Ok Falls Sub-Geographic Indication

November 2017

Technical Description and Geographic Extent

Documentation in support of a formal application to the BC Wine Authority for the creation of a new sub-GI named Okanagan Falls.

Scott Smith, Eterrna Consulting

Pat Bowen, Summerland Research and Development Centre, Agriculture and Agri-Food Canada

Ok Falls Sub-Geographic Indication

TECHNICAL DESCRIPTION AND GEOGRAPHIC EXTENT

EXECUTIVE SUMMARY

The proposed OK Falls sub-Geographic Indication (sub-GI) has a unique terroir combining climatic, topographic and soil characteristics that influence the development and performance of grapevines including the compositional development of fruit that determines wine quality. The essence of this sub-GI is a landscape created during deglaciation some 12,000 year ago. Most of the area is covered by what geologists call glaciofluvial deposits, sands and gravels that were deposited by glacial meltwater during deglaciation. The proposed sub-GI covers an area just under 800 ha. According to a provincial agricultural land use survey conducted in 2015 there are approximately 150 ha of vineyards within this area.

The proposed sub-GI is composed of two landscape elements. The first and by far the largest is the undulating glaciofluvial landscape along the Oliver Ranch, Allendale, Sun Valley and Rolling Hills Roads. This large landform covers about 75% of the sub-GI area and hosts 126 ha of the 150 ha of vineyards in the sub-GI. The second element is composed of mixed materials and landforms along Shuttleworth Creek below the base of Peach Cliff, and gently sloping mixed sediments along McLean Creek Road. These elements create diverse meso-climates that are utilized to advantage to effectively produce a range of V. vinifera cultivars from this relatively small but unique landscape within the Okanagan Valley.

There are no permanent long-term climate stations within the area of the sub-GI. Estimates for the period of 2005 to 2010 indicate that the sub-GI is currently experiencing GGD>10°C values of 1400 degree-days and frost-free period of just over 185 days. Average temperatures and cumulative growing degrees days are lower than in nearby areas to the south. The fruit of Burgundian cultivars, which dominate the area's plantings, matures under the cool conditions of late-summer and fall, improving their winemaking quality. Chardonnay, Pinot noir and Pinot gris account for roughly 75% of planted acreage in the area.

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BACKGROUND

In July 2017 Scott Smith was retained by Noble Ridge Vineyard and Winery to help define the extent of a proposed Okanagan Valley sub-Geographical Indication (sub-GI) in the Okanagan Falls area and to compile technical (biophysical) information to describe and define its nature. The section on viticultural characterization was completed in collaboration with Dr. Pat Bowen.

The starting point for the evaluation was the area outlined by the Appellation Task Group conceptual map of contiguous sub-GIs. Several iterations of possible sub-GI boundaries were prepared and reviewed by the proponents. Following detailed examination of geological, climatic, topographic and soil factors this rather large, heterogeneous area was narrowed down to focus on the unique surficial geology and resultant viticultural properties of the landscape on the east side of the valley from Vaseux Lake to just north of Shuttleworth Creek. A boundary map, technical characterization and rationalization for the delineation are compiled in this report.

The intent of this document is to support the submission of an application to the British Columbia Wine Authority seeking formal establishment of this proposed sub-GI.

GEOGRAPHIC EXTENT

The proposed area of this sub-GI is located immediately south of the village of Okanagan Falls and east of the Okanagan River within the region of the south Okanagan Valley (Figure 1). The sub-GI covers an area just under 800 ha in which there are approximately 150 ha of vineyards, most of these are situated in the southern two thirds of the sub-GI. The delineation also includes areas of native vegetation, a large industrial site (former Weyerhaeuser mill complex) and scattered areas of urban residential development.

Figure 1. The extent of the proposed sub-GI. The area extends south from OK Falls village to the northern shore of Vaseux Lake to include predominantly undulating glaciofluvial sands and gravels along the east side of the Okanagan Valley.

Boundary Rationalization

Boundary segments are shown on Figure 1. Along the north side of the sub-GI the boundary (segment 1 – 2) follows the base of the rock outcropping of Peach Cliff. Along the northeast extent, the boundary (segment 2 – 3) follows a subtle soil and hydrologic break between the relatively level alluvial fan deposits of McLean Creek and more sloping and mixed soil materials in proximity to Shuttleworth Creek and several of its tributary gullies. The expanse of relatively level land north of the boundary (McLean Creek flats) experiences a slightly different climate, one with a different pattern of cold air flow which limits horticultural production and has led to the current dominant land use of forage and pasture cover.

The boundary crosses Shuttleworth Creek at an elevation of 475 m at a point where upstream the creek becomes entrenched into bedrock and little arable land exists. The eastern boundary (segment 3 – 4) follows the landform break between glaciofluvial materials which host most of the viticulture in the sub-GI and the steep landscape of predominantly bedrock outcrops. This segment varies from an elevation of about 500 m above Shuttleworth Creek to just under 400 m at point 4 adjacent to Vaseux Lake.

The eastern boundary (segment 1 – 4) follows the edge of the Okanagan River floodplain and wetlands and the base of the escarpment that is formed below the strongly undulating glaciofluvial landscape along the Oliver Ranch Road (Figure 2). The floodplain and wetlands are largely unsuited for viticulture due to climate and soil conditions. For the most part, the boundary is coincident with Hwy 97 which follows this same path at the base of the escarpment.

Figure 2. View from west side of the valley looking eastward toward Okanagan River channel, Hwy 97 and the undulating upland surface of the glaciofluvial deposit upon which the vineyards of the Oliver Ranch Road area are situated.

PHYSICAL CHARACTERISTICS

The proposed sub-GI is composed of two landscape elements. The first and by far the largest is the undulating glaciofluvial landscape along the Oliver Ranch, Allendale, Sun Valley and Rolling Hills Roads. This large landform covers about 75% of the sub-GI area and hosts 126 ha of the 150 ha of vineyards in the sub-GI. The second element is composed of mixed materials and landforms along Shuttleworth Creek, which includes the alluvial (floodplain) plain formed by the creek, sloping remnant glaciofluvial deposits along the base of Peach Cliff, and gently sloping till-like sediments along McLean Creek Road. This landscape element currently hosts some 20 ha of vineyards, but expansion is occurring. Together, these two elements make up the full extent of the sub-GI (Figure 3). Both landscapes share a similar elevation range and regional climate. Their respective landforms where both shaped by events and deposits related to deglaciation of the Okanagan Valley, and most soils are coarse textured (sandy and/or gravelly) and well drained. These two landscape elements are described in more detail in the following sections.

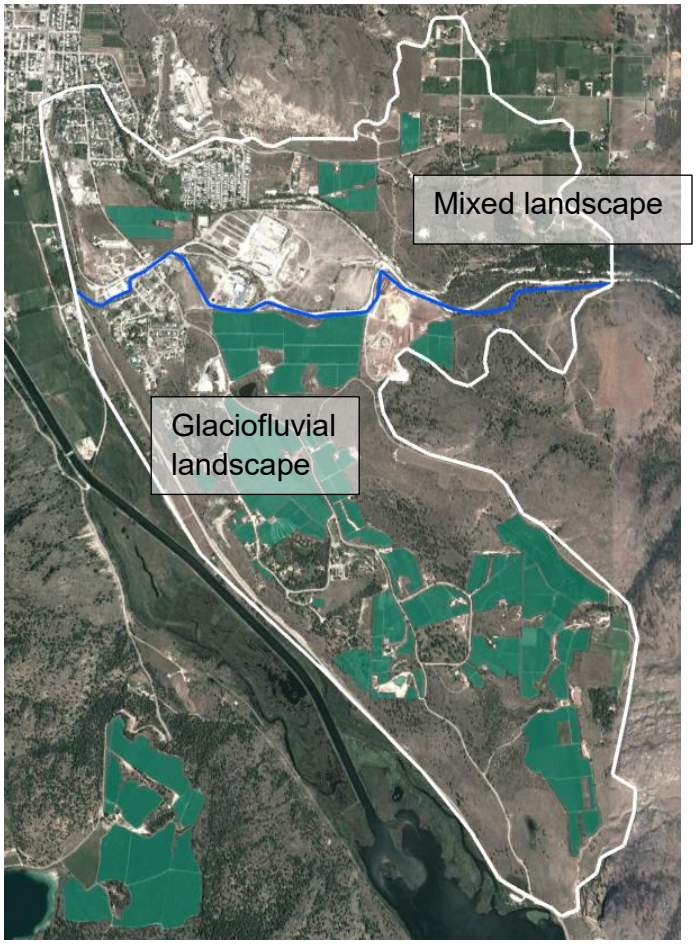

Figure 3. The sub-GI area is characterized by two landscape elements based on topography and type of surficial deposits. The blue line outlines the break between the mixed deposits along Shuttleworth Creek and the predominantly glaciofluvial materials that underlie the Oliver Ranch Road portion of the sub-GI. The extent of vineyards, based on a BC Ministry of Agriculture (2016), is shown in green.

Surficial Geology and Landforms

The first landscape element of the sub-GI, the glaciofluvial landscape, is characterized by a strongly undulating land surface. Much of the topography was generated during deglaciation as the result of erosion and/or buried glacier ice in the gravelly sediments. The strong slopes and depressions create a distinct landform, referred to as 'kettled' terrain. This is the signature landform of the OK Falls sub-GI and worth some description.

"Kettles are glaciofluvial landforms occurring as the result of blocks of ice calving from the front of a receding glacier and becoming partially to wholly buried by glacial outwash. Glacial outwash is generated when streams of meltwater flow away from the glacier and deposit sediment to form broad outwash plains. When the ice blocks melt, kettle holes are left in the outwash surface. When the development of numerous kettle holes disrupts the land surfaces, a jumbled array of ridges and mounds result" (Bennet and Glasser 1997).

Vineyards are located on all slope positions on this complex land surface (Figure 4).

Figure 4. Vineyards located on kettled terrain which creates slopes of all shapes and aspects. Upper slopes have convex curvature (a) while lower slopes are concave in shape (b). The deep closed depressions on the landscape (arrow) are unsuited for viticulture as they collect cold air.

A second process is also thought to generate the deep depressions such as are found in the Oliver Ranch Road area of the sub-GI. There is evidence that kettle holes can form as the result of floods caused by the sudden drainage of an ice-dammed lake, in this case perhaps Glacial Lake Penticton, which deposited the silts seen along the southern end of Okanagan Lake. These floods often rapidly deposit large quantities of sediment onto the outwash surface. The kettle holes are formed by the melting blocks of sediment-rich ice that were transported and consequently buried. A third mechanism is speculated as sub-glacial in origin whereby large volumes of meltwater flowing under a stagnant valley glacier may scour and erode sediment in an irregular fashion and

generate large irregular depressions on the land surface. Perhaps all of these processes contributed to the unique landform seen today (Figure 5).

Figure 5. A classic Okanagan landscape often seen in tourist literature and calendars. The undulating surface of the Oliver Ranch Road area is seen under vineyard cover with Vaseux Lake and McIntyre Bluff in the background. Geologists have long thought that this was the area of the valley where a temporary dam generated the blockage that led to the formation and emptying of Glacial Lake Penticton to the north.

The second landscape element in the sub-GI is that of the mixed deposits of the Shuttleworth Creek area. Shuttleworth Creek is a major tributary of the Okanagan River and drains the upland plateau to the east of OK Falls. Since the time of deglaciation this creek has altered the valley bottom landscape in a number of ways. The creek has removed much of the original glacial sediment (till and glaciofluvial deposits) from in front of Peach Cliff. In re-working the original sediments, the creek has cut down through at least 35 m of the glaciofluvial surface. This material has been largely removed but some has been re-deposited on the modern floodplain of Shuttleworth Creek. This modern floodplain provides the level site of the former Weyerhaeuser mill complex which sits at 390 m elevation just above the current creek channel (Figure 6). The floodplain continues downstream toward the Okanagan River and provides the site for the large vineyard located off Maple Street in OK Falls.

North of the creek channel are south facing slopes on mixed sediments that are ideally suited for viticulture. Finally, along McLean Creek Road approaching the large area known as McLean Creek Flats, are several vineyards located on unsorted deposits. These materials differ from those underlying most of the Flats further north and outside of the sub-GI, which are fluvial fan deposits from McLean Creek which flows to the north away from Shuttleworth Creek. Also of note are several dry gullies that run from the elevation of the flats to the Shuttleworth floodplain which generate considerable irregular topography in this landscape element (Figure 6).

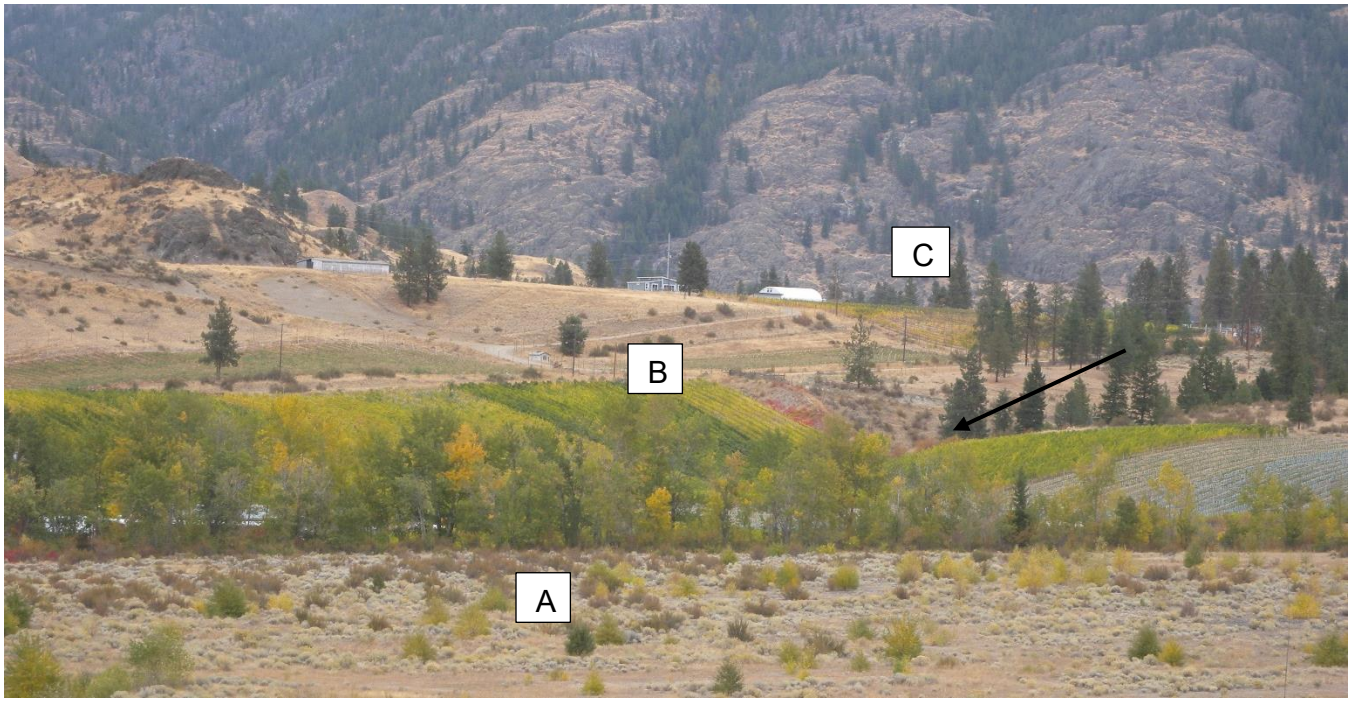

Figure 6. An overview of the northern landscape element. Shown are the former industrial land situated on the level floodplain of Shuttleworth Creek is shown the foreground (A), vineyards located on sloping glaciofluvial deposits on the north side of the creek (B) and vineyards located on gently sloping till-like sediments on the fringe of the McLean Creek Flats (C). The arrow points to one of the dry gullies that run from the Flats to Shuttleworth Creek. These no doubt act as a conduit for cold air drainage.

Soil Development and Soil Properties

In the report *Soils of the Okanagan and Similkameen Valleys,* Wittneben (1986) mapped a dozen common soil series in the Oliver Ranch Road landscape element and another 6 common soils in the Shuttleworth Creek landscape element. Soil series are soil mapping units defined by the nature of the soil profile and the type of surficial material within which the soil has formed. Surficial geologic deposits act as what are termed ‘soil parent materials’.

The vast majority of soils in the Oliver Ranch landscape element have formed on glaciofluvial parent materials. There are two groups of soils formed on these parent materials. Most common are stratified soils meaning the soil profile is composed of a sandy textured surface layer overlying a gravelly subsoil (Figure 7b). These individual soil series are named based on the nature and thickness of this surface layer which typically varies from 10 to 60 cm in depth. The most common soil series within this group are Rutland, Paradise, Dartmouth, and Acland Creek. Definitions for these are given in Wittneben (1986). It is important to note that wherever land leveling has occurred as part of vineyard development, actual thicknesses of the surface layer may differ markedly from what was mapped based on field work in the 1970’s and early 80’s.

Figure 7. Rolling landscape of the Oliver Ranch Road area as depicted in the Blue Mountain vineyards (a). The soils underlying the vineyard block in the foreground belong to the Acland Creek soil series which in this case is composed of loamy sand overlying gravelly sand at 75 cm depth (black line in b).

The other group of soils formed on glaciofluvial parent material are non-stratified, they are of a uniform texture, usually loamy sand, through the profile. These soils are less common than the stratified soils and are restricted to the southernmost portions of the sub-GI. The most common soil of this type belong to the Osoyoos soil series. There are also minor amounts of windblown and till soil parent materials found in this landscape element.

The is a complex of soil parent materials in the Shuttleworth Creek landscape element. Surficial geologic mapping in the area (Nasmith 1962) described most of the soil parent materials as being glaciofluvial in origin while Wittneben (1986) classified most as fluvial fan. Field observations conducted in the preparation of this report indicated both types to be present.

The vineyards located on the floodplain of Shuttleworth Creek belong to the Rye soil series, recent soils with little weathering profile and subject to a fluctuating water table at depth in the profile. Most of the vineyards on the slope above the creek (Figure 6) are formed on re-worked glaciofluvial materials, most of which are gravelly (Skaha soil series) while others are entirely composed of sands (Osoyoos series).

The boundary of the sub-GI extends onto the relatively level surface of McLean Creek Flats but onto that portion of the landscape that appears not to be part of the McLean Creek fan but rather mixed till-like sediments. Several vineyards are located on unsorted material composed of a matrix of sand, silt and clay interspersed with occasional cobbles and boulders (Figure 8). The soils best fit the definition for the Harland series.

Figure 8. On the fringe of the McLean Creek Flats area, below the site of the old Dusty Mac mine, a new vineyard is situated on level to gently sloping materials that are remarkably fine-textured (sandy loam and loam) and appear to be of direct glacial origin, most likely till.

CLIMATE

There are no long-term climate stations within the sub-GI or in the OK Falls townsite. There are climate data available for Penticton airport which lies approximately 16 km to the north and from Oliver townsite about 17 km to the south (Table 1). Interpolating these data to characterize the climate of the sub-GI has several caveats. Penticton airport is located on the valley floor between two large lakes and does not represent very well the complex and slightly elevated landscapes of the sub-GI.

Table 1. Climate normals for the 30-year period 1981 to 2010 for selected south Okanagan climate stations (Environment and Climate Change Canada, 2017).

Station	Elevation m	MAT °C	MAP mm	GDD >10 °C	# of days >20°C	FF Period Days
Penticton A	345	9.5	346	1234	129	160
Oliver STP	297	10.3	330	1445	140	167
Oliver	315	9.4	327	1330	137	m
Osoyoos West	297	10.4	323	1448	142	172

MAT = mean annual temperature, MAP = mean annual precipitation, GDD>10°C = growing degree days over 10°C, FF Period = Frost-free period

Anecdotally, local growers state that the Oliver sites better represent the area even though most of the vineyards in the sub-GI are situated at over 400 m elevation, much higher than any of the long-term climate stations. The data in the table are averages over a period of 30 years prior to 2010 and illustrate relative differences in climate in the south Okanagan Valley. Recent years have trended warmer than the historic averages, so these long-term values do not reflect the temperature conditions over the last two or three years.

Nonetheless, these stations highlight several climate trends. Elevation, even slight changes in elevation, greatly affect the temperature regime of a site, as does latitude. The length of the growing season, measured by the number of days between the last frost in the spring and the first frost in the fall, increases from north to south. Key horticultural temperature indices are highest in extreme southerly portion of the valley (Osoyoos climate station). Expressed in general terms, the region experiences a mean annual temperature of approximately 10 C, accumulates over 1300 growing degree days >10°C and a growing season of around 160 days, all values well suited to support a range of viticultural practices.

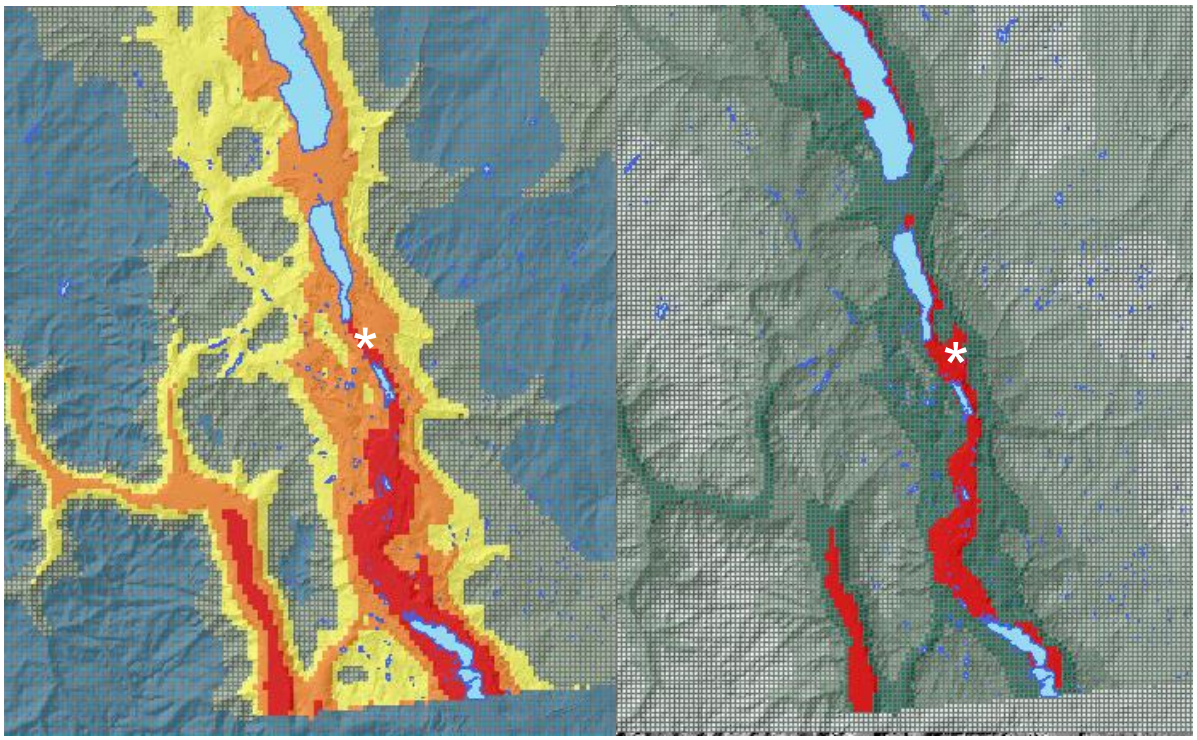

Figure 9. Distribution of growing degree days (a) and frost-free period (b) in the valley for the period 2005 to 2010. Areas highlighted in red have GGD>10 values >1400 and frost-free periods >185 days. The area of the proposed sub-GI fall (white star) falls within these upper climate classes.

Another approach to characterizing the climate of the sub -GI is to examine modeled data that are extrapolated from surrounding weather stations (Figure 9). These values, which are based on the period of 2005 to 2010, indicate that the sub-GI is currently experiencing GGD>10°C values of approximately 1400 and frost-free period of just over 185 days. Growing season length and heat are conducive to the production and maturation of a range of noble *V. vinifera* cultivars including most white and many red cultivars.

Research monitoring within vineyards has revealed that a wide range of temperatures can exist through the day as the result of landscape position. The complex undulating topography in the area includes several pathways through which cold air drains from the area to the Valley floor. This reduces the collection and pooling of lethally cold air, lowering the incidence of vine damage by frosts and winter freeze events. This combination of topography, landscape position and climate present both challenges and opportunity to vineyard managers in the sub-GI.

VITICULTURE CHARACTERISTICS

The proposed OK Falls sub-GI has a unique terroir combining climatic, topographic and soil characteristics that influence the development and performance of grapevines including the compositional development of fruit that determines wine quality.

As the vineyards are located on the east side of the Okanagan Valley, the dominant western aspect exposes grapevines to sunlight for a longer period in the afternoon than morning. This timing exposure affects the diurnal temperature patterns of berries and influences developmental processes including the synthesis of key constituents that contribute to the flavour, aroma and mouthfeel of the wines. In addition, cool air origination from adjacent high elevation sites to the east flows into the area at night, reducing nighttime temperatures and enhancing the development and retention of fruit acids and other constituents including flavor and aroma compounds that further contribute to the sensory quality of the wines.

Average temperatures and cumulative growing degrees days are lower than in nearby areas to the south. Slightly cooler temperatures slow berry development and delay ripening. The fruit of Burgundian cultivars which dominate the area's plantings, matures under the cool conditions of late-summer and fall, improving their winemaking quality. Chardonnay, Pinot noir and Pinot gris account for roughly 75% of planted acreage in the area.

Table 2. Cultivars grown in the proposed Okanagan Falls sub-GI.

Cultivar	% of total acreage (approx.)
Chardonnay	30
Pinot Gris	25
Pinot Noir	20
Gamay	5
Viognier	5
Pinot Blanc	5
Other reds (Merlot, Cab. Sauv, Tempranillo)	5
Other whites (Riesling, Sauv Blanc, Alvarino)	5

The dominant soils in the area are coarse textured and stony (Figure 10). These soils are well drained and their low moisture holding capacity naturally reduces vine vigour, enabling growers to manipulate vine growth and canopy function through irrigation management.

Figure 10. Soils belonging to the Rutland soil series underlie the Thomas Ranch vineyard. This very gravelly soil is widely used within the sub-GI for viticultural production.

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