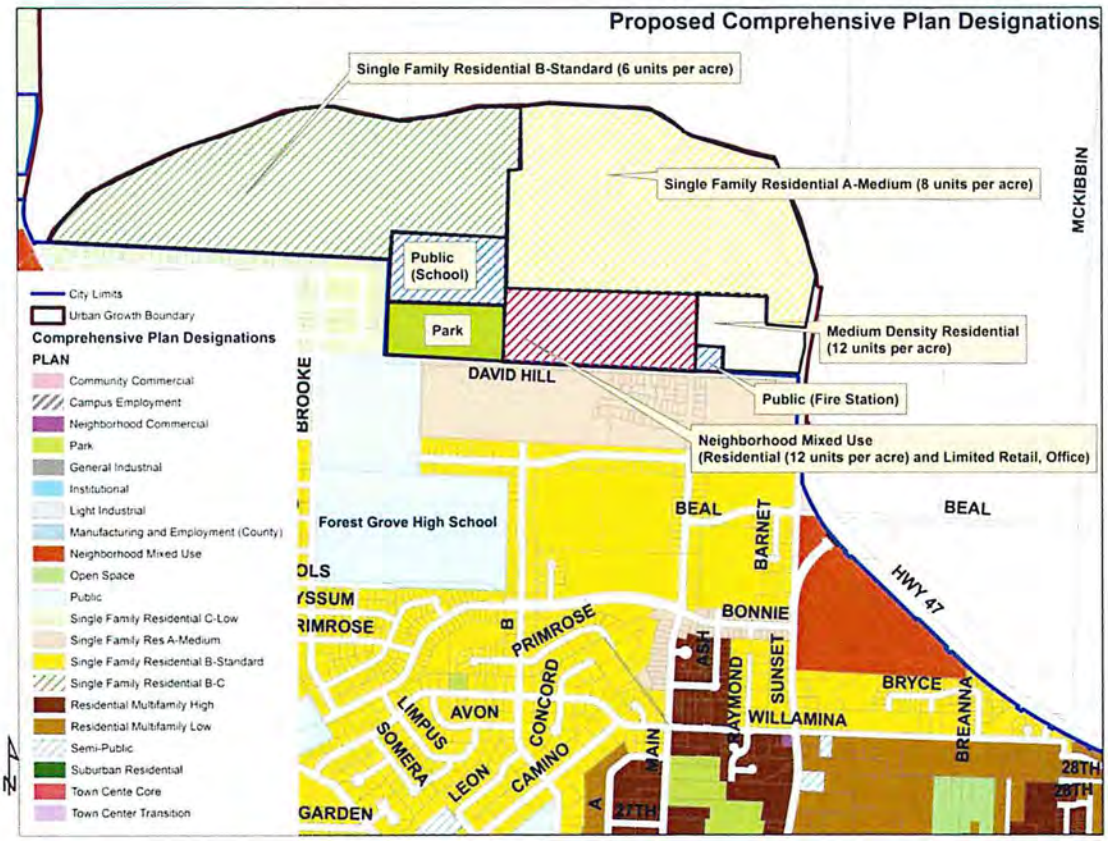
The following implementation actions are recommended for the Westside Planning Refinement Area:

Comprehensive Plan Amendments

The following amendments to the Forest Grove Comprehensive Plan Map are proposed for the Westside planning areas consistent with the land use concept described in Chapter 4.

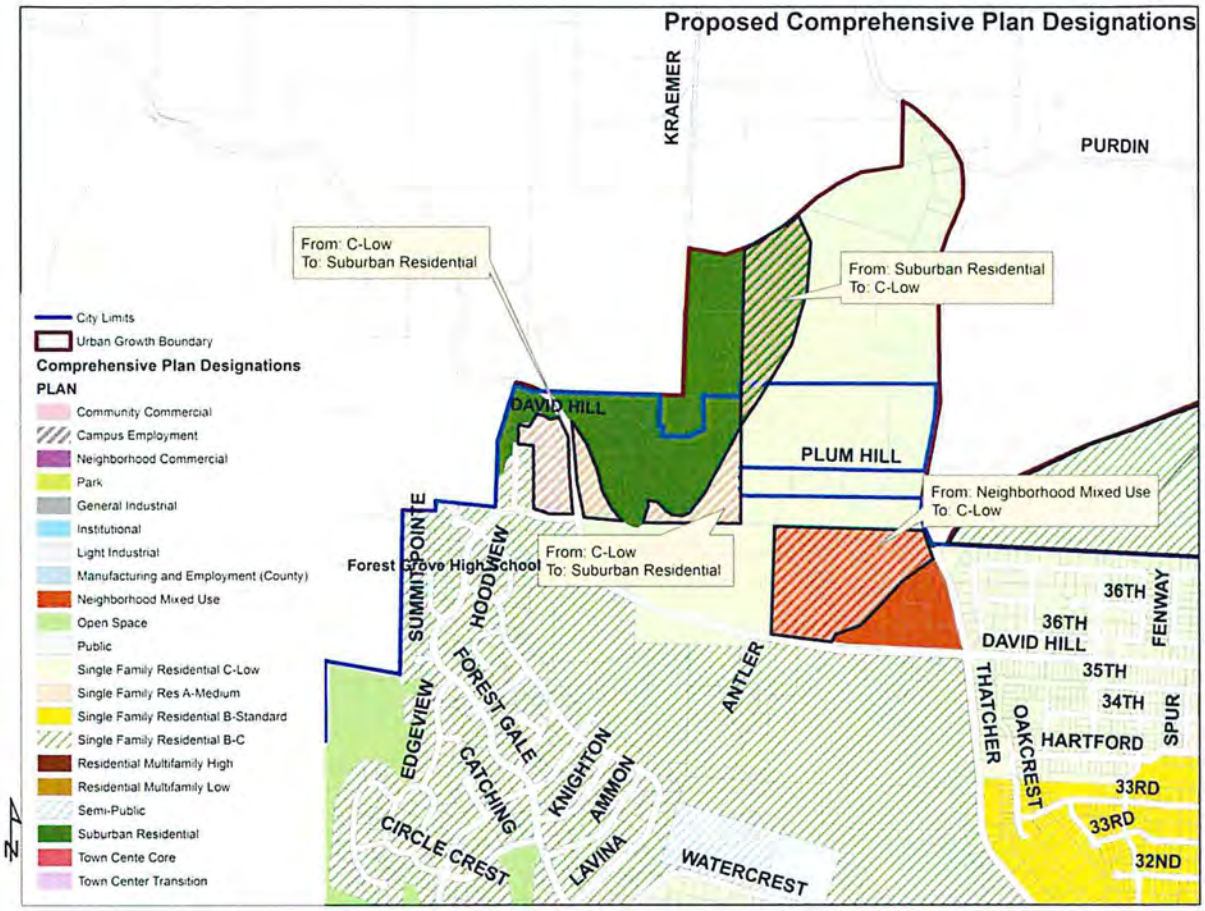
New Urban Growth Boundary Area

From	To	Gross Acres
Future Development-20 acre min.	A-Medium	86.18
Future Development-20 acre min.	B-Standard	98.62
Future Development-20 acre min.	Medium Density Residential	10.82
Future Development-20 acre min.	Neighborhood Mixed Use	24.63
Future Development-20 acre min.	Public (School)	10.00
Future Development-20 acre min.	Public (Fire Station)	2.40
Future Development-20 acre min.	Park	6.00



David Hill Area Urban Growth Area

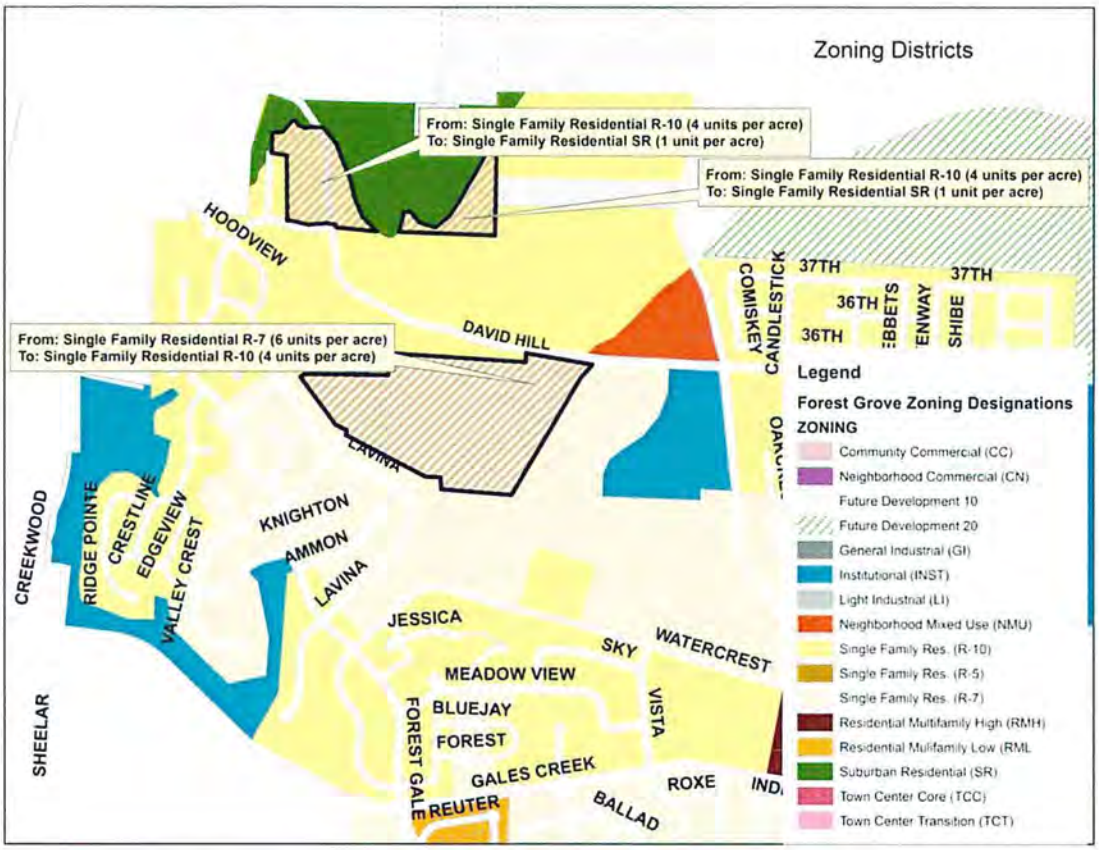
From	To	Gross Acres
Neighborhood Mixed Use	**C-Low**	20.67
B-Standard	**C-Low**	12.50
C-Low	**Suburban Residential**	14.1



Zoning Map Amendments

The Purdin Road Urban Growth Area will be rezoned upon annexation into the City consistent with the adopted Comprehensive Plan designations. The following zoning map amendments are proposed for the David Hill urban growth area consistent with the land use concept described in Chapter 4.

From	To	Gross Acres
R-7	**R-10**	36.96
R-10	**SR**	7.13



Development Code Amendments

10.8.610(M) Grades and Curves – Grades shall not exceed 10% on arterials, ~~12%~~ **15%** on collector streets for distances of no greater than 250 feet, or any other street (except that local or residential access streets may have segments with grades of up to 15% for distances of no greater than 250 feet), and:

10.8.310 (Hazard Areas)

2. For development sites having slopes of ~~20%~~ **10%** or more, the following requirements shall be met. To ensure compliance with the provisions of this ordinance, prior to the issuance of a building permit for the construction of any new building[5] within the city, and prior to any grading, excavation or filling or other site modification within areas having a slope of ~~20%~~ **10%** or greater, there shall be submitted to the Community Development Department for review and approval, or approval with modifications:

    a. A site plan (showing any grading, excavating or filling) drawn to scale of the entire property developed and of the proposed construction;

    b. The submission of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist who is a

[5] Building. That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

registered geologist certified in the specialty of Engineering Geology under provisions of ORS 672.505 to 672.705 **and a Geotechnical Engineer under provisions of ORS 672.002 to 672.325.** The assessment and report shall address the entire site and meet the following requirements:

i. The geological **and engineering** assessment shall include information and data regarding the nature, distribution of underlying geology, and the physical and chemical properties of existing soils; an opinion as to stability of the site, and conclusions regarding the effect of geo-logic conditions on the proposed development.

Transportation System Plan Amendments

Figure 8-1: Updated Street Classification System

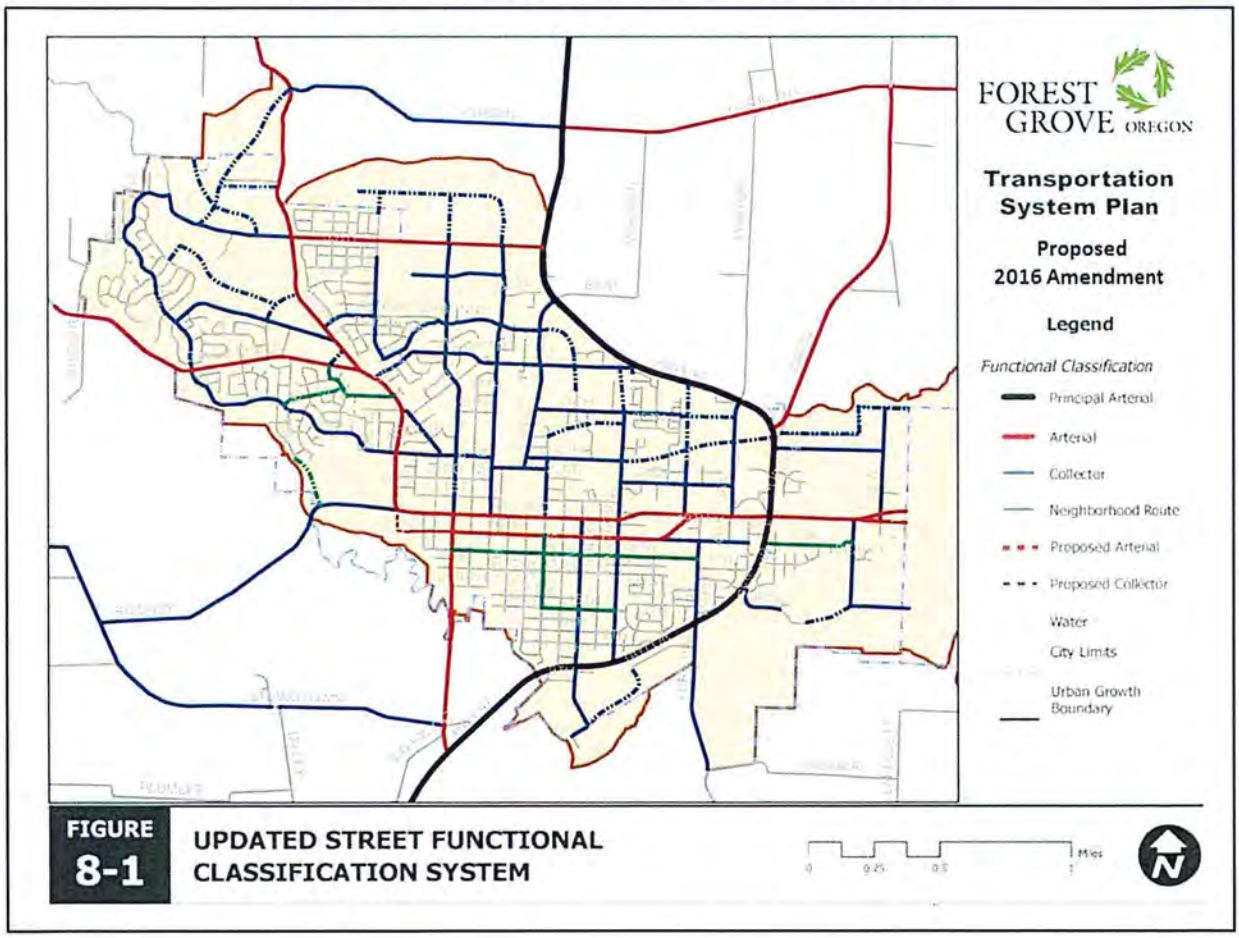
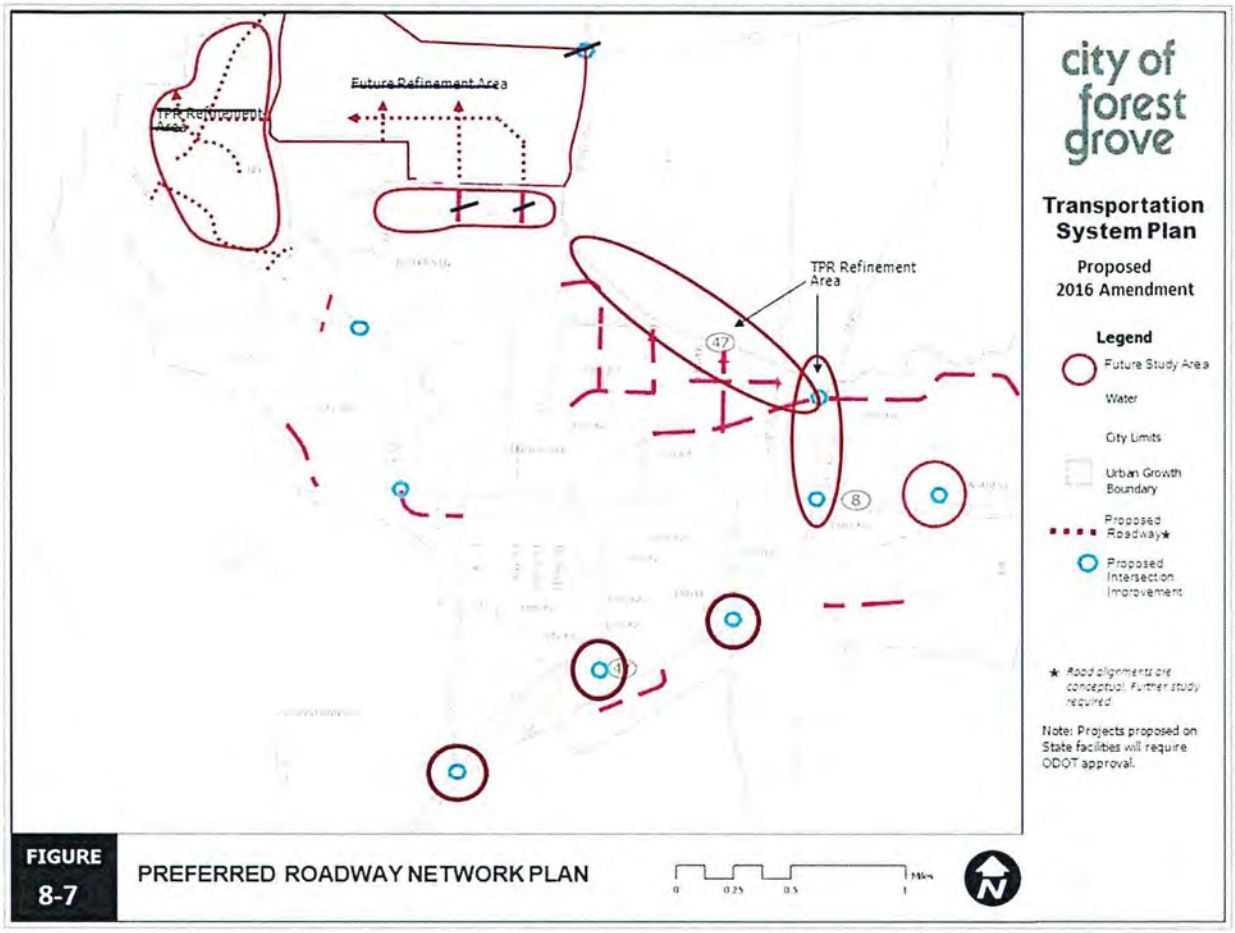
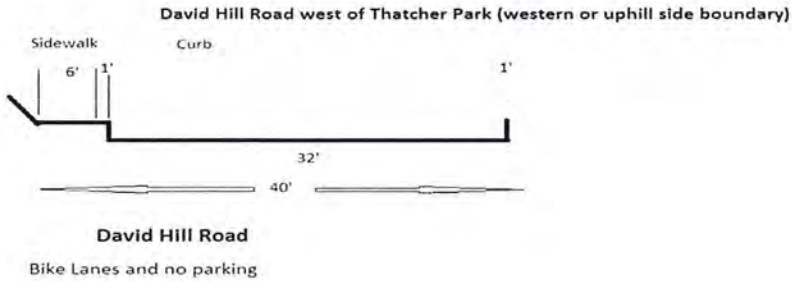


Figure 8-7: Preferred Roadway Network Plan



Proposed David Hill Road Cross-Section (Add to TSP Section 8-3)



Amend TSP Table 8-3: Roadway Projects and Programs

Recommended Street Projects

No.	Street Name	Project Limits	Description	Estimated Cost
1	Road 1 (Vista Drive Extension)	Watercrest Road to Thatcher Road	Construct new north-south 1,050 foot urban collector street	$1,000,300
2	Road 2	From Vista Drive Extension west 3,200 feet	Construct new east-west urban collector street	$4,246,000
3	Road 3 (Valley Crest Extension)	From terminus of Valley Crest Way north to Road 2	Construct new 600-foot urban collector street	$787,200
4	Road 4	David Hill Road north to Purdin Road	Construct new 4,700 foot urban collector street	$6,409,200
5	Road 5 (Plum Hill Improvement)	Existing Plum Hill Lane (privately-owned) to Road 4	Improve Plum Hill Lane to urban collector standards	$1,212,200
6	Road 6	David Hill Road to urban growth boundary	Construct new 2,300 foot urban collector street	$2,391,000
7	Road 7 (Brooke Street Extension)	Brooke Street to David Hill Road	Construct new 5,500 foot urban collector street	$4,766,200
8	Road 8 (B Street Extension)	David Hill Road to Brooke Street	Construct new 1,750 foot urban collector street	$1,583,700
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Full improvements to Council Creek crossing (short-term)	$1,454,000
9	Road 9 (Thatcher Improvement)	David Hill Road to Purdin Road	Half street reconstruction between David Hill Road to Purdin Road excluding Council Creek crossing (long-term)	$2,437,500
10	Road 10 (David Hill Improvement)	Thatcher Road to urban growth boundary	Full street reconstruction for 5,100 feet to urban collector street standards	$3,943,500
			TOTAL ESTIMATED COST	$30,230,800

Amend TSP Section 8.9.2 Future Study Areas

~~*David Hill Study Area*~~

~~The northwestern portion of the City, in the vicinity of David Hill Road, also includes transportation system challenges that require further study. These challenges relate both to the long-term need to improve David Hill Road to an urban section (portions of this road are currently narrow and winding with minimal shoulders), to connect David Hill Road to Highway 47, and to provide a system of local streets serving the expected residential and mixed use development in this area. Topography and the need to preserve vegetative corridors must also be considered. Identification of this study area including a commitment by the City to evaluate local circulation options is necessary to comply with the requirements of the Transportation Planning Rule (TPR) — hence its identification as a TPR Refinement Area. Compliance with the Regional Transportation Plan (RTP) and Regional Transportation Functional Plan (RTFP) will also require evaluation of local circulation options in this study.~~

~~*Northern Urban Reserve Area*~~

~~While this area is currently outside of the Forest Grove Urban Growth Boundary (UGB), it lies immediately north of existing development, including the future alignment of David Hill Road between that development and Highway 47. Evaluation of potential concept level local circulation options in this area is necessary to ensure that the proposed David Hill Road improvements and the recommended extensions of B and Main Streets to David Hill Road can be accommodated further north when the area is developed in the future. Additionally, identification of a backbone local circulation system will benefit the orderly development of the area in the future.~~

Implementation Actions to Address Post Adoption

Full implementation of the recommendations contained in the Westside Plan requires amendment to several infrastructure facility plans including:

- Water System Master Plan;
- Sanitary Sewer Master Plan; and
- Storm Water/Drainage Master Plan

These plans will be updated when the facility master plans are updated by the Engineering Division.

Appendix

A. Public Involvement & Stakeholder Summary Report
B. Land Use Map
C. Natural Resources Overview Report
D. Infrastructure Overview Report
E. Transportation Baseline Conditions Memo
F. Traffic Analysis
G. Geological and Geotechnical Assessment Report
H. Water, Sewer and Stormwater Infrastructure Analysis
I. Infrastructure Funding Approach

8/14/17
as amended
Ex A

8.2

SECOND READING:

ORDINANCE NO. 2017-05

ADOPTING LEGISLATIVE COMPREHENSIVE PLAN MAP AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Comprehensive Plan Map (Exhibit A); and

WHEREAS, the Comprehensive Plan Map amendments are consistent with the requirements of Metro Urban Growth Management Function Title 11 (Planning for New Residential Areas) are contained in Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Comprehensive Plan Map to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

Anna D. Ruggles, City Recorder

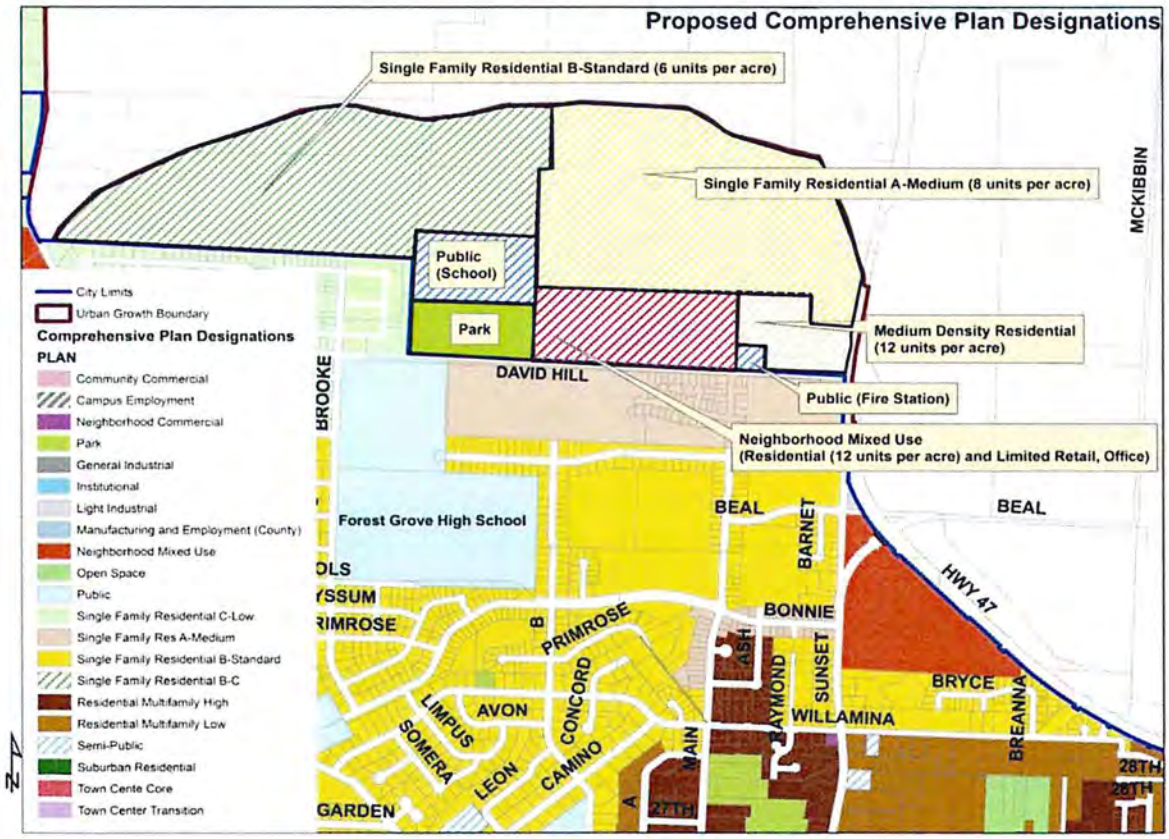
APPROVED by the Mayor this 14th day of August 2017.

Peter B. Truax, Mayor

EXHIBIT A
Westside Refinement Plan
Comprehensive Plan Amendments

The Planning Commission recommends approval of the following amendments to the Comprehensive Plan Map for the new urban growth boundary area north of David Hill Road, west of Highway 47 and east of Thatcher Road. No Comprehensive Plan Map amendments are recommended for the area west of Thatcher Road.

From	To	Gross Acres
Washington County Future Development-20 acre min.	**A-Medium (8.95 dwellings/net acre)**	86.18
Washington County Future Development-20 acre min.	**B-Standard (6.22 dwellings per net acre)**	98.62
Washington County Future Development-20 acre min.	**Medium Density Residential (12 dwellings per net acre)**	10.82
Washington County Future Development-20 acre min.	**Neighborhood Mixed Use (12 dwellings per net acre)**	24.63
Washington County Future Development-20 acre min.	**Public (School)**	10.00
Washington County Future Development-20 acre min.	**Public (Fire Station)**	2.40
Washington County Future Development-20 acre min.	**Park**	6.00



The findings supporting the recommended Comprehensive Plan Map amendments are contained in Attachment B to the May 15, 2017 staff report and are incorporated by herein by reference.

8/14/17
as amended
EXHA

SECOND READING: 8.3

ORDINANCE NO. 2017-06

ADOPTING LEGISLATIVE ZONING MAP AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Zoning Map (Exhibit A); and

WHEREAS, the Zoning Map amendments are consistent with the criteria for Development Code Amendments contained in Development Code §10.2.770 (Zone Change) as shown Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Amendment - Exh A

Section 1: The City Council hereby adopts the amendment to the Zoning Map to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

_____

Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

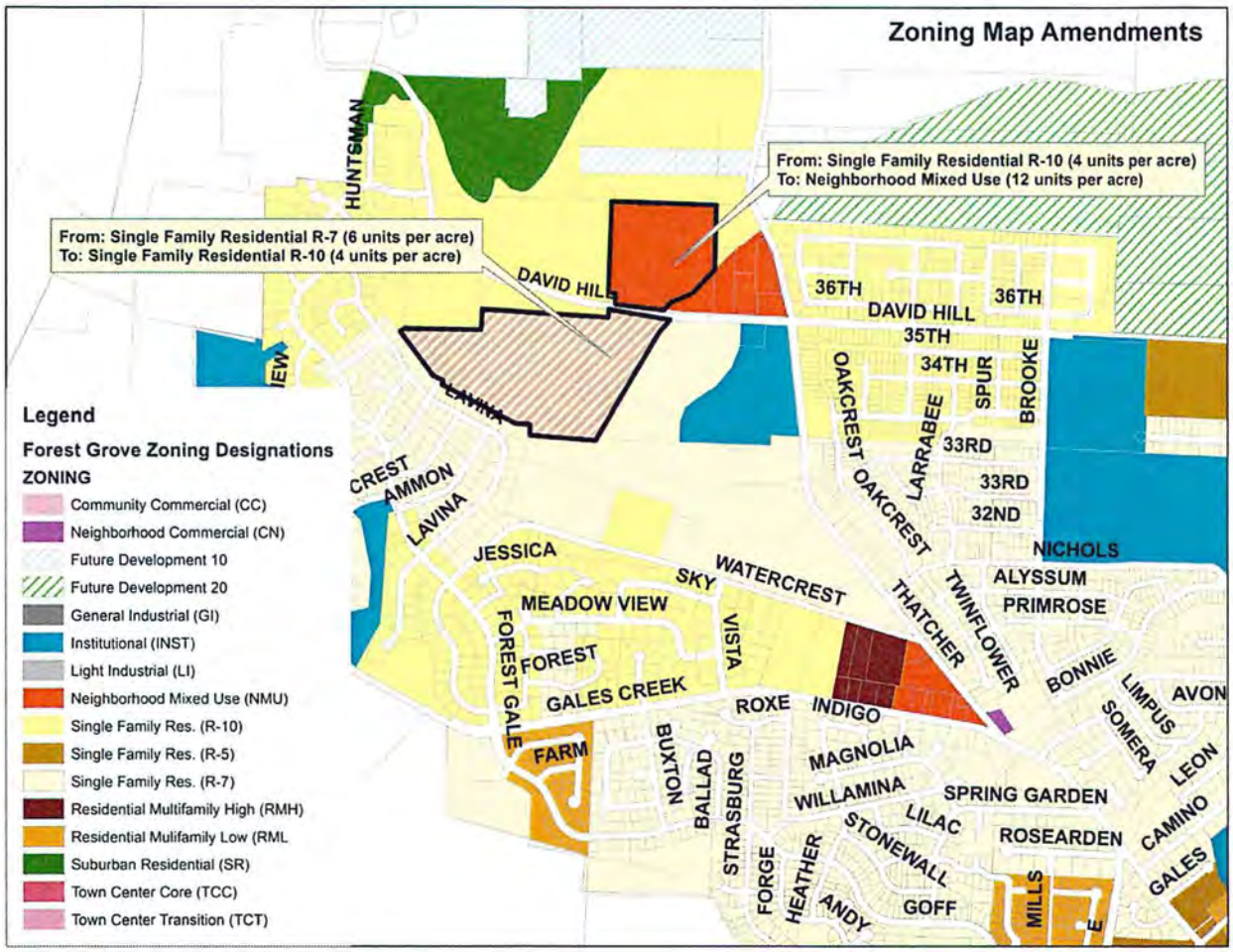
_____

Peter B. Truax, Mayor

EXHIBIT A
Westside Refinement Plan
Zoning Map Amendments

The Planning Commission recommends the following amendments to the Zoning Map for the area west of Thatcher Road. No zoning map amendments are recommended for the new urban growth boundary area north of David Hill Road, west of Highway 47 and east of Thatcher Road.

From	To	Gross Acres
R-7 (6.22 dwellings per net acre)	**R-10 (4.35 dwellings per net acre)**	36.96
R-10	**NMU (Neighborhood Mixed Use)**	20.67



The Planning Commission recommends the change from R-7 zoning to R-10 for a portion of the area south of David Hill Road to reflect constraints to development documented in the Geological and Geotechnical Report, February 2015, prepared by PBS Engineering and Environmental.

The Planning Commission recommends the change from R-10 to NMU for the Nixon Property (Washington County Map and Tax Lot Number 1N4260002602) in order to zone the property consistent with the corresponding NMU designation shown on the Comprehensive Plan Map.

8/14/17
as amended
Exhibit
8.4

SECOND READING:

ORDINANCE NO. 2017-07

ADOPTING LEGISLATIVE DEVELOPMENT CODE AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Transportation System Plan (Exhibit A); and

WHEREAS, the Development Code amendments are consistent with the criteria for Development Code Amendments contained in Development Code §10.2.630 (Development Code Text Amendments) as shown Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Development Code to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

_____

Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

_____

Peter B. Truax, Mayor

EXHIBIT A
Westside Refinement Plan
Development Code Amendments

The Planning Commission recommends the following amendment to the Forest Grove Development Code to implement the Westside Refinement Plan:

§10.4.315(F) TABLE 4-2: Commercial/Institutional Uses within the Village Center

NMU Zoned Area	Minimum Square Footage	Maximum Square Footage
Area 1 - David Hill/Nixon	None	15,000 SF Gross Floor Area
Area 2 - Gales Creek	None	25,000 SF Gross Floor Area
Area 3 - Davidson	25,000 SF Gross Floor Area	130,000 SF Gross Floor Area[1]
Area 4 – East David Hill Rd.	None	150,000 SF Gross Floor Area[2]

§10.8.610(M) Grades and Curves – Grades shall not exceed 10% on arterials, ~~12%~~ **15%** on collector streets for distances of no greater than 250 feet, or any other street (except that local or residential access streets may have concrete segments with grades of up to 15% for distances of no greater than 250 feet), and:

§10.8.310 (Hazard Areas)

2. For development sites having slopes of ~~20%~~ **10%** or more, the following requirements shall be met. To ensure compliance with the provisions of this ordinance, prior to the issuance of a building permit for the construction of any new building[3] within the city, and prior to any grading, excavation or filling or other site modification within areas having a slope of ~~20%~~ **10%** or greater, there shall be submitted to the Community Development Department for review and approval, or approval with modifications:

    a. A site plan (showing any grading, excavating or filling) drawn to scale of the entire property developed and of the proposed construction;

    b. The submission of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist who is a registered geologist certified in the specialty of Engineering Geology under provisions of ORS 672.505 to 672.705 **and a Geotechnical Engineer under provisions of ORS 672.002 to 672.325**. The assessment and report shall address the entire site and meet the following requirements:

        i. The geological **and engineering** assessment shall include information and data regarding the nature, distribution of underlying geology, and the physical and chemical properties of existing soils; an opinion as to stability of the site, and conclusions

[1] Maximum building footprint is 50,000 square feet.
[2] Maximum building footprint is 50,000 square feet.
[3] Building: That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

regarding the effect of geo-logic conditions on the proposed development.

The findings supporting the recommended amendments to the Development Code are contained in Attachment B to the staff report for the May 15, 2017, Planning Commission public hearing.

8/14/17

SECOND READING: 8.5

ORDINANCE NO. 2017-08 as amended - Exh A

ADOPTING LEGISLATIVE TRANSPORTATION SYSTEM PLAN AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Transportation System Plan (Exhibit A); and

WHEREAS, the Transportation System Plan amendments are consistent with the Oregon Transportation Planning Rule (OAR 660-012-0060) as shown Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Transportation System Plan to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: City Council finds that traffic volumes may exceed the current design capacity of the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Road during the twenty-year planning period addressed by the Westside Refinement Plan due to anticipated traffic volumes from future development in the area added to the urban growth boundary in 2014 located north of David Hill Road, west of Highway 47 and east of Thatcher Road, and not from traffic volumes from areas within the urban growth boundary prior to 2014.

Section 3: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

_____

Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

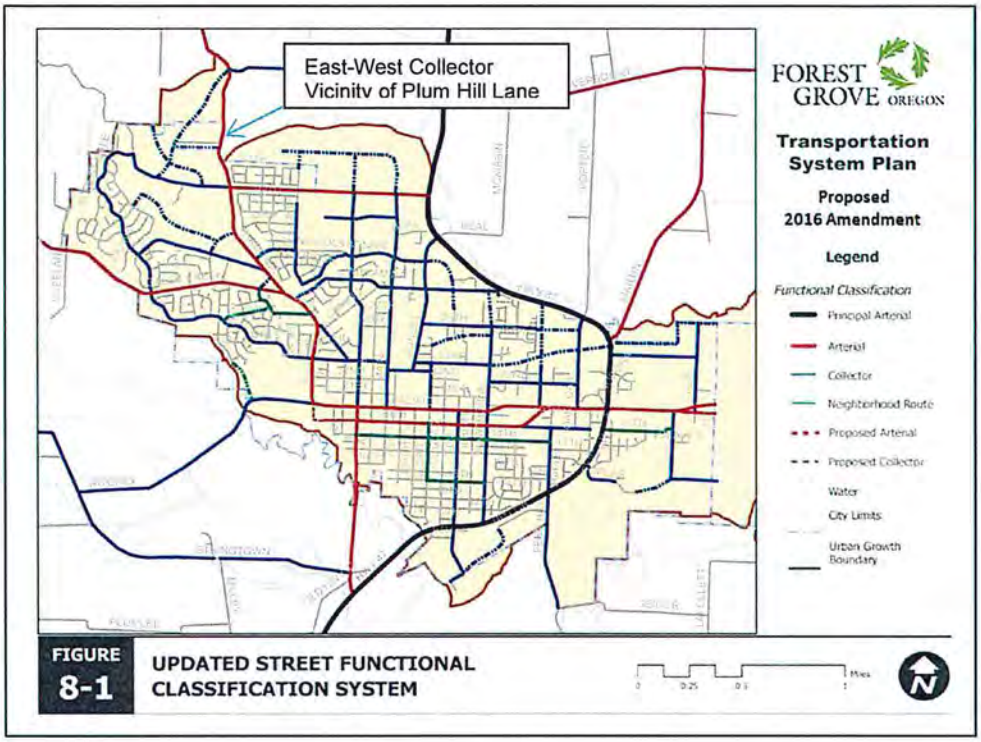
_____

Peter B. Truax, Mayor

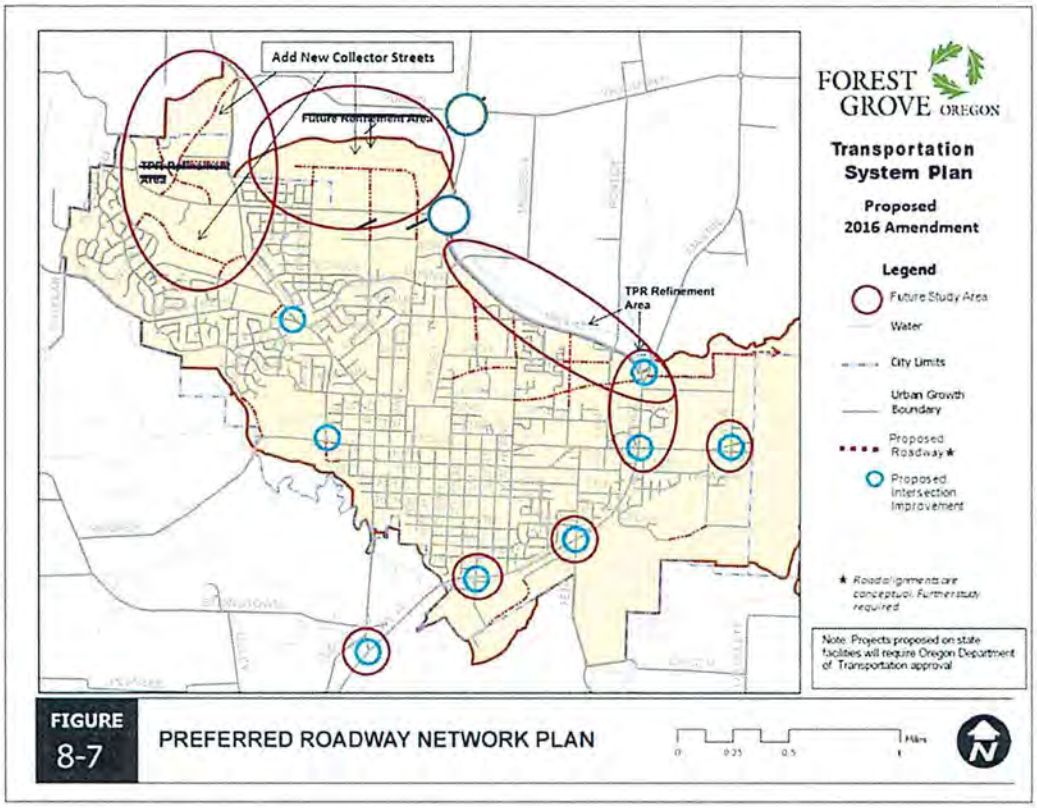
EXHIBIT A
Westside Refinement Plan
Transportation System Plan Amendments

The Planning Commission recommends the following amendments to the Forest Grove Transportation System Plan to implement the Westside Refinement Plan:

Recommended amendments to Transportation System Plan Figure 8-1



Recommended amendments to the Transportation System Plan Figure 8-7



Recommended revised cross-section for David Hill Road west of Thatcher Road:

Recommended amendments to the Transportation System Plan project tables to add needed mitigation to the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Roads required for compliance with the Oregon Transportation Planning Rule (OAR 660-012-0060). The Planning Commission finds the mitigation projects are needed due to anticipated traffic generation from growth in the new urban growth boundary area north of David Hill Road west of Highway 47 and east of Thatcher Road. The Planning Commission also finds that traffic volumes from the David Hill Road area have been accounted for in the TSP and therefore, do not have a significant effect on transportation facilities for purposes of Transportation Planning Rule Compliance (OAR 660-012-0060(9)). The proposed mitigation measure for the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Road will be recommended by the City for addition to the Metro Regional Transportation Plan to be updated in 2018.

Roadway Projects (TSP Table 8-3)

No.	Name	Description	Purpose	Metro Project ID*	Total Cost ($Million)
1	David Hill Road / Hwy. 47 Intersection Capacity Improvements ~~Extension~~	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing east terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.	~~Improve connectivity and balance circulation.~~ Improve operational deficiencies to ensure mobility standards are met.	10772	~~$13.61~~ $2.5
~~2~~	~~Highway 47 / Pacific Avenue Intersection Improvements *~~	~~Additional channelization, crosswalk, and traffic signal modification at intersection. Specific improvements may be modified at a future date.~~	~~Improve access and mobility. Improve substandard turn radius and pedestrian crossing.~~	~~10780a~~	~~$1.3~~
13	Hwy 47 and Purdin Road Intersection Improvements *	~~Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin and Verboort Roads~~ Add a northbound right turn slip lane on the south leg of the roundabout and a southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	Improve operational deficiencies to ensure mobility standards are met.	10780f	~~$3.17~~ $4.0
TOTAL					~~$122.44~~ $110.86

Notes: * Projects will require ODOT approval. Inclusion of a project in this table does not obligate or imply the obligation of funds for any specific project.

Forest Grove Financially Constrained Project List (TSP Table 1-2)

#	Name	Description	Jurisdiction Owner/ Operator	Metro Project ID	RTP Financially Constrained	Total Cost	Non-City Funds	City Funds	Project Timing
1	David Hill Road ~~Extension~~ / Hwy. 47 Intersection Capacity Improvements	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from~~	~~City~~ ODOT & County	10772	Add[1]	~~$13.61 **~~ $2.5 **/***	~~$13.61~~ $2.50	$0.0	~~0-5 years~~ 6-10 years

[1] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

		~~existing terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.							
~~5~~	~~Highway 47 / Pacific Avenue Intersection Improvements*~~	~~Additional channelization, crosswalk, and traffic signal modification at intersection. Specific improvements may be modified at a future date.~~	~~ODOT~~	~~10780a~~	~~Yes~~	~~$1.3 **~~	~~$0.8~~	~~$0.5~~	~~0-5 years~~
						TOTAL:		**$35.6M**	

Source: City of Forest Grove. Estimated share of city cost provided by City of Forest Grove.
Notes: **PROJECT PRIORITIES ARE BASED ON ANTICIPATED PROJECT TIMING**
*Project will require ODOT approval. Inclusion of a project on an ODOT facility in this table does not obligate or imply the obligation of funds for any specific project.
**Partially or fully funded by jurisdictional agency (i.e. TriMet, ODOT, Washington County, Metro or other).
***Partially or fully funded by private development exactions.

Forest Grove Financially Constrained Project List (TSP Table 10-3)

#	Name	Description	Jurisdiction Owner/ Operator	Metro Project ID	RTP Financially Constrained	Total Cost	Non-City Funds	City Funds	Project Timing
1	David Hill Road / Hwy. 47 Intersection Capacity Improvements ~~Extension~~	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing terminus to Highway 47~~ Add an additional second	City	10772	Add[2]	~~$13.61 **~~ $2.5 **/***	~~$13.61~~ $2.50	$0.0	~~0-5 years~~ 6-10 years

[2] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

		circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.							
16	Highway 47 / Purdin Road Intersection Improvements*	~~Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin Road and Verboort Rd.~~ Add a northbound right turn slip lane on the south leg of the roundabout and southbound right turn lane on the south leg of the roundabout to the overall roundabout intersection.	ODOT & County	10780f	~~No~~ Add[3]	~~$3.32 **~~ $4.0 **/***	~~$3.32~~ $4.0	$0.0	6-10 Years
								$35.6M	

Source: City of Forest Grove. Estimated share of city cost provided by City of Forest Grove.
Notes: **PROJECT PRIORITIES ARE BASED ON ANTICIPATED PROJECT TIMING**

*Project will require ODOT approval. Inclusion of a project in this table does not obligate or imply the obligation of funds for any specific project.

**Partially or fully funded by jurisdictional agency (i.e. TriMet, ODOT, Washington County, Metro or other).
***Partially or fully funded by private development exactions.

[3] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

FOREST GROVE OREGON

A place where families and businesses thrive.

CITY RECORDER USE ONLY:	
AGENDA ITEM #:	7.1 - 7.5
MEETING DATE:	First Reading July 10, 2017
FINAL ACTION:	ord 2017-04 ord 2017-05 ord 2017-06 ord 2017-07 ord 2017-08

CITY COUNCIL STAFF REPORT

TO: *City Council*

FROM: *Jesse VanderZanden, City Manager*

PROJECT TEAM: *Jon Holan Community Development Director, Rob Foster, Public Works Director; Richard Blackmun, Special Projects Engineer; Dan Riordan, Senior Planner*

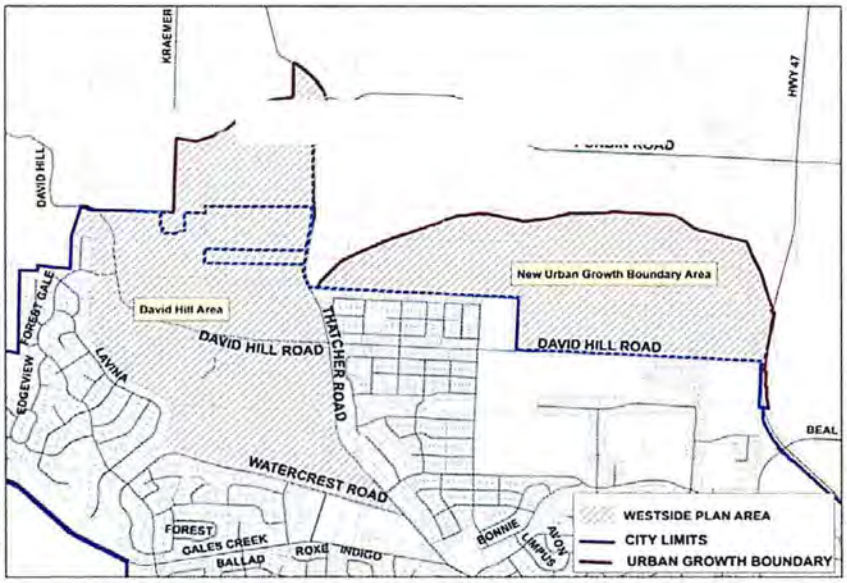
MEETING DATE: *July 10, 2017*

SUBJECT TITLE: *Public Hearing and First Reading of Ordinances Adopting the Westside Refinement Plan and accompanying implementations as recommended by the Planning Commission; File No. 311-17-00013-PLNG*

ACTION REQUESTED:	X	Ordinance		Order		Resolution		Motion		Informational

X all that apply

ISSUE STATEMENT: Over the past two years, City staff and a consultant team have been working with potentially affected property owners and residents toward completion of the Westside Refinement Plan (Exhibit A). This report summarizes the culmination of this effort and the Planning Commission's recommendations for Council consideration. If adopted, the Westside Refinement Plan will provide a policy framework to guide and get ahead of subdivision activity in two largely undeveloped areas in the urban growth boundary described below. Three public hearings were held with Commission on the Westside Plan and implementation measures.



The Planning Commission recommendations are summarized in this report below.

BACKGROUND: The Westside Refinement Plan contains a recommended policy framework to guide future development in the two largely undeveloped areas within the urban growth boundary: the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road, west of Highway 47 and east of Thatcher

Road and area north of Watercrest Road and west of Thatcher Road. The area west of Thatcher Road has been in the urban growth boundary since inception in the early 1980s.

The need for a Westside Refinement Plan increased in importance from:

- Absorption of vacant land in the urban growth boundary near infrastructure;
- Metro adoption of the Regional Transportation Functional Plan requiring local adoption of a conceptual backbone street system to serve future development. The conceptual street system must be incorporated into the local transportation system plan; and
- Amendment to the urban growth boundary by the Oregon Legislature to include the area north of David Hill Road between Highway 47 and Thatcher Road. The City must adopt Comprehensive Plan designations for this area to comply with Metro Urban Growth Management Functional Plan and intent of the Urban Planning Area Agreement between the City and Washington County. Since the City is closest municipality to the new urban growth boundary area the City has planning responsibility.

Given the limited resources available to the City to complete an endeavor as comprehensive as the Westside Refinement Plan the City applied for a Metro planning grant. The grant provided resources to retain a consultant team with expertise in conducting the technical analyses necessary to support recommendations for land use and infrastructure. The consultant team assessed transportation needs, environmental constraints including slope and soil instabilities, water system deficiencies and needed sanitary and storm sewer improvements. The consultants' analysis and findings are contained in the following documents attached as appendices to the Refinement Plan:

- Westside Transportation Baseline Report, January 2015, prepared by SCJ Alliance;
- Westside Natural Resources Overview, January 2015, prepared by SCJ Alliance;
- Westside Infrastructure Overview, December 2014, prepared by SCJ Alliance;
- Geological and Geotechnical Assessment Report, Westside Planning Project, February 2015, prepared by PBS Engineering + Environmental;
- Revised Final Westside Water, Sewer, and Stormwater Infrastructure Report, June 24, 2016, prepared by SCJ Alliance;
- Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative, March 8, 2017, prepared by SCJ Alliance; and
- Infrastructure Funding Approach Report, December 2016, prepared by FCS Group.

The Westside Plan includes the following elements:

- Planning Framework;
- Citizen Participation Overview;
- Land Use Concept;
- Natural Resources Overview;
- Recreational, Cultural and Open Space Resources Overview;
- Natural Hazards Overview;
- Transportation System Overview;
- Sewer System Overview;
- Water System Overview;
- Infrastructure Funding Approach;
- Policy Direction; and
- Implementation Actions Overview

The Westside Refinement Plan includes goals, policy recommendations, and actions for carrying-out the plan. The goals, policies and actions address land use, public facilities, natural resources, natural hazards, transportation and funding needed infrastructure to support the land use concept. In general the goals, policies and actions speak to:

- Physical limitations of the land in the Westside area such as slope and soil stability;
- Promoting a mix of land uses in the area;
- Promoting efficient and cost-effective land development;
- Promoting an orderly transition from rural land to urban land use;
- Encouraging a variety of housing types;
- Addressing potential visual impacts due to development;
- Identifying a context sensitive street network addressing the characteristics of the Westside planning area;
- Addressing funding for infrastructure improvements;
- Addressing local and regional street network capacity constraints anticipated from development; and
- Minimizing development impacts on natural resources

ADOPTION PROCESS AND PLANNING CONTEXT

Staff is requesting City Council:

1. Review the Westside Refinement Plan and accompanying implementation actions;
2. Consider the Planning Commission's recommendations;
3. Accept public comment on the proposals; and
4. Adopt the required ordinances approving the Westside Refinement Plan and accompanying implementation measures making any changes to the proposals desired by Council.

Specific implementation actions include:

- Amendments to the Forest Grove Comprehensive Plan Map to implement the land use concept contained in the Plan especially the area added to the urban growth boundary. The specific amendments are described elsewhere in this report.

- Amendments to the Zoning Map to address findings contained in the technical analysis especially related to slope and soil instabilities. The specific amendments are described elsewhere in this report.

- Amendments to the Development Code text to address findings contained in the technical analysis related to slope. The specific amendments are described elsewhere in this report.

- Amendment to the Forest Grove Transportation System Plan to adopt a conceptual backbone street system for the Westside area as described in this report and exhibits.

The applicable review criteria for the actions above include:

- Comprehensive Plan Amendments: Amendments to the Comprehensive Plan Map are reviewed based on consistency with the goals and policies contained in the Comprehensive Plan text, statewide land use planning goals, Metro Regional Framework Plan, and Metro Urban Growth Management Functional Plan.

- Zoning Amendments: Zoning Map amendments are reviewed based on the criteria contained in Development Code §10.2.770. This includes:
  - The zone change is consistent with the Comprehensive Plan Map.
  - The zone change is consistent with the relevant goals and policies of the Comprehensive Plan.
  - The site is suitable for the proposed zone.
  - The zone change is consistent with the adopted Transportation System Plan.
  - Public facilities and services for water supply, sanitary waste disposal, storm water disposal, and police and fire protection are capable of supporting the uses allowed by the zone.
  - The establishment of the zone district is not subject to the meeting of conditions.
- Development Code Text Amendments: Amendments to the text of the Development Code are considered based on the following criteria contained in Development Code §10.2.630)
  - The text amendment is consistent with the relevant goals and policies of the Forest Grove Comprehensive Plan;
  - The text amendment is consistent with the relevant state and regional planning goals, programs and rules.
- Transportation System Plan Amendments: Amendments to the Transportation System Plan are evaluated based on the following criteria:
  - Compliance with the Oregon Transportation Planning Rule (OAR 660-12-060)
  - Metro Regional Transportation Functional Plan

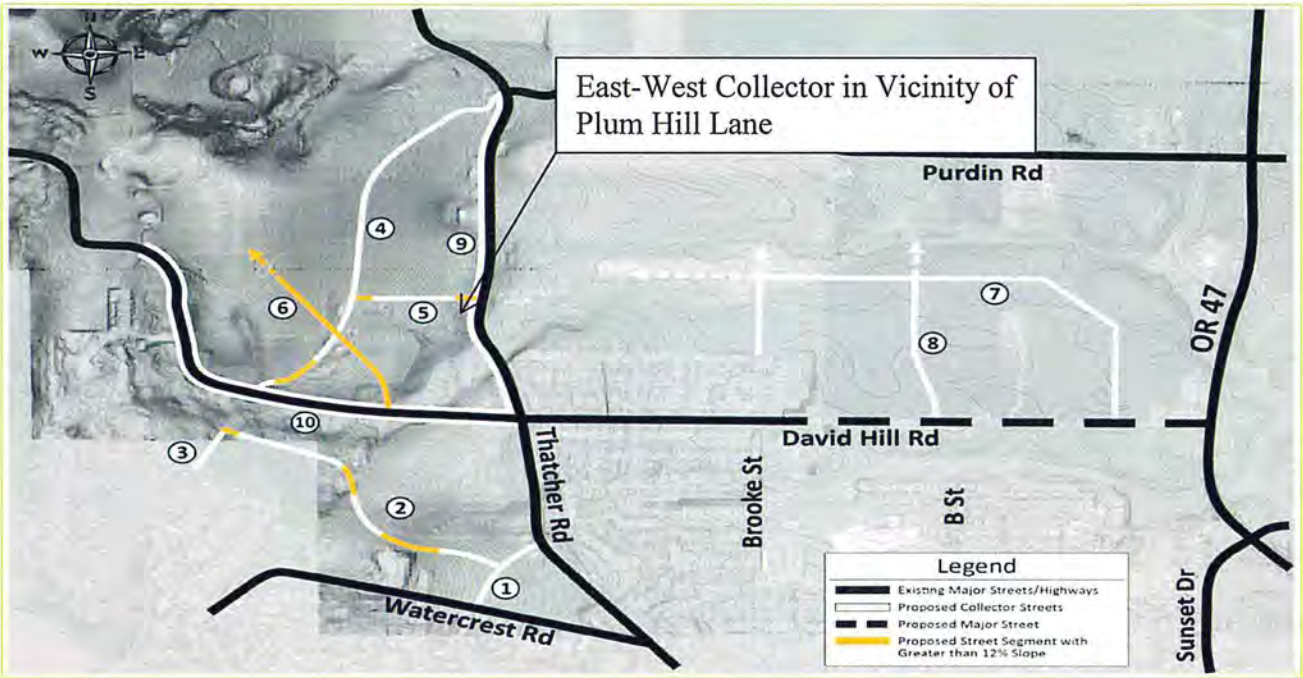
Demonstration of how the Westside Refinement Plan and accompanying implementation actions comply with the applicable review criteria is addressed in detail in the attached findings document (Exhibit B). The findings document also provides the factual basis supporting the recommendations contained in the plan and proposed implementation actions.

In addition to the initial implementation actions, the Westside Refinement Plan also includes recommendations for post adoption actions. These actions include amending various infrastructure facility plans including the City's Water System Master Plan, Sanitary Sewer Master Plan, Stormwater and Drainage Master Plan and establishing infrastructure financing tools. Recommendations pertaining to these actions will be taken as the City's Engineering Division updates the various facility master plans beginning in 2018 and ending in 2020. Details regarding identified infrastructure improvements are contained in the Plan (Exhibit A) and summarized below.

Transportation System

Land use and transportation are inherently linked and should not be considered in isolation. Land use designations mean little if property is inaccessible due to lack of streets or if insufficient roadway capacity exists. Roads currently serving the Westside planning area include David Hill Road, Watercrest Road, Thatcher Road, and Highway 47. To some extent Purdin Road also serves the Westside planning area by providing a connection to the north Hillsboro employment from the northern portion of the David Hill area. The existing roadway network is shown on the map below. The map also shows proposed conceptual collector street corridors to serve future development. The conceptual street network complies with the Metro Regional Transportation Functional Plan requirement for a system of collector streets placed ½ mile apart unless topography or other factors preclude such placement.

The highlighted street segments on the map are those that exceed 12% slope. Current development standards limit street grade to 12%. An amendment to the Development Code is proposed to allow grades up to 15% for a distance of up to 250 feet unless a longer distance is approved by the City Engineer.



SCJ ALLIANCE
CONSULTING SERVICES

Figure 3
Proposed Street System

Westside Planning Project
Forest Grove, OR

The total estimated cost for the streets identified below is approximately $37.7 million. This includes adding capacity to the roundabouts on Highway 47 at David Hill Road and Purdin Road. Adding capacity is necessary due to expected traffic impacts from development in the area north of David Hill Road between Highway 47 and Thatcher Road. This is discussed further below. It is expected impacts will occur toward the end of the 20-year planning period depending on the annual number of building permits issued.

The consultant recommended funding approach for transportation improvements described in the December 2016 Funding Approach report relies primarily on using the current Transportation Development Tax (TDT) revenue, establishing a supplemental transportation system development charge (STSDC), and using outside funding sources. Identified potential outside funding sources could include the Washington County Major Street Transportation Improvement Program (MSTIP), Metro regional flexible funds for transportation, state funding through the State Transportation Improvement Program (STIP), establishment of a local improvement district or reimbursement district. A local improvement district requires City Council adopt an ordinance establishing a fee assessed against property benefitting from a new infrastructure improvement such as a street. The assessment could be based on the cost of the improvement and the lineal distance of property frontage or the land area benefitted. In contrast, a reimbursement district relies on a property owner or developer paying for a needed improvement upfront. As other benefitting properties develop the benefitting properties reimburse a proportionate share of the cost to the entity that paid for the improvement upfront.

Staff believes the following projects are potentially suitable for outside funding:

- Highway 47/David Hill Road Roundabout;
- Highway 47/Purdin Road Roundabout;
- Thatcher Road between David Hill Road and Purdin Road; and
- David Hill Road west of Thatcher Road to the urban growth boundary.

The Highway 47 roundabouts are suitable for outside funding because the facility is owned by ODOT and provides benefit to the City and Washington County road systems. Thatcher Road is suitable for outside funding because it is a Washington County facility linking David Hill Road and Purdin Road. Washington County has expressed interest in transferring jurisdiction to the City. Before the City would accept jurisdiction of Thatcher Road would have to be improved to urban standards. David Hill Road west of Thatcher Road is potentially suitable for outside funding due to complexity of improving this stretch of David Hill Road due to topography and environmental constraints including the stream located to the south of roadway.

Water System

The ability to provide water at adequate pressure to certain areas of the Westside Planning area is a constraint on development. Identified needs include a 2.25 million gallon reservoir located near or adjacent to 5.0 million gallon reservoir at the water treatment plant on Watercrest Road. This reservoir will provide service to areas from elevations in the City between 250 feet and 440 feet.

A new 500,000 gallon reservoir to serve the highest elevations between 440 feet and 615 feet is another identified need. This reservoir would be located further up David Hill Road from the existing David Hill Reservoir. In addition, two 300,000 gallon reservoirs located near the existing David Hill reservoir are also shown on the concept map below. These reservoirs will provide service to areas located in the intermediate pressure zone between 250 feet and 440 feet. These improvements are based on the currently adopted Waster Master Plan. An update to the Master Plan will occur in 2018 and a new reservoir approach will be considered. Reservoir needs could be consolidated to reduce costs.

The overall estimated total cost for the identified water system is approximately $17.5 million. Of this amount, approximately $8.5 million is attributable to needs in the Westside planning area.

The Westside Refinement Plan also identifies needed improvements to the water storage and distribution system to serve development in the planning area. The Funding Approach Report appended to the Refinement Plan indicates that approximately 76% of SDC revenue generated by development will be needed to construct the full project list identified below. Incorporating the Westside project into Water Master Plan update provides an opportunity to address funding needs in a comprehensive way factoring in broader city-wide system requirements. Staff recommends the funding strategy be evaluated further and include additional discussion with property owner and develop input prior to refinement and implementation.

A water system development charge is collected at time of building permit issuance for water system improvements. The current water SDC is $5,478. FCS Group calculated the level of funding required from the private sector to cover 100% of water system project costs. This analysis is provided in the Funding Approach Report (December 2016), Outside funding is required for the City to construct the full water system project list unless the City devotes at 76% of water SDC revenues from the Westside planning area for project capital costs. The consultant recommended funding strategy for water relies on using at least 76% of water SDC revenues meet capital improvement obligations in the planning area. The consultant further recommends the City consider issuing revenue bonds backed by water rates to a new General Obligation bond to pay for any necessary short-term water capital improvements. It is recommended that this strategy be further evaluated by the City and additional opportunities for public input be provided prior to its refinement and implementation.

Sanitary Sewer

The Refinement Plan shows sanitary sewer mains that will be constructed with the collector street network. The sewer system contained in the plan is the backbone network that individual development will tie into. The estimated cost for the identified sanitary sewer improvements is approximately $3.6 million. A possible short-term need includes extending the sanitary sewer line that terminates near Thatcher Park westward. This extension is estimated to cost approximately $1.1 million and may be too high for any one developer to afford on their own. Funding sources including a local improvement district, reimbursement district or outside source may be required for this improvement.

The current sanitary sewer system development charge is $5,300. The agreement between Clean Water Services and the City is being updated. The updated agreement will allocate system development charge revenue by a formula where Clean Water Services will receive 96% of the revenue and the City retains 4%. The revenue received by Clean Water Services is intended for regional needs including trunk lines and treatment. The City approached Clean Water Services about the prospect of using additional revenue generated by development in the Westside planning area for Westside specific needs. Discussions with Clean Water Services will continue.

The sanitary sewer system improvements identified improvements will be incorporated into the next update of the Sanitary Sewer Master Plan expected in 2019-2020.

Storm Sewer and Drainage

The Plan also identifies the storm water management system needed for the collector street system. The proposed system is based on the use of ponds to treat storm water. The analysis of storm water system needs is based on the lineal footage of the road layout. At this time, the local streets that support development have not been included in the analysis since local roads will be based on specific development proposals. Runoff from property adjacent to the public street system is also not included. The identified storm sewer projects identified on the map below will be incorporated in the next update to the Storm Drainage Master Plan.

The estimated cost for the identified storm water management system is approximately $1.6 million. Because the current storm water system development charge is $510 per dwelling existing revenue does very little to cover required capital costs leaving a funding gap. The consultant recommended a funding approach that relies upon the existing system development charge and includes a supplemental storm water rate surcharge of approximately $7 per month for households within the Westside Planning area. The consultant's analysis suggests the rate surcharge could be phased in over a period of five years and indexed with inflation. If the rate surcharge is insufficient consideration could be given to using local improvement and reimbursement districts for a share of funding costs. Further discussion of this approach is needed through the Stormwater and Drainage Master Plan update scheduled to be completed by 2020.

Parks

The Westside Refinement Plan identifies a six-acre neighborhood park in the area north of David Hill Road between Highway 47 and Thatcher Road. The future neighborhood park is included in the Parks and Recreation Master Plan. In addition, the Westside Refinement Plan identifies improvements at Thatcher Park also included in the Parks and Recreation Master Plan. Total estimated cost is $6,600,000. Of this amount, $3,648,000 is attributable to addressing Westside planning area growth. Funding for these improvements is the Parks system development charge. The current charge is $3,000 per dwelling unit.

COMMUNITY INVOLVEMENT

Preparation of the Westside Refinement Plan included opportunities for community involvement. Opportunities for community involvement included stakeholder interviews, three community meetings (April 2015, May 2015 and March 2017) and work sessions with the Planning Commission (October 2014, July 2015, May 2016 and February 2107). Stakeholder interviews included property owners, residents, a realtor, Planning Commission member, Parks and Recreation Commission member, Forest Grove School District representative and a business owner. In addition, opportunities for formal public input are provided during the public hearing process leading to plan adoption.

The draft plan was changed based on the comments received from the community. This included changing the land use concept to provide a greater emphasis on single family residential development and opportunities for retail commercial in the new urban growth boundary area, identifying options for funding needed infrastructure based on equity considering costs and area benefitted, and including policies for addressing potential view impacts resulting from development on David Hill.

The next sections of this report describe Planning Commission's recommendations for City Council consideration.

PLANNING COMMISSION RECOMMENDATIONS

The Planning Commission held public hearings on the Refinement Plan and proposed implementation actions on May 15, 2017, May 30, 2017 and June 5, 2017. As a result of the public comments received and Planning Commission member deliberations, the Commission recommends the following modifications to the Westside Refinement Plan and accompanying implementation measures. The Planning Commission's Decision and Recommendation 2017-09 is attached for reference (Exhibit C). The complete record supporting the Planning Commission's decision is incorporated by reference to this report as Exhibit D.

The Planning Commission's decision is Council adopt the Westside Refinement and accompanying implementation measures incorporating the following recommendations:

Planning Commission Recommendation 1

The Planning Commission heard testimony and considered the zoning designation of property west of Thatcher Road and north of David Hill Road. The property is currently owned by the Nixon's and is zoned single family residential R-10. The Comprehensive Plan Map designation is Neighborhood Mixed Use. The site is adjacent to a small Neighborhood Mixed Use area across from Thatcher Park.

The Planning Commission recommends the zoning map be modified to apply the Neighborhood Mixed Use zone to the Nixon Property (Washington County Map and Tax Lot Number 1N4260002602) consistent with the current Comprehensive Plan designation which is also Neighborhood Mixed Use. The specific location of the proposed zoning map modification is shown below in the section describing proposed zoning map amendments.

The Planning Commission also recommends the Neighborhood Mixed Use in the new urban growth boundary area north of David Hill Road be treated similar to the Davidson Neighborhood Mixed Use area at Sunset Drive and Highway 47 to provide the opportunity for a maximum of 15,000 square feet of commercial/institutional space for uses shown on Table 3-10 of Development Code §10.3.320. In support of this recommendation the Planning Commission makes the following finding:

Applying the Neighborhood Mixed Use zone to the Nixon Property implements the Forest Grove Comprehensive Plan designation which is also Neighborhood Mixed Use and this action makes the zoning and Comprehensive Plan designation consistent. In addition, applying the Neighborhood Mixed Use zoning designation to the Nixon property will provide an opportunity to establish a complete neighborhood in the area with a variety uses in proximity consistent with Comprehensive Plan Sustainability Goal 8 which state: "Create complete neighborhoods, through land use regulation, with housing, recreational opportunities, retail, services and employment nearby." Furthermore, applying the NMU zoning designation to the Nixon Property will provide flexibility in site design, housing types and density.

Planning Commission Recommendation 2

The Planning Commission considered modifying the Suburban Residential zoning designation to follow property lines rather than the 440 foot contour elevation as it currently does. The Commission recommends retaining the Suburban Residential zone above the 440 foot contour elevation. In support of this recommendation the Planning Commission makes the following finding:

The Suburban Residential zone was created to establish a land use designation allowing for one acre lots due to topography and inherent difficulty of providing sanitary sewer and water infrastructure. The large lots are intended to accommodate wells and septic systems on large lots and retaining the SR designation will achieve this objective.

Planning Commission Recommendation 3

The Planning Commission considered a conceptual funding approach for needed infrastructure improvements to serve development. Regarding infrastructure needs and funding the Planning Commission recommends including a policy statement in the Westside Refinement Plan recognizing the Westside planning area includes three subareas:

1. The area above the 440 foot contour elevation;
2. The area west of Thatcher Road below the 400 foot contour elevation; and
3. The area north of David Hill Road, east of Thatcher Road and west of Highway 47.

To support this recommendation the Planning Commission makes the following finding:

The Westside Planning Area is characterized by distinct areas based on elevation, topography, and ability to provide cost-effective public infrastructure. The area east of Thatcher Road is flat and public infrastructure in nearby allowing for extension in the near-term. The area west of Thatcher Road has the highest elevations in the urban growth boundary, is relatively steep, and has a variety of environmental constraints including adverse soils and a historic landslide area. Public infrastructure is lacking and extension of necessary infrastructure is costly as reflected in the Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis, June 24, 2016 and Funding Approach Report, December 2016. These factors identified above distinguish the subareas and provide the basis for the Planning Commission recommendation to address infrastructure needs on a subarea basis.

The capability to fund needed infrastructure improvements will be evaluated as the City's various infrastructure facility plans are updated by the Engineering Division over the next few years. Staff has a concern about dividing the Westside planning area into three subareas for purposes of funding needed infrastructure improvements. The primary concern is that development fees could be cost prohibitive if infrastructure needs and costs are only considered by subarea. Based on analysis, staff believes that the

cost differential does not appear to be as significant as the Commission believes. To address this issue staff proposes the following policy statement action item be added to the Westside Refinement Plan:

> ***Policy Statement: As infrastructure costs are evaluated in future updates of facility master plans and the Transportation System Plan, consideration to spread these costs should take the following alternatives into account:***
>
> - ***Area-wide (David Hill and New Urban Growth Boundary Area) and the following subareas:***
> - ***New Urban Growth Boundary Area;***
> - ***David Hill west of Thatcher Road below the 440 foot contour elevation;***
> - ***David Hill west of Thatcher Road above the 440 foot contour elevation***

Planning Commission Recommendation 5

Based on the public comments heard during the public hearing process the Planning Commission recommended that the Plan include a policy statement and action Item stating the water system for the area above the 440 foot contour elevation requires a slow, careful, long-term approach for addressing water needs. To support this recommendation the Planning Commission makes the following finding:

> *The area above the 440 foot contour elevation cannot currently be served by the municipal water system due to the elevation of the current water reservoir on David Hill. A new reservoir is required at a higher elevation to ensure adequate water pressure and provide additional storage as described in the Revised Final Westside, Water, Sewer and Stormwater Infrastructure Analysis, June 24, 2016. The Planning Commission recommends a slow, careful and long-term approach to addressing water needs to ensure needs are considered comprehensively and to minimize costs associated with improving the system.*

Planning Commission Recommendation 6

The Planning Commission also recommended a policy statement to recognize that the street system should follow contours when designed and engineered. To support this recommendation the Planning Commission makes the following finding:

> *The proposed Westside Refinement Plan identifies as a goal in Chapter 13 – Policy Direction, to "Establish a context sensitive street network addressing the characteristics of the Westside Planning Area" (Goal 8.1). This goal recognizes the David Hill area is characterized by steep slopes as documented in the Geological and Geotechnical Assessment Report, February 2015, prepared by PBS Engineering and Environmental. A context sensitive approach is recommend to minimize environmental disturbance including cut-and-fill and potential visual impacts. For this reason, the Planning Commission recommends that roads follow contours when designed and engineered.*

Planning Commission Recommendation 7

Another Planning Commission recommendation is to add a policy statement to the Plan to evaluate Septic Tank Effluent Gravity (STEP) and Septic Tank Effluent Pump (STEP) sewerage treatment approaches as a potential cost-effect strategy for addressing sewerage needs in the area west of Thatcher Road. The proposed wording for the policy statement and action item is shown below:

Policy 7.5.1: Through the next update of the City of Forest Grove Wastewater Management Plan evaluate the feasibility of implementing sanitary sewer systems such as Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) in the Westside planning area.

Action 7.5.1: Initiate discussions with Clean Water Services to evaluate the feasibility of implementing sanitary sewer systems such as Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) in the Westside planning area.

To support this recommendation the Planning Commission makes the following finding:

Testimony was provided to the Planning Commission on May 15, 2017, May 30, 2017 and June 5, 2017 regarding the use of Septic Tank Effluent Gravity (STEG) and Septic Tank Effluent Pump (STEP) systems as a lower cost solution for addressing sanitary sewerage needs compared to the traditional method of conveyance to a treatment plant. The Planning Commission endorses further evaluation of such systems to determine if it is a feasible way to address sanitary sewerage needs in the David Hill area.

Planning Commission Recommendation 8

During the public process the Planning Commission heard concern about the prospect of improving Plum Hill Lane to urban collector standards due to steep grades and impacts on adjacent properties. To comply with regional transportation planning requirements there is a need for an east-west collector intersecting with Thatcher Road between David Hill Road and Purdin Road. The proposed road corridors including Plum Hill are conceptual and do not represent any specific alignment. Roadway alignments will be determined as part of the development review process based on specific proposals.

Based on the testimony received the Commission recommends consideration of alternative corridors for the collector road as part of the next updated to the Transportation System Plan likely to begin in 2018. This recommendation is reflected in the proposed Transportation System Plan amendments noted elsewhere in this report.

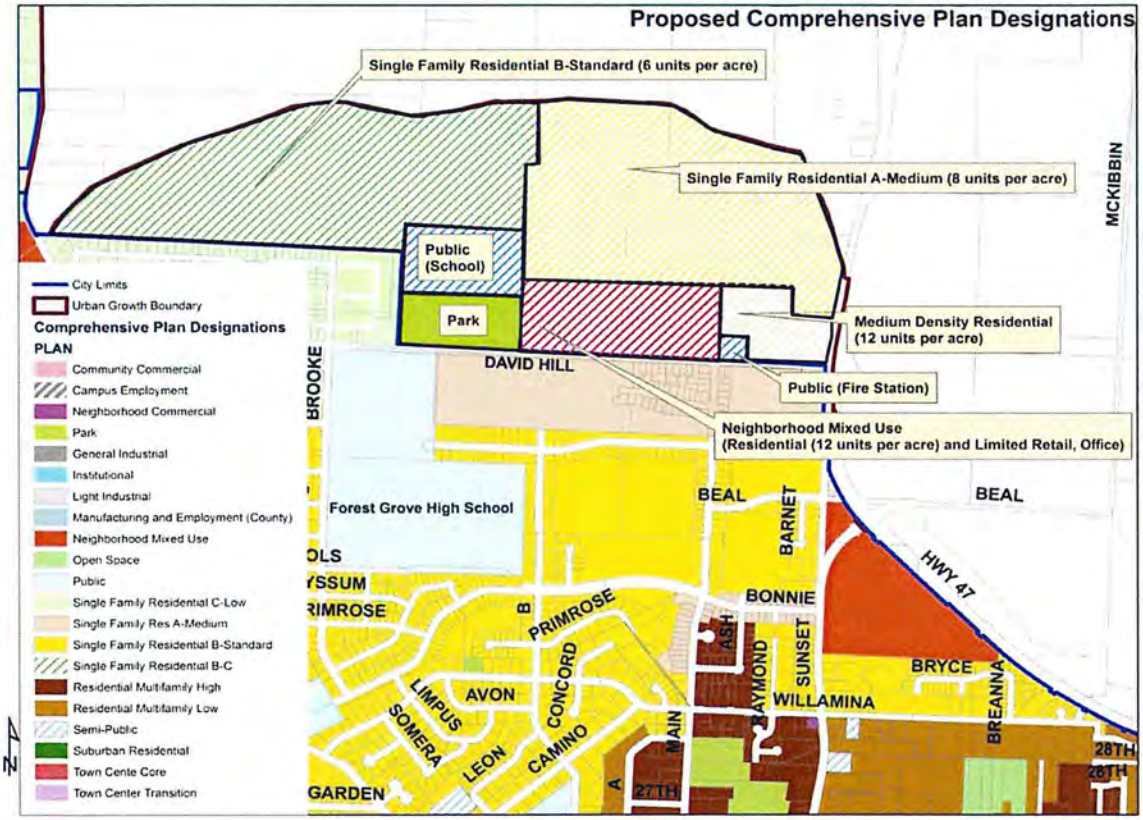
Along with adoption of the Westside Refinement Plan specific implementation actions are proposed. The implementation actions are described below and include amendments to the Comprehensive Plan Map, Zoning Map, Development Code and Transportation System Plan.

Recommended Comprehensive Plan Amendments

The Planning Commission recommends the following amendments to the Forest Grove Comprehensive Plan Map for the area north of David Hill Road between Highway 47 and Thatcher Road.

Comprehensive Plan Map Amendments
New Urban Growth Boundary Area

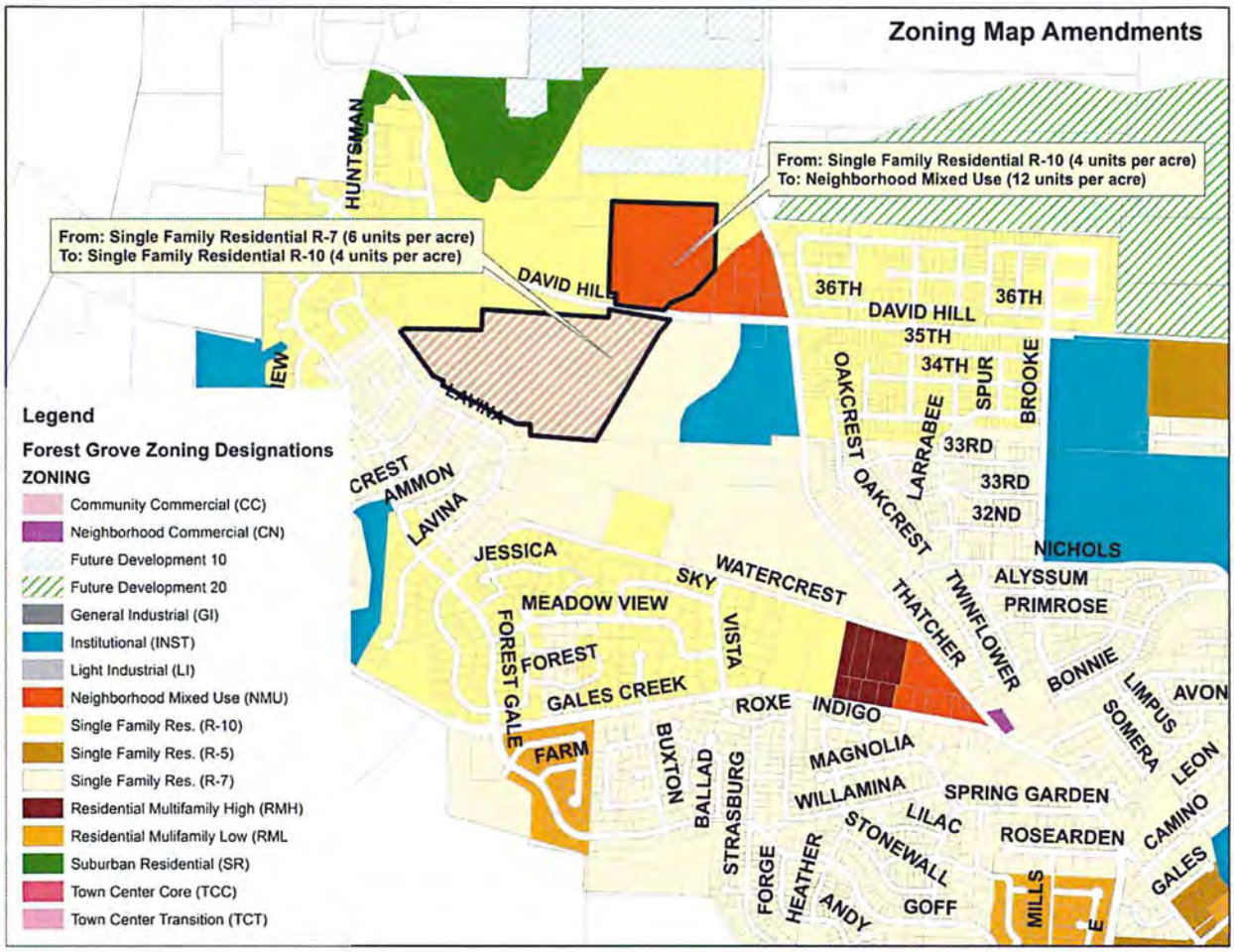
From	To	Gross Acres
Future Development-20 acre min.	A-Medium (8.95 dwellings/net acre)	86.18
Future Development-20 acre min.	B-Standard (6.22 dwellings per net acre)	98.62
Future Development-20 acre min.	Medium Density Residential (12 dwellings per net acre)	10.82
Future Development-20 acre min.	Neighborhood Mixed Use (12 dwellings per net acre)	24.63
Future Development-20 acre min.	Public (School)	10.00
Future Development-20 acre min.	Public (Fire Station)	2.40
Future Development-20 acre min.	Park	6.00



Recommended Zoning Map Amendments

The Planning Commission recommends the following amendments to the Zoning Map for the area west of Thatcher Road. No zoning map amendments are recommended for the new urban growth boundary area north of David Hill Road, west of Highway 47 and east of Thatcher Road.

From	To	Gross Acres
R-7 (6.22 dwellings per net acre)	**R-10 (4.35 dwellings per net acre)**	36.96
R-10	**NMU (Neighborhood Mixed Use)**	20.67



Since land within the new urban growth boundary area is not in the city limits no zoning map amendments are proposed for this area. The new urban growth boundary area will be rezoned with a City g designation concurrent with annexation actions. The timing of annexation is at the discretion of individual property owners with approval by the City Council. Land in the new urban growth boundary area will be rezoned consistent with the adopted Comprehensive Plan designations described above.

Recommended Transportation System Plan Amendments

The maps below show specific proposed amendments to the Transportation System Plan to incorporate recommendations included in the Westside Refinement Plan. The proposed amendments include updates to the preferred roadway network map and classification system map.

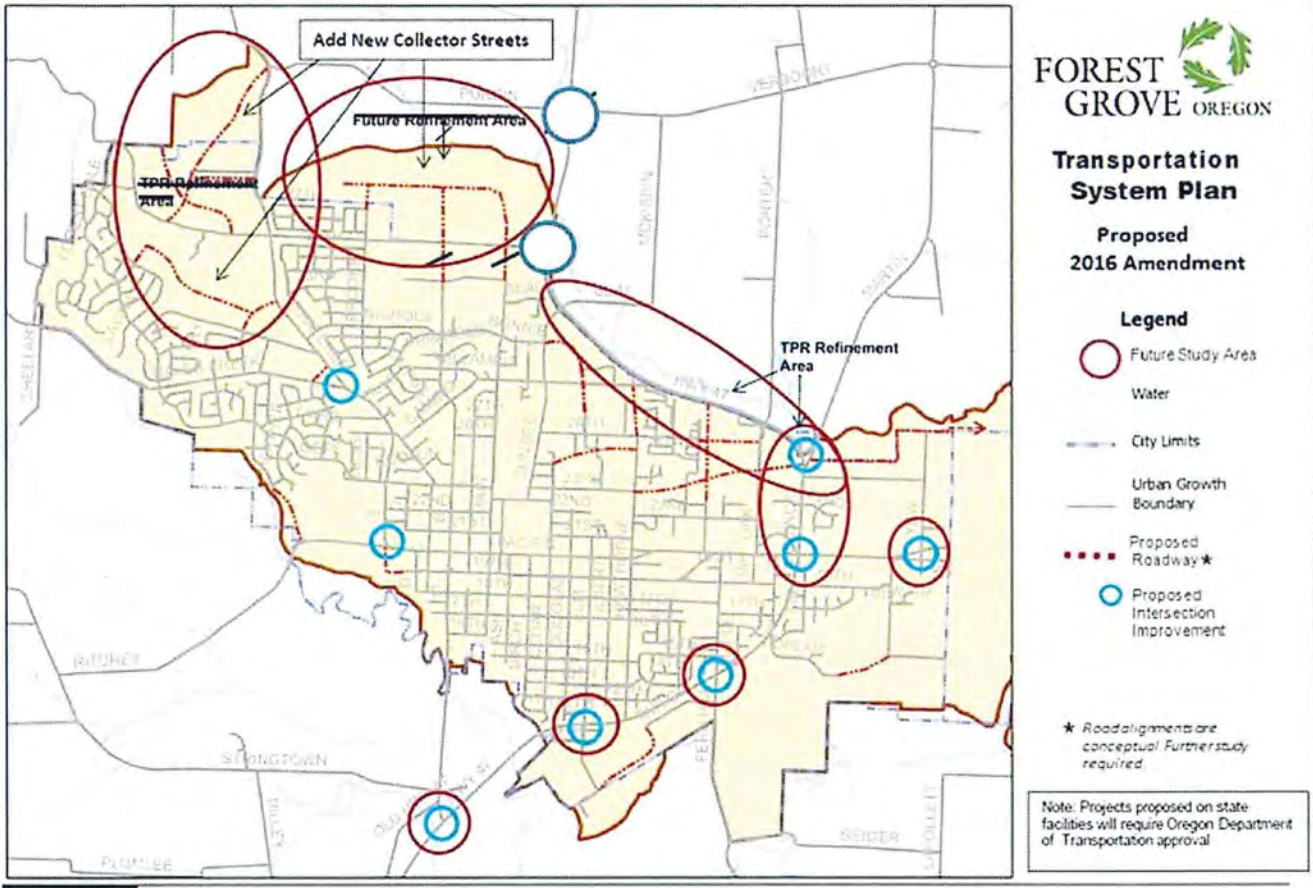


FIGURE 8-7 PREFERRED ROADWAY NETWORK PLAN

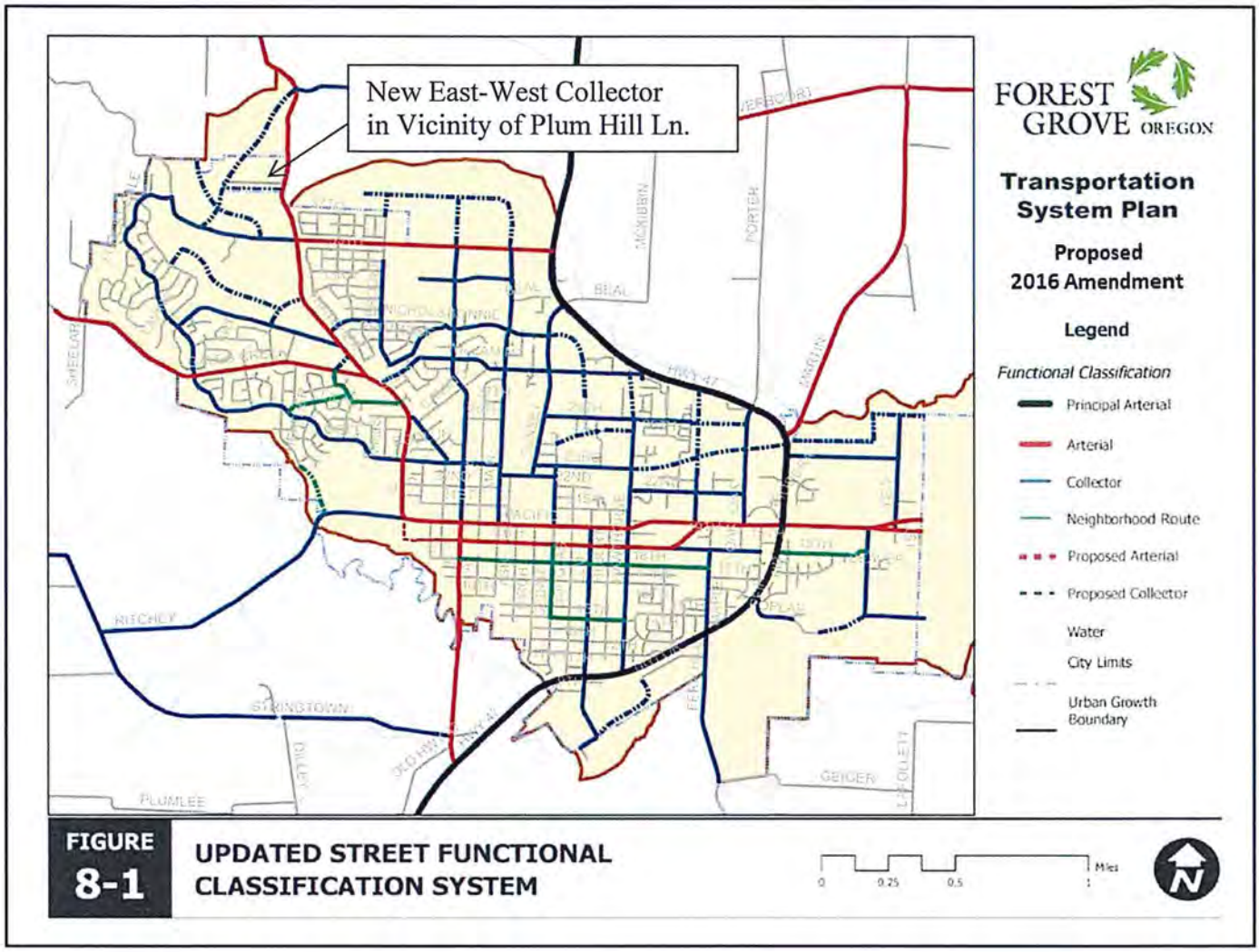


FIGURE 8-1 **UPDATED STREET FUNCTIONAL CLASSIFICATION SYSTEM**

The Oregon Department of Transportation (ODOT) provided a letter to the City with recommendations for ensuring expected traffic impacts to Highway 47 are addressed. The City's transportation consultant prepared a traffic analysis in March 2017 and identified improvements to the two roundabouts on Highway 47 address traffic impacts. The ODOT letter states because the improvements are not included in the City's Transportation System Plan or the Regional Transportation Plan's financially constrained project list they cannot be assumed to be constructed for the purposes of complying with the Oregon Transportation Planning Rule (OAR 660-012-0060). The letter goes on to state to ensure there will not be a significant effect on the state highway facilities ODOT recommends the following condition of approval:

"Until such time the mitigations listed below have been adopted into the city's Transportation System Plan and the Regional Transportation Plan's Financially Constrained projects lists, no approvals of habitable development structures shall be permitted by the city in the area added to the urban growth boundary in 2014 north of David Hill Road between Highway 47 and Thatcher Road.

1. <u>OR 47/David Hill Road Intersection</u> – Add an additional second circulating land to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.

2. OR 47/Purdin Rd/Verboort Rd Intersection – Add a northbound right turn slip lane on the south leg of the roundabout and a southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.

The improvements identified above will be further evaluated with other potential alternatives once capacity improvements are required."

The City notified ODOT of concerns over the condition the improvement projects be added to the Regional Transportation System Plan Financially Constrained projects list. The reason for this is the City does not have control over adding projects to the Regional Transportation Plan. The process for adding projects to the Regional Transportation Plan requires nomination by the City, review and concurrence by the Washington County Coordinating Committee on Transportation, and approval by Metro (Joint Policy Advisory Committee on Transportation and Metro Council). Therefore, the City cannot guarantee the projects will be included on the Regional Transportation Plan's Financially Constrained Projects list. If unsuccessful, this limitation creates a de facto moratorium. Discussions between staff and ODOT will continue to address this concern.

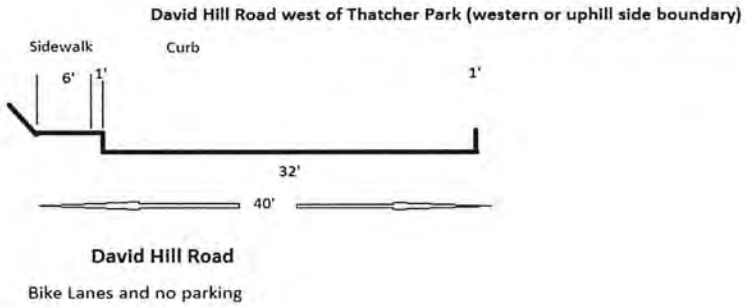
In addition the traffic impacts are due to traffic generation from new development in the new urban growth boundary area. Impacts from the David Hill area have already been accounted for and assumed in the roundabout designs for Highway 47. Thus, any limitations should apply to the new urban growth boundary area only.

Specific amendments to the Transportation System Plan project list to incorporate the ODOT recommendations are shown below.

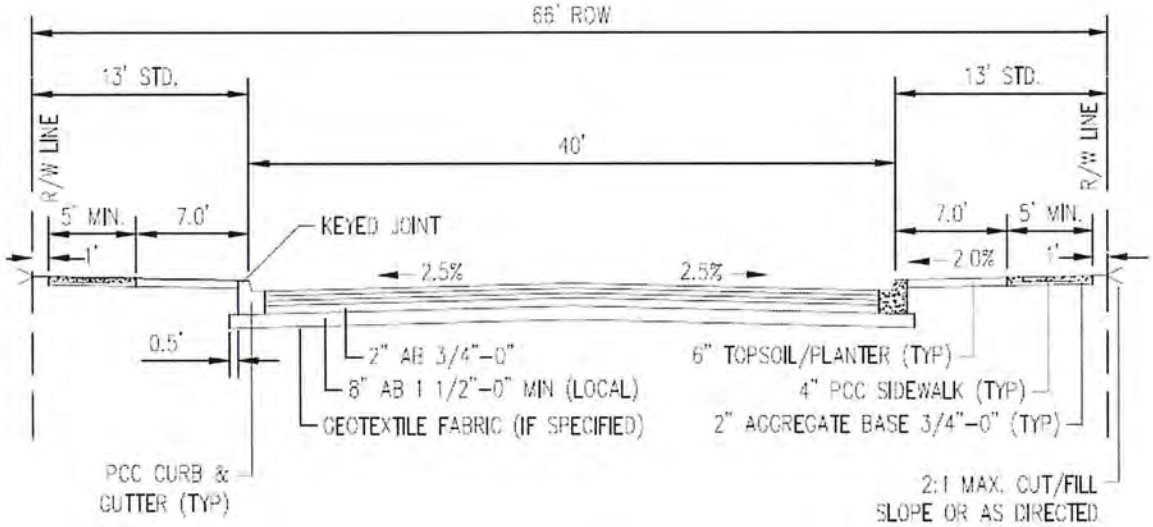
David Hill Road / Hwy. 47 Intersection Capacity Improvements ~~Extension~~	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing east terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.	~~Improve connectivity and balance circulation.~~ Improve operational deficiencies to ensure mobility standards are met.	~~$13.61~~ $2.5
Hwy 47 and Purdin Road Intersection Improvements	~~Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin and Verboort Roads~~ Add a northbound right turn slip lane on the south leg of the roundabout and a southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	Improve operational deficiencies to ensure mobility standards are met.	~~$3.17~~ $4.0

Another transportation recommendation is modification to the collector street standards for David Hill Road west of Thatcher Road. Given the steep topography along the David Hill corridor west of Thatcher Road and presence of a stream and historic landslide area a reduced collector street cross-section is proposed. The cross-section would include a 40 foot right-of-way and 32 feet of pavement. A sidewalk and bike lane would be provided on one side of the street and on-street parking would be prohibited. In contrast, the standard

collector street cross-section is 66 feet of right-of-way and 40 feet of pavement with sidewalks and bike lanes on both sides for the street.



The standard collector roadway section is shown below. The cross-section shows sidewalks and a planter area on both sides of the street within a 66 foot right-of-way.



COLLECTOR ROADWAY SECTION

NTS

Proposed Development Code Amendments

The Planning Commission recommends the following amendments to the Forest Grove Development Code:

1. Requiring geotechnical and engineering studies for land with slopes greater than 10% (Code Section 10.8.310 – Hazard Areas). The current requirement is 20%.

2. Allow a maximum collector street grade of up to 15% for distances no greater than 250 feet (Code Section 10.8.610(M) –Grades and Curves). The current maximum is 12%. This will allow for less environmental disturbance for road construction and less cost.

OVERVIEW OF COMMENTS RECEIVED

Matt Dale (Forest Gale Heights Neighborhood) Mr. Dale contacted staff by voicemail and E-mail to express significant concern about the notice mailed prior to the Planning Commission public hearings. Mr. Dale's concerns included the legal wording and lack of detail. The notice conformed to requirements of Measure 56 which requires certain wording the notice. The notice also conformed to the requirements of the Development Code for notices including identifying the applicable review criteria. In response, staff concurred with Mr. Dale's concern and provided a second notice with more information about the proposal.

In addition, to Mr. Dale's concern about the notice he expressed concern about the potential impact development may have on views from his property and potential impact to a large wooded area nearby. Mr. Dale provided the attached photo showing the view. Staff explained to Mr. Dale the developable area near his home has been in the urban growth boundary since 1983 and was zoned Single Family Residential R-7 (approximately 6 units per acre) when annexed in 2007. The property was annexed during the voluntary annexation process initiated by the City. Staff also explained the largely wooded area is zoned Single Family Residential R-10 (approximately 4 units per acre).

Regarding potential view impacts the Westside Refinement Plan includes goals and policies to reduce potential view impacts. This includes:

- Goal 6.1: Ensure land development on David Hill considers the visual impacts of development from lower elevation view corridors especially the Town Center.
    - Action 6.1.1: Amend the Forest Grove Development Code to require a visual impact assessment and mitigation measures for development proposals west of Thatcher Road.

In addition to the goal and policy above, the Westside Plan also includes a policy to encourage the clustering of housing. Clustering of housing could serve to reduce impacts of development on sensitive natural areas included wooded tracts.

Mary Van Vliet (Quail Run Estates) Ms. Van Vliet contacted staff by E-mail to state her desire that the opportunities for shopping be provided in the area. The land use concept and zoning recommendations for the Westside Area identifies areas for non-residential land uses intended to complement the area. This includes the Neighborhood Mixed Use area north of Thatcher Park and the proposed Neighborhood Mixed Use area north of David Hill Road near B Street and Main Street.

Kelly Peterson (Falcon Ridge Neighborhood) Ms. Peterson inquired as to how development on David Hill might affect views from the Falcon Ridge Neighborhood. Staff responded that although potential view

impacts will not be known until development is proposed and reviewed; the Westside Refinement Plan includes goals and policies to reduce potential view impacts. This includes:

- Goal 6.1: Ensure land development on David Hill considers the visual impacts of development from lower elevation view corridors especially the Town Center.
    - Action 6.1.1: Amend the Forest Grove Development Code to require a visual impact assessment and mitigation measures for development proposals west of Thatcher Road.

FOLLOW-UP FROM PRESENTATION TO CITY COUNCIL ON JUNE 12, 2017

Staff presented an overview of the Westside Refinement Plan and proposed implementation action to City Council on June 12, 2017. A list of items for follow-up along with responses is provided below for Council consideration.

Street Grade

Concern was expressed from two Councilors about the recommendation to increase permissible collector street grades from 12% for a maximum distance of 250 feet to 15% for a maximum distance of 250 feet provided the street section is concrete. Staff contacted the Police Chief and Fire Marshal about the recommendation for their perspectives.

The Police Chief expressed no concern about the proposed increase in street grade. The Fire Marshal commented the proposed increase to 15% for 250 feet is acceptable. The Fire Marshal also commented that mitigation measures would be required if street grades exceeded 15% or a 15% segment exceeded 250 feet. Such measures could include fire sprinklers in all homes accessed of the roadway and would require individual approval by the Fire Department. This could be addressed through a future code amendment.

The Cities of Tigard, Beaverton and Sherwood also allow street grades up to maximum 15%.

Bus Pull-Outs on David Hill Road West of Thatcher Road

A comment was made that the proposed reduced cross-section for David Hill Road could preclude bus pull-outs along David Hill Road. The Development Code (§10.8.110(E)) requires referral to Tri-Met for development proposals along Pacific Avenue and 19th Avenue. The Development Code authorizes conditions of approval such as walkways to transit stops, bus shelters or waiting areas, and turnouts for buses. This section of the Development Code could be amended to require referral to GroveLink in addition to Tri-Met for recommendations in needed improvements to accommodate transit on routes served such as David Hill Road. The proposed code wording is provided below in underlined italics text:

> §10.8.110(E) Transit Agency Referral. The City shall submit all development proposals located along the Pacific Avenue/19th Avenue transit corridor to Tri-Met *and along David Hill Road to GroveLink* for review and comment regarding facilities necessary to support transit. The following facilities may be required as a condition of a permit:
>
> 1. Walkways to transit stops;
> 2. Bus stop shelters or waiting areas;
> 3. Turnouts for buses.

Thatcher Road Roundabouts

A comment was made that the David Hill Road and Purdin Road intersections with Thatcher Road could include roundabouts. Engineering and Community Development Department staff are not aware of a firm proposal for roundabouts at these intersections. The Public Works Director indicates that the David Hill Road intersection would likely be controlled with a traffic signal. The Thatcher Road/Purdin Road intersection is outside the city limits and staff is not aware of plans by Washington County to construct a roundabout at this intersection.

RECOMMENDATIONS: Staff recommends City Council:

1) Accept and consider public comments on the proposed Westside Refinement Plan and accompanying implementation measures;

2) Adopt an ordinance adopting the Westside Refinement Plan incorporating the changes recommended by the Planning Commission as reflected in Planning Commission Decision 2017-09 and accepting the findings of fact relied upon support the Planning Commission recommendation;

3) Approve an ordinance amending the Comprehensive Plan Map consistent with the Planning Commission recommendations;

4) Adopt an ordinance amending the Zoning Map consistent with the Planning Commission recommendations;

5) Adopt an ordinance amending the Development Code consistent with Planning Commission recommendations;

6) Adopt an ordinance amending the Transportation System Plan consistent with the Planning Commission recommendations;

EXHIBITS:

A. Westside Refinement Plan and Appendices
B. Findings Document
C. Planning Commission Decision and Recommendation 2017-09
D. Project Record (Electronic Links)
   http://www.forestgrove-or.gov/planning/page/westside-planning-project
   1. Public Participation
   2. Technical Advisory Committee
   2. Correspondence
   3. Alternatives Analysis
   4. Refinement Plan
   5. Technical Documents
   6 Proposed Amendments
   7. Notices and Mailing Lists
   8. Planning Commission Review
   9. City Council Review

E. Ordinance Adopting Westside Refinement Plan
F. Ordinance Amending Comprehensive Plan Map
G. Ordinance Amending Zoning Map
H. Ordinance Amending Development Code
I. Ordinance Amending Transportation System Plan

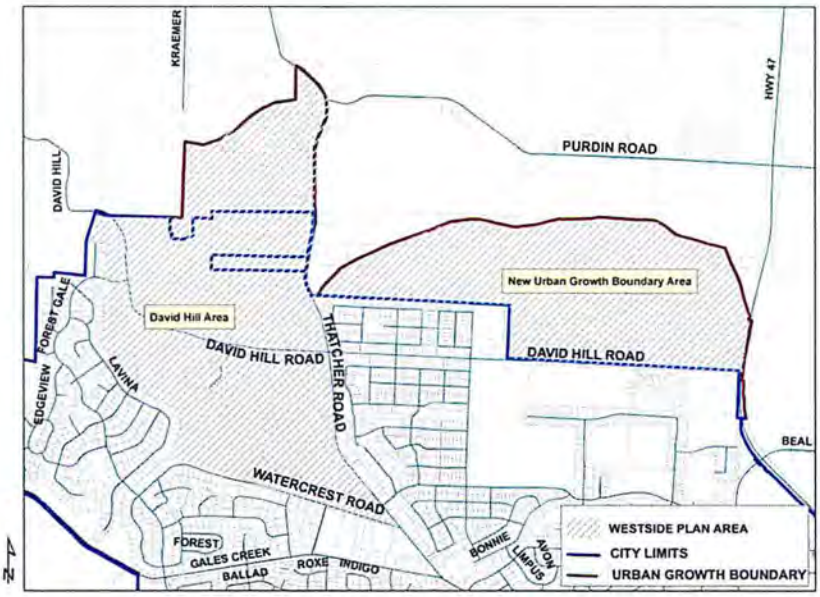
FOREST GROVE OREGON

A place where families and businesses thrive.

NOTICE OF PUBLIC HEARING
FOREST GROVE CITY COUNCIL

ADOPTION OF WESTSIDE REFINEMENT PLAN AND PROPOSED AMENDMENTS TO FOREST GROVE COMPREHENSIVE PLAN MAP, ZONING MAP, DEVELOPMENT CODE, AND TRANSPORTATION SYSTEM PLAN; FILE NUMBER 311-17-00013-PLNG

NOTICE IS HEREBY GIVEN that the Forest Grove City Council will hold Public Hearings on **Monday, July 10, 2017,** and **Monday August 14, 2017**, at **7:00 p.m.**, or thereafter, in the Community Auditorium, 1915 Main Street, to consider the Planning Commission's recommendation to adopt the proposed Westside Refinement Plan and accompanying implementation actions. The proposal is described below. *The affected area includes property located north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary in 2014 north of David Hill Road between Highway 47 and Thatcher Road*.



If an issue is not raised in the hearing (by person or letter) or if the issue is not explained in sufficient detail to allow the Planning Commission or City Council to respond to the issue then that issue cannot be used as the basis for an appeal to the Land Use Board of Appeals (LUBA).

If additional documents or evidence are provided regarding the application any person shall be entitled to a continuance of the hearing. Information pertaining to this request may be obtained from Senior Planner, Daniel Riordan, Community Development Department, 1924 Council Street, (503) 992-3226 or driordan@forestgrove-or.gov. Additional information is also available online at: http://www.forestgrove-or.gov/planning/page/westside-planning-project. The staff report will be available for review seven days prior to the hearing at Forest Grove City Hall, 1924 Council Street or online at: http://www.forestgrove-or.gov/bc-pc.

Proposal Overview

Proposed Comprehensive Plan Map Amendments

- Assignment of City Comprehensive Plan Map designations to the area added the urban growth boundary north of David Hill Road, between Highway 47 and Thatcher Road. Proposed Comprehensive Plan Map designations include: Single Family Residential B-Standard (6.22 homes per net acre), Single Family Residential A-Medium (8.71 homes per net acre), Medium Density Residential (12 homes per net acre), Park, Public (School), and Neighborhood Mixed Use (retail, office and residential (12 homes per net acre)).

Proposed Zoning Map Amendments

- Expansion of the Single Family Residential R-10 (4.35 homes per net acre) zone boundary south of David Hill Road near Antler Lane. The current zone is Single Family Residential R-7 (6.22 homes per net acre).
- Re-designation of property north of David Hill Road and east of Thatcher from Single Family Residential (R-10) to Neighborhood Mixed Use (NMU) consistent with the Forest Grove Comprehensive Plan Map.

Proposed Development Code Amendments

- Development Code §10.8.610(M) (Grades and Curves): Modification of the City's collector street standard to allow grades up to 15% for distances no greater than 250 feet. The current maximum is 12%.
- Development Code §10.8.310 (Hazard Areas): Modification of the code requirement for hazard areas to require geotechnical and engineering studies for land with slopes greater than 10%. The current requirement is 20%.

Transportation System Plan Amendments

- Reduction of the street standard for David Hill Road west of Thatcher Road to allow for 32 feet of pavement in a 40 foot right-of-way with sidewalk and bike lane on one side. The current requirement is feet of pavement in a 70 foot right-of-way with sidewalk and bike lanes on both sides.
- Modification to the Transportation System Plan street system map to add conceptual locations for future collector streets needed for future development in the planning area.

Criteria

Comprehensive Plan Amendments

- Consistency with applicable Comprehensive Plan policies; Metro Regional Framework Plan, Metro Urban Growth Management Functional Plan; and Oregon Statewide Land Use Planning Goals.

Zoning Map Amendments

- The zone map amendment is consistent with the Comprehensive Plan Map.
- The zone change is consistent with relevant goals and policies of the Comprehensive Plan as identified by the Community Development Director.
- The site is suitable for the proposed zone.
- The zone change is consistent with the adopted Transportation System Plan.

- Public facilities and services for water supply, sanitary waste disposal, storm water disposal and police and fire protection are capable of supporting uses allowed by the zone.
- The establishment of a zone district is not subject to the meeting of conditions.

Development Code Amendments

- The text amendment is consistent with the relevant goals and policies of the Forest Grove Comprehensive Plan.
- The text amendment is consistent with relevant statewide and regional planning goals, programs and rules.

Transportation System Plan Amendments

- Compliance with the Oregon Transportation Planning Rule (OAR 660-012-0035(2)), Metro Regional Transportation Functional Plan Title 1 (Street System Design) and Title 5 (Amendments to Comprehensive Plans).

Anna D. Ruggles, CMC, City Recorder
City of Forest Grove

To be published Wednesday, July 5, 2017
NewsTimes

Date: July 10, 2017 **Agenda Item:** 7.1. – 7.5.

Subject: PUBLIC HEARING TO CONSIDER THE FOLLOWING ORDINANCES:

✓ 7.1 FIRST READING OF ORDINANCE NO. 2017-04 ADOPTING WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

✓ 7.2 FIRST READING OF ORDINANCE NO. 2017-05 ADOPTING LEGISLATIVE COMPREHENSIVE PLAN MAP AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

✓ 7.3 FIRST READING OF ORDINANCE NO. 2017-06 ADOPTING LEGISLATIVE ZONING MAP AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

✓ 7.4 FIRST READING OF ORDINANCE NO. 2017-07 ADOPTING LEGISLATIVE DEVELOPMENT CODE AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

✓ 7.5 FIRST READING OF ORDINANCE NO. 2017-08 ADOPTING LEGISLATIVE TRANSPORTATION SYSTEM PLAN AMENDMENTS TO IMPLEMENT WESTSIDE REFINEMENT PLAN; FILE NO. 311-17-000013-PLNG

CITY COUNCIL MEETING
Request to Testify at Public Hearing

Public Hearings – Public hearings are held on each matter required by state law or City policy. Anyone wishing to testify should sign-in for the Public Hearing prior to the meeting. The Mayor or presiding officer will review the complete hearing instructions prior to testimony. The Mayor or presiding officer will call the individual or group by the name given on the sign-in form. When addressing the Mayor and Council, please move to the witness table (center front of the room). Each person should speak clearly into the microphone and must state their first and last name and provided a mailing address for the record. All testimony is electronically recorded. In the interest of time, Public Hearing testimony is limited to three minutes unless the Mayor or presiding officer grants an extension. Written or oral testimony is heard prior to any Council action.

Please sign-in below to testify.

PROPONENTS: *(Please print legibly)*

First & Last Name:	*Address:*	*City, State & Zip Code:*

COMMUNITY NEWSPAPERS
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E-mail: legals@commnewspapers.com

AFFIDAVIT OF PUBLICATION

State of Oregon, County of Washington, SS

I, Kathy Snyder, being the first duly sworn, depose and say that I am the Accounts Receivables Manager of the ***Forest Grove News-Times***, a newspaper of general circulation, published at Forest Grove, in the aforesaid county and state, as defined by ORS 193.010 and 193.020, that

City of Forest Grove
Notice of Public Hearing – File 311-17-00013 PLNG
FGNT15906327

a copy of which is hereto attached, was published in the entire issue of said newspaper for
1
week in the following issue:
July 5, 2017

Kathy Snyder
Kathy Snyder, Accounts Receivables Manager

Subscribed and sworn to before me this July 5, 2017.

Jerrin L Sipe
NOTARY PUBLIC FOR OREGON

OFFICIAL STAMP
JERRIN L. SIPE
NOTARY PUBLIC - **OREGON**
COMMISSION NO. **941161**
MY COMMISSION EXPIRES **JULY 28, 2019**

Acct #298024
PO #: 20165070
Attn: Anna Ruggles
City of Forest Grove
PO Box 326
Forest Grove, OR 97116
Size: 2 x 18.42"
Amount Due: $351.78*
*Please remit to the above address.

NOTICE OF PUBLIC HEARING
FOREST GROVE CITY COUNCIL

ADOPTION OF WESTSIDE REFINEMENT PLAN AND PROPOSED AMENDMENTS TO FOREST GROVE COMPREHENSIVE PLAN MAP, ZONING MAP, DEVELOPMENT CODE, AND TRANSPORTATION SYSTEM PLAN; FILE NUMBER 311-17-00013-PLNG

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near Antler Lane. The current zone is Single Family Residential R-7 (6.22 homes per net acre).

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Transportation System Plan Amendments

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- Modification to the Transportation System Plan street system map to add conceptual locations for future collector streets needed for future development in the planning area.

Criteria

Comprehensive Plan Amendments

- Consistency with applicable Comprehensive Plan policies; Metro Regional Framework Plan, Metro Urban Growth Management Functional Plan; and Oregon Statewide Land Use Planning Goals.

Zoning Map Amendments

- The zone map amendment is consistent with the Comprehensive Plan Map.
- The zone change is consistent with relevant goals and policies of the Comprehensive Plan as identified by the Community Development Director.
- The site is suitable for the proposed zone.
- The zone change is consistent with the adopted Transportation System Plan.
- Public facilities and services for water supply, sanitary waste disposal, storm water disposal and police and fire protection are capable of supporting uses allowed by the zone.
- The establishment of a zone district is not subject to the meeting of conditions.

Development Code Amendments

- The text amendment is consistent with the relevant goals and policies of the Forest Grove Comprehensive Plan.
- The text amendment is consistent with relevant statewide and regional planning goals, programs and rules.

Transportation System Plan Amendments

- Compliance with the Oregon Transportation Planning Rule (OAR 660-012-0035(2)), Metro Regional Transportation Functional Plan Title 1 (Street System Design) and Title 5 (Amendments to Comprehensive Plans).

Anna D. Ruggles, CMC, City Recorder
City of Forest Grove

Published NewsTimes
Wednesday, July 5, 2017. FGNT15906327

FIRST READING: 07/10/2017

ORDINANCE NO. 2017-04

ADOPTING THE WESTSIDE REFINEMENT PLAN
FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan complies with the provisions of ORS §197.200 and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the Westside Refinement Plan addresses the requirements of Metro Urban Growth Management Function Title 11 (Planning for New Residential Areas) and findings demonstrating compliance are contained in Attachment B to the Planning Commission staff report dated May 15, 2017; and

WHEREAS, the following background documents were prepared and provide the factual basis supporting the Westside Refinement Plan:

- Westside Infrastructure Overview, December 2014;
- Westside Transportation Baseline Report, January 2015;
- Westside Natural Resources Overview, January 2015;
- Geological and Geotechnical Assessment Report, February 2015;
- Revised Final Westside Water, Sewer, and Stormwater Infrastructure Report, June 2016;
- Infrastructure Funding Approach Report, December 2016; and
- Revised 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use Alternative, March 2017; and

WHEREAS, the Westside Refinement Plan provided opportunities for community participation to influence preparation of recommendations; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Comprehensive Plan Map to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

_____
Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

_____
Peter B. Truax, Mayor

FIRST READING: 07/10/2017

ORDINANCE NO. 2017-05

ADOPTING LEGISLATIVE COMPREHENSIVE PLAN MAP AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Comprehensive Plan Map (Exhibit A); and

WHEREAS, the Comprehensive Plan Map amendments are consistent with the requirements of Metro Urban Growth Management Function Title 11 (Planning for New Residential Areas) are contained in Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Comprehensive Plan Map to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

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Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

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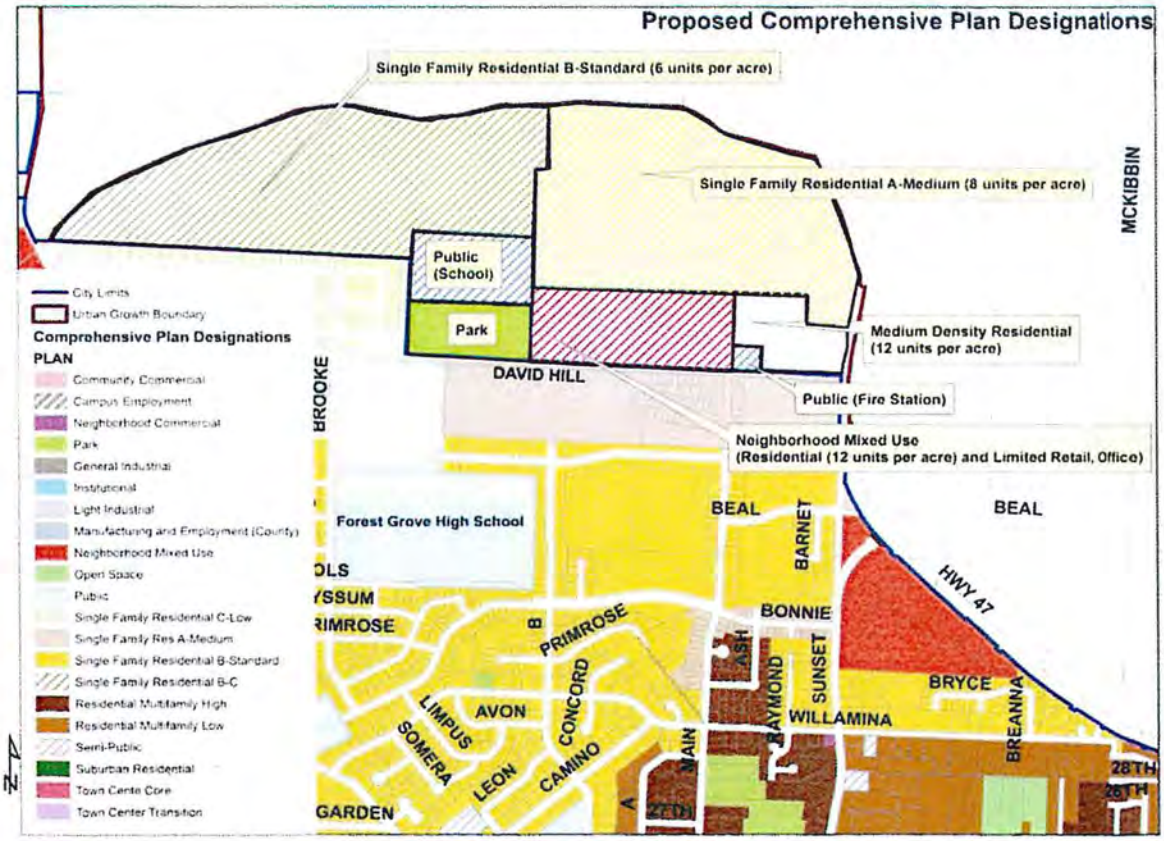
Peter B. Truax, Mayor

EXHIBIT A
Westside Refinement Plan
Comprehensive Plan Amendments

The Planning Commission recommends approval of the following amendments to the Comprehensive Plan Map for the new urban growth boundary area north of David Hill Road, west of Highway 47 and east of Thatcher Road. No Comprehensive Plan Map amendments are recommended for the area west of Thatcher Road.

From	To	Gross Acres
Washington County Future Development-20 acre min.	**A-Medium (8.95 dwellings/net acre)**	86.18
Washington County Future Development-20 acre min.	**B-Standard (6.22 dwellings per net acre)**	98.62
Washington County Future Development-20 acre min.	**Medium Density Residential (12 dwellings per net acre)**	10.82
Washington County Future Development-20 acre min.	**Neighborhood Mixed Use (12 dwellings per net acre)**	24.63
Washington County Future Development-20 acre min.	**Public (School)**	10.00
Washington County Future Development-20 acre min.	**Public (Fire Station)**	2.40
Washington County Future Development-20 acre min.	**Park**	6.00



The findings supporting the recommended Comprehensive Plan Map amendments are contained in Attachment B to the May 15, 2017 staff report and are incorporated by herein by reference.

FIRST READING: 07/10/2017

ORDINANCE NO. 2017-06

ADOPTING LEGISLATIVE ZONING MAP AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Zoning Map (Exhibit A); and

WHEREAS, the Zoning Map amendments are consistent with the criteria for Development Code Amendments contained in Development Code §10.2.770 (Zone Change) as shown Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Zoning Map to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

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Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

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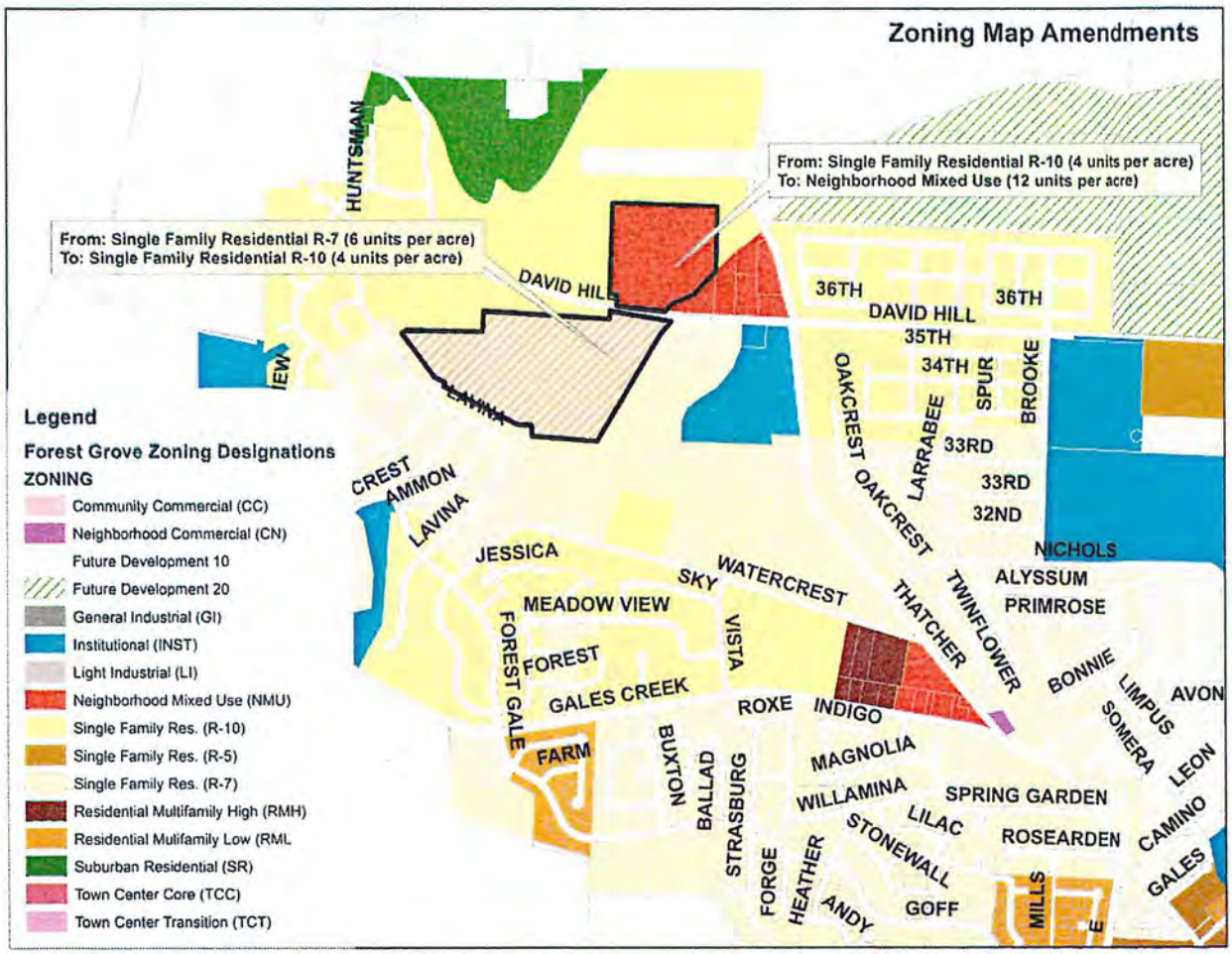
Peter B. Truax, Mayor

EXHIBIT A
Westside Refinement Plan
Zoning Map Amendments

The Planning Commission recommends the following amendments to the Zoning Map for the area west of Thatcher Road. No zoning map amendments are recommended for the new urban growth boundary area north of David Hill Road, west of Highway 47 and east of Thatcher Road.

From	To	Gross Acres
R-7 (6.22 dwellings per net acre)	**R-10 (4.35 dwellings per net acre)**	36.96
R-10	**NMU (Neighborhood Mixed Use)**	20.67



The Planning Commission recommends the change from R-7 zoning to R-10 for a portion of the area south of David Hill Road to reflect constraints to development documented in the Geological and Geotechnical Report, February 2015, prepared by PBS Engineering and Environmental.

The Planning Commission recommends the change from R-10 to NMU for the Nixon Property (Washington County Map and Tax Lot Number 1N4260002602) in order to zone the property consistent with the corresponding NMU designation shown on the Comprehensive Plan Map.

FIRST READING: 07/10/2017

ORDINANCE NO. 2017-07

ADOPTING LEGISLATIVE DEVELOPMENT CODE AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Transportation System Plan (Exhibit A); and

WHEREAS, the Development Code amendments are consistent with the criteria for Development Code Amendments contained in Development Code §10.2.630 (Development Code Text Amendments) as shown Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Development Code to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

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Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

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Peter B. Truax, Mayor

EXHIBIT A
Westside Refinement Plan
Development Code Amendments

The Planning Commission recommends the following amendment to the Forest Grove Development Code to implement the Westside Refinement Plan:

§10.4.315(F) TABLE 4-2: Commercial/Institutional Uses within the Village Center

NMU Zoned Area	Minimum Square Footage	Maximum Square Footage
Area 1 - David Hill/Nixon	None	15,000 SF Gross Floor Area
Area 2 - Gales Creek	None	25,000 SF Gross Floor Area
Area 3 - Davidson	25,000 SF Gross Floor Area	130,000 SF Gross Floor Area[1]
Area 4 – East David Hill Rd.	None	150,000 SF Gross Floor Area[2]

§10.8.610(M) Grades and Curves – Grades shall not exceed 10% on arterials, ~~12%~~ **15%** on collector streets for distances of no greater than 250 feet, or any other street (except that local or residential access streets may have concrete segments with grades of up to 15% for distances of no greater than 250 feet), and:

§10.8.310 (Hazard Areas)

2. For development sites having slopes of ~~20%~~ **10%** or more, the following requirements shall be met. To ensure compliance with the provisions of this ordinance, prior to the issuance of a building permit for the construction of any new building[3] within the city, and prior to any grading, excavation or filling or other site modification within areas having a slope of ~~20%~~ **10%** or greater, there shall be submitted to the Community Development Department for review and approval, or approval with modifications:

    a. A site plan (showing any grading, excavating or filling) drawn to scale of the entire property developed and of the proposed construction;

    b. The submission of a geological assessment and geotechnical report prepared and stamped by a Certified Engineering Geologist who is a registered geologist certified in the specialty of Engineering Geology under provisions of ORS 672.505 to 672.705 **and a Geotechnical Engineer under provisions of ORS 672.002 to 672.325**. The assessment and report shall address the entire site and meet the following requirements:

        i. The geological **and engineering** assessment shall include information and data regarding the nature, distribution of underlying geology, and the physical and chemical properties of existing soils; an opinion as to stability of the site, and conclusions

[1] Maximum building footprint is 50,000 square feet.
[2] Maximum building footprint is 50,000 square feet.
[3] Building: That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

regarding the effect of geo-logic conditions on the proposed development.

The findings supporting the recommended amendments to the Development Code are contained in Attachment B to the staff report for the May 15, 2017, Planning Commission public hearing.

FIRST READING: 07/10/2017

ORDINANCE NO. 2017-08

ADOPTING LEGISLATIVE TRANSPORTATION SYSTEM PLAN AMENDMENTS TO IMPLEMENT THE WESTSIDE REFINEMENT PLAN FILE NUMBER 311-17-000013-PLNG

WHEREAS, the City applied for and received a Community Planning Development Grant award from Metro to prepare a refinement plan for the Westside planning area comprised of the area within the urban growth boundary north of Watercrest Road and west of Thatcher Road and the area added to the urban growth boundary by the Oregon Legislature in 2014 north of David Hill Road and west of Highway 47 and east of Thatcher Road; and

WHEREAS, Oregon Revised Statutes (ORS) §197.200 provides authority to local governments to adopt refinement plans for areas within urban growth boundaries; and

WHEREAS, the Westside Refinement Plan identifies certain implementation actions including amendments to the Forest Grove Transportation System Plan (Exhibit A); and

WHEREAS, the Transportation System Plan amendments are consistent with the Oregon Transportation Planning Rule (OAR 660-012-0060) as shown Exhibit B; and

WHEREAS, opportunities for community participation to influence preparation of recommendations were provided throughout the planning process; and

WHEREAS, community participation included stakeholder interviews during November 2014, design charrettes on April 20, 2015 and May 20, 2015, a community open house on March 2, 2017, work sessions with the Planning Commission on October 6, 2014, July 6, 2015, May 2, 2016 and February 6, 2017, and work sessions with the City Council on November 14, 2016 and December 12, 2016; and

WHEREAS, the Planning Commission held duly-noticed public hearings on May 15, 2017, May 30, 2017, and June 5, 2017 on the proposed Westside Refinement Plan; and

WHEREAS, notice of the public hearings were mailed to affected property owners and property owners within 300 of the affected area on April 26, 2017 and May 11, 2017 as required by Oregon Ballot Measure 56 and Development Code §10.1.715); and

WHEREAS, notice of public hearing was published in the Forest Grove News-Times as required by Forest Grove Development Code (§10.1.715) on May 10, 2017 and July 5, 2017; and

WHEREAS, a staff report addressing the applicable review criteria was published on May 8, 2017 and is hereby incorporated by reference; and

WHEREAS, staff reports responding to public testimony and Planning Commission considerations were published on May 23, 2017, and June 2, 2017, the staff reports are hereby incorporated by reference; and

WHEREAS, the Planning Commission accepted written testimony on May 15, 2017 and oral testimony on May 30, 2017 and June 5, 2017 on the proposed Westside Refinement Plan and accompanying implementation measures and the testimony was considered by the Planning Commission in preparing recommendations for consideration by City Council; and

WHEREAS, the Planning Commission adopted Planning Commission Findings and Decision Number 2017-09; and

WHEREAS, the City Council held a duly-noticed public hearing on the proposed ordinance on July 10, 2017, and continued the hearing to August 14, 2017.

NOW THEREFORE, THE CITY OF FOREST GROVE ORDAINS AS FOLLOWS:

Section 1: The City Council hereby adopts the amendment to the Transportation System Plan to implement the Westside Refinement Plan making the changes recommended by the Planning Commission shown in the Planning Commission's Findings and Decision 2017-09 (Exhibit C).

Section 2: City Council finds that traffic volumes may exceed the current design capacity of the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Road during the twenty-year planning period addressed by the Westside Refinement Plan due to anticipated traffic volumes from future development in the area added to the urban growth boundary in 2014 located north of David Hill Road, west of Highway 47 and east of Thatcher Road, and not from traffic volumes from areas within the urban growth boundary prior to 2014.

Section 3: This ordinance is effective 30 days following its enactment by the City Council.

PRESENTED AND PASSED the first reading this 10th day of July 2017.

PASSED the second reading this 14th day of August 2017.

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Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 14th day of August 2017.

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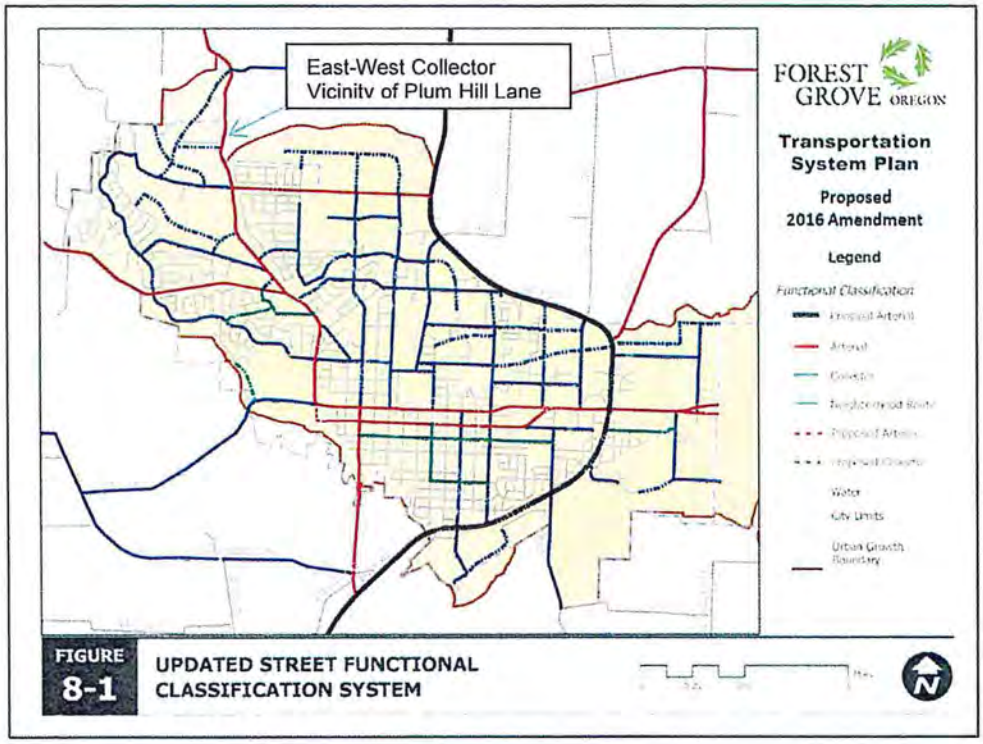
Peter B. Truax, Mayor

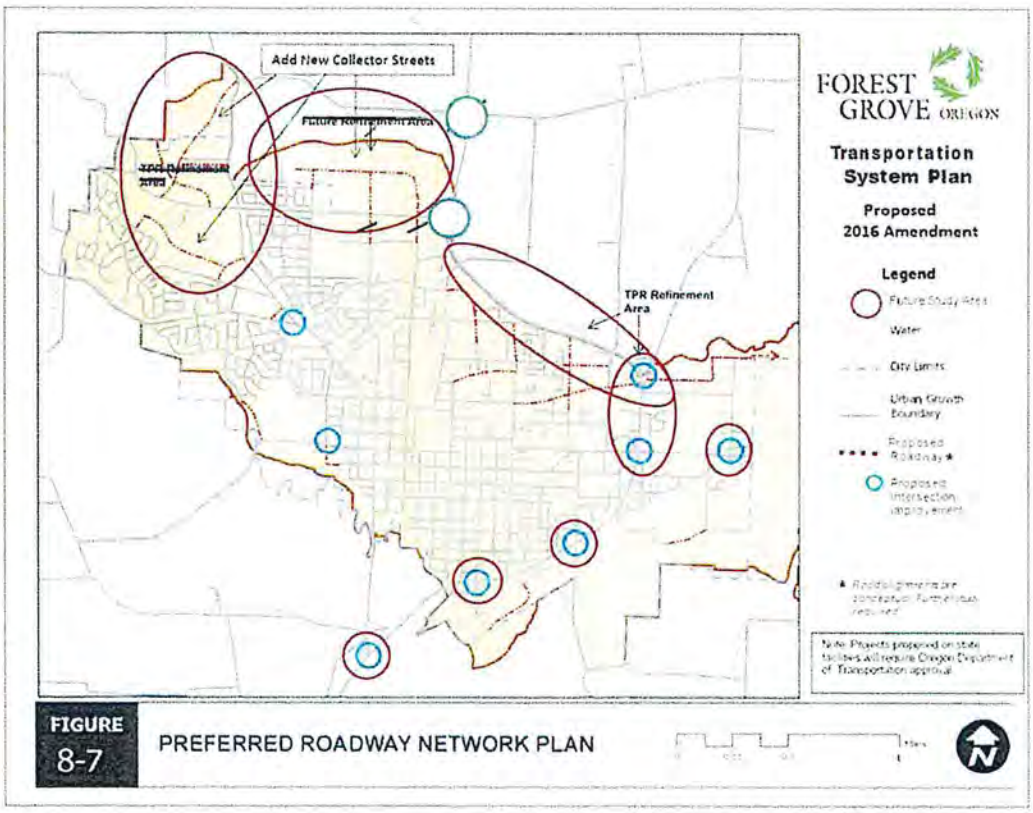
EXHIBIT A
Westside Refinement Plan
Transportation System Plan Amendments

The Planning Commission recommends the following amendments to the Forest Grove Transportation System Plan to implement the Westside Refinement Plan:

Recommended amendments to Transportation System Plan Figure 8-1



Recommended amendments to the Transportation System Plan Figure 8-7



Recommended revised cross-section for David Hill Road west of Thatcher Road:

Recommended amendments to the Transportation System Plan project tables to add needed mitigation to the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Roads required for compliance with the Oregon Transportation Planning Rule (OAR 660-012-0060). The Planning Commission finds the mitigation projects are needed due to anticipated traffic generation from growth in the new urban growth boundary area north of David Hill Road west of Highway 47 and east of Thatcher Road. The Planning Commission also finds that traffic volumes from the David Hill Road area have been accounted for in the TSP and therefore, do not have a significant effect on transportation facilities for purposes of Transportation Planning Rule Compliance (OAR 660-012-0060(9)). The proposed mitigation measure for the Highway 47 roundabouts at David Hill Road and Purdin/Verboort Road will be recommended by the City for addition to the Metro Regional Transportation Plan to be updated in 2018.

Roadway Projects (TSP Table 8-3)

No.	Name	Description	Purpose	Metro Project ID*	Total Cost ($Million)
1	David Hill Road / Hwy. 47 Intersection Capacity Improvements ~~Extension~~	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from existing east terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.	~~Improve connectivity and balance circulation.~~ Improve operational deficiencies to ensure mobility standards are met.	10772	~~$13.61~~ $2.5
~~2~~	~~Highway 47 / Pacific Avenue Intersection Improvements *~~	~~Additional channelization, crosswalk, and traffic signal modification at intersection. Specific improvements may be modified at a future date.~~	~~Improve access and mobility. Improve substandard turn radius and pedestrian crossing.~~	~~10780a~~	~~$1.3~~
13	Hwy 47 and Purdin Road Intersection Improvements *	~~Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin and Verboort Roads~~ Add a northbound right turn slip lane on the south leg of the roundabout and a southbound right turn slip lane on the south leg of the roundabout to the overall roundabout intersection.	Improve operational deficiencies to ensure mobility standards are met.	10780f	~~$3.17~~ $4.0
TOTAL					~~$122.44~~ $110.86

Notes: * Projects will require ODOT approval. Inclusion of a project in this table does not obligate or imply the obligation of funds for any specific project.

Forest Grove Financially Constrained Project List (TSP Table 1-2)

#	Name	Description	Jurisdiction Owner/ Operator	Metro Project ID	RTP Financially Constrained	Total Cost	Non-City Funds	City Funds	Project Timing
1	David Hill Road ~~Extension~~ / Hwy. 47 Intersection Capacity Improvements	~~Construct new 2-lane collector with bicycle lanes, sidewalks and street lights from~~	~~City~~ ODOT & County	10772	Add[1]	~~$13.61 **~~ $2.5 **/***	~~$13.61~~ $2.50	$0.0	~~0-5 years~~ 6-10 years

[1] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

		~~existing terminus to Highway 47~~ Add an additional second circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.							
~~5~~	~~Highway 47 / Pacific Avenue Intersection Improvements*~~	~~Additional channelization, crosswalk, and traffic signal modification at intersection. Specific improvements may be modified at a future date.~~	~~ODOT~~	~~10780a~~	~~Yes~~	~~$1.3 **~~	~~$0.8~~	~~$0.5~~	~~0-5 years~~
						TOTAL:		**$35.6M**	

Source: City of Forest Grove. Estimated share of city cost provided by City of Forest Grove.
Notes: **PROJECT PRIORITIES ARE BASED ON ANTICIPATED PROJECT TIMING**
*Project will require ODOT approval. Inclusion of a project on an ODOT facility in this table does not obligate or imply the obligation of funds for any specific project.
**Partially or fully funded by jurisdictional agency (i.e. TriMet, ODOT, Washington County, Metro or other).
***Partially or fully funded by private development exactions.

Forest Grove Financially Constrained Project List (TSP Table 10-3)

#	Name	Description	Jurisdiction Owner/ Operator	Metro Project ID	RTP Financially Constrained	Total Cost	Non-City Funds	City Funds	Project Timing
1	David Hill Road / Hwy. 47 Intersection Capacity Improvements ~~Extension~~	~~Construct new 2 lane collector with bicycle lanes, sidewalks and street lights from existing terminus to Highway 47~~ Add an additional second	City	10772	Add[2]	~~$13.61 **~~ $2.5 **/***	~~$13.61~~ $2.50	$0.0	~~0-5 years~~ 6-10 years

[2] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.

		circulating lane to the roundabout to provide separation for northbound left turning and through traffic as well as a separate lane for southbound turns.							
16	Highway 47 / Purdin Road Intersection Improvements*	~~Construct improvements at Highway 47 (e.g. roundabout) to connect Purdin Road and Verboort Rd.~~ Add a northbound right turn slip lane on the south leg of the roundabout and southbound right turn lane on the south leg of the roundabout to the overall roundabout intersection.	ODOT & County	10780f	~~No~~ Add[3]	~~$3.32 **~~ $4.0 **/***	~~$3.32~~ $4.0	$0.0	6-10 Years
								$35.6M	

Source: City of Forest Grove. Estimated share of city cost provided by City of Forest Grove.
Notes: **PROJECT PRIORITIES ARE BASED ON ANTICIPATED PROJECT TIMING**

*Project will require ODOT approval. Inclusion of a project in this table does not obligate or imply the obligation of funds for any specific project.

**Partially or fully funded by jurisdictional agency (i.e. TriMet, ODOT, Washington County, Metro or other).
***Partially or fully funded by private development exactions.

[3] The City of Forest Grove will nominate this project for addition to the Metro RTP Financially Constrained Project List through the Washington County Coordinating Committee process.