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# PHYSICAL ENVIRONMENT

## CLIMATE

The climate of Tangent is temperate owing to the strong marine influences of the Pacific Ocean and the associated ocean currents. The temperate climate is characterized by dry warm summers and mild wet winters. The average temperature for January is 39 degrees Fahrenheit and for July the average is 67 degrees Fahrenheit (recorded at Albany). Precipitation that falls primarily as rain averages approximately 40 inches a year. Because of Tangent's location in the center of the Willamette Valley, the tendency for less than 40 inches of precipitation a year would dominate. Since there are no weather recording (climatological) stations in Tangent, the information provided herein is subject to generalities.

The major amount of precipitation for the most part is experienced from October to May with an average of 120-140 days per year with some precipitation. Precipitation in the form of snow, freezing rain and fog are also experienced during the wet winter months.

## GEOLOGY

The City of Tangent and the Planning Area are atop a generally homogeneous geologic surface. Based on the information developed by the State of Oregon, Department of Geology and Mineral Industries, (DOGAMI), the Tangent area consists of two geologic units. The first, Quaternary Alluvium, consists of thin veneers of silt and clay mixed with gravels. Quaternary Alluviums are found lining the Calapooia River, Lake Creek, and other small streams in the planning area. Because of the lower elevation and association to streams, the Quaternary Alluvium unit experiences seasonal flooding.

The second and major geologic unit within the Tangent Planning Area is identified as Willamette silts. This unit consists of 20 to 30 feet of faintly bedded quartz feldspathic silts, silty clays, and clays of lacustrine (lake) and glacial flood water origin. Surficial erratics and heavy minerals indicate Columbia River source. Carbon 14 dating reveals an age 19,000 to 34,000+ years. Additional information is available on the DOGAMI website:  
<http://www.oregon.gov/DOGAMI>

### *See Figure 3: Geology*

Geologic hazards associated with the Quaternary Alluvium are flooding, stream meandering, and siltation.

Hazards associated with Willamette silts are poor drainage, ponding, and low permeability.

# GROUND WATER RESOURCES OF THE TANGENT AREA

The source of ground water in the Tangent area is precipitation. Most of the precipitation evaporates; some is transpired to the atmosphere by vegetation, some runs off, and some infiltrates into the ground. Part of the water that infiltrates is retained as soil moisture; the remainder percolates downward to the zone of saturation. The water in the saturated zone moves by force of gravity down gradient to points of discharge, such as springs, seeps along stream channels, or wells. Saturated permeable rock materials that yield usable quantities of water to wells and springs are called aquifers.

The upper surface of a zone of saturation is the water table and the water in a zone of saturation is ground water.

Ground water is generally available for domestic use. The unconsolidated alluvial deposits that underlie the Valley Plain are the most productive aquifers and the only ones feasible for large-scale development of ground water for irrigation, municipal and industrial uses.

Ground water levels in the unconsolidated alluvial deposits fluctuate about 10 to 12 feet during the year. Available data indicate that seasonal fluctuations of the water table have been in the same range for more than 30 years.

The seasonal change of storage for the alluvial deposits is estimated to be about 130,000 acre feet of water, which is more than nine (9) times the 1971 pumpage of 14,000 acre feet.

Storage capacity of the alluvial aquifers in the area is estimated to be about 750,000 acre-feet of water between the depths of 10 to 100 feet.

## WATER QUALITY

The Environmental Protection Agency (EPA) is responsible for testing drinking water from systems with fifteen (15) or more services or serving twenty-five (25) people in a public place. In order to keep the drinking water safe, streams and lakes must be kept relatively free of contaminants and pollutants. The Federal Safe Drinking Water Act (Public Law 93 923) was passed in 1974 and has been amended in 1986 and 1996 and can be found at this website: [http://www.epa.gov/safewater/sdwa/laws\\_statutes.html](http://www.epa.gov/safewater/sdwa/laws_statutes.html). This Law establishes primary standards with which the City of Tangent must comply, and a set of secondary standards relating to the taste, odor, and appearance of the drinking water. At the present time these secondary regulations are not in effect, and the EPA does not have enforcement authority for these regulations. Underground water supplies are also protected from contamination by the Act.

In 1972, the Federal Government passed the Water Pollution Control Act Amendments, (<http://wildlifelaw.unm.edu/fedbook/fwpc.html>) and was last amended in 2008. These amendments were a significant advance over previous water quality legislation in that they made polluting of inland water of the U.S. illegal. The Act provides for planning to be done on three orders. First, at the river basin scale. Section 202 (3) requires states to develop plans for each river basin, to set a general framework within which planning for point and non point sources of pollution. The Oregon Department of Environmental Quality, (DEQ) has developed a Water Quality Management Plan that sets forth a water pollution prevention program.

The overall goal of the Comprehensive Plan is to recognize and protect beneficial uses of waterways. The beneficial uses include, but are not limited to: domestic water supply, fish rearing and spawning, resident fish and aquatic life, and industrial water supply. Presently there are no severe point sources of pollution within the Tangent Planning Area that merit special protection measures, according to the DEQ's report entitled, Statewide Assessment of Non Point Source Problems.

Subsurface sewage disposal of waste is managed through the state mandatory permit system. Under this system the DEQ sets rules and specifications that subsurface disposal systems must meet. The Environmental Quality Commission then must adopt the DEQ regulations; however, this authority is generally delegated to the County Environmental Health Division. This is the case in Linn County where the Environmental Health Division is the management agency responsible for enforcing regulations pertaining to subsurface disposal systems and their upkeep. This also applies within the City of Tangent. All permits for subsurface disposal must meet land use requirements of the City.

The Tangent area had some water quality problems that were the result of sewer drainfield failures and seepage into surface and subsurface waters. Tangent currently uses a STEP, (Septic Tank Effluent Pumping) Sewer System for its treatment of sewage gray water, (effluent). The Linn County Environmental Health Division continues to monitor sewage disposal sites and repair sites outside the area served by the City sewer system.

Stormwater runoff during storm events has become problematic over the years. The greatest concern is the periodic flooding congestion due to restrictions at the railroad culverts. Additionally, DEQ now requires Total Maximum Daily Load, (TMDL) allowances of temperature and some pollutants and heavy metals to be monitored and controlled throughout Tangent's Stormwater System, (OAR 340-042-0025). As a result, Tangent developed its TMDL Plan in 2008, and in 2010 completed the Hydrological and Ecological Assessment of North Lake Creek, City of Tangent, Oregon.

## SOILS

Tangent's approximate elevation is 246 feet (<http://www.city-data.com/city/Tangent-Oregon.html>) with about 5 foot variations from East to West until it approaches the Calapooia River.

The United States Department of Agriculture Soil Conservation Service, (<http://soils.usda.gov/>) has studied and mapped the soils of the Tangent area. Specific information on each soil type is available at that website.

In general, the soils of Tangent will need to be taken into consideration prior to most development. The restrictive characteristics range from flooding to poor drainage, and from shrink-swell to low strength.

***See Figures 5A-5D: United States Department of Agricultural, Natural Research Conservation Service Soil Map – Linn County Area (City of Tangent July 2010, (<http://soils.usda.gov/>)***

## AGRICULTURAL CAPABILITY CLASS

All soils within the City of Tangent and the planning area have been identified by the Soil Conservation Service as being in soil classes I through IV. The Land Use element of this Comprehensive Plan describes these soils and the various agricultural uses that are found upon them.

# FOUNDATION SUITABILITY

*See Figure 6: Foundation Suitability, (Soil Survey of Linn County Area Oregon. United States Department of Agriculture, Soil Conservation Service, 1987, Table 8.)*

Foundation suitability is a measure of how well the soil or ground will be able to support a structure. There are three categories of structure that are considered. They are: dwellings with basements, dwellings without basements and small commercial buildings.

Of the eleven soils present within the Tangent City limits and UGB, only four soils indicate moderately restrictive characteristics and seven are listed as severe soils.

It should be noted that a severe rating of any one soil does not mean that development cannot take place on that soil. What it does mean is that caution and certain building techniques must be employed in order to achieve a sound development.

The characteristics of a soil may have already been modified for some other reason such as improved agricultural productivity and, therefore, each site should be evaluated based on the existing conditions and their proposed use.

## SHALLOW EXCAVATIONS

For the most part, shallow excavations present the same characteristics as foundation suitability. As such, further mapping is unnecessary.

## DRAINAGE

*See Figure 4a, City of Tangent, Master Drainage Plan, Data from the Tangent Local Wetland Inventory*

Problems associated with drainage ranges from the inconvenience of standing water to the inability of obtaining septic approval or the seasonal failure of septic systems. Of the eleven soils in Tangent, only four are rated as severe with regards to drainage.

Wapato silty clay loam 50A, and Natroy silty clay loam 110A, both rated as severe for drainage, are limited in the amount of area that they cover. However, Concord silt loam 210A, and Dayton silt loam 220A, both are rated as severe for drainage, and combined, cover a large area of the City.

In most cases, soils with severe drainage ratings are situated at slightly lower elevations than the surrounding soils. The lower elevations coupled with the clay composition of the restrictive soil facilitates water to drain to the lower elevation where it is held by the clay. This situation is commonly referred to as ponding, several of these ponding areas appear seasonally throughout Tangent and are collectively identified as wetlands on the Tangent Wetlands Inventory Map

Development that may be proposed will need to examine the drainage characteristics of the soils) on the parcel where the development desires to locate. In most cases, the Concord silt loam 210A, and Dayton silt loam 220A are long and narrow with some providing natural drainage ways connected to Lake Creek, North Lake Creek, and other streams in the area.

These natural drainage ways can easily become blocked causing flooding when development takes place. The result could be increased water in other parts of the City. Drainage throughout the city also becomes problematic during large storm events. A study was performed in 2009 of the drainageways in Tangent to learn more about the drainage concerns of Tangent and to offer some methodologies for resolution. (HEANLC, *The Hydrological and Ecological Assessment of North Lake Creek, City of Tangent, Oregon*, July 2009, ICF Jones and Stokes under a grant funded by the Department of Fish and wildlife.)

The HEANLC assessment uncovered multiple factors that contribute to periodic flooding problems experienced in the City such as: 1) The City's position within the watershed; 2) Soils; 3) Land use; 4) Topography; and 5) Undersized conveyance systems. It identified three alternatives to help remedy the periodic flooding from poor drainage: 1) The potential ecological enhancements that would improve the biological functions of North Lake Creek while providing increased storage capacity; 2) Provide an estimate of the amount of converted farm land needed to be returned to wetland in order to provide enough storage; and 3) Offered a revised estimate for the cost of improving the City's existing infrastructure as was suggested in the 1992 Master Drainage Plan.

## **LOCAL ROADS**

Local roads in Tangent are identified as State, County, City or private

In the development and improvement of roads, special care should also be given to soils with drainage restrictions. Many new roads will most likely run north-south. Since the natural orientation of the soils is for the most part east-west, the new roads could divide and/or block natural drainage ways.

Other characteristics that may present problems for road development are associated with those soils with low strength and high shrink swell. To avoid these problems, all new roads in Tangent must meet minimum composition and compaction requirements and allow for natural drainage as defined by Tangent City Codes

## **SURFACE WATER**

All surface water contained in the creeks and seasonal streams of Tangent eventually flow into the Calapooia River.

Although the Calapooia River lies just outside the west boundary of the City limits, its influence can be felt far within the City, as evidenced during the flood of 1996 and cyclical flooding of 2005. Winter floodwaters of the Calapooia River cover much of the southwestern part of the City. During flooding of the Calapooia, other creeks such as Lake Creek and North Lake Creek back up, adding to the problem. The result, as shown on the *U.S. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Study for Linn County, Oregon and Incorporated Areas*, September 29, 2010, shows that much of western and central Tangent experience flooding.

# VEGETATION COVER

## *See Figure 9: Vegetation Map*

Vegetation cover that is not related to agricultural practices is limited in the Tangent area. For the most part, natural vegetation occurs along the creek and stream channels. This vegetation is predominantly deciduous, having broad leaves that fall annually like oak and Cottonwood trees. Without question, the largest amount of natural vegetation occurs along Lake Creek and the western portion of North Lake Creek.

Wind breaks usually located near farmhouses account for some of the other vegetative cover. In many instances windbreaks consist of nut trees, thus providing protection from the wind and acting as a seasonal source of food. Windbreaks are also aligned with fencerows and property lines.

The remaining vegetation cover is associated with development adding aesthetic appeal in the form of landscaping. Much of this vegetation or landscaping is as old as the town of Tangent that dates back to the late 1800's and as such the vegetation is fully grown, making the development blend into a more natural setting. The remainder of the Tangent area has been extensively farmed.

Conversion of farmland to urban uses within the City will not be visually appealing without the use of landscaping. As the open grass fields of Tangent give way to development, there will be a lag time in that the development may appear intrusive on the horizon. However, once the landscaping grows and matures, the development will blend into the surroundings better.

Efforts are being made across Oregon to encourage native vegetation to the region. Tangent City Hall has a list of preferred vegetation planting for its development on public and private lands.

Soils that restrict root depth can cause plantings to be stunted or may add to their toppling in moderate winds. When selecting plants and trees for planting, guidelines using publications from the United States Department of Agriculture such as: *Field Guide to Riparian Plant Communities in Northwestern Oregon* are a potential resource. Information regarding invasive or noxious plants can be found at the USDA's website: [http://www.oregon.gov/ODA/pub\\_regs\\_plants.shtml#Protected\\_native\\_plants](http://www.oregon.gov/ODA/pub_regs_plants.shtml#Protected_native_plants)

# MINERAL RESOURCES

There are no known marketable mineral resources in Tangent.

# FISH AND WILDLIFE

Statewide land use Goal 6 law requires cities to maintain and improve water resources of the state. Strategies to maintain and improve water quality focus on preserving the beneficial uses of waterways, the most sensitive use often being fish habitat. Goal 5 requires that all fish and wildlife areas and habitats be inventoried as to location, quality, and quantity. Updates to the City's Comprehensive Plan with respect to Goal 5 for habitat must comply with OAR 660-23-0110.

Until the city chooses to pursue a comprehensive update of inventories and protection measures for fish and wildlife habitat, it will maintain a record of fish presence as identified by the Oregon Department of Fish and Wildlife and support development patterns and practices that maintain and improve water quality in streams where fish are present and in waterways that discharge into these streams.

Areas identified by the State Department of Fish and Wildlife within the Tangent Planning Area are the Calapooia Watershed, the Oak Creek Watershed, and the Lake Creek Watershed. The state inventory indicates that these watersheds have both sensitive vegetation and riparian zones.

For the most part, agricultural activities and practices in and around Tangent limit the numbers and types of wildlife found in the City. Because of the extensive agricultural activity, most wildlife will be found in association with the vegetative cover along the stream and creek channels.

The most common wildlife types in the Tangent area are deer and small animals (rabbits, raccoons, skunks, opossum, etc.) and several bird species, including waterfowl species. Bald Eagles have been observed along the Calapooia River during the winter months.

All three watersheds in Tangent provide a good habitat for several documented species of fish. These include native species of cutthroat trout, three-spine stickleback, redbreast shiner, and largescale sucker as well as non-native species including largemouth bass, brown bullhead, black crappie, and western mosquitofish. (Oregon Department of Fish and Wildlife, South Willamette Watershed District, 2010). Other fish, such as Chinook and Coho Salmon and Steelhead that spawn in the headwaters of the Calapooia and its tributaries. Source: *Fish and Amphibian Use of Vegetated and Non-vegetated Intermittent Agricultural Waterways in the South Willamette Valley*. G.R. Giannico, J.L. Li, K.L. Boyer, R.W. Colvin, W.J. Gerth, M.E. Mellbye, S.M. Griffith and J.J. Steiner. *Oregon Seed Extension Research Program Seed Production Research Report 2005*

## **OPEN SPACE**

Open space consists of recreational areas such as parks and playgrounds and flood plain areas. Although some of it will be developed, most of the flood plain areas will remain undeveloped due to flood plain standards described in the City's Flood Plain Ordinance.

Furthermore, certain areas within the flood plain, especially along stream banks, and natural drainage ways, contain riparian habitat areas, that will be preserved. Some of it will become parkland and the remainder will be protected by siting standards for development in the Flood Plain Ordinance and requirements for natural drainage way easements.