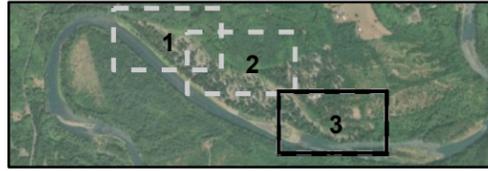
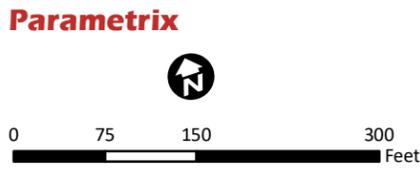


Date: 8/12/2019 Author: Amittian Path: U:\PSO\Projects\Clients\8092-Cowlitz\_Timber\_Trails\267-8092-001\_CITTA\_Permit\_Assst\99Svcs\GIS\MapDocs\CITTA\_Delineated\_Wetland\_Boundary.mxd

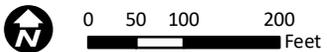


- Delineated Wetland Boundary
- - - Approximate Wetland Boundary
- Shoreline Jurisdiction
- Wetland A Buffer
- Wetland B Buffer
- Wetland C Buffer
- Wetland Sample Plot
- Road
- Stream
- OHWM

**Figure 2**  
 Delineated Wetland Boundaries  
 Cowlitz Timber Trails Association  
 Page 3 of 3  
 Salkum, Washington



**Parametrix**



- Buffer Mitigation Area
- Wetland A Buffer
- Wetland B Buffer
- Delineated Lots
- Approximate Wetland Boundary
- Delineated Wetland Boundary
- Shoreline Jurisdiction

**Figure 3.**  
Wetland A: Buffer Impact and Mitigation Areas  
Salkum, Washington

Attachment A  
Background Information





Soil Map—Lewis County Area, Washington  
(CTTA Soils Map)



Map Scale: 1:17,500 if printed on A landscape (11" x 8.5") sheet.



Soil Map—Lewis County Area, Washington  
(CTTA Soils Map )

**MAP LEGEND**

**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

**Special Point Features**

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

**Water Features**

 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

 Aerial Photography

**MAP INFORMATION**

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lewis County Area, Washington  
Survey Area Data: Version 18, Sep 10, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 29, 2015—Sep 27, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
4	Aquic Xerofluvents, overflow	11.4	0.7%
61	Cloquato silt loam	38.1	2.4%
116	Klaber silt loam	25.9	1.6%
117	Klaber variant silty clay loam	51.8	3.2%
118	Lacamas silt loam, 0 to 3 percent slopes	57.2	3.6%
123	Ledow sand	275.5	17.2%
152	Olequa silt loam, 0 to 5 percent slopes	8.3	0.5%
170	Puget silt loam	23.2	1.4%
171	Puyallup fine sandy loam	93.2	5.8%
180	Riverwash	7.8	0.5%
242	Winston loam, 0 to 8 percent slopes	118.5	7.4%
243	Winston gravelly loam, 0 to 8 percent slopes	492.1	30.7%
244	Winston gravelly loam, 8 to 15 percent slopes	33.3	2.1%
245	Winston gravelly loam, 15 to 30 percent slopes	1.2	0.1%
248	Xerorthents, steep	185.6	11.6%
W	Water	180.1	11.2%
<b>Totals for Area of Interest</b>		<b>1,603.2</b>	<b>100.0%</b>



LOCATION WINSTON

WA

Established Series  
Rev. WRF/RJE/TLA  
01/2000

## WINSTON SERIES

The Winston series consists of very deep, well drained soils formed in glacial outwash, or old alluvium, with a mantle of loess and volcanic ash. Winston soils are on terraces and terrace escarpments and have slopes of 0 to 65 percent. Elevation is 150 to 1,900 feet. The average annual precipitation is about 55 inches and average annual temperature is about 48 degrees F.

**TAXONOMIC CLASS:** Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Andic Dystrochrepts

**TYPICAL PEDON:** Winston ashy loam - grass pasture. (Colors are for moist soil unless otherwise stated. All textures are apparent field textures.)

**Ap**--0 to 4 inches; dark brown (7.5YR 3/2) ashy loam, dark brown (7.5YR 4/2) dry; moderate medium and fine granular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine, fine and medium roots; many very fine interstitial pores; 5 percent concretions; 5 percent pebbles; slightly acid (pH 6.2); clear smooth boundary. (3 to 8 inches thick)

**Bs1**--4 to 8 inches; dark reddish brown (5YR 3/4) ashy loam, dark reddish brown (5YR 3/4) dry; moderate very fine subangular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine, fine and medium roots; many very fine irregular pores; 5 percent concretions, 5 percent pebbles; slightly acid (pH 6.4); clear smooth boundary.

**Bs2**--8 to 35 inches; dark brown (7.5YR 4/4) ashy loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure parting to weak fine and very fine subangular blocky; soft, friable, nonsticky and nonplastic, weakly smeary; common very fine, fine and medium roots; many very fine tubular pores; 2 percent concretions; 10 percent pebbles; moderately acid (pH 6.0); gradual wavy boundary. (Combined thickness of the Bs horizon is 9 to 40 inches)

**2C**--35 to 60 inches; dark brown (10YR 4/3) and dark grayish brown (10YR 4/2) extremely gravelly sand, pale brown (10YR 6/3) and light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine irregular pores; 70 percent pebbles; neutral (pH 6.8).

**TYPE LOCATION:** Lewis County, Washington; 250 feet north and 675 feet west of the 1/2 corner of section 17, T. 11 N., R. 1 W.

**RANGE IN CHARACTERISTICS:** Average annual soil temperature at a depth of 20 inches ranges from 47 to 53 degrees F. These soils are usually moist but are dry in all parts of the soil moisture control section for 45 to 60 consecutive days within the four months following the summer solstice. The solum thickness and depth to the 2C horizon ranges from 14 to 38 inches. The control section above the 2C horizon averages 5 to 35 percent coarse fragments. Volcanic ash influence is 7 to 38 inches, however below 14 inches bulk density is greater than 1.0 g/cc. The 7 to 14 inches volcanic ash mantle has an estimated moist bulk density of 0.90 to 1.0 g/cc, volcanic glass content of 5 to 20 percent, acid oxalate extractable aluminum plus one-half iron of 1.0 to 2.0 percent, phosphate

retention of 50 to 75 percent, and 15 bar water retention of 8 to 12 percent for air dried samples. The solum has a base saturation of less than 50 percent (NH<sub>4</sub>OAc).

The A horizon has hue of 5YR through 10YR, value of 2 through 5 moist, 3 through 6 dry and chroma of 1 through 4 moist and dry. This horizon has weak or moderate granular or subangular blocky structure. Reaction is strongly acid to slightly acid. Some pedons have thin E horizons.

The Bs horizon has hue of 5YR through 10YR, value of 3 through 5 moist, 4 through 6 dry and chroma of 3 through 6 moist and dry. Horizons with both values and chroma of 3 or less moist are less than 3 inches thick. The horizon is loam, gravelly sandy loam, silt loam, gravelly fine sandy loam, gravelly silt loam or gravelly loam. Reaction is strongly acid to slightly acid. Some pedons have a BC horizon or a C horizon above the 2C horizon.

The 2C horizon has hue of 10YR through 2.5YR, value of 3 through 6 moist, 3 through 7 dry and chroma of 2 through 6 moist and dry. It is very gravelly sand, very gravelly loamy coarse sand, extremely gravelly coarse sand or extremely gravelly sand. Thin layers of sandy loam or loamy sand are in some pedons. Rock fragments range from 35 to 90 percent by volume. Reaction is moderately acid through neutral.

**COMPETING SERIES:** These are the [Birchbay](#), [Lystair](#) and [Ragnar](#) series. All of the soils except Birchbay are 0 to 35 percent rock fragments in the lower part of the particle-size control section. In addition, Birchbay soils have a perched water table in the lower part of the particle-size control section at times in winter and early spring. Birchbay and Ragnar soils are dry for more than 60 consecutive days.

**GEOGRAPHIC SETTINGS:** Winston soils are on outwash terraces and terrace escarpments at elevations of 150 to 1,900 feet. Slopes are 0 to 65 percent. These soils formed in gravelly alluvium or glacial outwash with a mantle of loess and volcanic ash. Winston soils are in a marine climate with cool, dry summers and mild, wet winters. Average annual precipitation is 40 to 80 inches occurring mostly as rain in the winter. Average January temperature is 35 degrees F.; average July temperature is 62 degrees F.; average annual temperature is 46 to 52 degrees F. The frost-free season is 125 to 200 days. The growing season (28 degrees F.) is 150 to 220 days.

**GEOGRAPHICALLY ASSOCIATED SOILS:** These are the [Barneston](#), [Galvin](#), [Klaber](#), [Olequa](#), and [Tokul](#) soils. Barneston soils are sandy-skeletal. Galvin and Klaber soils have an argillic horizon and an aquic moisture regime. Olequa soils are fine-silty and have an argillic horizon. Tokul soils have ortstein formed in dense glacial till at a depth of 20 to 40 inches.

**DRAINAGE AND PERMEABILITY:** Well drained, very slow to medium runoff; moderate permeability in the solum and very rapid in the substratum.

**USE AND VEGETATION:** Used for cropland and woodland. Seeded grass pasture, hay and small grains are the principal crops. Native vegetation is Douglas-fir, western redcedar, western hemlock, bigleaf maple and red alder with an understory of vine maple, Oregongrape, western swordfern, salal, trailing blackberry, red huckleberry, western brackenfern, violet, trillium, evergreen blackberry, rose and salmonberry.

**DISTRIBUTION AND EXTENT:** Western Washington. Series is moderately extensive.

**MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE:** Portland, Oregon

**SERIES ESTABLISHED:** Lewis County, Washington, 1941.

**REMARKS:** Diagnostic horizons and features recognized in this pedon are an ochric epipedon from the surface to 4 inches, a cambic horizon from 4 to 35 inches, and a lithologic discontinuity to sandy-skeletal material at 35 inches. The cambic horizon is assumed to have micro morphological of cracked coatings and silt-sized and larger pellets (once considered as spodic horizon). This description reflects a change in classification based on amendment 16 from coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplorthods to coarse-loamy over sandy or sandy-skeletal, mixed, mesic Andic Xerochrepts. Classification revised 1/00 from Andic Xerochrepts to Andic Dystroxerepts based on changes to Soil Taxonomy.

**ADDITIONAL DATA:** Lab number RP77-WA-081. Soil was sampled as the Startup series.

---

National Cooperative Soil Survey  
U.S.A.



LOCATION CLOQUATO

WA+OR

Established Series  
Rev. ARH/DRJ/RWL  
07/2006

## CLOQUATO SERIES

The Cloquato series consists of very deep, well drained soils formed in mixed alluvium. Cloquato soils are on flood plains at elevations of 30 to 800 feet. Slopes are 0 to 5 percent. The mean annual temperature is about 52 degrees F. and the average annual precipitation is about 50 inches.

**TAXONOMIC CLASS:** Coarse-silty, mixed, superactive, mesic Cumulic Ultic Haploxerolls

**TYPICAL PEDON:** Cloquato silt loam - cultivated. (Colors are for moist soil unless otherwise noted.)

**Ap**--0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium and coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; moderately acid; abrupt smooth boundary. (4 to 9 inches thick)

**A1**--7 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 4/3) dry; moderate medium and coarse granular structure ; slightly hard, very friable, many fine roots; many fine and medium pores; slightly acid; clear smooth boundary. (4 to 12 inches thick)

**A2**--12 to 40 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; slightly hard, very friable; common fine roots; many fine and medium pores; neutral; abrupt smooth boundary. (0 to 32 inches thick)

**2C1**-- 40 to 52 inches; dark grayish brown (10YR 4/2) stratified sandy loam to silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; soft, very friable; few fine roots; many fine and medium tubular pores; neutral; abrupt smooth boundary. (10 to 20 inches thick)

**3C2**--52 to 72 inches; light brownish gray (2.5Y 6/2) stratified sand to fine sandy loam, dark grayish brown (2.5Y 4/2) dry; single grain; loose; few fine roots; neutral.

**TYPE LOCATION:** Clark County, Washington; 1,500 feet west of northeast corner section. 31, T. 5 N., R. 1 E.

**RANGE IN CHARACTERISTICS:** The mean annual soil temperature ranges from 47 to 54 F. These soils are usually moist but are dry in all parts between depths of 4 and 12 inches for 45 to 60 consecutive days. The mollic epipedon ranges from 20 to more than 40 inches thick. The particle-size control section is dominantly silt loam and contains 5 to 18 percent clay with less than 15 percent fine sand or coarser. The soil profile has a hue of 10YR or 2.5Y.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry. It has weak or moderate granular or subangular blocky structure. This horizon is moderately acid or slightly acid in the upper part and grades to slightly acid or neutral in the lower part.

A Bw horizon, when present, has value of 3 or 4 moist, 4 to 6 clay, and chroma of 2 to 4 moist and dry. It is slightly acid to neutral. It has weak prismatic or weak to moderate subangular blocky structure.

The 2C and 3C horizons have value of 3 through 6 moist or dry, and chroma of 2 through 4 moist or dry. Texture is silt loam, loam, very fine sandy loam, sandy loam, loamy sand or sand with 2 to 15 percent clay and is commonly stratified. The sandy loam, loamy sand or sand textures do not occur above a depths of 40 inches. It has 0 to 10 percent gravel. It has weak subangular blocky structure or is massive or single grain. Reaction is neutral or slightly acid.

**COMPETING SERIES:** There are no other series in this family, however, similar soils include [Chapman](#), [Chehalis](#) and [McBee](#) series. All of these soils have more than 18 percent clay in the particle-size control section. In addition, McBee soils are moderately well drained. Chapman soils have more than 15 percent fine sand and coarser.

**GEOGRAPHIC SETTING:** These soils are on flood plains at elevations of 30 to 800 feet. Slopes are 0 to 5 percent. These soils formed in mixed alluvium. Cloquato soils occur in a climate characterized by relatively cool dry summers and cool wet winters. Average annual precipitation is 38 to 70 inches. Average January temperature is 30 to 40 degrees F., average July temperature is 65 to 67 degrees F., and mean annual temperature is 50 to 54 degrees F. The growing season (28F) ranges from 150 to 240 days.

**GEOGRAPHICALLY ASSOCIATED SOILS:** These are the [Camas](#), [Chapman](#), [Chehalis](#), [McBee](#), [Newberg](#), [Pilchuck](#), and [Wapato](#) soils. Camas soils are sandy-skeletal. Pilchuck soils are sandy. Camas and Pilchuck soils are on bar positions. Newberg soils are coarse-loamy and have a mollic epipedon less than 20 inches thick. Wapato soils are poorly drained and are in depressions on flood plains. Chapman soils are on higher flood plains. McBee soils are in depressions on flood plains.

**DRAINAGE AND PERMEABILITY:** Well-drained; slow runoff; moderate permeability. These soils are subject to occasional flooding for brief periods from November to March unless protected.

**USE AND VEGETATION:** This soil is used for cropland, pasture and woodland. Hay, winter wheat, oats, corn for silage, potatoes, strawberries and raspberries are common crops. Native vegetation is Douglas-fir, red alder, western redcedar, and bigleaf maple with an understory of western swordfern, vine maple, western brackenfern, salal, oregongrape, trailing blackberry, salmonberry and red huckleberry.

**DISTRIBUTION AND EXTENT:** Western Washington and northwestern Oregon; MLRA 2. The series is of moderate extent.

**MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE:** Portland, Oregon

**SERIES ESTABLISHED:** Grays Harbor County, Washington, 1970.

**REMARKS:** Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon - the zone from 0 to 40 inches with an assumed irregular decrease in organic carbon with depth.

Ultic feature - base saturation (sum) of 75 percent or less in at least one horizon between 10 and 50 inches.

Particle-size control section - the zone from 10 to 40 inches.

**ADDITIONAL DATA;** National Soil Survey Lab soil survey sample numbers: S62OR-071-015 and S62OR-071-016.

3/28/2019

Official Series Description - CLOQUATO Series

National Cooperative Soil Survey  
U.S.A.



LOCATION PUGET

WA

Established Series  
Rev. DES/RJE/TDT  
05/2000

## PUGET SERIES

The Puget series consists of very deep, poorly drained soils that formed in recent alluvium on floodplains and low river terraces. Slopes are 0 to 3 percent. The average annual precipitation is about 40 inches. The mean annual temperature is about 50 degrees F.

**TAXONOMIC CLASS:** Fine-silty, mixed, superactive, nonacid, mesic Fluvaquentic Endoaquepts

**TYPICAL PEDON:** Puget silty clay loam - pasture. (Colors are for moist soil unless otherwise noted.)

**A1**--0 to 1 inches; very dark grayish brown (2.5Y 3/2) silt loam, moderate thin platy structure; hard, firm, slightly sticky and slightly plastic; many roots; moderately acid (pH 6.0); abrupt smooth boundary. (1 to 7 inches thick)

**A2**--1 to 7 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light gray (2.5Y 7/2) dry; common fine prominent dark brown (7.5YR 4/4) redox concentrations; moderate very coarse prismatic structure; hard, firm, moderately sticky and moderately plastic; many roots; moderately acid (pH 6.0); clear smooth boundary. (0 to 7 inches thick)

**Bg1**--7 to 17 inches; dark grayish brown (2.5Y 5/2) silty clay loam, light olive gray (2.5Y 7/2) dry; common medium prominent strong brown (7.5YR 5/6, 5/8) redox concentrations; moderate medium prismatic structure; hard, firm, moderately sticky and moderately plastic; many roots; slightly acid (pH 6.2); clear smooth boundary. (5 to 12 inches thick)

**Bg2**--17 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam, light olive gray (5Y 6/2) dry; many medium prominent yellowish red (5YR 5/8, 4/8) redox concentrations; strong very coarse prismatic structure; very hard, firm, moderately sticky and moderately plastic; common roots; slightly acid (pH 6.4); abrupt smooth boundary. (0 to 12 inches thick)

**Bg3**--25 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam, light gray (5Y 7/2) dry; many medium prominent dark yellowish brown (10YR 3/6) and yellowish red (5YR 5/8, 4/6) redox concentrations; moderate medium angular blocky structure; hard, firm, moderately sticky and moderately plastic; few roots; moderately acid (pH 6.0); abrupt wavy boundary. (0 to 6 inches thick)

**Bg4**--31 to 40 inches; grayish brown (2.5Y 5/2) silty clay loam, light gray (5Y 7/1) dry; common fine prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/8) redox concentrations; strong very coarse prismatic structure; hard, firm, moderately sticky and moderately plastic; few roots; moderately acid (pH 5.8); clear smooth boundary. (0 to 10 inches thick)

**Cg1**--40 to 45 inches; greenish gray (5GY 5/1) silty clay loam, light gray (5Y 7/1) and white (5Y 8/1) dry; common fine prominent strong brown (7.5YR 5/6) and brown (7.5YR 4/4) redox concentrations; massive; hard, firm, moderately sticky and moderately plastic; moderately acid (pH 5.8); clear smooth boundary. (0 to 6 inches thick)

**Cg2**--45 to 60 inches; gray (5Y 5/1) silty clay, light gray (5Y 7/1) dry; few fine prominent yellowish red (5YR 4/8, 5/8) and common medium distinct light olive brown (2.5Y 5/4) redox concentrations; massive; very hard, firm, moderately sticky and moderately plastic, moderately acid (pH 6.0).

**TYPE LOCATION:** King County, Washington; 1/2 mile southwest of Carnation; 2,640 feet north and 600 feet east of the southwest corner of sec. 21, T. 25 N., R. 7 E.

**RANGE IN CHARACTERISTICS:** The mean annual soil temperature is 47 to 52 degrees F. The particle-size control section lacks coarse fragments, has less than 15 percent fine and coarser sand, and 18 to 35 percent clay.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 5 moist, 4 through 7 dry and chroma of 1 or 2 moist and dry. Subhorizons with a value of 3 moist are less than 7 inches thick. It is moderately acid to neutral.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 or 5 moist, 6 or 7 dry and chroma of 2 moist, 1 or 2 dry. It is silt loam or silty clay loam. Some pedons have thin strata (less than 2 inches thick) or sand or loamy sand. This horizon is slightly acid to very strongly acid.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, or 5GY, value of 4 or 5 moist, 6 or 7 dry and chroma of 0 to 2 moist and dry. It is silt loam, silty clay loam or silty clay and has strata of sand or loamy sand. It is slightly acid to very strongly acid.

**COMPETING SERIES:** This is the [Aetna](#) series. Aetna soils have a buried mollic epipedon that is 10 to 24 inches thick.

**GEOGRAPHIC SETTING:** The Puget soils are on flood plains at elevations ranging from 10 to 650 feet. They formed in recent alluvium. Slopes are 0 to 3 percent. The soils are in a mild marine climate. Average annual precipitation ranges from 35 to 55 inches, most of which falls as rain during the winter. Snow is infrequent. The average January temperature is about 38 degrees F.; average July temperature is about 64 degrees F.; and mean annual temperature is about 50 degrees F. The frost-free season is about 150 to 190 days.

**GEOGRAPHICALLY ASSOCIATED SOILS:** These are the [Briscot](#), [Nooksack](#), [Oridia](#), [Puyallup](#), and [Sultan](#) soils. Briscot soils are coarse-loamy. Nooksack, Puyallup, and Sultan soils have a xeric moisture regime. In addition, Nooksack and Puyallup soils have a mollic epipedon. Oridia soils are coarse-silty.

**DRAINAGE AND PERMEABILITY:** Poorly drained; slow to ponded runoff; moderately slow permeability. These soils are subject to occasional periods of flooding from December to March. An apparent water table is as high as 1 foot over the surface to 1 foot below the surface at times from November to April unless the soil is drained.

**USE AND VEGETATION:** Most of the Puget soil has been cleared and drained for use as cropland. Seeded grass pasture, grass-legume hay, oats, and green-chop are the major crops. The natural vegetation is red alder, black cottonwood, western redcedar, and willow with an understory of trailing blackberry, salmonberry, Oregon-grape, western swordfern, Indian plum, hardhack, willow, and rush.

**DISTRIBUTION AND EXTENT:** The Puget Sound Basin of Western Washington; MLRA 2. The series is of moderate extent.

**MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE:** Portland, Oregon

**SERIES ESTABLISHED:** Eastern part of Puget Sound Basin, Reconnaissance, 1909.

**REMARKS:** Laboratory data are available on this series NSSL #S74WA61-7- 341-345. Diagnostic horizons and features recognized in this pedon are an ochric epipedon and a cambic horizon from 17 to 40 inches. The sediments have more than 0.2 percent organic carbon to a depth of 60 inches or more.

---

National Cooperative Soil Survey  
U.S.A.



LOCATION LEDOW

WA

Established Series

Rev. WRP/RJE

11/79

## LEDOW SERIES

The Ledow series consists of deep, somewhat excessively drained soils that formed in mixed alluvium from igneous rock, volcanic ash, and pumice. Ledow soils are on flood plains and have slopes of 0 to 3 percent. The mean annual precipitation is about 65 inches and the mean annual temperature is about 50 degrees F.

**TAXONOMIC CLASS:** Sandy, mixed, mesic Mollic Xerofluvents

**TYPICAL PEDON:** Ledow sand, brush and trees. (Colors are for moist soil unless otherwise stated.)

**O**--2 inches to 0; leaves and twigs.

**A1**--0 to 8 inches; very dark gray (10YR 3/1) sand, dark grayish brown (10YR 4/2) dry; single grained; loose; common roots; 10 percent sand-size volcanic ash; neutral (pH 6.8); gradual smooth boundary. (6 to 10 inches thick)

**C1**--8 to 20 inches; very dark grayish brown (10YR 3/2) fine sand, grayish brown (10YR 5/2) dry; single grained; loose; common roots; 10 percent sand size volcanic ash; neutral (pH 6.6); abrupt wavy boundary. (11 to 13 inches thick)

**IIc2**--20 to 24 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure that parts to moderate very fine and fine subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many roots; common very fine tubular pores; slightly acid (pH 6.4); abrupt wavy boundary. (1 to 5 inches thick)

**IIIC3**--24 to 60 inches; very dark gray (10YR 3/1) fine sand, dark grayish brown (10YR 4/2) dry; single grained; loose; neutral (pH 6.6).

**TYPE LOCATION:** Lewis County, Washington; 875 feet south of the north 1/4 corner sec. 17, T.11N., R.1W.

**RANGE IN CHARACTERISTICS:** The mean annual soil temperature at a depth of 20 inches ranges from 47 degrees to 53 degrees F. Rock fragments are less than 10 percent. These soils are usually moist but they are dry in all parts between depths of 12 and 35 inches for 60 to 75 consecutive days in moist years. The soil ranges from neutral to slightly acid. Sand-size volcanic ash ranges from 0 to 15 percent. These soils are dark colored because of the dark colored sand grains.

The A horizon has value of 2 or 3 moist, 4 or 5 dry, and chroma of 1 or 2 moist or dry. This horizon is single grained or has weak subangular blocky structure.

The C horizon has value of 2 or 3 moist, 4 or 5 dry, and chroma of 1 through 3 moist and 2 through 4 dry. It is commonly sand or fine sand with layers of silt loam or fine sandy loam that range in thickness from 1 to 5 inches.

**COMPETING SERIES:** These are the [Avawatz](#) series in the same family and the [Greenwater](#) and [Pilchuck](#) series. Avawatz soils have a mean annual soil temperature of about 57 degrees F., are dry for more than 90 consecutive days following summer solstice and have colors with a value of 4 moist and 6 dry in the C horizon. Greenwater and Pilchuck soils are not stratified and have a regular decrease in organic matter.

**GEOGRAPHIC SETTING:** Ledow soils are on flood plains. Elevations range from 75 to 1,200 feet. Slopes are 0 to 3 percent. The soils formed in mixed alluvium dominantly from andesite and basalt with lesser amounts of volcanic ash and pumice. The soils are in a cool and humid climate with annual precipitation ranging from 50 to 80 inches. Mean January temperature is about 35 degrees F.; the mean July temperature is about 64 degrees F.; the mean annual temperature is about 50 degrees F.; and the frost-free season is 125 to 200 days.

**GEOGRAPHICALLY ASSOCIATED SOILS:** These are the [Cloquato](#), [Newberg](#), [Puyallup](#), [Schooley](#), and [Siler](#) soils and the competing [Greenwater](#) soils. Cloquato, Newberg, Puyallup, and Siler soils have a mollic epipedon. Schooley soils are coarse-loamy and have an aquic moisture regime.

**DRAINAGE AND PERMEABILITY:** Somewhat excessively drained; slow runoff; moderate permeability. These soils are subject to frequent, brief flooding during the winter and early spring.

**USE AND VEGETATION:** Most areas are used for cropland. Hay, grass pasture, and small grains are the principal crops. Native vegetation is alder, cottonwood, and Douglas-fir with an understory of vine maple, salmonberry, western swordfern, trailing blackberry, and Oregon-grape.

**DISTRIBUTION AND EXTENT:** Southwestern Washington. Series is of small extent.

**MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE:** Portland, Oregon

**SERIES ESTABLISHED:** Lewis County, Washington, 1976.

---

National Cooperative Soil Survey  
U. S. A.