

## **Interpretation Guide Linking Soil and Natural Resource Information to GVI Site Types in the Foothills Fescue Natural Subregion**

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The Grassland Vegetation Inventory uses a system with 32 site types classified into three Primary Classes: 22 site types in the Native/Natural Primary Class, two site types in the Water Primary Class, and eight site types in the Anthropogenic Primary Class.

A unique interpretation guide has been developed for each Natural Subregion in the Grassland Natural Region. Each interpretation guide identifies key properties and distinguishing features for the 22 Native-Natural and two water-related site types. Representative examples are also provided for the eight Anthropogenic site types.

For each Natural Subregion, the 24 site types in the Native/Natural and Water Primary Classes are divided into four groups based on their main defining features of landscape, soil features, type of wetland, soil textural groupings. Each guide contains the following information for each of the 24 site types:

- Definition
- Representative example
- Usual landscape position
- Common association with other GVI site types
- Differentiation from the most similar site type(s)
- Correlation with Soil Landscape Models
- Native vegetation
- Expression on colour infrared photography
- Examples in pilot areas, for Dominant, Co-dominant and Significant occurrences, based on available colour infrared aerial photography
- Example(s) of non-typical occurrence.

This Foothills Fescue interpretation guide applies to the following GVI Pilot Areas.

Year	Area	Townships	Ranges
2004	Milk River Ridge	3	20-W4
2006	Milk River Ridge	1 to 4	Western areas of 17 to 25 – W4
2006	Cowley, Lundbreck, Maycroft, and Callum Creek areas	7 and 8 9 and 10	30-W4, 1 and 2–W5 2-W5

## Site Types Defined Mainly by Landscape

### Badlands/Bedrock (BdL)

**Definition:** Nearly barren or barren lands with exposures of softrock, hardrock or surficial geologic materials. Includes steep valley walls.

**Representative example:** Mokowan Ridge near Standoff.

**Usual landscape position:** Moderate to steep coulee or valley sides; also eroded bedrock plains.

**Common association with other GVI site types:** TB, Li and Ov.

**Differentiation from the most similar site type(s):** TB is characterized by fewer softrock exposures and less bare soil and hence has more vegetative cover.

**Correlation with Soil Landscape Models:** Applies to all inclined to steeply sloping landscapes with greater than 10% bedrock exposures of softrock or hardrock. Slopes generally range from 30% to 60% (in isolated cases 15% to 100%). Includes I4h and I5 landscape models from AGRASID 3.0.

**Native vegetation:** Very limited cover due to high proportion of bare soil.

**Expression on colour infrared photography:** highly reflective, with most geologic formations appearing white or very light grey. Linear bands may also occur due to the continuity of exposed strata over distances.

#### Examples in pilot areas:

- **Dominant** ( $\geq 65\%$ ): Exposed bedrock on the walls of the Oldman River valley at the Maycroft Bridge, in SW 12-10-2-W5, with significant TB.
- **Co-Dominant** (two or three site types each cover 30 to 60%): BdL and TB are co-dominant along the Oldman valley walls north of the Cowley airport, in 38-8-1-W5, where depth to bedrock and vegetative cover are variable.

- **Significant** (one to three sites types, each of 10 to 30%): Ridge crest in W 36-9-2-W5, with bedrock surrounded by dominant TB.

**Example(s) of non-typical occurrence:** There are more areas of hard bedrock (sandstone) exposures than softrock exposures in the Foothills Fescue Natural Subregion. The Foothills Fescue is more represented by hard bedrock compared with other Natural Subregions in the Grassland Natural Region.

## Overflow (Ov)

**Definition:** Areas that receive additional moisture from overland flow or increased snow catch. Typically occurs in valleys on gentle inclines, or on terraces subject to infrequent flooding.

**Representative example:** Apron deposits in the Bow River valley at Highway 2 south of Calgary.

**Usual landscape position:** Occurs mainly in coulees or valley settings as fan or apron deposits.

**Common association with other GVI site types:** Lo, BlO, SL, TB, BdL, and Lotic types

**Differentiation from the most similar site types:** Loamy (Lo) does not receive additional moisture inputs; Lotic types occur on slightly lower to lower slope positions and have greater available soil moisture.

**Correlation with Soil Landscape Models:** Applies to non-saline Chernozemic (soils with A, B and C horizons) and/or Regosolic soils (soils that lack a B horizon >5 cm thick, and may lack an A horizon) on landscapes that are low-relief inclines in valley or basinal settings. Overflow sites are usually fan or apron deposits, where upslope streams enter lowland areas and experience a marked decrease in gradient. Slopes generally range from 2% to 9% (in isolated cases from 0.5% to 15%). Overflow occurs only on lower slope positions or adjacent to stream(s), and the percentage of eligible overflow ranges from 10% to 50% per SLM. Overflow includes I3l and I4l landscape models from AGRASID 3.0 and may occur with IUl and IUh landscape models.

**Native vegetation:** Variable herbaceous cover and often occurs with some shrub cover.

**Expression on colour infrared photography:** Generally a uniform dull pinkish green to olive tone if dominant and the soils are relatively mature. If the soils are immature then a mottled appearance is common.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Lonely Valley in 5-3-20-W4, with approximately 80% Ov and significant Li.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Cow Creek fan at Highway 22 in SW 35-8-2-W5, with co-dominant Ov, Cy and Li.

- **Significant** (one to three sites types, each of 10 to 30%): Benches of the Oldman River in W 33-8-1-W5, dominated by SwG, with significant Li and Ov.

**Example(s) of non-typical occurrence:** Low-gradient flats below highlands (Eg., Porcupine Hills) that have Overflow in association with Saline Lowland, Limy, Loamy and Blowouts.

## Thin Breaks (TB)

**Definition:** Areas with soft or hard bedrock at or near the soil surface; partially vegetated; thin, eroded, and immature soils on gentle to steep landscapes, including slumped or failed slopes.

**Representative examples:** Shallow drift of lacustrine and till over softrock at Rayley, NE of Cardston.

**Usual landscape position:** moderate to steep coulee or valley sides; or plains with thin surficial sediments overlying bedrock.

**Common association with other GVI site types:** BdL, Li, Ov.

**Differentiation from the most similar site type(s):** Both Li and TB usually exhibit immature soils (ie. Rego or Calcareous) but TB is usually distinguished by bedrock within 1 m. TB can be considered a transition between Limy and Badlands. Badlands have negligible vegetation, while TB has moderate vegetation cover.

**Correlation with Soil Landscape Models:** Applies to: **1)** all steeply-sloping landscapes with less than 10% bedrock exposures; **2)** largely vegetated areas with bedrock at or near (within 5 m) the surface; **3)** AGRASID 3.0 landscape models I3m, I3h or I4m.

**Native Vegetation:** Usually graminoid with some bare soil; less vegetation on south or west facing slopes.

**Expression on Colour Infrared Photography:** Light greenish gray to white tones.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Ridge crest in W 36-9-2-W5, with bedrock surrounded by dominant TB.
- **Co-Dominant** (two or three site types each cover 30 to 60%): BdL and TB are co-dominant along the Oldman valley walls in 38-8-1-W5 north of the Cowley airport, where depth to bedrock and vegetative cover are variable.
- **Significant** (one to three sites types, each of 10 to 30%): Significant TB occurs with dominant BdL (exposed bedrock) on the walls of the Oldman River valley at the Maycroft Bridge, in SW 12-10-2-W5.

**Example(s) of non-typical occurrences:** Site-specific level to depressional locations with exposed softrock or hardrock. Sometimes soft sandstone deposits have been subjected to wind erosion, and may exhibit deflation hollows.

## Site Types Defined Mainly by Soil Features

### Blowouts/Solonetzic Order (BIO)

**Definition:** Areas dominated by Solonetzic Order (hardpan) soils, which may or may not have the presence of eroded surface pits. Sometimes termed burnouts.

**Representative example:** Southern portion of the Blood Reserve (Kainai Nation) between Cardston and Ninastoko.

**Usual landscape position:** Often in swales or at slope inflections within plains; can be valley bottoms and inclined surfaces. Often associated with Bearpaw Shale <5 m from surface, or in areas of former groundwater discharge.

**Common association with other GVI site types:** Lo, Ov, TB; to a lesser extent SL, Sy

**Differentiation from the most similar site type(s):** There are seldom areas of 100% BIO. BIO usually occur with Lo, with Lo occupying areas between pits.

**Correlation with Soil Landscape Models:** Applies to all SLMs where soils from the Solonetzic order are dominant (>50%) or co-dominant (30 to 50%). Solonetzic soils have an impervious hardpan layer (Bnt horizon) in the subsoil that is caused by excess sodium ( $\text{Na}^+$ ). The land surface is usually characterized by rough microtopography.

**Native vegetation:** Usually with wheatgrasses and some bare ground. Highly mottled appearance, as BIO exhibits microtopography on a 1 to 5 m range laterally, and 20 to 50 cm vertically.

**Expression on colour infrared photography:** Highly speckled or mottled.

#### Examples in pilot areas:

- **Dominant** ( $\geq 65\%$ ): Site-specific locations with a high percentage of pits may occur between Todd Creek and Maycroft Bridge at Highway #22.
- **Co-Dominant** (two or three site types each cover 30 to 60%): 35% BIO occurs with 55% Cy and 10% Li in SW 13-3-25-W4 (soil polygon CTPG1/2-3 on the Cardston Soil Survey).
- **Significant** (one to three sites types, each of 10 to 30%): Significant BIO occurs with co-dominant Cy and Lo in the area of Highway 22 between Todd Creek and the Maycroft Bridge.

**Example(s) of non-typical occurrences:** BIO areas at the edge of springs from the Porcupine Hills. Eg., SW 21-10-1-W5.

## Limy (Li)

**Definition:** Eroded or immature soils with free lime ( $\text{CaCO}_3$ ) at the soil surface. The soil pH is generally  $>7.5$ .

**Representative Example:** High-level terraces of the Oldman River valley near Cowley.

**Usual landscape position:** Eroded side slopes, upper and crest positions, moderate to steep coulee or valley sides, but not including areas with bedrock exposures (BdL and TB).

**Common association with other GVI site types:** TB, Lo, Cy.

**Differentiation from the most similar site type(s):** Lo represents a normally developed Orthic Dark Brown Chernozemic soil, while Li is an immature Rego or Calcareous Dark Brown Chernozemic. TB may be developed on similar soils as Li, but TB is characterized by shallow bedrock, and vegetative cover is generally sparser.

**Correlation with Soil Landscape Models:** Applies to all immature or eroded soils with free lime (calcium carbonates) at the soil surface or in the B horizon. Free lime is detected by effervescence when soil is treated with 10% hydrochloric acid (HCl). Li soils include Rego or Calcareous Chernozemics, eroded phases, and subgroups from the Regosolic order if they are calcareous.

**Native vegetation:** Graminoid with patchy shrub cover.

**Expression on colour infrared photography:** Smooth gray to green tone.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Terraces between Todd Creek and the Oldman River in E 30 and E 31-8-1-W5.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Cow Creek fan at Highway 22 in SW 35-8-2-W5, with co-dominant Li, Ov, and Cy.
- **Significant** (one to three sites types, each of 10 to 30%): Lonely Valley in 5-3-20-W4, with approximately 80% Ov and significant Li

**Example(s) of non-typical occurrences:** 1) Locations with occasional groundwater discharge, where the groundwater is carbonated, rather than saline; and 2) Extensive areas of the Cowley Plain characterized by Calcareous Rego Chernozems developed on fine to very-fine textured glaciolacustrine sediments.

### **Sub-irrigated (Sb)**

**Definition:** Water table is close to surface during growing season, but rarely above. The water table is relatively stable, and is not subject to strong seasonal fluctuations.

**Representative Example:** Areas with a high water table in Sa and CS in the Ardenode – Gayford area, in Twps. 26 and 27, Rge. 25-W4.

**Usual landscape position:** Almost always occurs in concave settings (swales). Ranchers often locate dugouts within lowland portions of Sa or CS areas, due to reliable shallow water table conditions.

**Common association with other GVI site types:** Sa, Sy, CS, Lentic wetlands, and to a lesser extent, Lo.

**Differentiation from the most similar site type(s):** LenT and Sb both typically represent gleyed subgroups. The water table is near the surface in the Sb site type, but water seldom ponds on the soil surface. In contrast, LenT has standing water for a short duration (typically less than a season), after which the water table may or may not be out of range for plant roots. LenT commonly occurs with medium and fine soil textures, whereas Sb commonly occurs with coarse and very coarse textures, and occasionally with medium textures.

**Correlation with Soil Landscape Models:** Sb best represents areas with the water table near the surface causing gleyed soils. Sb includes Gleyed, non-saline, very coarse to medium textured soils. Gleyed subgroups have faint to distinct mottles within 50 cm, or prominent mottles between 50 and 100 cm.

**Native vegetation:** Often a higher density of shrubs (eg. Thorny Buffaloberry, willow) and wild licorice can be an indicator.

**Expression on colour infrared photography:** Dark gray speckled appearance, with the darker areas receiving groundwater enrichment from a near-surface water table.

#### **Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): May occur in high water table areas in native cover in Sy, Sa or Gr site types, such as adjacent to the Milk River.
- **Co-Dominant** (two or three site types each cover 30 to 60%): May occur in high water table areas in native cover in Sy, Sa or Gr site types, such as adjacent to the Milk River.
- **Significant** (one to three sites types, each of 10 to 30%): May occur in high water table areas in native cover in Sy, Sa or Gr site types, such as adjacent to the Milk River.

**Example(s) of non-typical occurrences:** Areas with an artificial high water table in Sa and CS, such as near Gayford Lake.



## Saline Lowland (SL)

**Definition:** Native areas with negligible or limited vegetation due to electrical conductivity (salts) and/or sodium adsorption ratio limitations.

**Representative example:** Many in the Landgon area southeast of Calgary, in Twp 23 Rg. 27-W4.

**Usual landscape position:** lower slopes; can be broad concave settings.

**Common association with other GVI site types:** B1O, Ov, Lo, LenA

**Differentiation from the most similar site type(s):** Distinguished from Lentic Alkali by the lack of a defined basin.

**Correlation with Soil Landscape Models:** Applies to salt-enriched soils, including Saline phase Chernozemic, Saline phase Regosolic, and occasionally Saline phase Gleysolic soils. Saline phase soils generally have an electrical conductivity greater than 4.0 dS/m, which retards most plant growth.

**Native vegetation:** Wheatgrass, Saltgrass, Foxtail Barley, Red Samphire

**Expression on colour infrared photography:** White when dry; can be red when lush growth of salophytes is present.

### Examples in pilot areas:

- **Dominant** ( $\geq 65\%$ ): Site-specific locations with abundant salinity. Eg., north of Lundbreck and west of Highway 22, in LSDs 2 and 7, 27-8-2-W5, corresponding to CWY3/2 on the Pincher Creek soil survey.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Salinity (S) in Lonely Valley (NW 6-3-20-W4 on the Warner Soil Survey) in association with Ov.
- **Significant** (one to three sites types, each of 10 to 30%): The majority of soil polygon CWY3/2, in SW 26-8-2-W5 in the Pincher Creek Soil Survey, is best described as co-dominant Cy and Li, with significant SL.

**Example(s) of non-typical occurrences:** Areas adjacent and below reservoirs such as Chestermere Lake east of Calgary.



## Site Types Defined as Wetlands

### ***Lotic Undifferentiated*** - Note: This is Not a Site Type

**Definition:** Any riparian habitat associated with a flowing stream, and represents the active floodplain. True riparian areas only include the valley floor portions that are prone to occasional flooding (Eg., 1 in 10 years). Lotics do not include fans, aprons, or mid to high elevation terraces in valley or coulee settings. A wide range of vegetation types occur, depending on moisture, and nutrient regime, soil chemistry (salinity and sodicity), texture, parent material, etc.

**Correlation with Soil Landscape Models:** AGRASID and soil surveys have a correlation to Lotic Undifferentiated. **The GVI interpreters are required to identify the appropriate Lotic site type.** Valley systems on AGRASID are often identified as undifferentiated Soil Landscape Models. The AGRASID 3.0 correlation includes FP1, FP2, FP3, SC1-l, SC1-h, SC2, SC3 and SC4 landscape models from AGRASID 3.0.

### **Lotic River (LtcR)**

**Definition:** Any river that is generally wider than 20 m, and conforms to the double-line base-features hydrography, representing water edge to water edge.

**Associated with other ecological range sites:** Any other Lotics; also Ov. Occasionally where a river borders a steep bank the bank may be BdL or TB. Islands in LtcR that are larger than 0.16 ha in size and are either partially or totally vegetated will be mapped and described as other Lotic polygons.

**Landscape Position:** Wide stream or river.

**Representative Example:** Waterton River.

**Non-typical Example(s):** Artificial channel.

**Native Vegetation:** None, due to permanent water.

**Expression on Colour Infrared Photography:** Blue.

### **Lotic Coniferous (LtcC)**

**Representative Example:** May occur in western or northern areas of the Foothills Fescue, bordering on the Foothills Parkland or Montane Natural Subregions.

### **Lotic Deciduous (LtcD)**

**Definition:** “Riparian wetlands” that border flowing water systems and where deciduous trees have a combined canopy cover of >25% OR more than 25 trees per ha.

**Representative example:** *Populus angustifolia* (Narrow-leaf Cottonwood) stands in the Oldman Valley in the area of the Oldman dam to Summerview.

**Usual landscape position:** Terraces immediately above rivers or creeks.

**Common association with other GVI site types:** Mainly LtcS, but may be adjacent to LtcH or LtcR. In occasional cases it may border Ov, SL, Li, TB, or BdL.

**Differentiation from the most similar site type(s):** LtcS with tall shrubs may present some difficulty in interpretation. However, shrubs have a high degree of canopy cover, and are shorter than the main tree species, *Populus angustifolia* (Narrow-leaf Cottonwood).

**Native vegetation:** Mainly Narrow-leaf Cottonwood plant communities.

**Expression on colour infrared photography:** Very bright red colours, often as ribbons near rivers or streams.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Portions of the Oldman River valley upstream (north) of Cowley, in Twp. 8 Rg. 1-W5.
- **Co-Dominant** (two or three site types each cover 30 to 60%): There may be occasional small polygons ( $>1$  ha) that cannot be subdivided into specific Lotic site types (LtcD, LtcS, LtcH), and are therefore composed of varying percentages of different Lotics.
- **Significant** (one to three sites types, each of 10 to 30%): There may be occasional small polygons ( $>1$  ha) that cannot be subdivided into specific Lotic site types (LtcD, LtcS, LtcH), and are therefore composed of varying percentages of different Lotics.

### Lotic Shrub (Ltc S)

**Definition:** “Riparian wetlands” that border flowing water systems and have a combined canopy cover of greater than 10% shrub species.

**Representative example:** Conelly Creek floodplain in LSD 1, 4-8-2-W5, visible to the west of Highway 22 north of Lundbreck. The floodplain is covered mainly with willow.

**Usual landscape position:** Terraces immediately above rivers or creeks.

**Common association with other GVI site types:** Mainly LtcD and LtcH, and may be adjacent to LtcR. In occasional cases it may border Ov, SL, Li, TB, or BdL.

**Differentiation from the most similar site type(s):** LtcS has varying shrub heights, of which the tall ones may be similar to short trees. However, Lotic Shrub usually has denser canopy and has a different appearance compared to LtcD. Ltc S may also be confused with LtcH in locations where the shrub cover is near 10%. If the shrub cover is interpreted as less than 10%, then LtcH is correct.

**Native vegetation:** A wide range of shrub species, from roses to willow to birch.

**Expression on colour infrared photography:** Bright red to pinkish red colours; may flank bright red rings or linear features that are LtcD.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): 70% LtcS and 30% LtcH in the Todd Creek floodplain in Sections 11 and 14, Twp. 9 Rg. 2 W5. The main shrubs are willow and snowberry.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Co-dominant association of LtcS and LtcH in Lonely Valley, in 5-3-20-W4.
- **Significant** (one to three sites types, each of 10 to 30%): Significant LtcS with Dominant LtcH in an unnamed channel north of Pincher Station, in LSDs 7, 8, 9 and 10, 12-7-30-W4.

### **Lotic Herbaceous (Ltc H)**

**Definition:** “Riparian wetlands” that border flowing water systems and are usually dominated by emergent herbaceous plants (Eg. sedges), but also can be dominated by bare ground indicative of recent features (Eg. gravel bars).

**Representative example:** Many segments of Mackie Creek in Twp. 3 Rg. 19-W4, downstream of Mackie Reservoir.

**Usual landscape position:** Point bars, meander scrolls and low level terraces.

**Common association with other GVI site types:** Mainly adjacent to LtcS, LtcD and LtcR in major rivers. In occasional cases it may border Ov, SL, Li, TB, or BdL.

**Differentiation from the most similar site type(s):** LtcS has  $>10\%$  shrub cover and LtcH has  $<10\%$

**Native vegetation:** Emergent herbaceous plants including reed canarygrass, wild licorice, wheatgrasses, sedges, rushes, horsetail, etc.

**Expression on colour infrared photography:** More uniform reddish or pinkish tones than with LtcS and LtcD. Lotic Shrub and Lotic Deciduous polygons have texture that indicate some height.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): With significant LtcS in an unnamed channel north of Pincher Station, in LSDs 7, 8, 9 and 10, 12-7-30-W4
- **Co-Dominant** (two or three site types each cover 30 to 60%): Co-dominant association of LtcH and LtcS in Lonely Valley, in 5-3-20-W4.
- **Significant** (one to three sites types, each of 10 to 30%): There may be occasional small polygons ( $>1$  ha) that cannot be subdivided into specific

Lotic site types (LtcD, LtcS, LtcH), and are therefore composed of varying percentages of different Lotics.

**Example(s) of non-typical occurrences:** Recently formed islands that have pioneer species, such as horsetail, beginning to colonize.

### ***Lentic Undifferentiated*** –*Note: This is Not a Site Type*

**Definition:** Typically low-lying or depressional positions subject to occupation by water ranging from temporary to permanent in duration. Also known as the lentic zone. AGRASID and soil surveys have a correlation to Lentic Undifferentiated. **The GVI interpreters are required to identify the appropriate Lentic site type.**

**Correlation with Soil Landscape Models:** Applies to all non-saline or weakly-saline soils of the Gleysolic and Organic orders. Gleysolic soils occur in seasonal to semi-permanent wetlands. They are typified by dull colours or prominent mottles within 50 cm, due to prolonged periods of intermittent or continuous saturation and the lack of oxygen in the soil. Organic soils are dominated by the accumulation of decomposing peat material derived mainly from sedges and reeds.

### **Lentic Temporary (LenT)**

**Definition:** Still-water wetland depression with a defined edge that only holds water for brief periods, usually in the spring.

**Representative example:** Numerous wetlands in the southeast corner of the Peigan Reserve, in Twp. 6 Rg. 27-W4).

**Usual landscape position:** Depressional.

**Common association with other GVI site types:** Other Lentic or other Native/Natural Site Types; edges may be Sb.

**Differentiation from the most similar site type(s):** LenS holds water seasonally rather than for a few days to weeks.

**Native vegetation:** Low prairie or wet meadow vegetation zones as described by Stewart and Kantrud (1971).

**Expression on colour infrared photography:** Usually a dull colour such as olive to slightly pink, and a contrasting tone compared to the surrounding upland.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Temporary wetlands  $>1$  ha on the Milk River Ridge. (Eg., SW 8-4-19-W4).
- **Co-Dominant** (two or three site types each cover 30 to 60%): Wetlands with a mix of low prairie (LenT) and shallow marsh (LenS) habitats.

- **Significant** (one to three sites types, each of 10 to 30%): 10% LenT occurs with 75% Lo, 10% Li, and 5% LenS in S 17-3-20-W4 on the Warner soil survey, corresponding to soil polygon BZR1/5.

**Example(s) of non-typical occurrences:** Blowout pits in Solonetzic areas that contain surface water at the time of imagery acquisition will be called LenT.

### **Lentic Seasonal (LenS)**

**Definition:** Still-water wetland that usually holds water for a few months, usually in the spring.

**Representative example:** Numerous wetlands in the Gladys Ridge area (Twp. 20 Rge. 27-W4) east of Okotoks.

**Usual landscape position:** Depressional

**Common association with other GVI site types:** Other Lentic.

**Differentiation from the most similar site type(s):** LenT only holds water for a few days to a few weeks; LenSP holds water for most to all of most years.

**Correlation with Soil Landscape Models:** Applies to non-saline or weakly saline Gleysolic Order soils in depressions with shallow marsh vegetation. Usually applies to Gleysol soil series and ZGW soils. Usually L1 or L2 landscape models, but may occasionally be W1 or W2.

**Native vegetation:** Characterized by shallow marsh vegetation in the deepest part, and wet meadow and low prairie vegetation at the edges.

**Expression on colour infrared photography:** Pink tones.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Wetland of about 1.5 ha in LSD 10-20-3-20-W4 on the Milk River Ridge.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Wetlands with a mix of low prairie (LenT) and shallow marsh (LenS) habitats.
- **Significant** (one to three sites types, each of 10 to 30%): Shallow marsh edges of dominant LenSP wetlands in 9-3-20-W4 on the Milk River Ridge.

**Example(s) of non-typical occurrences:** Depressions in oxbows of riverine systems.

### **Lentic Semi to Permanent (LenSP)**

**Definition:** Still-water wetland that usually holds water for several months, usually to late summer, and is usually wet in the majority of years.

**Representative example:** Numerous wetlands in Twp. 5 Rg. 29-W4, in the Indianfarm Creek basin.

**Usual landscape position:** Depressions.

**Common association with other GVI site types:** LenW where the water is deeper and permanent, and LenS where the water is shallower.

**Differentiation from the most similar site type(s):** LenW where the water is deeper and permanent; LenS where the water is shallower and typically occurs for only a few months of the year.

**Correlation with Soil Landscape Models:** Applies to non-saline or weakly saline Gleysolic Order soils in depressions with deep marsh vegetation. Usually applies to Gleysol soil series, ZGW soils, or occasionally ZWA soils. Usually W1, W2 or W3 landscape models.

**Native vegetation:** Deep marsh vegetation (reeds, cattails) with shallow marsh edges. May have open water in deeper areas.

**Expression on colour infrared photography:** Usually bright red or reddish pink tones.

#### **Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): The edges surrounding Reed Lake can be mapped as a single polygon dominated by LenSP, at the common corners of Twps. 2 and 3, Rges. 21 and 22, adjacent to Highway 62.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Water bodies  $>1$  ha in size, where the LenSP habitat cannot be mapped separately due to polygon size constraints.
- **Significant** (one to three sites types, each of 10 to 30%): May occur where LenW polygons are surrounded by tall marsh habitat (LenSP), but the LenSP cannot be delineated due to polygon size constraints.

**Example(s) of non-typical occurrences:** Depressions in oxbows of riverine systems.



### **Lentic Alkaline (LenA)**

**Definition:** Still water wetland that holds water for variable time periods ranging from a few weeks to several months, and has a salt (saline) fringe. Vegetation types are variable to none.

**Representative example:** Silver Lake, immediately southeast of Nanton.

**Usual landscape position:** Depressional flats with apparent salts.

**Common association with other GVI site types:** SL, Li, and other Lentic.

**Differentiation from the most similar site type(s):** Saline Lowland does not have a defined basinal edge and is characterized by imperfectly drained soils (usually Saline Regosols). LenA is in a definite basin and is usually represented by poorly drained Saline Gleysolic soils.

**Correlation with Soil Landscape Models:** Applies to saline soils of the Gleysolic, Organic and Regosolic (if Gleyed) Orders.

**Native vegetation:** Dominated by bare ground, and salts if dry.

**Expression on colour infrared photography:** Usually white or grayish-white.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Wetlands with a distinguishable salt crust, such as LSD 7-1-4-20-W4 on the Milk River Ridge.
- **Co-Dominant** (two or three site types each cover 30 to 60%): May apply if LenA wetlands have partial water (LenW) at the time of imagery.
- **Significant** (one to three sites types, each of 10 to 30%): May apply if LenA wetlands have appreciable water (LenW) at the time of imagery.

**Example(s) of non-typical occurrences:** Alkaline fens with deep Organic (peat) soils due to permanent groundwater discharge. Organic soils are rare in the Foothills Fescue Natural Subregion, and when they occur, they are typically alkaline fens (LenA).

### **Lentic Open Water (LenW)**

**Definition:** Water bodies, either artificial or natural, that are typically characterized by standing water.

**Representative example:** Oldman Reservoir.

**Usual landscape position:** Water bodies.

**Common association with and differentiation from other GVI site types:** LenSP where the water is shallower and not as permanent.



**Correlation with Soil Landscape Models:** Applies to ZWA soils and the W3 landscape model, but may occur less commonly with W1, W2, L2 and L3 landscape models.

**Native vegetation:** Dominated by open water, but may have some occurrences of deep marsh vegetation (reeds, cattails).

**Expression on colour infrared photography:** Usually blue or bluish-green tones.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Mackie Reservoir in 17-3-19-W4 on the Milk River Ridge.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Water bodies  $>1$  ha in size, where the LenW habitat cannot be mapped separately due to polygonal size constraints.
- **Significant** (one to three sites types, each of 10 to 30%): Smaller reservoirs or ponds surrounded by a larger habitat of deep marsh (LenSP).

## Ecological/Range Sites Defined Mainly by Textural Groupings

### Clayey (Cy)

**Definition:** Clayey-textured soils including silty clay, sandy clay, clay, and heavy clay. Generally  $>40\%$  clay.

**Representative example:** Glaciolacustrine basin in the Cardston area.

**Usual landscape position:** Level to gently undulating plains.

**Common association with other GVI site types:** Lo, Li, BIO, SL.

**Differentiation from the most similar site type(s):** Many clay-dominated areas are actually Li and typified by Rego or Calcareous Dark Brown Subgroups, due to the shallow depth of leaching in clay soils. Therefore, many clay-rich soils are calcareous to the surface.

**Correlation with Soil Landscape Models:** Applies to all non-saline and non-gleyed Vertisolic soils; **OR** to fine or very fine Chernozemic soils (soils with A, B and C horizons), and **fine or very fine** non-saline and non-gleyed Regosolic soils (soils that lack a B horizon  $>5$  cm, and may lack an A horizon) (E.g., clay and silty clay textural subgroups,  $>40\%$  clay).

**Native vegetation:** Wheatgrasses.

**Expression on colour infrared photography:** Uniform green or can even be a dark green to purple colour.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Plain areas in NW 8-4-24-W4, mapped as CTN1/2-3 on the Cardston soil survey. Expect 80 to 90% Cy, with minor amounts of Lotic and Lentic.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Co-dominant Cy and Lo occur with significant BIO in the area of Highway 22 between Todd Creek and the Maycroft Bridge
- **Significant** (one to three sites types, each of 10 to 30%): Cow Creek fan at Highway 22 in SW 35-8-2-W5, with co-dominant Cy, Ov, and Li.

**Example(s) of non-typical occurrences:** Coulee valley bottoms where former shallow lakes (locations where clay may have been deposited) have improved drainage, and are now represented by Regosolic, Chernozemic or Vertisolic soil orders.

### **Loamy (Lo)**

**Definition:** Includes loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam soil textures.

**Representative Example:** The main site type of native areas adjacent to Highway 2 from High River to Granum.

**Usual landscape position:** Undulating to hummocky plains

**Common association with other GVI site types:** Li, Sy, BIO, Ov, or Cy.

**Differentiation from the most similar site type(s):** Soil texture is intermediate between Cy and Sy. Li has surface carbonates; Lo has carbonates in the subsoil and parent material. Ov occurs in settings that receive additional moisture from run-on, and Lo does not.

**Correlation with Soil Landscape Models:** Applies to all non-saline and non-gleyed Chernozemic soils (soils with A, B and C horizons), and non-saline and non-gleyed Regosolic soils (soils that lack a B horizon  $>5$  cm, and may lack an A horizon) with soil textures in the **medium and moderately fine** textural subgroups (E.g., loam and clay loam).

**Native vegetation:** Dominated by grasses.

**Expression on colour infrared photography:** Smooth pale green to brownish-green tone.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): 75% Lo occurs with 10% Li, 10% LenT, and 5% LenS in S 17-3-20-W4 on the Warner soil survey, corresponding to soil polygon BZR1/5.

- **Co-Dominant** (two or three site types each cover 30 to 60%): Co-dominant Lo and Cy occur with significant BIO in the area of Highway 22 between Todd Creek and the Maycroft Bridge
- **Significant** (one to three sites types, each of 10 to 30%): Expect 20% Lo with 80% Sy in NW 32-3-20-W4, corresponding to soil polygon KNT1/2 on the Warner soil survey.

**Example(s) of non-typical occurrences:** Loamy textured landscapes that were formerly cultivated, and native landscapes that have returned gradually. GVI interpreters will be assessing whether the native species now predominate (i.e. >50% native).

### **Sandy (Sy)**

**Definition:** Sandy-loam-textured soils.

**Representative example:** Upper-level benches of the North Milk River valley, such as in NW 14-2-21-W4.

**Usual landscape position:** Undulating plains

**Common association with other GVI site types:** Lo, Sa.

**Differentiation from the most similar site type(s):** Sa are more drought prone than Sy; Lo is more drought tolerant.

**Correlation with Soil Landscape Models:** Applies to all non-saline and non-gleyed Chernozemic soils (soils with A, B and C horizons), and non-saline and non-gleyed Regosolic soils (soils that lack a B horizon >5 cm, and may lack an A horizon) with soil textures in the **moderately coarse** (sandy loam) textural subgroup.

**Native vegetation:** Grass-dominated.

**Expression on colour infrared photography:** generally smooth pinkish-green tone.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Expect 80% Sy and 20% Lo in NW 32-3-20-W4, corresponding to soil polygon KNT1/2 on the Warner soil survey.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Co-dominant Sy and Lo occurs in S 25-2-21-W4, corresponding to soil polygon SAKN1/3 on the Cardston soil survey.
- **Significant** (one to three sites types, each of 10 to 30%): Significant Sy (20%) and LenT (10%) occur with dominant Lo (70%) in NE 36-2-21-W4, corresponding to soil polygon BZR6/4 on the Cardston soil survey.

**Example(s) of non-typical occurrences:** Sandy soils with some gravels, where gravels are <20% by volume.

## Sands (Sa)

**Definition:** Loamy sand and sand soils, and not with a duned surface.

**Representative example:** North Milk River Valley on upper benches (above gravels) in Twp. 2 Rg. 19-W4.

**Usual landscape position:** Undulating to ridged plains.

**Common association with other GVI site types:** Sy, CS, Sb.

**Differentiation from the most similar site type(s):**

- CS has open dunes, bare soil, and more shrubs, with shrubs particularly on north or east-facing slopes.
- Sy is more drought tolerant than Sa.
- Sb has a shallow water table, is located in swales, and usually a high proportion of shrubs, and sometimes occasional trees.

**Correlation with Soil Landscape Models:** Applies to all non-saline and non-gleyed Chernozemic soils (soils with A, B and C horizons), and non-saline and non-gleyed Regosolic soils (soils that lack a B horizon >5 cm, and may lack an A horizon) with soil textures in the **very coarse** (loamy sand) textural subgroup. Sa does not apply to duned landscapes.

**Native Vegetation:** Graminoids and small shrubs, including Wild Rose.

**Expression on Colour Infrared Photography:** generally smooth to blotchy pinkish-green, grading to pinkish- brown (more shrubs).

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): May occur in site-specific areas with native cover, possibly in the Milk River valley.
- **Co-Dominant** (two or three site types each cover 30 to 60%): May occur in site-specific areas with native cover, possibly in the Milk River valley.
- **Significant** (one to three sites types, each of 10 to 30%): May occur in site-specific areas with native cover, possibly in the Milk River valley.

**Example(s) of non-typical occurrences:** None.

## Choppy Sandhills (CS)

**Definition:** Loamy sand and sand soils with a rough surface caused by wind, resulting in a duned landscape. Dunes may be longitudinal or parabolic (U-shaped).

**Representative example:** Stable (CS) and active (CS-Ac) sand dunes in the Ardenode – Gayford area of Twps. 26 and 27, Rg. 25-W4.

**Usual landscape position:** Sand plains with low to high relief dunes; some are active.

**Common association with other GVI site types:** Sa, Sb.

**Differentiation from the most similar site type(s):**

- Sa does not include irregular moderate and high-relief dunes.
- Sb has a shallow water table.

**Correlation with Soil Landscape Models:** Applies to all non-saline and non-gleyed Chernozemic soils (soils with A, B and C horizons), and non-saline and non-gleyed Regosolic soils (soils that lack a B horizon >5 cm, and may lack an A horizon) with soil textures in the **very coarse** (loamy sand) textural subgroup. CS applies to soils that occur on duned landscapes, including D11, D1m, D1h, D21, D2m and D2h in AGRASID 3.0. Applies to **other Sands range sites on duned landscapes**.

**Native vegetation:** Graminoid with shrubs including Rose, Chokecherry, and Buffaloberry.

**Expression on colour infrared photography:** Blotchy irregular pattern with pinkish-brown to pink colouration. Dunes may appear as blemishes and may be oriented in the direction of the prevailing wind (longitudinal) or U-shaped (parabolic).

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): May occur in site-specific areas with native cover, possibly in the Milk River valley.
- **Co-Dominant** (two or three site types each cover 30 to 60%): May occur in site-specific areas with native cover, possibly in the Milk River valley.
- **Significant** (one to three sites types, each of 10 to 30%): May occur in site-specific areas with native cover, possibly in the Milk River valley.

**Example(s) of non-typical occurrences:** Dunes on the leeward sides of ridges (often north-south ridges), where sand textures may accumulate over time.

## Gravel (Gr)

**Definition:** Dominated by gravels or cobbles (>50% coarse fragments). May be covered by a mantle with few gravels, up to 20 cm thick.

**Representative example:** Delta on the Waterton River near the south end of the Waterton Reservoir.

**Usual landscape position:** Often on terraces and in valley bottoms.

**Common association with other GVI site types:** SwG, Sy, Lo.

**Differentiation from the most similar site type(s):**

- SwG: gravels not at surface but between 20 and 100 cm in depth.
- Sy: Gravels occur only occasionally, and textures are moderately coarse (sandy loam). Gravels are <20% in Sy.
- Lo: 0 to 20% gravels by volume, and textures are medium (loam, silt loam).

**Correlation with Soil Landscape Models:** Applies to any soil with less than 20 cm of a surface mantle of any textural class over gravelly to very gravelly or cobbly to very cobbly (>20% gravel or cobbles) material.

**Native vegetation:** Graminoids and shrub with some bare soil.

**Expression on colour infrared photography:** Light green and light grayish to white tones. The lightest tones correlate to the locations with gravel at the surface.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): 75% Gr occurs with significant SwG in N 8-2-21-W4 at highway 62 south of Magrath, corresponding to soil polygon RND1/4 on the Cardston soil survey.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Co-dominant Gr and SwG occur with significant Li on the north side of the Oldman River and east of Highway 22 at the Maycroft Bridge.
- **Significant** (one to three sites types, each of 10 to 30%): Significant Gr (20%) occurs with dominant SwG (80%) in 10-2-21-W4 in the North Milk River valley, corresponding to soil polygon BFT1/33 on the Cardston soil survey.

**Example(s) of non-typical occurrences:** Upland gravel surfaces such as the Buffalo Hills south of Arrowood (Foothills Fescue and Mixedgrass Natural Subregions).

## Shallow to Gravel (SwG)

**Definition:** Soil with 20 to 50 cm of a sandy or loamy surface overlying a gravel or cobble- rich substrate.

**Representative Example:** Native areas of the Del Bonita Plateau, with gravels under a loess-like veneer.

**Usual landscape position:** Often on terraces and in valley bottoms

**Common association with other GVI site types:** Sy, Lo, Gr.

**Differentiation from the most similar site type(s):**

- Gr has gravels at the surface.
- Lo has only a few gravels between 20 and 100 cm from the surface.

**Correlation with Soil Landscape Models:** Applies to any soil with 20 to 50 cm of a surface mantle of any textural class overlying gravelly or very gravelly or cobbly to very cobbly (>20% gravel or cobbles) material.

**Native vegetation:** Graminoid with some shrub.

**Expression on colour infrared photography:** Generally a smooth green tone.

**Examples in pilot areas:**

- **Dominant** ( $\geq 65\%$ ): Dominant SwG occurs with significant Li and Ov in benches of the Oldman River in W 33-8-1-W5.
- **Co-Dominant** (two or three site types each cover 30 to 60%): Co-dominant SwG and Gr occur with significant Li on the north side of the Oldman River and east of Highway 22 at the Maycroft Bridge.
- **Significant** (one to three sites types, each of 10 to 30%): Significant SwG occurs with 75% Gr in N 8-2-21-W4 at highway 62 south of Magrath, corresponding to soil polygon RND1/4 on the Cardston soil survey

**Example(s) of non-typical occurrences:** Upland SwG surfaces such as the Del Bonita Plateau and the Buffalo Hills south of Arrowood (Foothills Fescue and Mixedgrass Natural Subregions).



## Examples of Other GVI Site Types

### Crop Irrigated (CI)

**Representative Example:** Crop production between Spring Coulee and the St. Mary's Reservoir in the St. Mary's River Irrigation District.

**Example(s) of non-typical occurrences:** Flood irrigation for crop production in the Glenwood area.

### Crop Non-Irrigated (CN)

**Representative Example:** Pincher Creek area.

**Example(s) of non-typical occurrences:** Scattered isolated crop production fields on the Milk River Ridge.

### Tame Pasture or Hay - Irrigated (PI)

**Representative Example:** Centre-pivot hay or pasture production in the Hillspring area.

**Example(s) of non-typical occurrences:** Flood irrigation for pasture or hay production near Glenwood.

### Tame Pasture or Hay - Non-Irrigated (PN)

**Representative Example:** Hay production (and pasture) in areas between the Waterton and Belly Rivers west of Standoff.

**Example(s) of non-typical occurrences:** None observed.

### Pits Site Type and Examples of Modifiers

**Pit Coal:** None.

**Pit Sand:** Between Beiseker and Strathmore.

**Pit Gravel:** Many locations. Eg., Waterton River delta.

**Pit Clay:** Possibly occurs in the Pincher Creek area.

**Pit Quarries:** Occasional quarries used for building sandstone.

### Developed Site Type and Examples of Modifiers

**Developed Confined Feeding Operations:** Several in the Pincher Creek area.

**Developed Transportation:** Highway #1 in the Calgary – Strathmore area.

**Developed Agricultural Research or Processing:** Cargill meat plant at High River.

**Developed Industrial Processing:** Magnesium plant at Aldersyde and Agrium fertilizer plant at Carseland.

**Developed Lagoons:** Nanton treatment lagoons.

**Developed Oil or Gas Facilities:** Gas processing plant east of Claresholm.

**Developed Mining Facilities:** Not expected in the Mixedgrass.

### **Urban Site Type**

**Representative Examples:** Calgary, Cardston, Cowley, Cayley.

### **Rural Site Type**

**Representative Examples:** Farmsteads; small hamlets, Eg., Aetna, Woodhouse.  
Country residential development (Eg., east of Okotoks and Calgary).  
Campgrounds (Eg., Woolford and Wyndham – Carseland Prov. Parks)

### **Literature Resources Applicable to this Guide**

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