Human Footprint Inventory 2014

Alberta Biodiversity Monitoring Institute

Geospatial Centre

Version 1

March 2017

(Venskaitis, n.d.)

Table of Contents

1. Overview

1.1 Summary

This dataset represents the 2014 Human Footprint Inventory (HFI) of Alberta (HFI2014). The 2014 HFI maps Human Footprint features across the entire province of Alberta. The dataset is intended to aid human footprint and land use inquiries in Alberta.

1.2 Description

The ABMI uses Alberta base features and other source information as the starting point for this product. Information is then further updated and added using SPOT6 satellite imagery to manually interpret anthropogenic disturbances on the land surface.

About 20% of the 2014 SPOT6 mosaic contains imagery acquired in 2013, therefore this dataset represents circa 2014 human footprint updates. Figure 1 and Figure 2 display spatial distribution of satellite imagery coverage for 2013 and 2014 and spatial distribution of circa 2014 Human Footprint, respectively. Representative HF polygons and polylines were delineated for 115 feature types, which were organized into 21 final sublayers.

1.3 Credits

This dataset includes data collected and created by the Alberta Human Footprint Monitoring Program and the Alberta Biodiversity Monitoring Institute.

1.3.1 Acknowledgments

Few of the sublayers used in the public version of the 2014 Human Footprint Inventory, e.g., the enhanced sub-layers for Roads, Railways, Well Sites, were obtained from the Government of Alberta through the Alberta Human Footprint Mapping Program (AHFMP), a collaboration program between the Government of Alberta, the Alberta Biodiversity Monitoring Institute (ABMI), and non-governmental organizations. The AHFMP governance and organization structure are designed to promote relevancy, accessibility, and transparency of human footprint information. The AHFMP organization structure includes two Steering Committees (Data Steering Committee and Stakeholder Steering Committee) and Technical Committee. The Technical Committee is directly involved in the assembling of the enhanced sub-layers (i.e., Roads, Railways, Well Sites) and includes members from the GoA and the ABMI.

1.4 Contact Information

If you have questions or concerns about the data, please contact:

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Alberta Biodiversity Monitoring Institute

CW 405 Biological Sciences Centre

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1.5 Keywords

Alberta, human footprint, 2014, reservoirs, borrow pits, sumps, dugouts, lagoons, roads, rails, canals, mines, industrial, wells, landfills, recreation, wind generation facilities, transmission lines, CFO, residential, cultivation, harvested areas, pipelines, seismic lines, disturbed vegetation

2. Use Limitations

2.1 Proprietary Sourced Data

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3. Data Product Specification

3.1 Scale Range

Maximum (zoomed in): 1:5,000

Minimum (zoomed out): 1:50,000

3.2 Spatial Resolution

Dataset's scale denominator: 30,000

3.3 Processing Environment

Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.1.1.3300

3.4 Extents

This dataset comprises visually interpreted human footprint in Alberta circa 2014.

Geographical Extent

West Longitude: -120

East Longitude: -110

South Latitude: 49

North Latitude: 60

West Longitude: 172077.519400

East Longitude: 865132.571100

South Latitude: 5425699.141800

North Latitude: 6659292.313800

3.5 Resource Maintenance

Resource Maintenance updates frequency: as needed

3.6 Spatial Reference

NAD_1983_10TM_AEP_Forest

WKID: 3400 Authority: EPSG

Projection: Transverse Mercator

False Easting: 500000.0

False Northing: 0.0

Central Meridian: -115.0

Scale Factor: 0.9992

Latitude of Origin: 0.0

Linear Unit: Meter (1.0)

Geographic Coordinate System: GCS_North_American_1983

Angular Unit: Degree (0.0174532925199433)

Prime Meridian: Greenwich (0.0)

Datum: D_North_American_1983

Spheroid: GRS_1980

Semi-major Axis: 6378137.0

Semi-minor Axis: 6356752.314140356

Inverse Flattening: 298.257222101

4. Lineage

The ABMI's HFI2014 was built using open sourced, proprietary, historical, and remotely sensed data. Remotely sensed data were used for visual interpretation and heads-up digitization of human footprint features. Assessment analysis was conducted to identify new and missing features, which were then digitized and added to the 2014 dataset. This dataset is comprised of 21 unique Human Footprint categories, i.e., sub-layers. This dataset is representative of the visual interpretation of anthropogenic disturbances on the Alberta landscape as seen from SPOT6 (circa 2014) satellite imagery mosaic.

5. Sublayers and Field Descriptions

The HFI_2014 is a product of multiple sub-layers that have been merged together into a single layer. Each sub-layer is listed below, including a detailed description of the layer contents, the data source, modifications made by the ABMI, associated HF codes, spatial distribution of the polygons, and horizontal accuracy. The order of precedence applied during creation of the final HFI dataset, i.e., merging process of the sub-layers is provided in Table 1.

Table 1. The order of precedence applied during creation of the final HFI dataset, i.e., merging process of the sub-layers.

Order of Precedence	Sub-layer
1	Reservoirs
2	Borrow Pits, Sumps, Dugouts and Lagoons
3	Non-Vegetated Impermeable Surfaces (Roads)
4	Rail Lines Hard Surface
5	Canals
6	Vegetated Surfaces of Roads, Trails and Railways
7	Mine Sites
8	Industrial Sites
9	Well Sites (Energy) ACTIVE
10	Landfill
11	Other Vegetated Facilities and Recreation
12	Wind Generation Facility
13	Transmission Lines
14	CFO and other High Density Livestock
15	Urban and Rural Residential
16	Well Sites (Energy) ABANDONED
17	Cultivation
18	Cut Blocks
19	Pipelines
20	Seismic Lines
21	Disturbed Vegetation

01 RESERVOIRS

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
RESERVOIR	101	Reservoirs	Commercial and Industrial	1	A body of water created by excavation or the man-made damming of a river or stream.

Definition:

An artificial lake or storage pond resulting from human made dam.

A body of water created by excavation or the man-made damming of a river or stream.

Source:

ABMI, Grassland Vegetation Inventory (GVI), Base Features (BASEFE)

Interpretation Elements and Rules:

SIZE:

Different sizes: ranging from the small ones created by damming small streams for a purpose of watering livestock to large water bodies of hydro dams.

SHAPE:

Dam structure (straight or hyperbolic wall) must be visible on reservoirs created on streams and rivers. Sides of the water body are given by topology of the terrain.

Storage pond reservoirs shape is given by engineers to fulfill specific needs. There is no front wall but all sides of storage pond are artificially created.

SHADOW: no shadow

COLOR: may depend on water depth, but usually in gradients of blue and brown

TEXTURE: fine

ASSOCIATED RELATIONSHIP or CONTEXT:

Dams must be in valleys of streams and rivers.

Storm water storage ponds are located nearby residential areas.

Irrigation storage ponds are located nearby agriculture along with irrigation structures – canals, pumps.

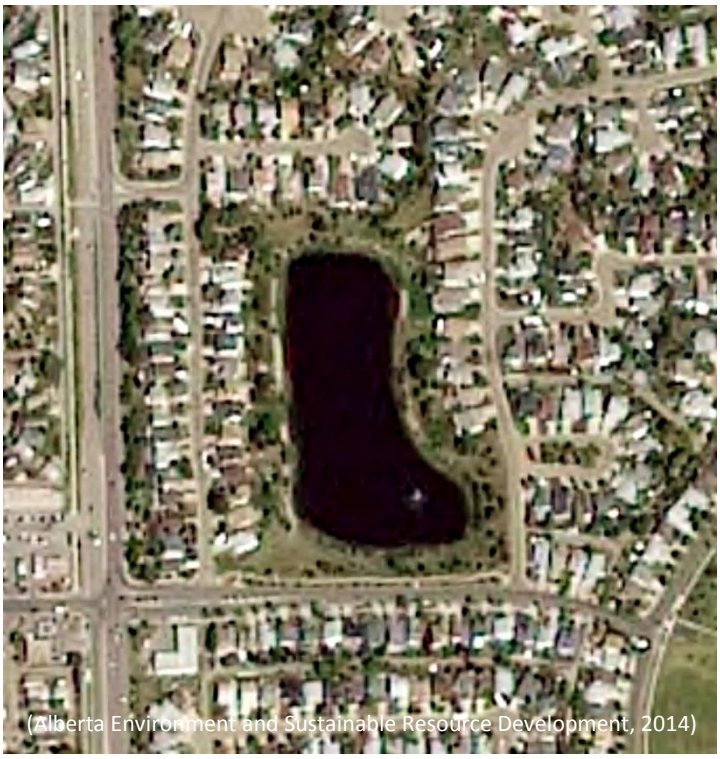
Feature type: **RESERVOIR**

Satellite snapshot: Dam reservoir

Orthophoto snapshot: Dam reservoir

Feature type: **RESERVOIR**

Satellite snapshot: Storm water reservoir



Orthophoto snapshot: Storm water reservoir

Feature type: **RESERVOIR**

Satellite snapshot: Irrigation reservoir

Orthophoto snapshot: Irrigation reservoir

Feature type: **RESERVOIR**

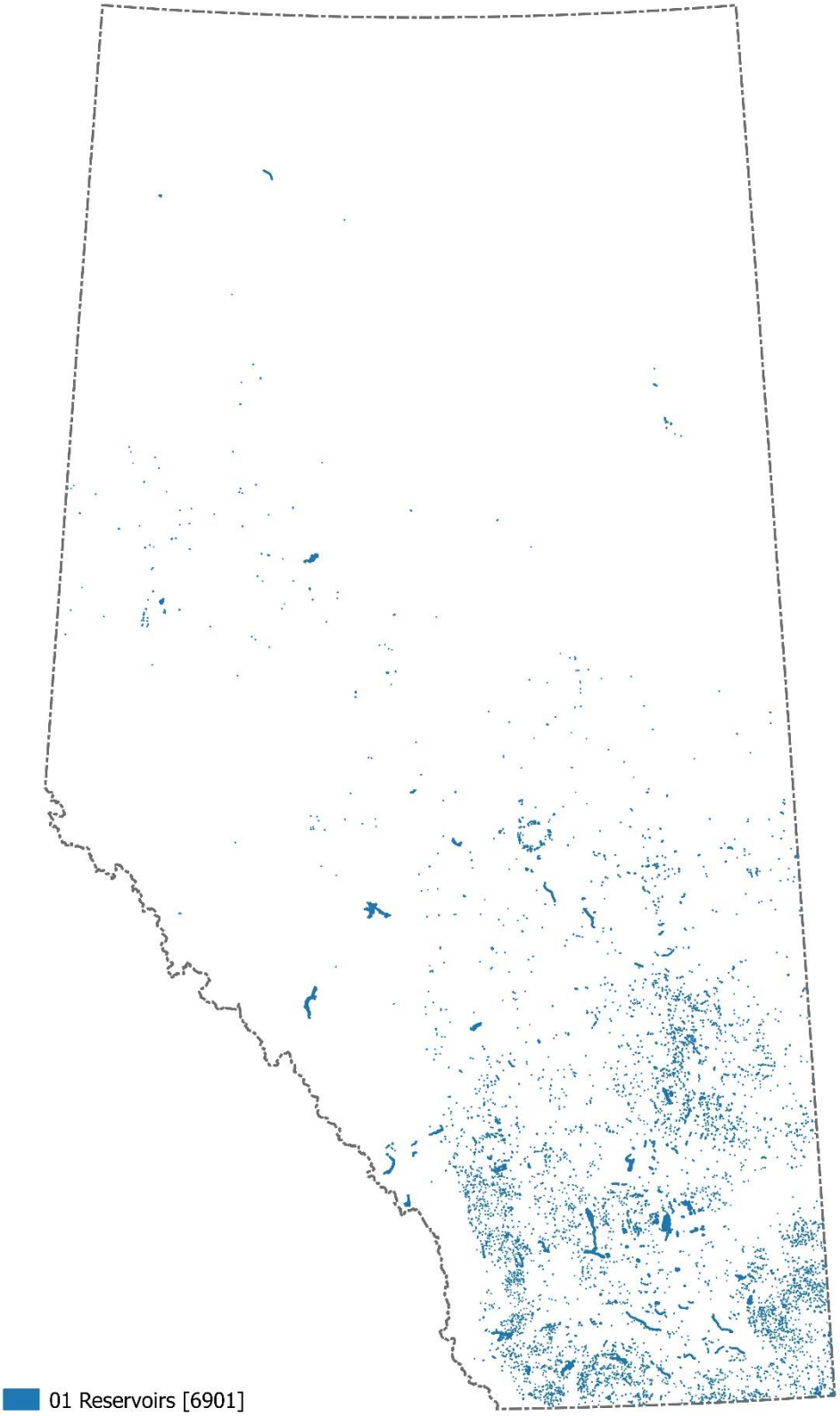
Terrestrial Photo: Storm water storage

Feature type: **RESERVOIR**

Similar Features, Potential Misinterpretation Sources:

Lagoons, Dugouts, Sumps, Borrow Pits

Spatial Distribution [Number of features]:



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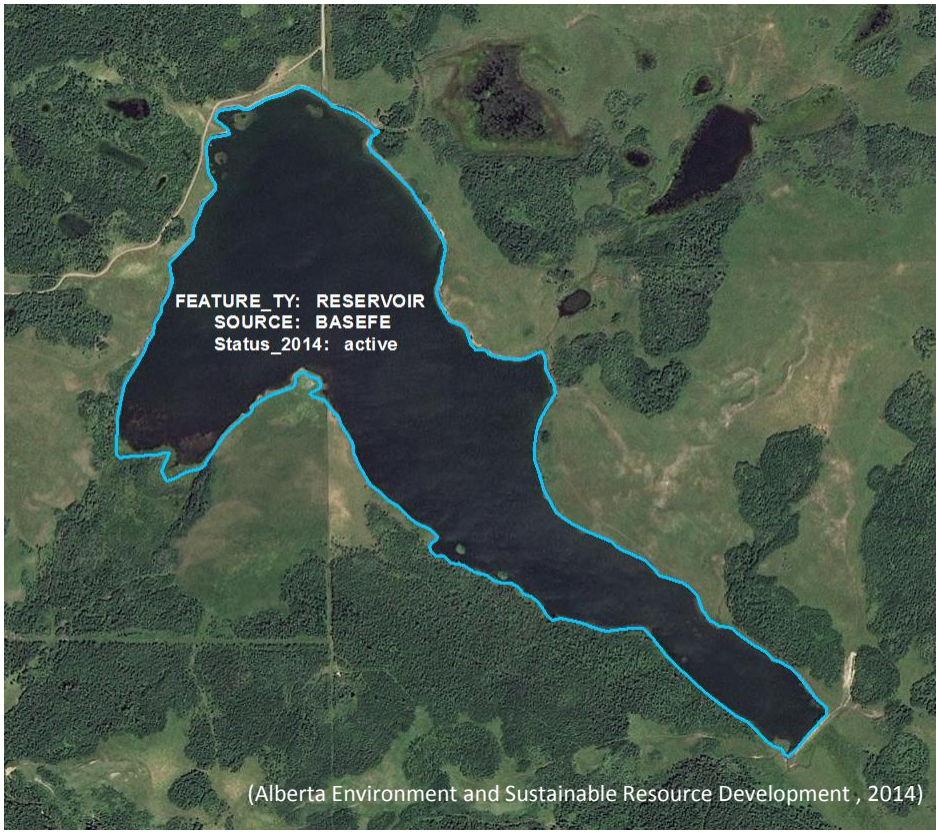
SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: 1910 to 2014

Status_2014 – Type: String; Length: 50; Values: active/abandoned

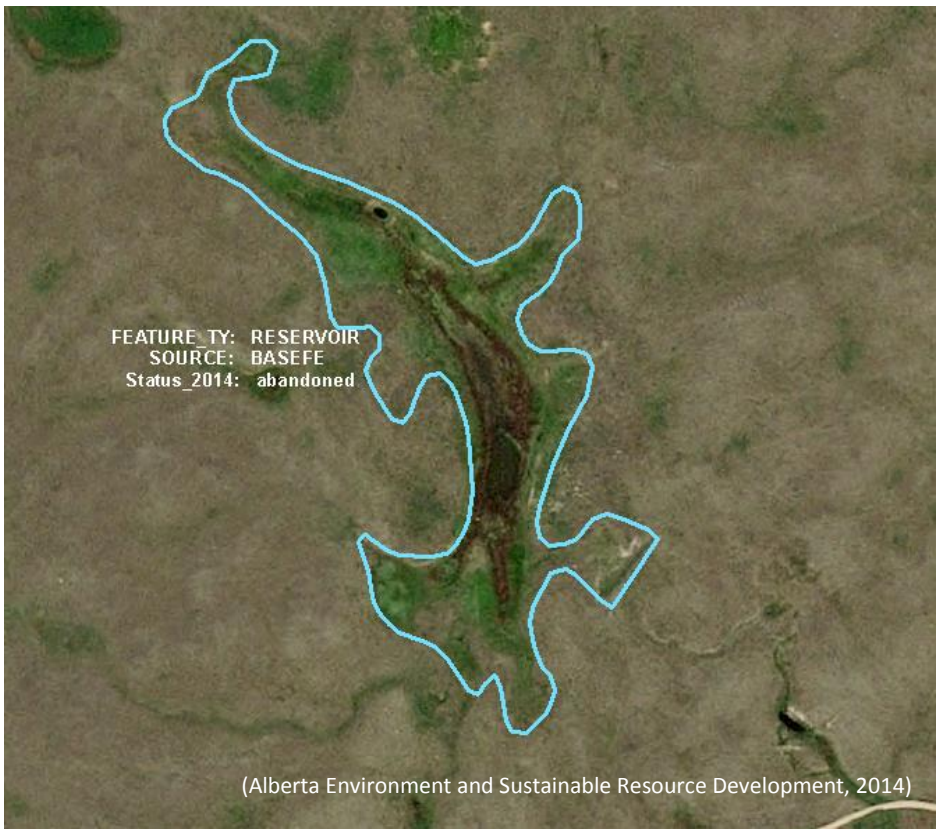
HFI_ID – Type: Guid

Status_2014 – “active”



(Alberta Environment and Sustainable Resource Development , 2014)

Status_2014 – “abandoned”



02 BORROW PITS, SUMPS, DUGOUTS and LAGOONS (BPSDL)

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
LAGOON	201	Municipal (Water and Sewage)	Residential and Recreation	2	Artificial holding or treatment ponds for industrial, agricultural or municipal wastewater. Human made water and sewage lagoons used for municipal purposes.

Definition:

An artificial holding or treatment ponds for industrial, agricultural or municipal wastewater. Human made water and sewage lagoons used for municipal purposes.

Source:

ABMI, ABMI14, AHFMP, AVIE, BASEFE, GVI, PLVI, RIS

Interpretation Elements and Rules:

SIZE:

Smaller to medium sized water bodies.

SHAPE:

Usually rectangular or square shape structure, occasionally might be triangular or other shape – following terrain topography and engineering design. Structural walls are usually elevated above surrounding terrain.

SHADOW: Shadow might be visible as lagoons are usually elevated above surrounding terrain.

COLOR: may depend on water depth, but usually in gradients of blue and brown

TEXTURE: fine

ASSOCIATED RELATIONSHIP or CONTEXT:

Lagoons are municipal structures built as part of water treatment facilities, so they are usually located nearby residential areas and within industrial zones.

Many times there are more than two lagoons build by each other creating a cluster of water bodies.

Feature type: **LAGOON**

Satellite snapshot:


(Alberta Environment and Sustainable Resource Development, 2014)

Orthophoto snapshot:


(Valtus Imagery Services, 2012)

Feature type: **LAGOON**

Satellite snapshot:

Orthophoto snapshot:

Feature type: **LAGOON**

Aerial Photo:

Feature type: **LAGOON**

Aerial Photo:

Feature type: **LAGOON**

Similar Features, Potential Misinterpretation Sources:

Reservoirs, Dugouts, Sumps, Borrow Pits

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
SUMP	201	Borrow Pts/Dugouts/Sumps	Energy and Mining	2	Artificial holding or treatment ponds for industrial wastewater.

Definition:

An artificial holding or treatment ponds for industrial wastewater.

Drilling waste storage system – holding of drilling waste on well sites or remotely.

Either earthen excavation (in clayey soils) or sumps lined with a synthetic liner.

Source:

ABMI, AHFMP, AVIE, BASEFE, GVI, PLVI, RIS

Interpretation Elements and Rules:

SIZE:

Smaller to medium size water bodies.

SHAPE:

Usually rectangular or square shape structure, occasionally might be triangular or other shape – following terrain topography and engineering design. Structural walls might be elevated above surrounding terrain for lined sump.

SHADOW: Shadow might be visible if sump walls are elevated above surrounding terrain.

COLOR: may depend on water depth, but usually in gradients of blue and brown

TEXTURE: fine

ASSOCIATED RELATIONSHIP or CONTEXT:

Sumps are industrial structures built as part of water treatment process, so they are usually located nearby industrial sites and well pads.

There is usually a single drilling waste storage structure build for a single well pad/industrial site.

Feature type: **SUMP**

Satellite snapshot:

(Alberta Environment and Sustainable Resource Development, 2014)

Feature type: **SUMP**

Orthophoto snapshot:

Feature type: **SUMP**

Satellite snapshot:

Feature type: **SUMP**

Feature type: **SUMP**

Terrestrial Photo:

Feature type: **SUMP**

Similar Features, Potential Misinterpretation Sources:

Reservoirs, Dugouts, Lagoons, Borrow Pits

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
BORROWPITS	203	Borrow Pts/Dugouts/Sumps	Energy and Mining	2	Includes pits dug to build forestry and well-site roads. They are usually associated with a road or another structure.
BORROWPIT-DRY	204	Borrow Pts/Dugouts/Sumps	Energy and Mining	2	Includes pits dug to build forestry and well-site roads. They are usually associated with a road or another structure. No presence of water.
BORROWPIT-WET	205	Borrow Pts/Dugouts/Sumps	Energy and Mining	2	Includes pits dug to build forestry and well-site roads. They are usually associated with a road or another structure. Presence of water confirmed by visual interpretation.
RIS-BORROWPITS	206	Borrow Pts/Dugouts/Sumps	Energy and Mining	2	Identifies any area disturbed for the purpose of extraction of aggregate materials including gravel pits.

Definition:

Excavation outside of the road right-of-way, made solely for the purpose of removing or proving borrow material for the construction of the sub-base for a specific roadway project. It includes any other associated infrastructure such as access roads. (*ALBERTA TRANSPORTAITON; GUIDE TO RECLAIMING BORROW EXCAVATIONS – 2013 Edition*).

Areas where soil has been dug out to be used for construction purposes. Either filled with water or dry excavations.

Source:

ABMI, AHFMP, AVIE, BASEFE, GVI, PLVI, RIS

Interpretation Elements and Rules:

SIZE:

Usually smaller excavation quite often smaller than 1 ha.

SHAPE:

Rectangular or square shape structure, occasionally might be triangular or other shape – following terrain topography and engineering design.

SHADOW: no shadows

COLOR: Depends whether they are dry or filled with water. Brown/Grey/Blue

TEXTURE: fine / coarser

ASSOCIATED RELATIONSHIP or CONTEXT:

Always located along roadways.

Feature type: **BORROWPITS**

Satellite snapshot:

Orthophoto snapshot:

Feature type: **BORROWPITS**

Satellite snapshot:

Orthophoto snapshot:

Feature type: **BORROWPIT-DRY**

Terrestrial Photo:

Feature type: **BORROWPIT-WET**

Terrestrial Photo:

Feature type: **BORROWPITS**

Similar Features, Potential Misinterpretation Sources:

Reservoirs, Dugouts, Lagoons, Sumps

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
DUGOUT	207	Borrow Pts/Dugouts/Sumps	Energy and Mining	2	Excavations typically associated with agriculture and rural residence, constructed to catch run off water for use by livestock.

Definition:

Small water storage excavations collecting water that occurs either as a runoff from summer rains or as a surplus of surface water that occurs during snowmelt in the spring. *(Alberta Agriculture and Rural Development, QUALITY FARM DUGOUTS).*

Areas where soil has been dug out to be used for construction purposes. Either filled with water or dry excavations.

Source:

ABMI, AHFMP, AVIE, BASEFE, GVI, PLVI, RIS

Interpretation Elements and Rules:

SIZE:

Usually smaller excavation quite often smaller than 1 ha.

SHAPE:

Rectangular, square or elliptical shape structure.

SHADOW: no shadows

COLOR: Depends whether they are dry or filled with water. Brown/Grey/Blue

TEXTURE: fine / coarser

ASSOCIATED RELATIONSHIP or CONTEXT:

Usually located along pastures, farms and agriculture areas.

Feature type: **DUGOUT**

Satellite snapshot:

(Alberta Environment and Sustainable Resource Development , 2014)

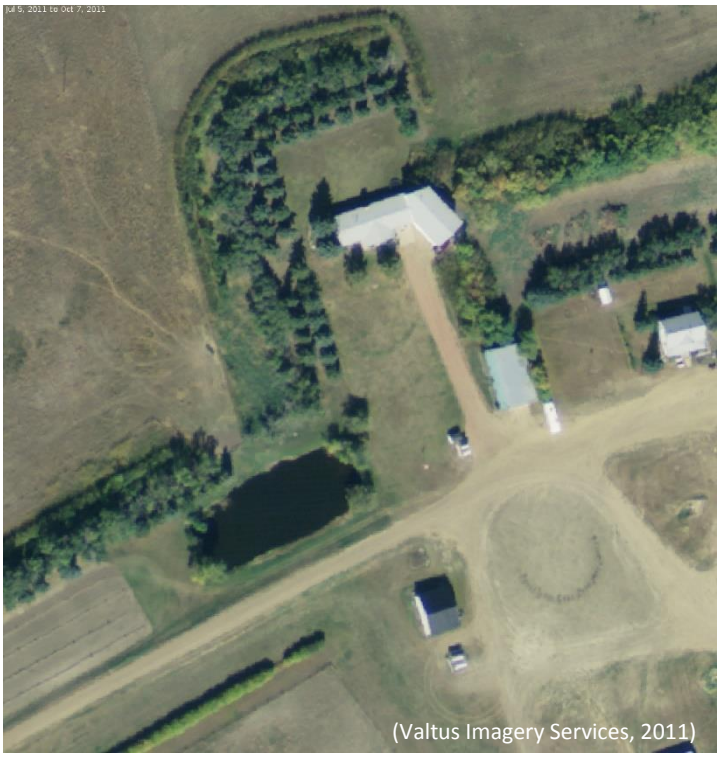
Orthophoto snapshot:

(Valtus Imagery Services, 2011)

Feature type: **DUGOUT**

Satellite snapshot:

Orthophoto snapshot:



Feature type: **DUGOUT**

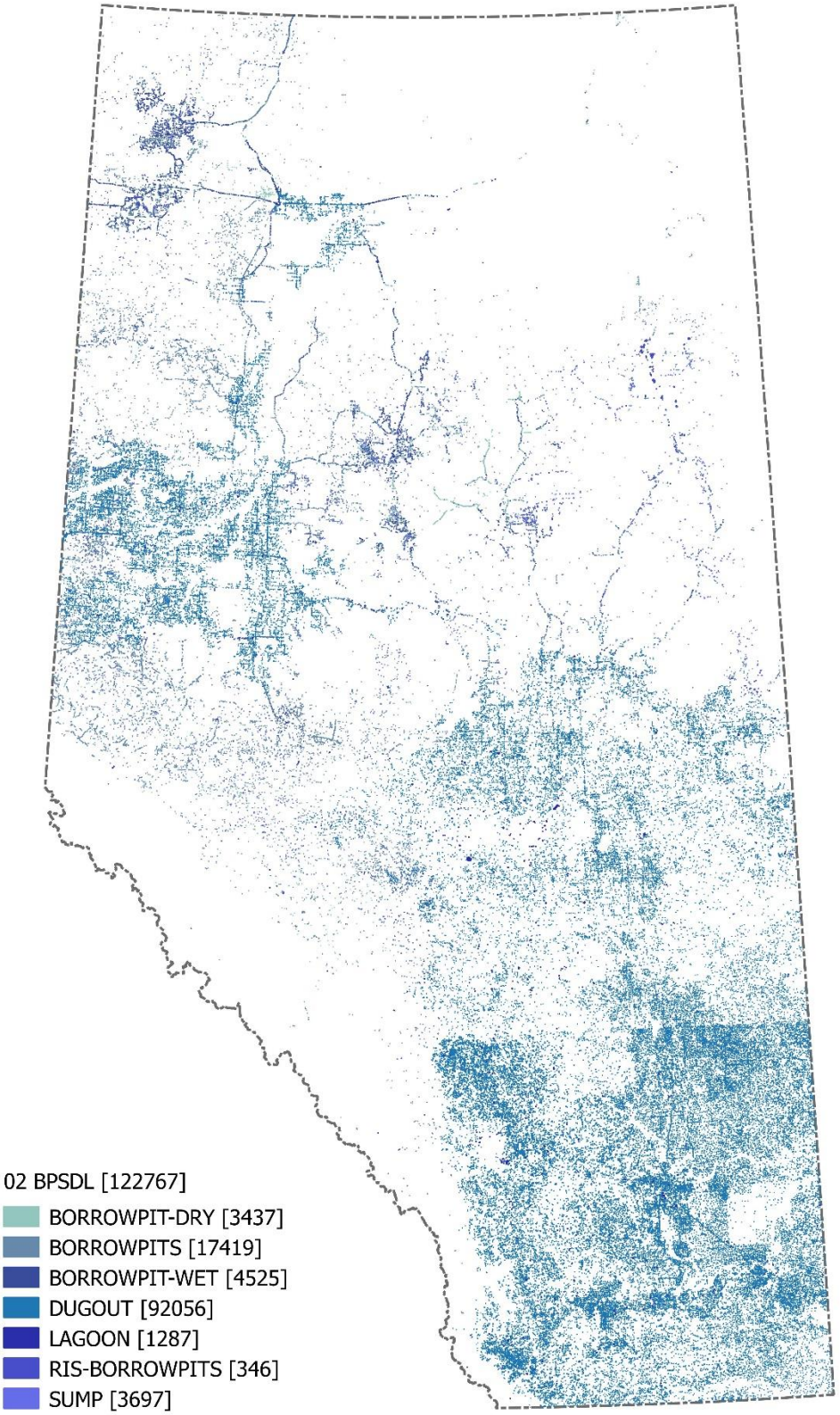
Terrestrial Photo:

Terrestrial Photo:

Feature type: **DUGOUT**

Similar Features, Potential Misinterpretation Sources:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1950 to 2014

HFI_ID – Type: Guid

03 ROADS

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
AIRP-RUNWAY	301	Road – Hard Surface	Transportation	3	An active landing facility for aircraft, usually associated with paved and lighted runways, an operating control tower, and services for aircraft and passengers.
INTERCHANGE-RAMP	302	Road – Hard Surface	Transportation	3	A series of roadways (ramps) constructed to permit access to and from intersecting paved roads. These ramps are usually at different levels, and form an overpass / underpass.
RIS-AIRP-RUNWAY	303	Road – Hard Surface	Transportation	3	Identifies operator owned landing facility for airplanes and related transportation.
RIS-ROAD	304	Road – Hard Surface	Transportation	3	Identifies roads that are not specifically part of other disturbed features.
ROAD-GRAVEL-1L	305	Road – Hard Surface	Transportation	3	A roadway surfaced with gravel and constituted as a main access route. The road surface is about 6 metres in width, and the road clearing is about 20 metres or greater in width. The surface, ditches, bridges and intersections are in good condition.
ROAD-GRAVEL-2L	306	Road – Hard Surface	Transportation	3	A roadway surfaced with gravel and constituted as a main access route. The road surface is 7 metres or greater in width, and the road clearing is 30 metres or greater in width. The surface, ditches, bridges and intersections are in good condition.
ROAD-PAVED-1L	307	Road – Hard Surface	Transportation	3	A roadway, paved with asphalt or concrete, consisting of one (1) lane.
ROAD-PAVED-2L	308	Road – Hard Surface	Transportation	3	A major roadway, which is paved with asphalt or concrete, and consists of two (2) roadbeds separated by a median. Each road bed usually consists of two (2) or more lanes.
ROAD-PAVED-3L	309	Road – Hard Surface	Transportation	3	
ROAD-PAVED-4L	310	Road – Hard Surface	Transportation	3	
ROAD-PAVED-5L	311	Road – Hard Surface	Transportation	3	
ROAD-PAVED-6L	312	Road – Hard Surface	Transportation	3	
ROAD-PAVED-7L	313	Road – Hard Surface	Transportation	3	
ROAD-PAVED-DIV	314	Road – Hard Surface	Transportation	3	A major roadway, which is paved with asphalt or concrete, and consists of two (2) roadbeds separated by a median. Each road bed usually consists of two (2) or more lanes.

ROAD-PAVED-UNDIV-1L	315	Road – Hard Surface	Transportation	3	A roadway, paved with asphalt or concrete, consisting of one (1) lane, and usually found servicing rural acreages that are close to large urban centres.
ROAD-PAVED-UNDIV-2L	316	Road – Hard Surface	Transportation	3	A roadway, paved with asphalt or concrete, and consisting of two (2) adjacent lanes, with no median to separate them.
ROAD-PAVED-UNDIV-4L	317	Road – Hard Surface	Transportation	3	A roadway, paved with asphalt or concrete, and consisting of four (4) adjacent lanes, with no median to separate them.
ROAD-UNCLASSIFIED	318	Road – Hard Surface	Transportation	3	A temporary coding for an unknown class of road, which will be updated after a field check or verification. (Source: road_album_2.ppt)
ROAD-UNIMPROVED	319	Road – Hard Surface	Transportation	3	A roadway surfaced with dirt and constituted as a minor access route. The road surface is up to 7 metres in width, and the road clearing is up to 20 metres in width. The surface and ditches are poorly maintained, and the bridges are narrow.
ROAD-UNPAVED-1L	320	Road – Hard Surface	Transportation	3	
ROAD-UNPAVED-2L	321	Road – Hard Surface	Transportation	3	
ROAD-WINTER-ACCESS	322	Road – Hard Surface	Transportation	3	A clearing that is vehicular accessible in winter only.
TRAIL-ATV	323	Road – Hard Surface	Transportation	3	A trail primarily used for ATV activities.
TRUCK-TRAIL	324	Road – Hard Surface	Transportation	3	A roadway surfaced with dirt or low vegetation and constituted as a minor access route. The road clearing is 6 metres or greater in width. Streams are generally forded, and ditches are few.

Source:

ABMI, AHFMP, RIS

Details of AHFMP processing steps and User Guide are included in these documents:

AHFMP - Road Processing 2014 Footprint.pdf

AHFMP - Road User Guide 2014 Footprint.pdf

Feature type: **ROAD-PAVED-DIV**

Terrestrial Photo:

Feature type: **ROAD-PAVED-UNDIV-2L**

Terrestrial Photo:

Feature type: **ROAD-GRAVEL-1L**

Terrestrial Photo:

Feature type: **ROAD-GRAVEL-2L**

Terrestrial Photo:

Feature type: **TRUCK-TRAIL**

Terrestrial Photo:

Feature type: **ROAD-UNIMPROVED**

Terrestrial Photo:

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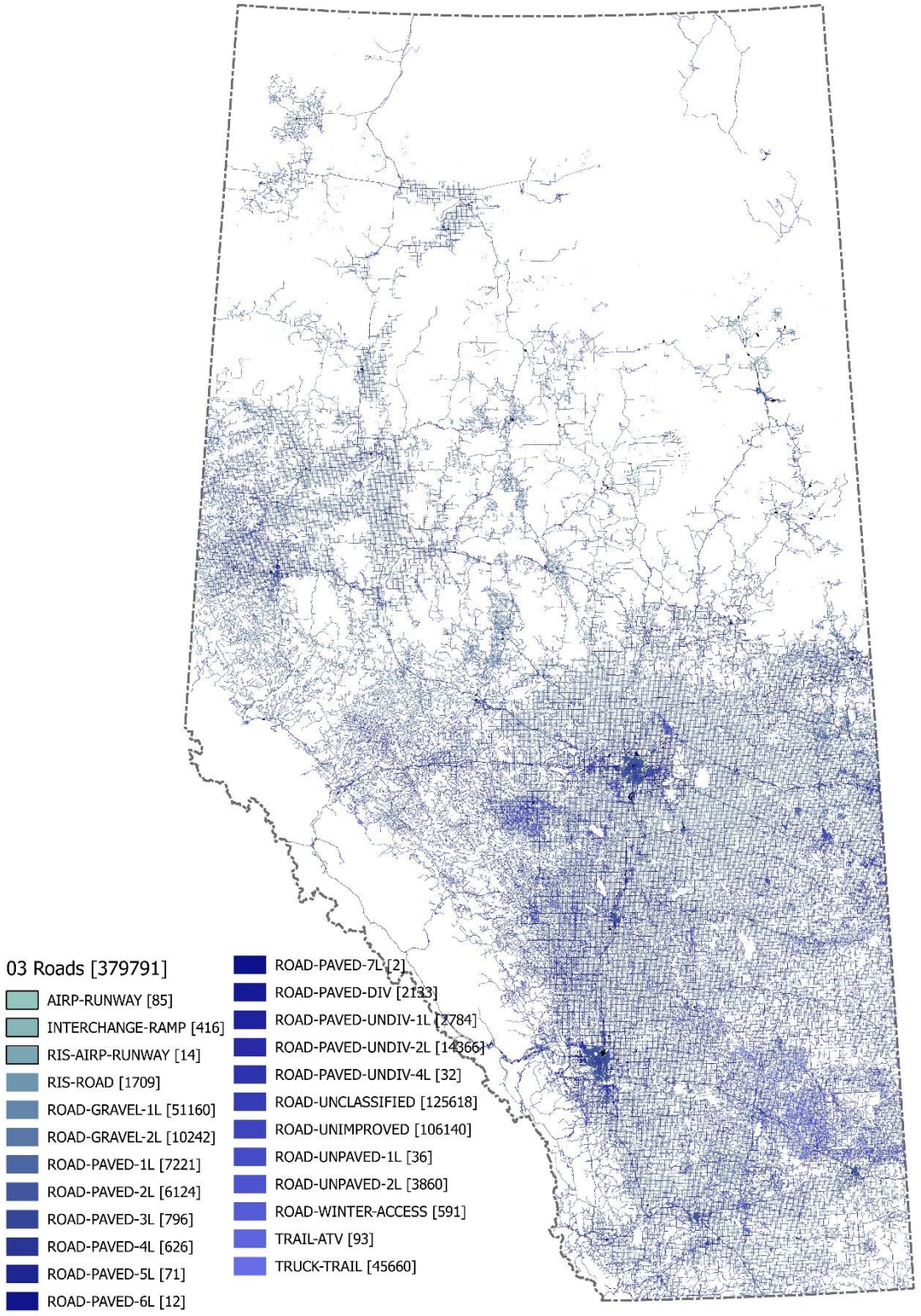

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YEAR – Type: Short Integer; Range: NULL/1950 to 2014

HFI_ID – Type: Guid

04 Railways Lines – Hard Surface

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
RLWY-ABANDONED	401	Rail – Hard Surface	Transportation	4	An abandoned road or track for trains, consisting of parallel steel rails, supported on wooden crossbeams that is no longer in use.
RLWY-DBL-TRACK	402	Rail – Hard Surface	Transportation	4	A road or track for trains, consisting of parallel steel rails, supported on wooden crossbeams. The Double track consists of two parallel sets of tracks.
RLWY-MLT-TRACK	403	Rail – Hard Surface	Transportation	4	A road or track for trains, consisting of parallel steel rails, supported on wooden crossbeams. A multiple track railway consists of many parallel sets of tracks.
RLWY-SGL-TRACK	404	Rail – Hard Surface	Transportation	4	A road or track for trains, consisting of parallel steel rails, supported on wooden crossbeams. The single track consists of one parallel sets of tracks.
RLWY-SPUR	405	Rail – Hard Surface	Transportation	4	A short length of railway leading off a main line, to a dead end. Spur lines usually lead to a commercial/industrial site, or may be used as a turnaround along a rail line.

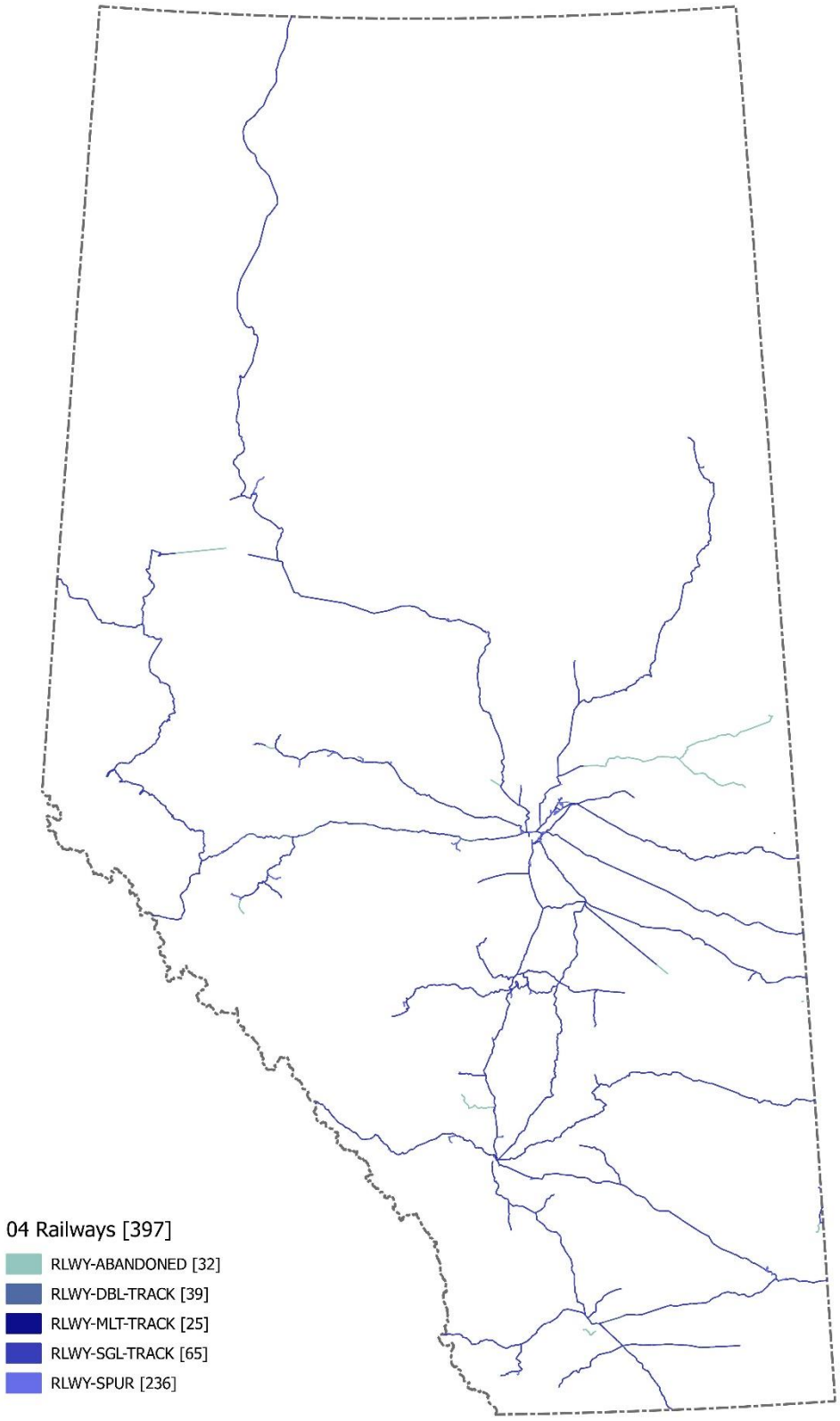
Source:

ABMI14, BASEFE

Feature type: RLWY-SGL-TRACK

Terrestrial Photo:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1950 to 2014

HFI_ID – Type: Guid

05 Canals

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
CANAL	501	Canals	Agriculture	5	A man-made watercourse built to convey water for irrigation.

Definition:

This is a man-made watercourse built to convey water for irrigation. An irrigation canal is larger than a ditch, with reinforced banks that are usually well maintained.

Source:

ABMI, ABMI14, BASEFE, GVI

Interpretation Elements and Rules:

SIZE:

Linear feature usually 20 meters to 40 meters in width with reinforced banks that are usually well maintained.

SHAPE:

Linear.

SHADOW: no shadows

COLOR: Depends whether they are dry or filled with water. Brown/Grey/Blue

TEXTURE: fine / coarser

ASSOCIATED RELATIONSHIP or CONTEXT:

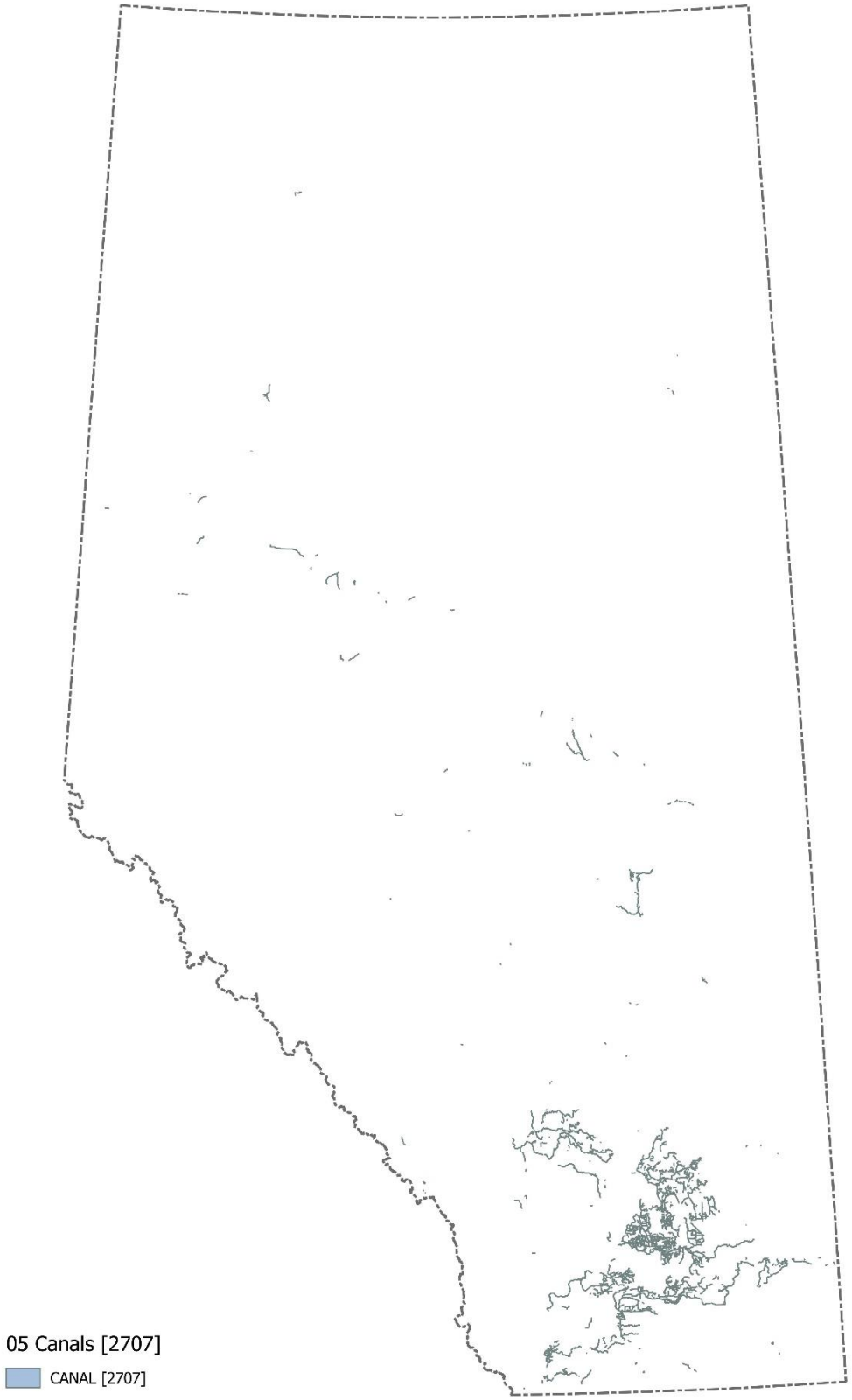
Usually located along irrigated cultivation fields.

Feature type: **CANAL**

Satellite snapshot:

Orthophoto snapshot:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1950 to 2014

HFI_ID – Type: Guid

06 Vegetated Surfaces of Roads, Trails and Railways

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
VEGETATED-EDGE-ROADS	601	Road – Vegetated Verge	Transportation	6	Disturbed vegetation alongside road edges
VEGETATED-EDGE-RAILWAYS	602	Rail – Vegetated Verge	Transportation	6	Disturbed vegetation alongside railway edges.

Definition:

Disturbed vegetation alongside road edges and railways edges including ditches.

Source:

ABMI14, AHFMP

Details of AHFMP processing steps and User Guide are included in these documents:

AHFMP - Road Processing 2014 Footprint.pdf

AHFMP - Road User Guide 2014 Footprint.pdf

Interpretation Elements and Rules:

SIZE:

Linear feature - various width.

SHAPE:

Linear.

SHADOW: no shadows

COLOR: shades of green,

TEXTURE: fine / coarser

ASSOCIATED RELATIONSHIP or CONTEXT:

Usually located along roads and railways.

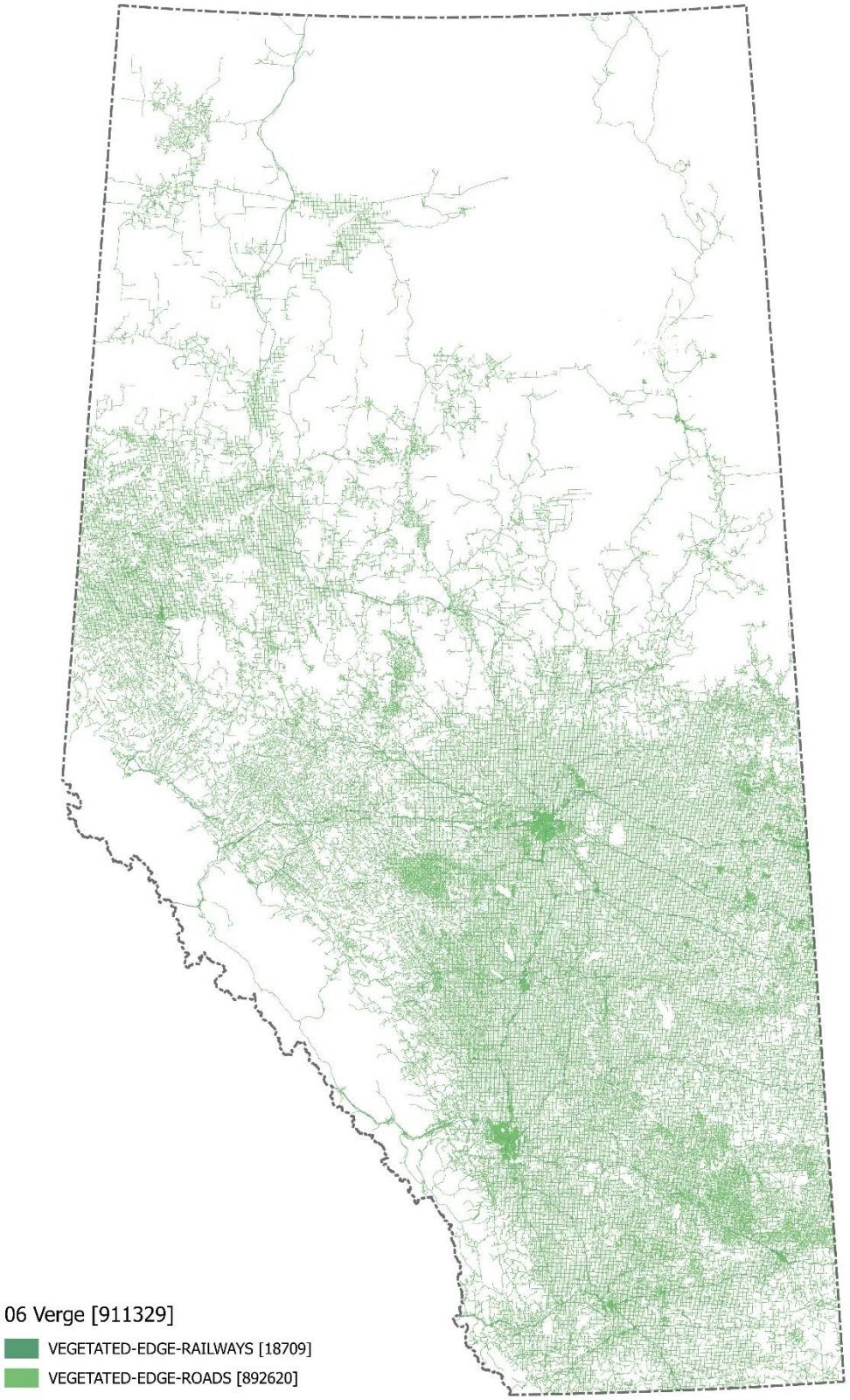
Feature type: VEGETATED-EDGE-ROADS

Satellite snapshot:

Feature type: VEGETATED-EDGE-ROADS

Orthophoto snapshot:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

BNDRY_SOURCE– Type: String; Length: 50; Values: ABMI14/BUFFER/CLO/DIDs

YEAR – Type: Short Integer; Range: NULL/1950 to 2014

HFI_ID – Type: Guid

07 MINE SITES

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
GRVL-SAND-PIT	701	Mine Site	Energy and Mining	7	An area of surface disturbance for the purpose of extracting sand and/or gravel consistently open and/or expanding over multiple years, usually close to lakes or rivers.
MINES-COAL	702	Mine Site	Energy and Mining	7	Heavy industry use with bare and/or vegetated ground and low human density for the purpose of coal mining.
MINES-OILSANDS	703	Mine Site	Energy and Mining	7	Heavy industry use with bare and/or vegetated ground and low human density for the purpose of oil sands mining.
MINES-PITLAKE	704	Mine Site	Energy and Mining	7	Areas of ground that were surface water is collected into the existing mine pit usually after mining activity is finished.
OPEN-PIT-MINE	705	Mine Site	Energy and Mining	7	An area of surface disturbance for the purpose of mining (with the exception of sand and/or gravel), consistently open and/or expanding over multiple years, usually close to lakes or rivers.
PEAT	706	Mine Site	Energy and Mining	7	An area of surface disturbance for the purpose of mining peat, consistently open and/or expanding over multiple years, usually in bogs or fens.
RIS-DRAINAGE	707	Mine Site	Energy and Mining	7	Identifies surface disturbance for the purpose of managing surface water features.
RIS-MINES-OILSANDS	708	Mine Site	Energy and Mining	7	Identifies areas where overburden removal has commenced for the purposes of preparing an area for open pit mining and all mine pit features.
RIS-OILSANDS-RMS	709	Mine Site	Energy and Mining	7	Identifies reclamation material stockpiles (RMS). Each RMS may have several material types and corresponding volumes.
RIS-OVERBURDEN-DUMP	710	Mine Site	Energy and Mining	7	Includes all areas where overburden and interburden is placed out-of-pit or in-pit for disposal.
RIS-RECLAIM-READY	711	Mine Site	Energy and Mining	7	Identifies areas where landform construction has been completed and the site is ready for clean cap, subsoil and surface soil placement. This definition is consistent with that used for annual reporting which identifies land "no longer required for mine or plant purposes and available for reclamation but where reclamation activities have not yet commenced.
RIS-RECLAIMED-CERTIFIED	712	Mine Site	Energy and Mining	7	Identifies polygons of reclaimed areas which have received a reclamation certificate.
RIS-RECLAIMED-PERMANENT	713	Mine Site	Energy and Mining	7	Identifies polygons which meet the definition of permanent reclamation - land is considered permanently reclaimed when landform construction and contouring, clean material placement (as required), reclamation material placement and revegetation has taken place.

RIS-RECLAIMED-TEMP	714	Mine Site	Energy and Mining	7	Identifies polygons which meet the definition of temporary reclamation – areas being managed where vegetation has been seeded, planted, or ingressed, where there is an expectation that future disturbance may occur at that location. This does not include cleared areas (planned for future disturbance) that have naturally revegetated through ingress.
RIS-SOIL-REPLACED	715	Mine Site	Energy and Mining	7	Identifies areas which have had subsoil or topsoil placed and which have not been revegetated.
RIS-SOIL-SALVAGED	716	Mine Site	Energy and Mining	7	Identifies areas where soil salvage is occurring but where overburden removal has not commenced.
RIS-TAILING-POND	717	Mine Site	Energy and Mining	7	Identifies all areas associated with tailings including toe berms, dykes, beaches, ponds and drying areas.
RIS-WASTE	718	Mine Site	Energy and Mining	7	Identifies all areas associated with waste and by-product storage on-site.
RIS-WINDROW	719	Mine Site	Energy and Mining	7	Includes areas where a line of reclamation material (soil or vegetation) is heaped up by a machine.
TAILING-PILE	720	Mine Site	Energy and Mining	7	An area used to store waste materials produced in mining processes.
TAILING-POND	721	Mine Site	Energy and Mining	7	Body of water on/in close proximity to an oil sands mine comprised of acids, benzene, hydrocarbons, residual bitumen, fine silts, and water.

Note: “RIS” features were imported from Reclamation Information System (GoA) based on Cross-reference table (Table 2.)

Source:

ABMI, BASEFE, GVI, RIS

Feature type: **GRVL-SAND-PIT**

Satellite snapshot:

Feature type: **GRVL-SAND-PIT**

Orthophoto snapshot:

Feature type: **PEAT**

Satellite snapshot:

Feature type: **PEAT**

Orthophoto snapshot:

Feature type: **MINES-COAL**

Satellite snapshot:

Feature type: **MINES-COAL**

Orthophoto snapshot:

Feature type: **MINES-COAL**

Terrestrial Photo:

Feature type: **MINES-COAL**

Terrestrial Photo:

Feature type: **GRVL-SAND-PIT**

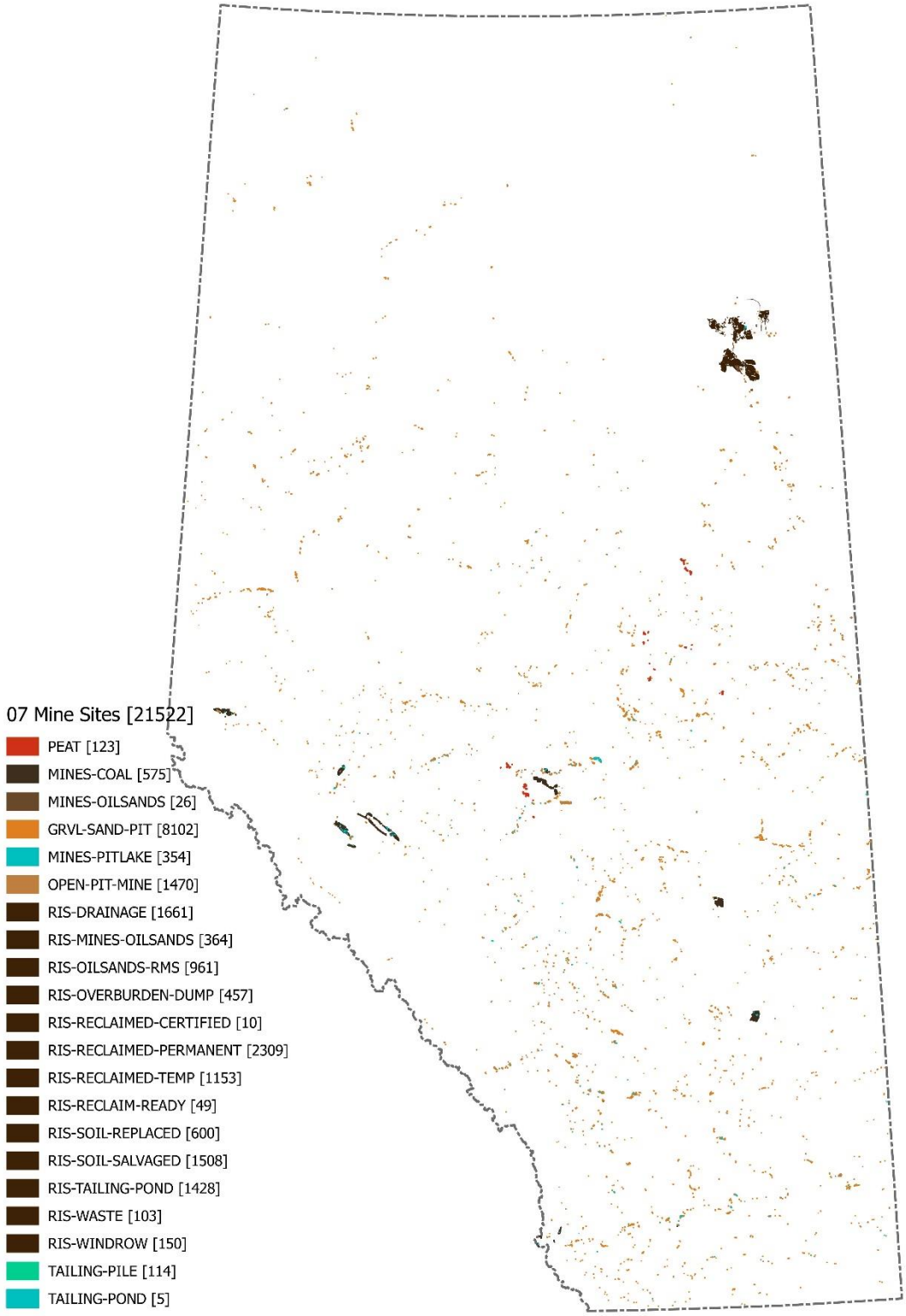
Terrestrial Photo:

Table 2. Reclamation Information System (GoA) Cross-reference table

RIS		ABMI HFI 2014	
LANDCOVER	**FEATURE_TY**	**FEATURE_TY**	**Sublayer**
CLEARED	Cleared other industry	RIS-CLEARING-UNKNOWN	08 Industrials
	<null>	RIS-CLEARING-UNKNOWN	08 Industrials
	Oil sands cleared	RIS-CLEARING-UNKNOWN	08 Industrials
DISTURBED	Aerodrome	AIRP-RUNWAY-ACTIVE	03 Roads
	Borrow pit	RIS-BORROWPITS	02 Borrow Pits, Sumps, Dugouts, Lagoons
	Camp housing	RIS-CAMP-INDUSTRIAL	08 Industrials
	Disturbed other industry	RIS-FACILITY-UNKNOWN	08 Industrials
	Disturbed unclassified	RIS-FACILITY-UNKNOWN	08 Industrials
	Drainage	RIS-DRAINAGE	07 Mines
	<null>	RIS-FACILITY-UNKNOWN	08 Industrials
	Mine pit	RIS-MINES-OILSANDS	07 Mines
	Operations	RIS-FACILITY-OPERATIONS	08 Industrials
	Other	RIS-FACILITY-UNKNOWN	08 Industrials
	Overburden dump	RIS-OVERBURDEN-DUMP	07 Mines
	Pipeline	RIS-PIPELINE	19 Pipelines
	Plant site	RIS-PLANT	08 Industrials
	Powerline	RIS-TRANSMISSION-LINE	13 Transmission Lines
	Ready to reclaim	RIS-RECLAIM-READY	07 Mines
	Reclamation material stockpile (RMS)	RIS-OILSANDS-RMS	07 Mines
	River water intake structure	RIS-RESERVOIR	01 Reservoir
	Road	RIS-ROAD	03 Roads
	Soil placed	RIS-SOIL-REPLACED	07 Mines
	Soil salvaged	RIS-SOIL-SALVAGED	07 Mines
	Tailings	RIS-TAILING-POND	07 Mines
	Tank farm	RIS-TANK-FARM	08 Industrials
	Utilities	RIS-UTILITIES	08 Industrials
	Waste	RIS-WASTE	07 Mines
	Wellsite	RIS-WELL	09 Well Sites Active
	Windrow	RIS-WINDROW	07 Mines

RECLAIMED	Certified	RIS-RECLAIMED-CERTIFIED	07 Mines
	<null>	RIS-RECLAIMED-UNKNOWN	07 Mines
	Permanent	RIS-RECLAIMED-PERMANENT	07 Mines
	Temporary	RIS-RECLAIMED-TEMP	07 Mines
	Temporary (dam safety)	RIS-RECLAIMED-TEMP	07 Mines

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1950 to 2014

HFI_ID – Type: Guid

08 INDUSTRIAL SITES

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
CAMP-INDUSTRIAL	801	Industrial Site Rural	Commercial and Industrial	8	Building used for temporary residence by employees on or in close proximity to an industrial activity such as mining, forestry, or oil and gas activities.
CLEARING-UNKNOWN	802	Industrial Site Rural	Commercial and Industrial	8	A human-made clearing with unknown purposes and contains no visible buildings, fences or equipment.
CLEARING-WELLPAD-UNCONFIRMED	803	Industrial Site Rural	Commercial and Industrial	8	Roughly square in shape clearing, roughly 90-120 meters wide (approximately 1 ha). Not confirmed as a well pad by available reference sources.
FACILITY-OTHER	804	Industrial Site Rural	Commercial and Industrial	8	Industrial facility characterized by large non-residential buildings most often surrounded by concrete for parking purposes. The purpose of the facility is not disclosed.
FACILITY-UNKNOWN	805	Industrial Site Rural	Commercial and Industrial	8	Industrial facility characterized by large non-residential buildings most often surrounded by concrete for parking purposes. The purpose of the facility is unknown.
MILL	806	Industrial Site Rural	Commercial and Industrial	8	Intense industrial & commercial development for the purpose of pulp or paper production.
MISC-OIL-GAS-FACILITY	807	Industrial Site Rural	Commercial and Industrial	8	Industrial facility used for the purpose of oil and gas.
OIL-GAS-PLANT	808	Industrial Site Rural	Commercial and Industrial	8	Industrial facility used for oil production.
RIS-CAMP-INDUSTRIAL	809	Industrial Site Rural	Commercial and Industrial	8	Identifies area disturbed for the purposes of housing camp workers.
RIS-CLEARING-UNKNOWN	810	Industrial Site Rural	Commercial and Industrial	8	Identifies all areas where vegetation has been removed for the purposes of preparing the land for drainage, soil removal, overburden removal, mining, etc. but where soil has been left mostly intact and relatively undisturbed. May include any or all of: tree removal, shrub removal, and/or grubbing (stump removal). Identifies areas cleared for by other industry and not for the purposes of forest harvesting or for oil sands development.
RIS-FACILITY-OPERATIONS	811	Industrial Site Rural	Commercial and Industrial	8	Designated for areas which are not part of the plant site, e.g., may include laydown areas not integrated with the main plant site(s), tailings lines, water lines, compressor station, buildings away from the main plant site, flare stack, communications tower.
RIS-FACILITY-UNKNOWN	812	Industrial Site Rural	Commercial and Industrial	8	Identifies areas where the reclamation liability associated for the disturbance is currently held by another industry operator.
RIS-PLANT	813	Industrial Site Rural	Commercial and Industrial	8	Includes areas associated with extraction, processing, upgrader. Plant sites may be multiple non-contiguous polygons.

RIS-TANK-FARM	814	Industrial Site Rural	Commercial and Industrial	8	Identifies areas where products of extraction or upgrading are stored. Product stored for on-site use can be identified under plant site or operations.
RIS-UTILITIES	815	Industrial Site Rural	Commercial and Industrial	8	Identifies areas specifically disturbed for the purposes of utilities (power generation).
URBAN-INDUSTRIAL	816	Industrial Site Rural	Commercial and Industrial	8	An industrial facility within the boundary of an urban residence.

Note: “RIS” features were imported from Reclamation Information System (GoA) based on Cross-reference table (Table 2.)

Source:

ABMI, ABMI14, AVIE, BASEFE, GVI, PLVI, RIS

Feature type: **CAMP-INDUSTRIAL**

Satellite snapshot:

Feature type: **CAMP-INDUSTRIAL**

Orthophoto snapshot:

Feature type: **MILL**

Satellite snapshot:

Feature type: **OIL-GAS-PLANT**

Satellite snapshot:

Feature type: **MISC-OIL-GAS-FACILITY**

Satellite snapshot:

Feature type: **URBAN-INDUSTRIAL**

Satellite snapshot:

Feature type: **URBAN-INDUSTRIAL**

Aerial Photo:

Feature type: **MISC-OIL-GAS-FACILITY**

Terrestrial Photo:

Feature type: **URBAN-INDUSTRIAL**

Terrestrial Photo:

Feature type: **URBAN-INDUSTRIAL**

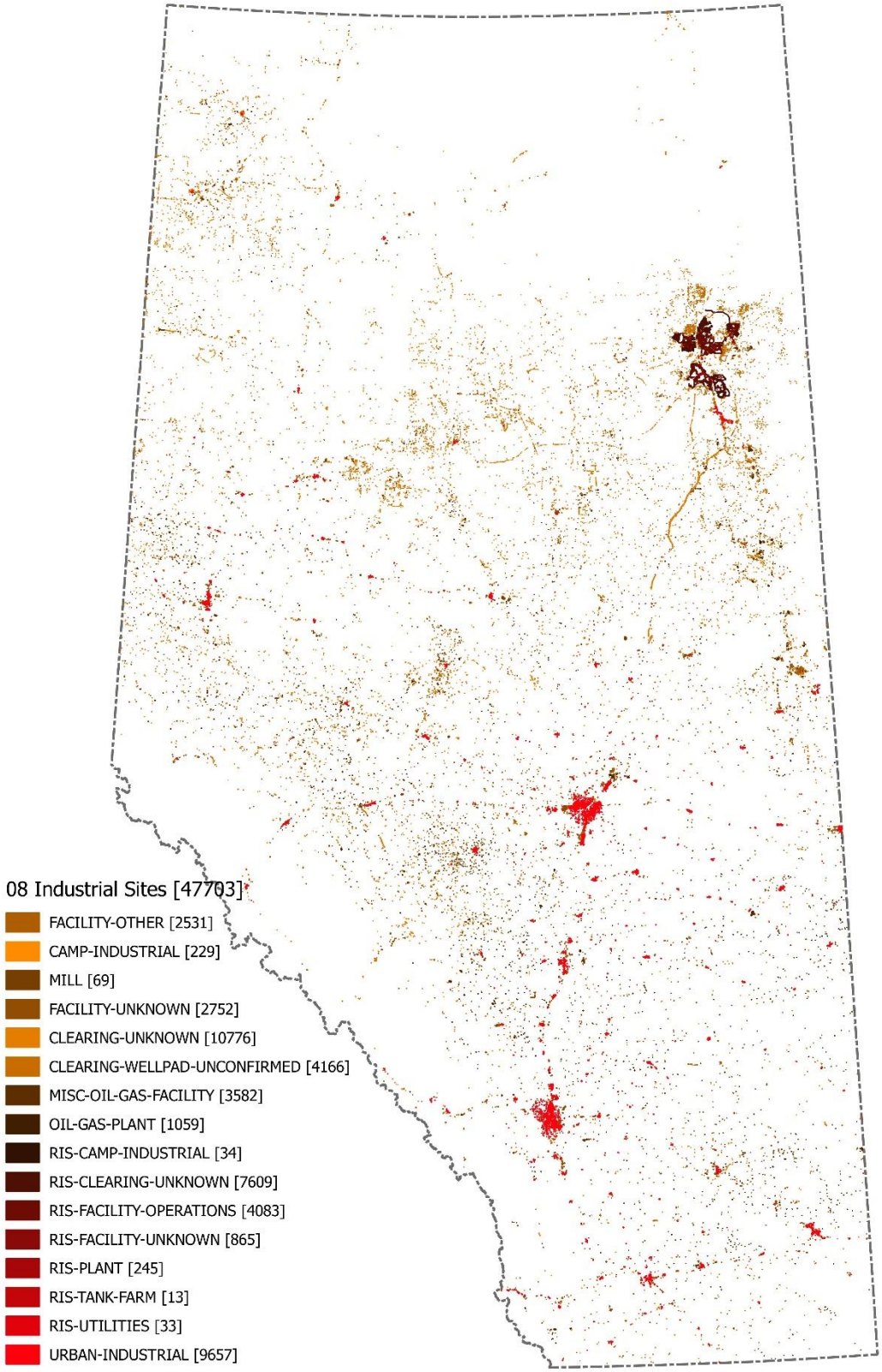
Terrestrial Photo:

Feature type: **URBAN-INDUSTRIAL**

Terrestrial Photo:

(Hricko, n.d.)

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1950 to 2014

HFI_ID – Type: Guid

BNDRY_SOURCE– Type: String; Length: 30; Range: ABMI/ABMI14/AVIE/BASEFE/GVI/PLVI/RIS

09 WELL SITES ACTIVE

Feature types:

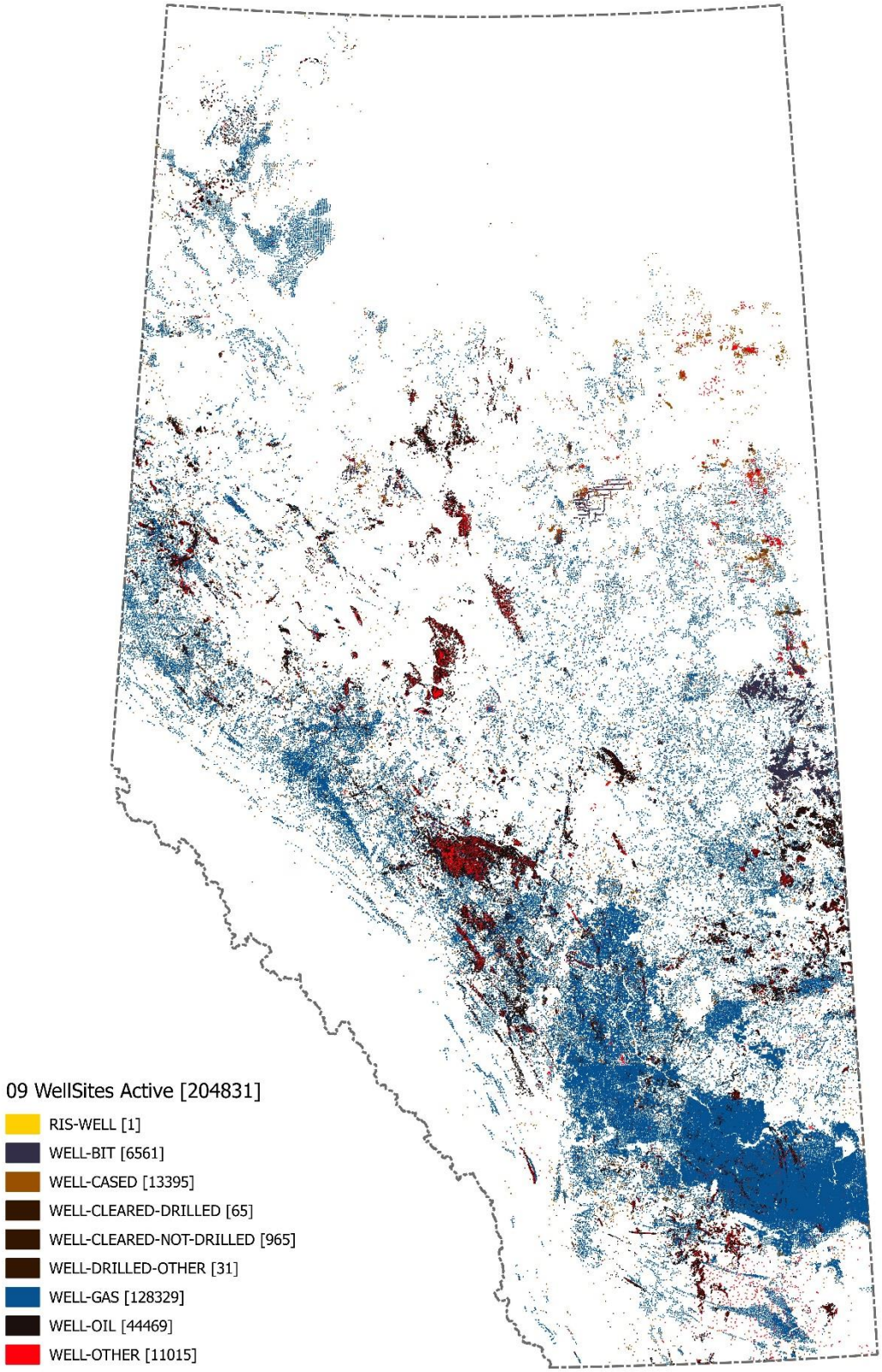
FEATURE_TY	Code	Public Code	Category	Order	Feature Description
RIS-WELL	901	Well Site	Energy and Mining	9	Identifies areas disturbed for the purpose of establishing exploration, production or disposal wells.
WELL-BIT	902	Well Site	Energy and Mining	9	Well site - ground cleared for a bitumen well pad.
WELL-CASED	903	Well Site	Energy and Mining	9	Well site - ground cleared and well cased.
WELL-CLEARED-DRILLED	904	Well Site	Energy and Mining	9	Well site - confirmation of drilling and the boundary outline are provided by reference sources.
WELL-CLEARED-NOT-DRILLED	905	Well Site	Energy and Mining	9	Well site - confirmation of the boundary outline are provided by reference sources.
WELL-DRILLED-OTHER	906	Well Site	Energy and Mining	9	Well site - confirmation of drilling are provided by reference sources.
WELL-GAS	907	Well Site	Energy and Mining	9	Well site - ground cleared for a gas well pad.
WELL-OIL	908	Well Site	Energy and Mining	9	Well site - ground cleared for an oil well pad.
WELL-OTHER	909	Well Site	Energy and Mining	9	Well site - clearing, purpose is unknown.

Note: “RIS” features were imported from Reclamation Information System (GoA) based on Cross-reference table (Table 2.)

Source:

ABMI14, AHFMP, RIS

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1897 to 2014

HFI_ID – Type: Guid

BNDRY_SOURCE– Type: String; Length: 30; Values: ABMI14/AVI/Buffer/DIDs – Application/DIDs – Conflict/DIDs – Historical/DIDs – Modified/Manually Digitized (SPOT)/RIS

PERCENT_AGRICULTURE – Type: Short Integer

PERCENT_BROADLEAF – Type: Short Integer

PERCENT_CONIFEROUS – Type: Short Integer

PERCENT_DEVELOPED – Type: Short Integer

PERCENT_EXPOSED_LAND – Type: Short Integer

PERCENT_GRASSLAND – Type: Short Integer

PERCENT_MIXED_FOREST – Type: Short Integer

PERCENT_ROCK – Type: Short Integer

PERCENT_SHRUBLAND – Type: Short Integer

PERCENT_SNOW_ICE – Type: Short Integer

PERCENT_WATER– Type: Short Integer

Details of AHFMP processing steps and User Guide are included in these documents:

AHFMP - Well Pad Procedures for 2014 Footprint.pdf

AHFMP - Well Pad User Guide 2014 Footprint.pdf

Table 3. AHFMP Well pads Cross-Reference Table.

[WELL_STATUS] Code (AESRD)	[WELL_STATUS] Value (AESRD)	[FEATURE_TYPE] Value (ABMI)	ABMI Sublayer's Name	Sublayer's Order of Precedence	# of Features
1	ABD	WELL-ABAND	Well Sites ABANDONED	16	140 971
2	OTHER	WELL-OTHER	Well Sites ACTIVE	9	11 021
3	DRILED AND CASED	WELL-CASED	Well Sites ACTIVE	9	13 395
4	GAS	WELL-GAS	Well Sites ACTIVE	9	128 335
6	OIL	WELL-OIL	Well Sites ACTIVE	9	44 466
7	BIT	WELL-BIT	Well Sites ACTIVE	9	6 549

Table 4. ABMI added Well pad features.

[FEATURE_TYPE] Value (ABMI)	ABMI Sublayer's Name	Sublayer's Order of Precedence	# of Features
WELL-DRILLED-OTHER	Well Sites ACTIVE	16	31
WELL-CLEARED-DRILLED	Well Sites ACTIVE	9	65
WELL-CLEARED-NOT-DRILLED	Well Sites ACTIVE	9	965
CLEARING-WELLPAD-UNCONFIRMED	INDUSTRIAL SITES	8	4163
MISC-OIL-GAS-FACILITY	INDUSTRIAL SITES	8	3573
FACILITY-OTHER	INDUSTRIAL SITES	8	2514

10 LANDFILL

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
LANDFILL	1001	Industrial Site Rural	Commercial and Industrial	10	Large area of raised land, indicating buried garbage. Some landfills have evidence of surface revegetation and garbage dispersed throughout designated extent. They may also have large perimeter berms or fences.
TRANSFER_STATION	1002	Industrial Site Rural	Commercial and Industrial	10	Small area of land, less than one hectare, usually fenced with a U-shaped road and two entry ways. One small rectangular building. Used primarily for garbage drop-off and located close to municipalities or present in rural areas.

Source:

ABMI

Interpretation Elements and Rules:

SIZE:

Various sizes, often larger polygons of landfills than transfer stations.

SHAPE:

Often rectangular or square shape structure.

SHADOW: no shadows

COLOR: various colours

TEXTURE: fine / coarser

ASSOCIATED RELATIONSHIP or CONTEXT:

Usually located in proximity of residential areas.

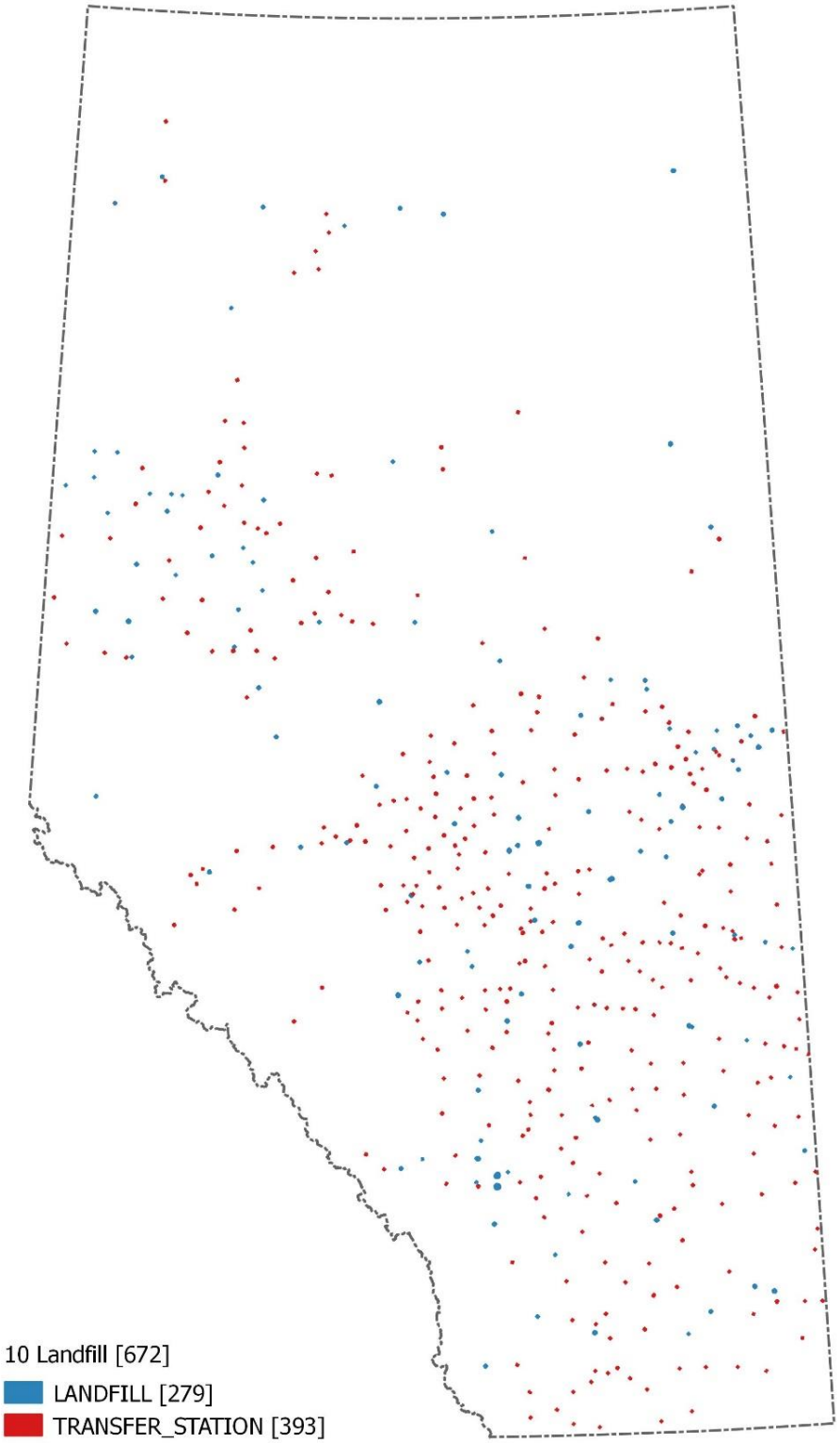
Feature type: **TRANSFER_STATION**

Orthophoto snapshot:

Feature type: **LANDFILL**

Orthophoto snapshot:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: 1984 to 2014

HFI_ID – Type: Guid

NAME – Type: String; Length: 70;

11 OTHER VEGETATED FACILITIES and RECREATION

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
CAMPGROUND	1101	Other Disturbed Vegetation	Residential and Recreation	11	Disturbed vegetation with frequently changing facilities of RVs and tents used for overnight stay. Most often comprised of several individual clearings surrounded by vegetation and gravel or concrete roads connecting clearings.
GOLFCOURSE	1102	Other Disturbed Vegetation	Residential and Recreation	11	Large recreational area comprised of a series of grass patches surrounded by trees.
GREENSPACE	1103	Other Disturbed Vegetation	Residential and Recreation	11	Greenspace used for recreation within a residential area including school, school yards and sport fields.
RECREATION	1104	Other Disturbed Vegetation	Residential and Recreation	11	Urban/rural greenspace and recreation that does not fit into other categories (e.g. grave yards, baseball diamonds, parks, shelterbelts, ski hills, clearings from old industrial activity that is now vegetated). This layer was also used to identify green-space features that do not fit into other categories such as storage areas and parking lots.
RUNWAY	1105	Other Disturbed Vegetation	Residential and Recreation	11	Vegetated runway.
SURROUNDING-VEG	1106	Other Disturbed Vegetation	Residential and Recreation	11	Disturbed vegetation surrounding an airport runway and other industrial features.

Source:

ABMI, ABMI14, ABMI37, AVIE, BASEFE, GVI, PLVI

Interpretation Elements and Rules:

SIZE:

Various sizes, often larger polygons of landfills than transfer stations.

SHAPE:

Often rectangular or square shape structure.

SHADOW: no shadows

COLOR: various colours

TEXTURE: fine / coarser

ASSOCIATED RELATIONSHIP or CONTEXT:

Usually located in proximity of residential areas.

Feature type: **GREENSPACE**

Orthophoto snapshot:

Feature type: **GOLFCOURSE**

Orthophoto snapshot:

Feature type: **RUNWAY**

Satellite snapshot:

Feature type: **RUNWAY**

Terrestrial Photo:

Feature type: **GREENSPACE**

Aerial Photo:

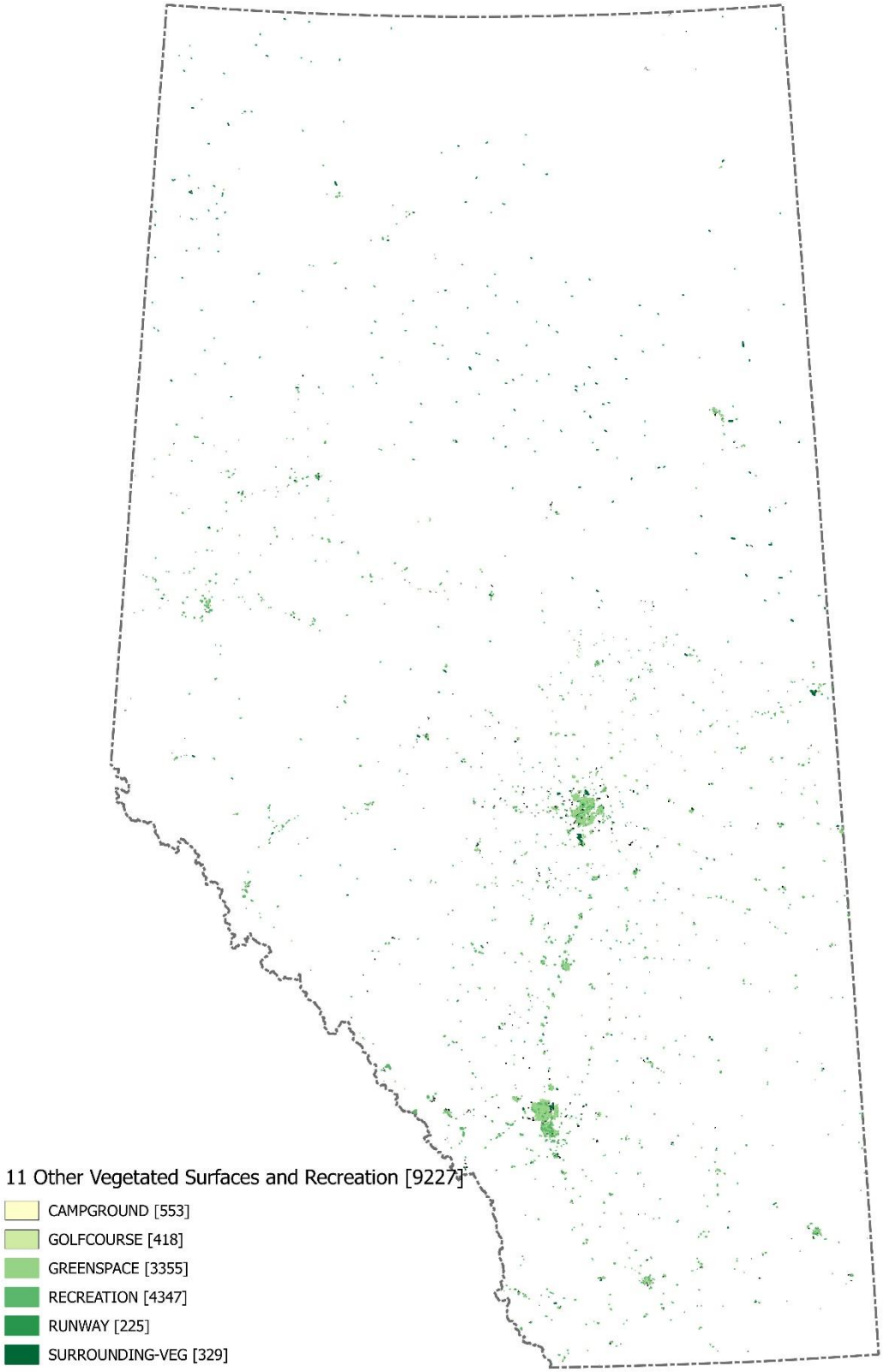
Feature type: **GOLFCOURSE**

Aerial Photo:

Feature type: **GREENSPACE**

Terrestrial Photo:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: 1959 to 2014

HFI_ID – Type: Guid

12 WIND GENERATION FACILITY

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
WINDMILLS	1201	Wind Generation Facility	Energy and Mining	12	Wind turbines, operational or former, visible on imagery. Digitized to represent original land disturbance from construction.

Source:

ABMI14

Interpretation Elements and Rules:

SIZE: Various sizes.

SHAPE: Often rectangular or square shape structure for land cover disturbance. Turbine structure visible for finished facilities.

SHADOW: tower and turbine shadows

COLOR: steel colours

TEXTURE: individual structure of turbine visible

ASSOCIATED RELATIONSHIP or CONTEXT:

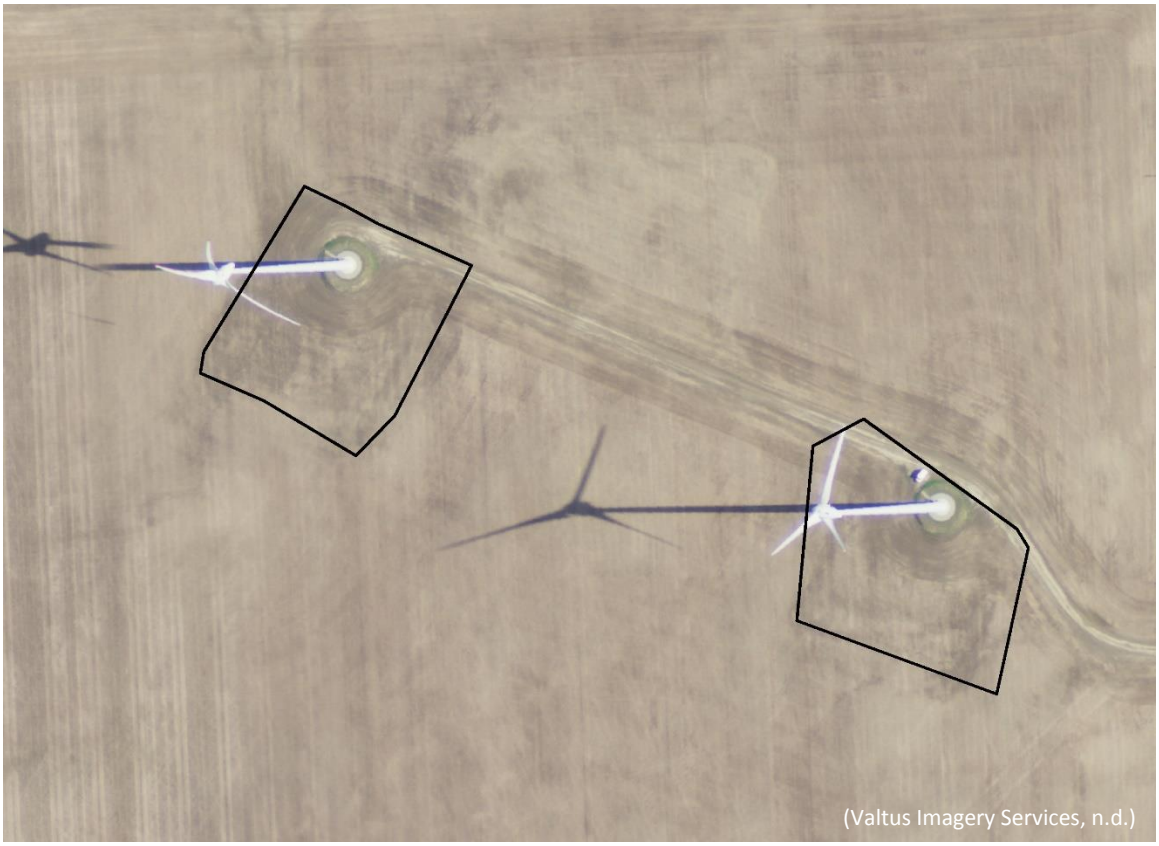
Usually clustered into “wind energy farms.”

Feature type: **WINDMILLS**

Satellite snapshot:

Feature type: **WINDMILLS**

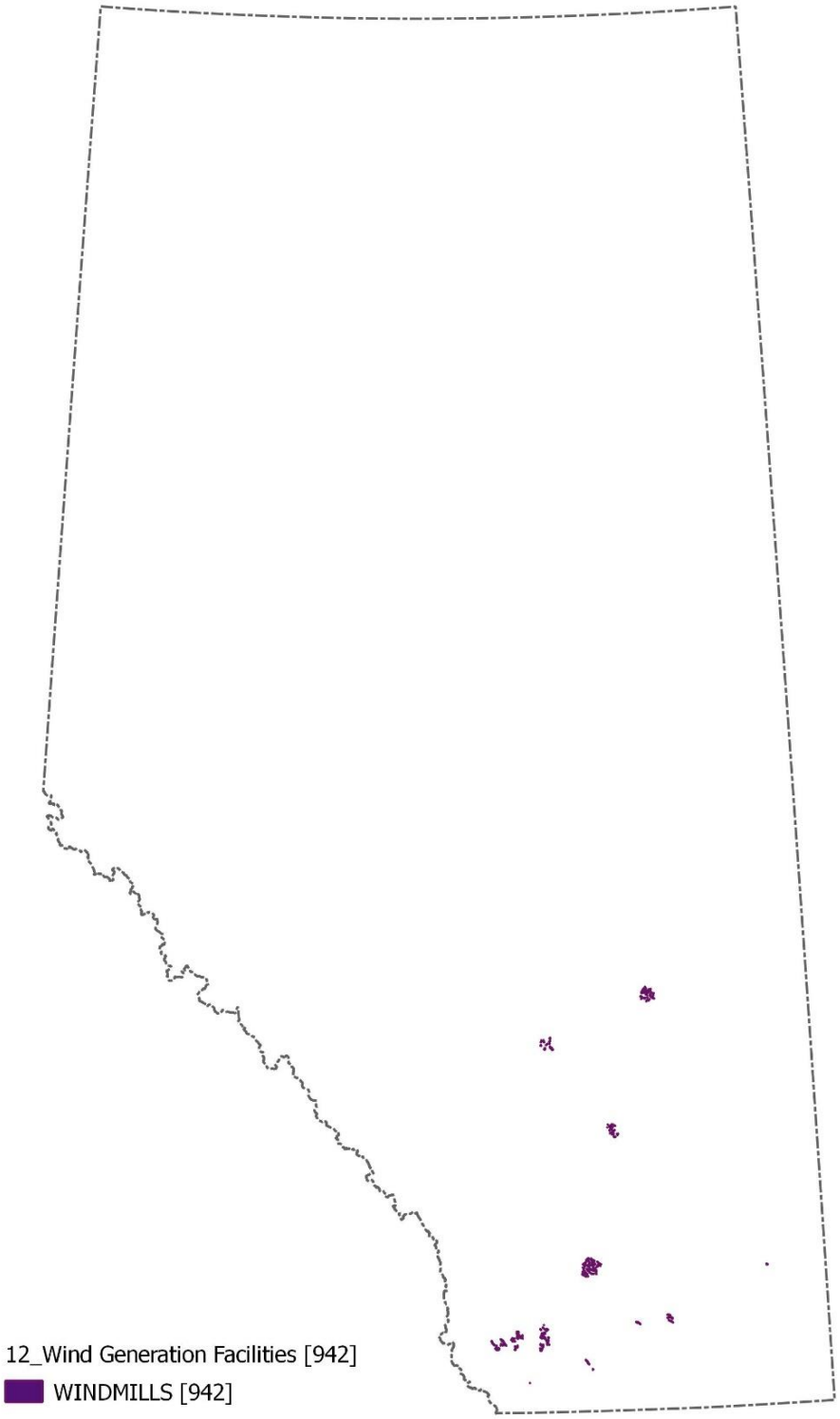
Orthophoto snapshot:



Feature type: **WINDMILLS**

Terrestrial Photo:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: 1994 to 2014

HFI_ID – Type: Guid

13 TRANSMISSION LINES

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
TRANSMISSION-LINE	1301	Transmission Line	Energy and Mining	13	A utility corridor >10 m wide with poles, towers and lines for transmitting high voltage electricity (voltage greater than 69 kV).
RIS-TRANSMISSION-LINE	1302	Transmission Line	Energy and Mining	13	Include the right of way area designated for the powerline.

Source:

ABMI, ABMI14, AHFMP, BASEFE, RIS

Interpretation Elements and Rules:

SHAPE: Linear shape – corridor in landscape. Tower structure visible.

WIDTH:

Buffered to 19 m - each side from the centerline (38 m in total width of the corridor) for AHFMP and BASEFE features.

Buffered to measured width for ABMI14 features.

SHADOW: tower shadows

COLOR: shades of green or brown/grey depending on vegetation cover of the corridor

TEXTURE: usually finer texture as a result even vegetation on the corridor

ASSOCIATED RELATIONSHIP or CONTEXT:

Corridor connects energy users with energy providers.

Feature type: **TRANSMISSION-LINE**

Orthophoto snapshot:

Feature type: **TRANSMISSION-LINE**

Aerial Photo:

Feature type: **TRANSMISSION-LINE**

Aerial Photo:

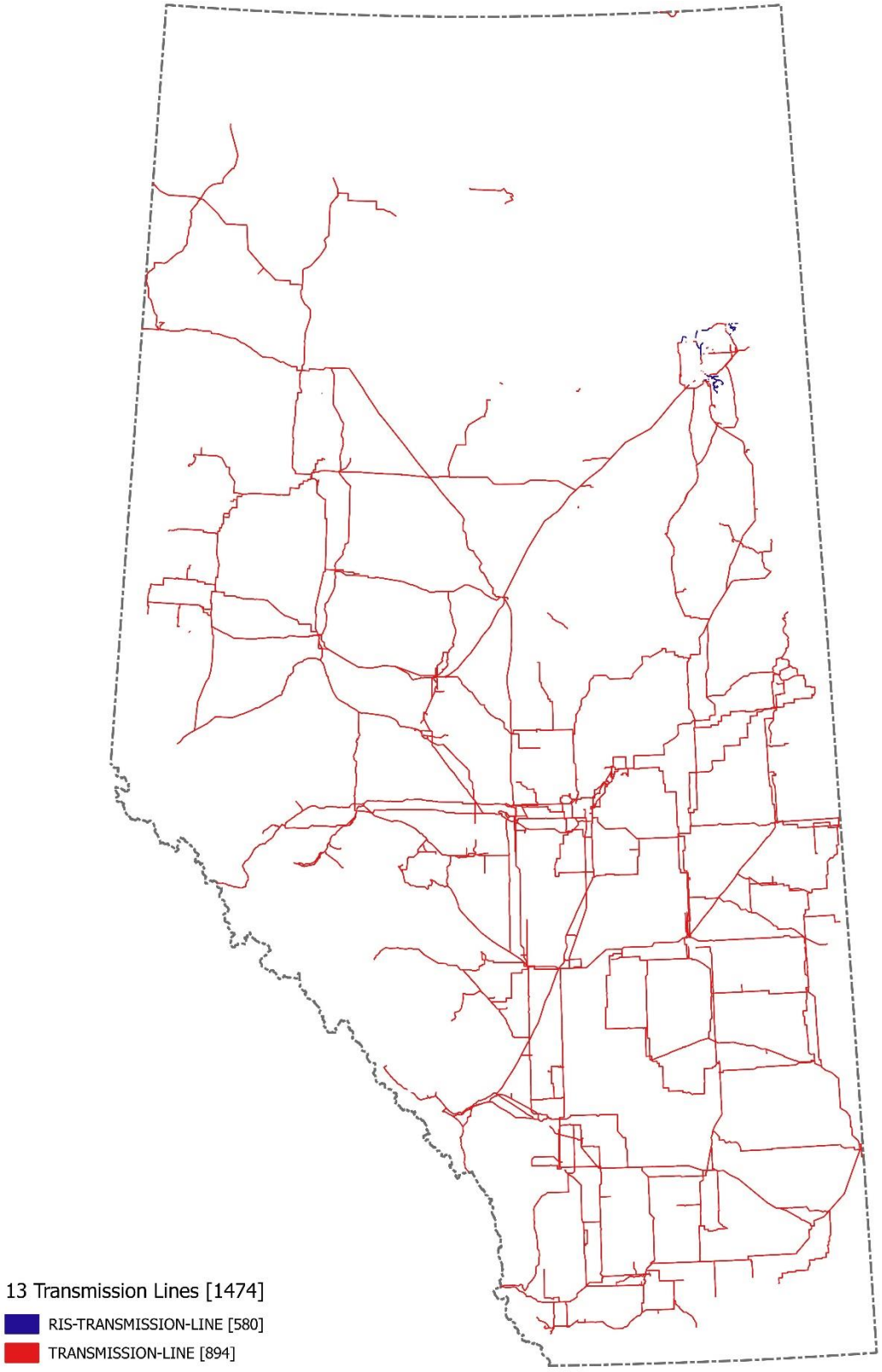
Feature type: **TRANSMISSION-LINE**

Terrestrial Photo:

Feature type: **TRANSMISSION-LINE**

Terrestrial Photo:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL

HFI_ID – Type: Guid

14 CFO and HIGH DENSITY LIVESTOCK

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
CFO	1401	High Density Livestock Operation	Commercial and Industrial	14	Confined feeding operations (CFO), interpreted as the presence of large buildings and fenced pens appearing to be used for the purpose of feeding and confining pigs, chickens, or cows.

Source:

ABMI, ABMI14, BASEFE, GVI, PLVI, SRDSPT'

Interpretation Elements and Rules:

SIZE: Various sizes.

SHAPE: Often regular shape.

SHADOW: shadows of building and facilities associated with CFO

COLOR: various colours

TEXTURE: usually coarser texture

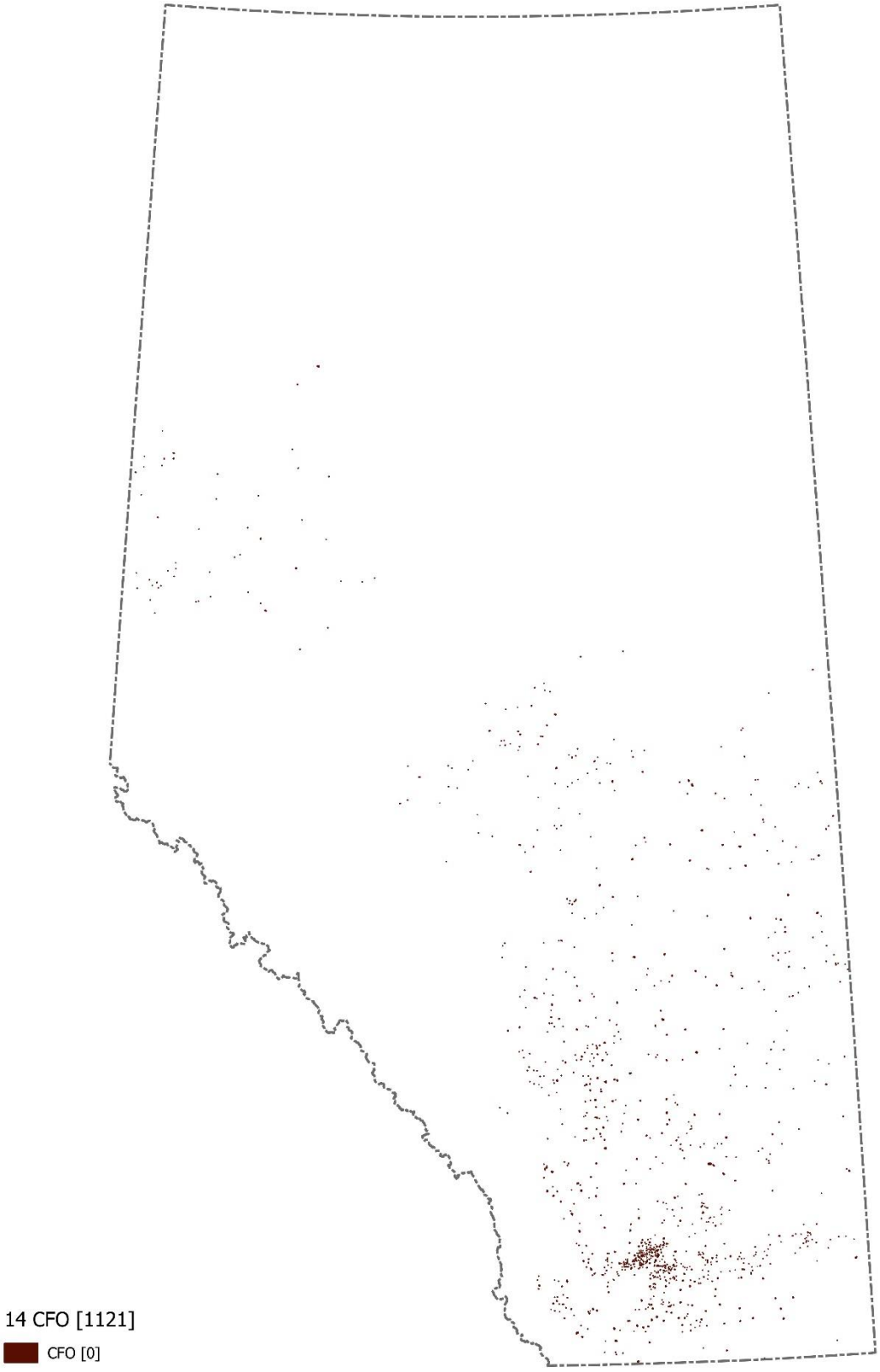
ASSOCIATED RELATIONSHIP or CONTEXT:

Usually in proximity of farm fields, residential or industrial features.

Feature type: **CFO**

Orthophoto snapshot:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1999 to 2014

HFI_ID – Type: Guid

15 URBAN and RURAL RESIDENTIAL

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
COUNTRY-RESIDENCE	1501	Rural (Residential/ Industrial)	Residential and Recreation	15	Rural developments (10 - 100 buildings per quarter section).

Definition:

Country-residential developments with density of 10 - 100 buildings per quarter section.

Source:

ABMI,ABMI07, ABMI10, ABMI12, ABMI14, ABMI37, AVIE, BUFF10, GVI, GVIed, PLVI, PLVIed

Interpretation Elements and Rules:

SIZE:

Minimum size of the polygon should be 0.4 Ha (1 Acre) in case one country-residential property creates an acreage polygon. More often – multiple country-residential developments are captured into one polygon therefore maximum size of polygon is not limited.

SHAPE:

Multi-vertices polygons, where boundaries follow property lines, fences, clearings of country-residential development.

SHADOW: no shadow

COLOR: no unique color

TEXTURE: no unique texture

ASSOCIATED RELATIONSHIP or CONTEXT:

Country-residentials are often grouped together with road system as a backbone of such residential development.

Feature type: **COUNTRY-RESIDENCE**

Satellite snapshot:


(Alberta Environment and Sustainable Resource Development , 2014)

Orthophoto snapshot:


(Valtus Imagery Services, n.d.)

Feature type: **COUNTRY-RESIDENCE**

Terrestrial Photo:

Feature type: COUNTRY-RESIDENCE

Similar Features, Potential Misinterpretation Sources:

Rural Residential

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
RURAL-RESIDENCE	1502	Rural (Residential/ Industrial)	Residential and Recreation	15	Rural developments (less than 10 buildings per quarter section).

Definition:

Rural-residential developments with density of less than 10 buildings per quarter section.

Source:

ABMI, ABMI07, ABMI10, ABMI12, ABMI14, ABMI37, AVIE, BUFF10, GVI, GVIed, PLVI, PLVIed

Interpretation Elements and Rules:

SIZE:

Various sizes. Usually one polygon per one rural residence.

SHAPE:

Multi-vertices polygons, where boundaries follow property lines, fences, clearings of country-residential development.

SHADOW: no shadow

COLOR: no unique color

TEXTURE: no unique texture

ASSOCIATED RELATIONSHIP or CONTEXT:

Rural residences are often isolated by other human footprint types (cultivation) or native landscape (lodges). They are connected to the other areas by access road.

Feature type: **RURAL RESIDENCE**

Satellite snapshot:

Orthophoto snapshot:

Feature type: **RURAL RESIDENCE**

Aerial Photo:

Feature type: RURAL RESIDENCE

Similar Features, Potential Misinterpretation Sources:

Country Residential

Feature type: URBAN-RESIDENCE

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
URBAN-RESIDENCE	1503	Rural (Residential/ Industrial)	Residential and Recreation	15	Urban residence (>100 buildings per quarter section).

Definition:

Residential areas in cities, towns, villages, hamlets and ribbon developments. Areas that are dominated by dwellings.

Source:

ABMI, ABMI07, ABMI10, ABMI12, ABMI14, ABMI37, AVIE, BUFF10, GVI, GVIed, PLVI, PLVIed

Interpretation Elements and Rules:

SIZE:

Various sizes. Usually one polygon per many urban residences.

SHAPE:

Multi-vertices polygons, where boundaries follow property lines, fences, clearings of country-residential development.

SHADOW: no shadow

COLOR: no unique color

TEXTURE: no unique texture

ASSOCIATED RELATIONSHIP or CONTEXT:

Urban residences are often surrounded by other human footprint types (recreational – GREENSPACE, industrial – URBAN-INDUSTRIAL).

Feature type: **URBAN-RESIDENCE**

Satellite snapshot:

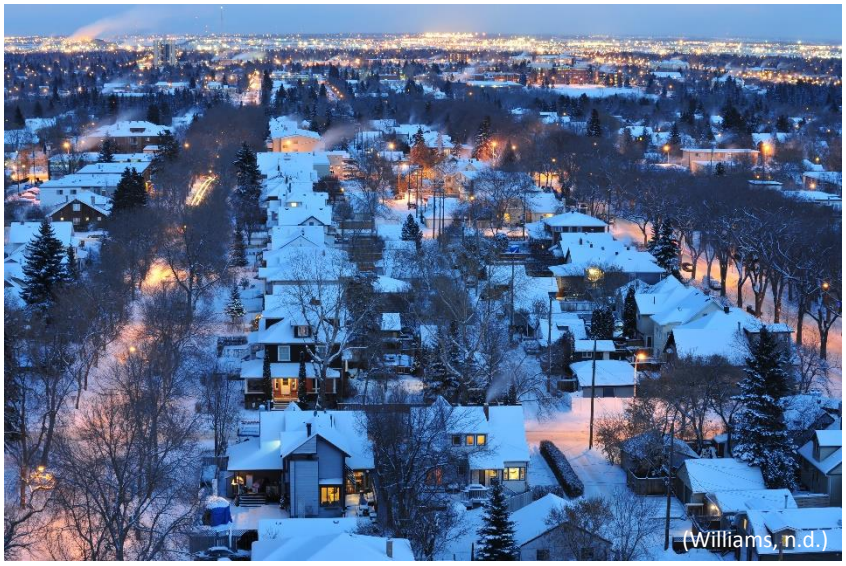
Orthophoto snapshot:

Feature type: **URBAN-RESIDENCE**

Aerial Photo:

Feature type: **URBAN-RESIDENCE**

Aerial Photo:



Feature type: RESIDENCE_CLEARING

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
RESIDENCE_CLEARING	1504	Rural (Residential/ Industrial)	Residential and Recreation	15	Areas cleared for building developments that do not yet have any buildings.

Definition:

Areas cleared for building developments that do not yet have any buildings.

Source:

ABMI, ABMI07, ABMI10, ABMI12, ABMI14, ABMI37, AVIE, BUFF10, GVI, GVIed, PLVI, PLVIed

Interpretation Elements and Rules:

SIZE:

Various sizes. Usually one polygon per one rural residence.

SHAPE:

Multi-vertices polygons, where boundaries follow property lines, fences, clearings of country-residential development.

SHADOW: no shadow

COLOR: no unique color

TEXTURE: no unique texture

ASSOCIATED RELATIONSHIP or CONTEXT:

Residence clearings are often in vicinity of existing urban residences.

Feature type: **RESIDENCE_CLEARING**

Satellite snapshot:


(Alberta Environment and Sustainable Resource Development , 2014)

Orthophoto snapshot:


(Valtus Imagery Services, n.d.)

Feature type: **RESIDENCE_CLEARING**

Terrestrial Photo:

Feature type: **RESIDENCE_CLEARING**

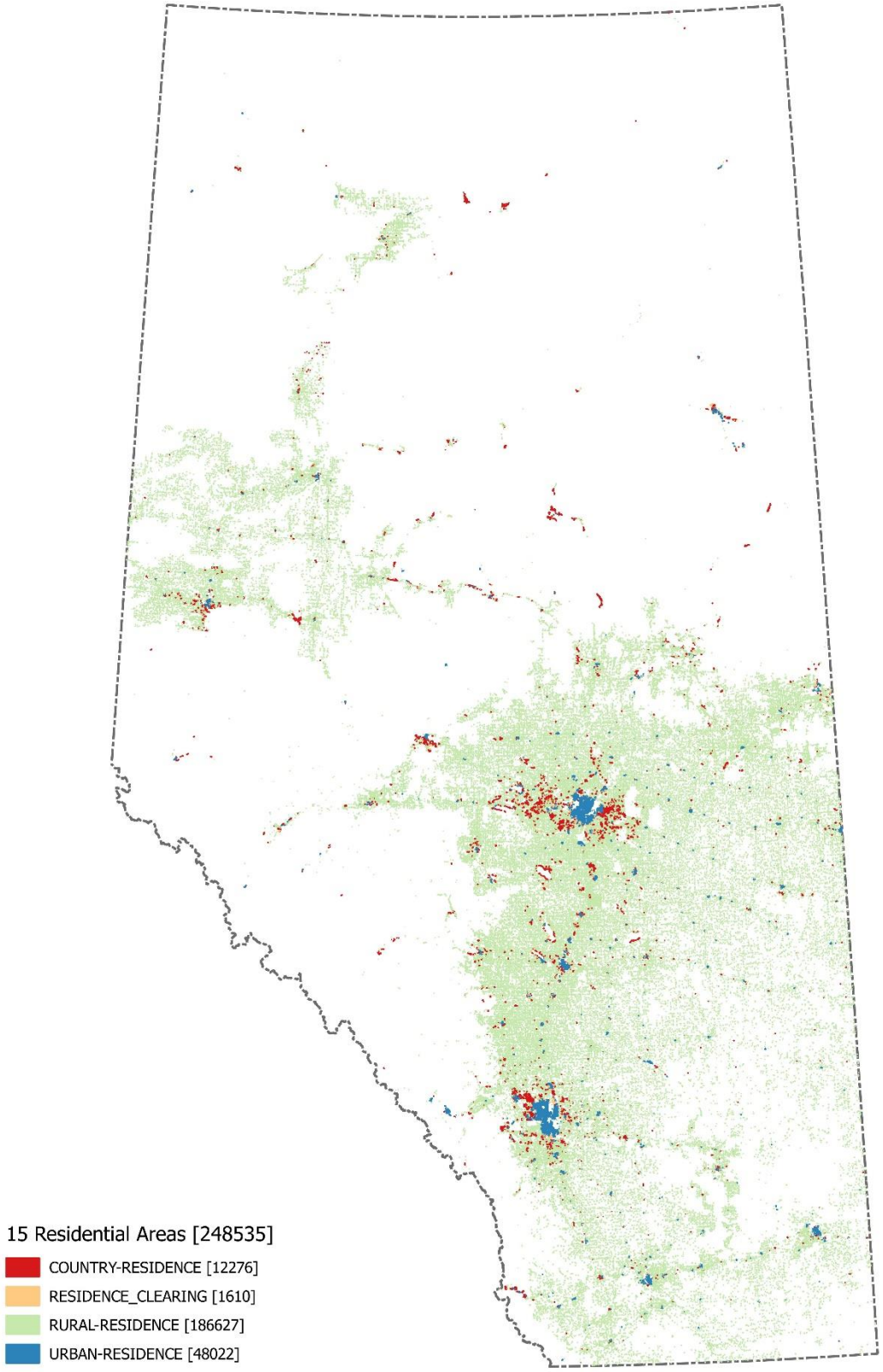
Terrestrial Photo:

Feature type: RESIDENCE_CLEARING

Similar Features, Potential Misinterpretation Sources:

Urban Industrial

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/1970 to 2014

HFI_ID – Type: Guid

16 WELL SITES ABANDONED

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
WELL-ABAND	1601	Well Site	Energy and Mining	16	Ground cleared for an oil/gas well pad where the well is currently abandoned.

Source:

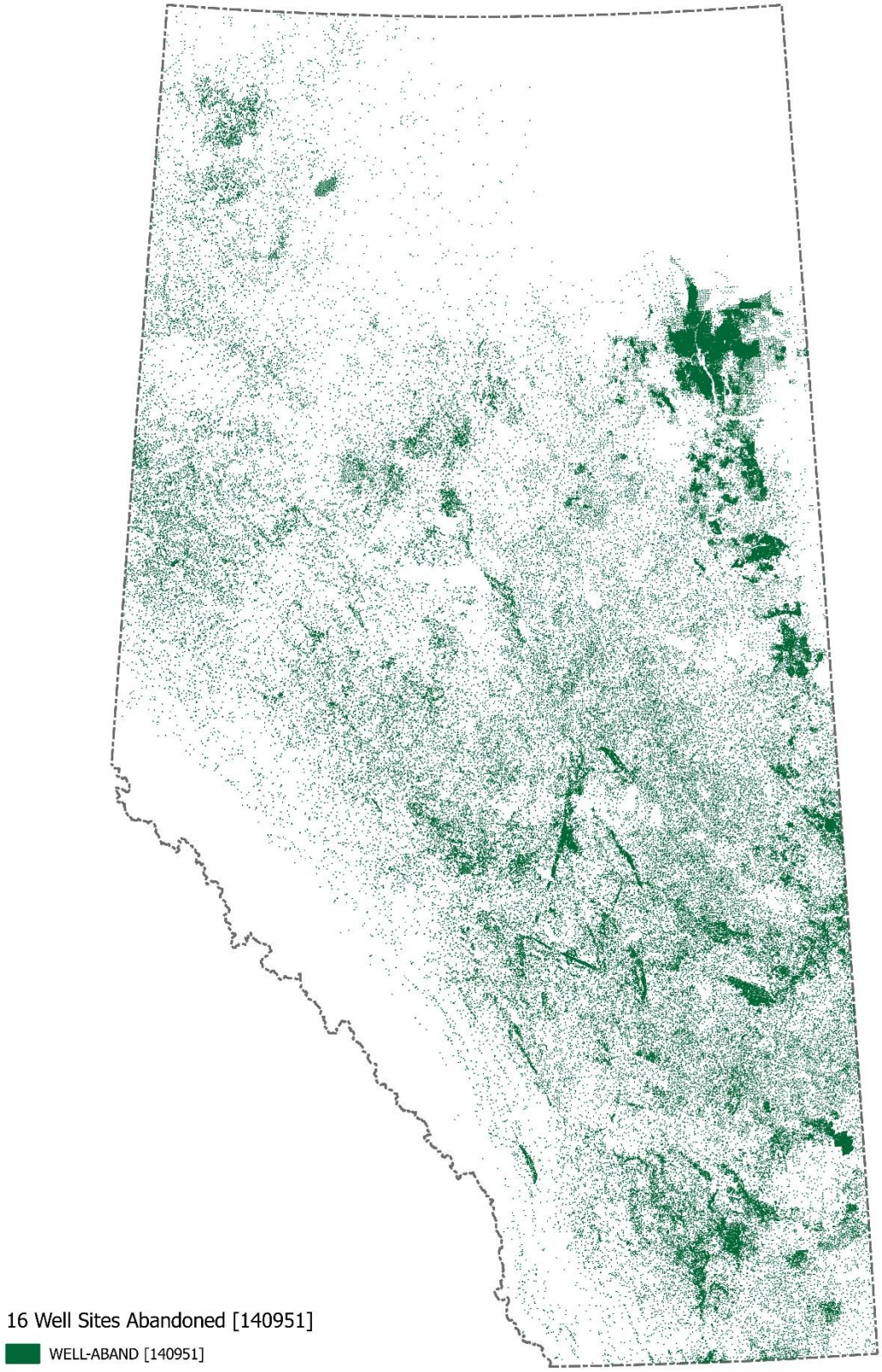
ABMI14, AHFMP,

Details of AHFMP processing steps and User Guide are included in these documents:

AHFMP - Well Pad Procedures for 2014 Footprint.pdf

AHFMP - Well Pad User Guide 2014 Footprint.pdf

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: 1883 to 2014

HFI_ID – Type: Guid

BNDRY_SOURCE– Type: String; Length: 30; Values: ABMI14/AVI/Buffer/DIDs – Application/DIDs – Conflict/DIDs – Historical/DIDs – Modified/Manually Digitized (SPOT)/RIS

RECLAMATION_STATUS_2014– Type: String; Length: 30; Values: NOT RECLAIMED/RECLAIMED

PERCENT_AGRICULTURE – Type: Short Integer

PERCENT_BROADLEAF – Type: Short Integer

PERCENT_CONIFEROUS – Type: Short Integer

PERCENT_DEVELOPED – Type: Short Integer

PERCENT_EXPOSED_LAND – Type: Short Integer

PERCENT_GRASSLAND – Type: Short Integer

PERCENT_MIXED_FOREST – Type: Short Integer

PERCENT_ROCK – Type: Short Integer

PERCENT_SHRUBLAND – Type: Short Integer

PERCENT_SNOW_ICE – Type: Short Integer

PERCENT_WATER– Type: Short Integer

17 CULTIVATION

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
CROP	1701	Cultivation (Crop/Pasture/ Bare Ground)	Agriculture	17	Agricultural areas used for cultivation.

Definition:

Cultivated cropland or cropland planted with annual crop species, including farmlands that are in cultivation rotation.

Cropland includes: **small grains** (wheat, barley, oats and mixed grains), **oilseeds** (canola, flax), **specialty crops** (peas, lentils), **row crops** (potatoes, sugar beets, corn, vegetables).

Fallow describes areas used for the production of the crops that do not exhibit visible vegetation as the result of being cultivated.

Source:

ABMI, ABMI07, ABMI10, ABMI12, ABMI14, AVI, GVIed, PLVI, PLVIed, SPAREA

Interpretation Elements and Rules:

SIZE: Variable size from smaller fields usually next to a rural residential areas up to the very large polygons covering multiple townships.

SHAPE: Often rectangular, square or multi-vertex shape with distinct round corners as a result of active cultivation by agricultural equipment and machinery.

Circular shape for irrigated crop fields.

SHADOW: no shadows

COLOR: Variable - depending on type of the cropland and imagery acquisition date.

TEXTURE: Consistent smooth, fine texture for cropland / coarser texture for fallow.

STRUCTURE: Often visible tillage lines as a result of active cultivation by agricultural equipment (field cultivator, disk and plow).

ASSOCIATED RELATIONSHIP or CONTEXT: No evidence of grazing as livestock are restricted from these fields during the growing season.

Feature type: **CROP**

Satellite snapshot:

Orthophoto snapshot:

Feature type: **CROP** (irrigated by central pivot irrigation system)

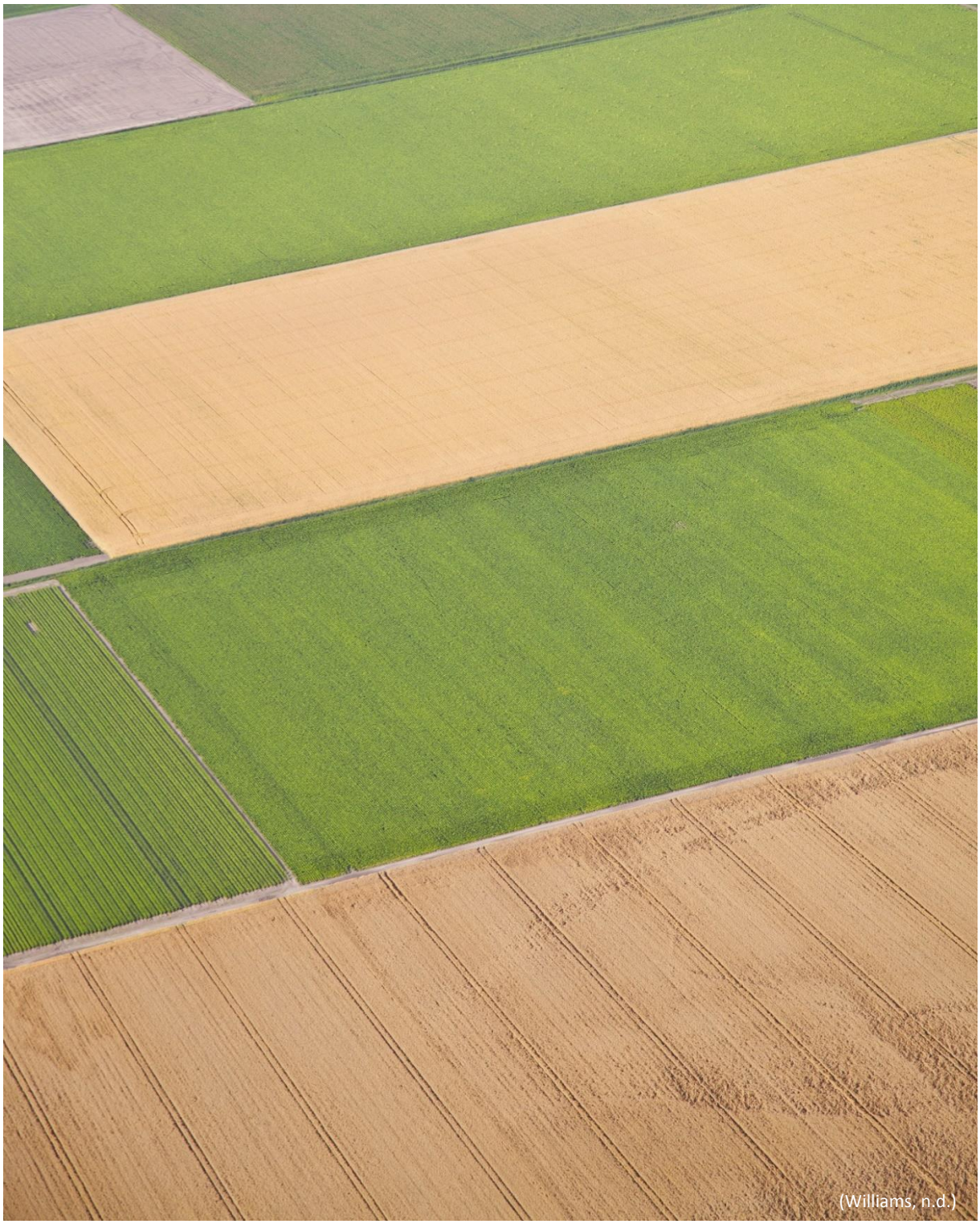
Satellite snapshot:

Feature type: **CROP** (irrigated by central pivot irrigation system)

Orthophoto snapshot:

Feature type: **CROP**

Aerial Photo:



Feature type: **CROP**

Aerial Photo:

Feature type: **CROP**

Terrestrial Photo:

Feature type: **CROP**

Terrestrial Photo:

Feature type: **CROP**

Similar Features, Potential Misinterpretation Sources:

Tame Pasture

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
TAME_PASTURE	1702	Cultivation (Crop/Pasture/ Bare Ground)	Agriculture	17	Farmlands planted with cultivated grasses or legumes.

Definition:

Lands where the soil has been disturbed and planted to perennial grass species used primarily for grazing livestock.

Tame pasture represents areas of grasses, legumes or grass-legume mixtures planted for livestock grazing or hay collection.

Source:

GVI, PLVI, AVI, ABMI

Interpretation Elements and Rules:

SIZE: Variable size from smaller fields usually next to a rural residential areas up to the very large polygons covering multiple townships.

SHAPE: Often rectangular, square or multi-vertex shape with distinct round corners as a result of active cultivation by agricultural equipment and machinery.

Circular shape for irrigated hay fields.

SHADOW: no shadows

COLOR: Variable - depending on the type of the pasture (grazing/hay) and imagery acquisition date.

TEXTURE: Coarser texture comparing to the crop.

STRUCTURE: Often visible hay collection lines or hay bales.

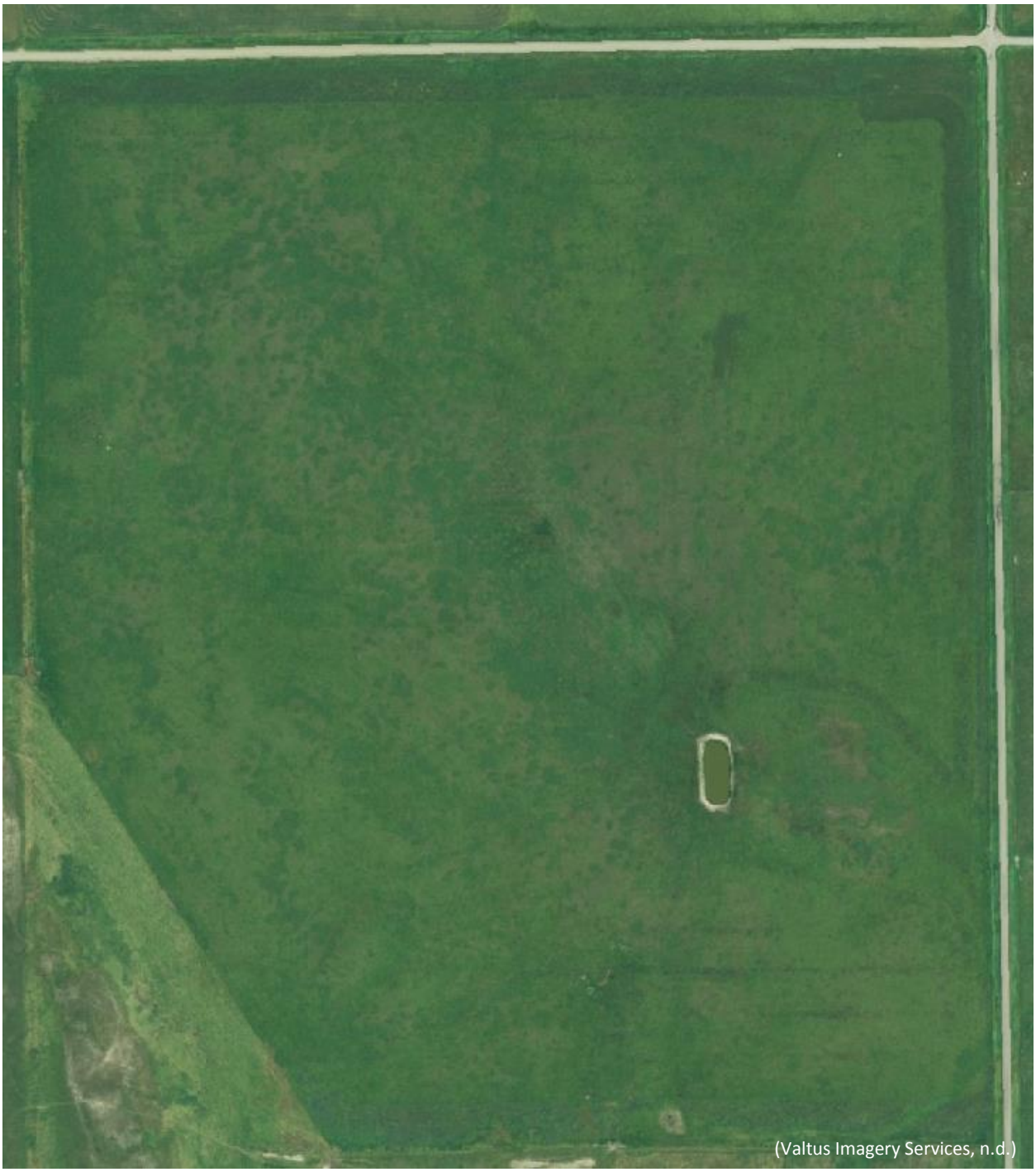
ASSOCIATED RELATIONSHIP or CONTEXT: Evidence of grazing by livestock – trails, dugouts.

Feature type: **TAME_PASTURE**

Satellite snapshot:

Feature type: **TAME_PASTURE**

Orthophoto snapshot:



Feature type: **TAME_PASTURE**

Terrestrial Photo:

Feature type: **TAME_PASTURE**

Terrestrial Photo:

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
ROUGH_PASTURE	1703	Cultivation (Crop/Pasture /Bare Ground)	Agriculture	17	Cleared land for purpose of livestock grazing.

Definition:

Lands where the forest and/or shrubs have been removed so that native or introduced grasses can flourish for the grazing of livestock.

This pastureland has not been irrigated, fertilized and the soil has not been disturbed to improve productivity.

Source:

GVI, PLVI, AVI, ABMI

Interpretation Elements and Rules:

SIZE: Variable.

SHAPE: Variable

SHADOW: no shadows

COLOR: Usually shades of green - depending on imagery acquisition date.

TEXTURE: Coarser texture for new clearings, smoother for old ones.

STRUCTURE: There might be remains of cleared wood/shrub lands on new clearings– wood piles, timber.

ASSOCIATED RELATIONSHIP or CONTEXT: Usually still surrounded by forest or wooded/shrubby remains. Quite often nearby existing farmland and crop/tame pasture fields.

Rough pasture is present in these natural regions of Alberta (Parkland, Foothills, Boreal Forest).

Feature type: **ROUGH_PASTURE**

Satellite snapshot:

Orthophoto snapshot:

Feature type: **ROUGH_PASTURE**

Terrestrial Photo:

Feature type: **ROUGH_PASTURE**

Terrestrial Photo:

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
CULTIVATION _ABANDONED	1704	Cultivation (Crop/Pasture /Bare Ground)	Agriculture	17	Agricultural land that has been formally seeded and tilled, but no evidence of present day production use. Landscape appears to have a heterogeneous mix of vegetation and closely resembles natural cover.

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
FRUIT-VEGETABLES	1705	Cultivation (Crop/Pasture /Bare Ground)	Agriculture	17	AAFC 2014 Crop Types: Vegetables, Tomatoes, Potatoes, Sugar beets, Other Vegetables, Fruits, Berries, Blueberry, Cranberry, Other Berry, Orchards, Other Fruits, Herbs.

Details of AHFMP processing steps and User Guide are included in these documents:

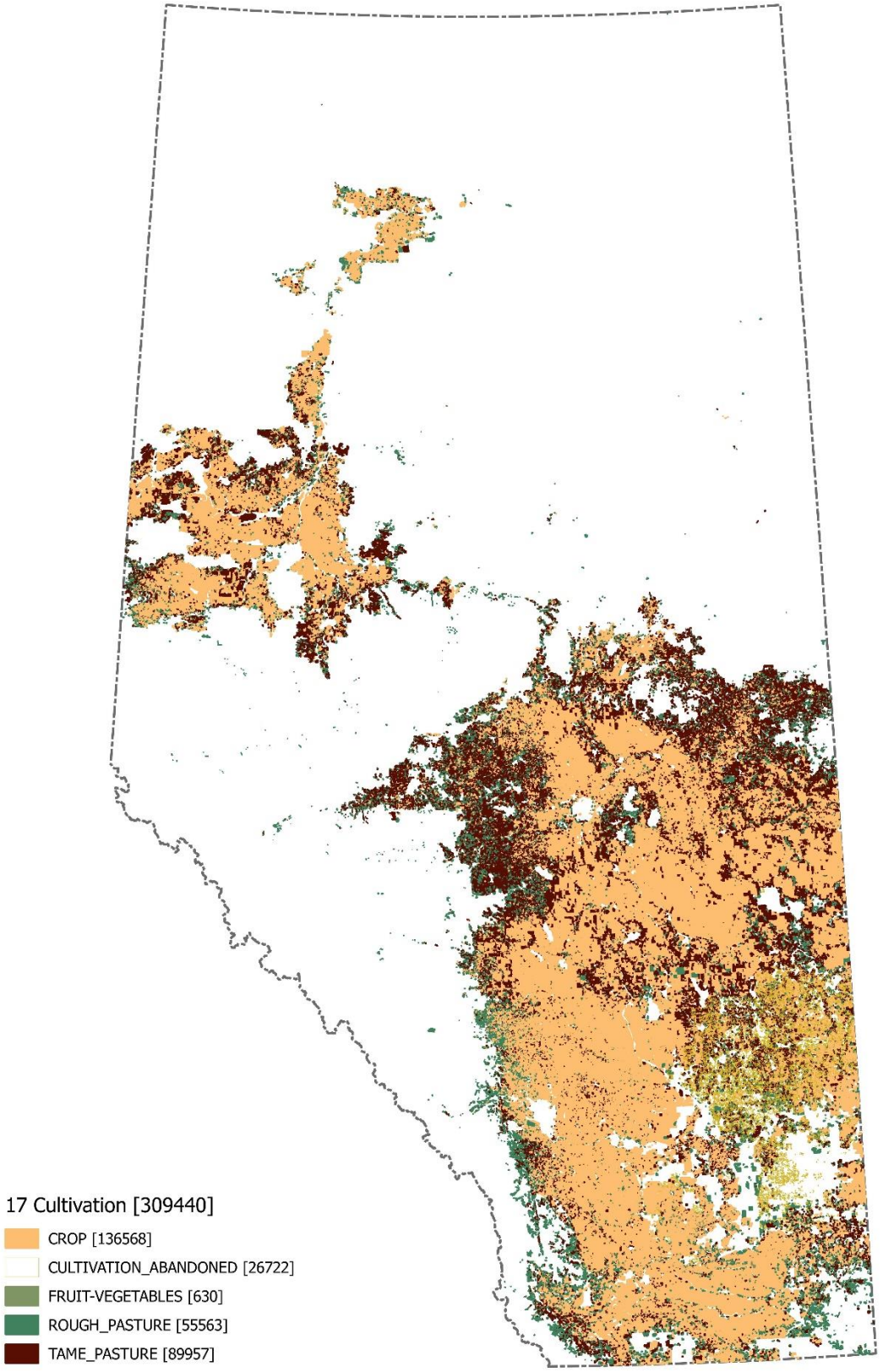
AHFMP_Cultivation_User_Guide_Footprint_HFI_2014FTv2.pdf

AHFMP_Cultivation_User_Guide_HFI_2014.pdf

Details about AAFC 2014 processes are available in document:

ISO 19131_AAFC_Annual_Crop_Inventory_Data_Product_Specifications.pdf

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

- Feature Type based on AAFC 2014 classification (HFI2014_FTv2 version)

FEATURE_TY_v1 – Type: String; Length: 30

- Feature Type based on data source classification (HFI_2014 version)

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: 1936 to 2014

HFI_ID – Type: Guid

FEATURE_TY_1 – Type: String; Length: 50;

Values: 'AGRICULTURE-OTHER' 'CROP' 'CROP-WETLAND' 'FRUIT-VEGETABLES' 'HYDRO' 'NATIVE-NATURAL' 'Residential-Industrial' 'TAME-PASTURE' 'WETLAND'

- Feature type based on "AAFC2014=>ABMI_HFI2014" cross reference table (Table 5.)

FEATURE_TY_1_percent – Type: Long Integer;

- Percentage of FEATURE_TY_1 crop type within entire polygon

FEATURE_TY_2 – Type: String; Length: 50;

Values: 'CROP' 'CROP-WETLAND' 'FRUIT-VEGETABLES' 'HYDRO' 'NATIVE-NATURAL' 'Residential-Industrial' 'TAME-PASTURE' 'WETLAND'

- Feature type based on "AAFC2014=>ABMI_HFI2014" cross reference table (Table 5.)

FEATURE_TY_2_percent – Type: Long Integer;

- Percentage of FEATURE_TY_2 crop type within entire polygon

FEATURE_TY_3 – Type: String; Length: 50;

Values: 'HYDRO' 'NATIVE-NATURAL' 'Residential-Industrial' 'TAME-PASTURE' 'WETLAND'

- Feature type based on "AAFC2014=>ABMI_HFI2014" cross reference table (Table 5.)

FEATURE_TY_3_percent – Type: Long Integer;

- Percentage of FEATURE_TY_3 crop type within entire polygon

FEATURE_TY_4 – Type: String; Length: 50;

Values: 'NATIVE-NATURAL' 'Residential-Industrial' 'TAME-PASTURE' 'WETLAND'

- Feature type based on "AAFC2014=>ABMI_HFI2014" cross reference table (Table 5.)

FEATURE_TY_4_percent – Type: Long Integer;

- Percentage of FEATURE_TY_4 crop type within entire polygon

FEATURE_TY_5 – Type: String; Length: 50;

Values: 'Residential-Industrial' 'TAME-PASTURE' 'WETLAND'

- Feature type based on “AAFC2014=>ABMI_HFI2014” cross reference table (Table 5.)

FEATURE_TY_5_percent – Type: Long Integer;

- Percentage of FEATURE_TY_5 crop type within entire polygon

Table 5. “AAFC2014=>ABMI_HFI2014” cross reference table.

AAFC		ABMI [proposed]
Code	**Label**	**Feature_Ty**
10	Cloud	NA
20	Water	HYDRO
30	Exposed Land and Barren	NATIVE-NATURAL
34	Urban and Developed	Residential-Industrial
35	Greenhouses	NA
50	Shrubland	NATIVE-NATURAL
80	Wetland	WETLAND
110	Grassland	NATIVE-NATURAL
120	Agriculture	CROP
122	Pasture and Forages	TAME-PASTURE
130	Too Wet to be Seeded	CROP-WETLAND
131	Fallow	CROP
132	Cereals	CROP
133	Barley	CROP
134	Other Grains	CROP
135	Millet	CROP
136	Oats	CROP
137	Rye	CROP
138	Spelt	CROP
139	Triticale	CROP
140	Wheat	CROP
141	Switchgrass	TAME-PASTURE
145	Winter Wheat	CROP
146	Spring Wheat	CROP
147	Corn	CROP
148	Tobacco	CROP
149	Ginseng	AGRICULTURE-OTHER
150	Oilseeds	CROP
151	Borage	CROP
152	Camelina	CROP
153	Canola and Rapeseed	CROP
154	Flaxseed	CROP
155	Mustard	CROP
156	Safflower	CROP
157	Sunflower	CROP
158	Soybeans	CROP
160	Pulses	CROP

AAFC		ABMI [proposed]
Code	**Label**	**Feature_Ty**
162	Peas	CROP
167	Beans	CROP
174	Lentils	CROP
175	Vegetables	FRUIT-VEGETABLES
176	Tomatoes	FRUIT-VEGETABLES
177	Potatoes	FRUIT-VEGETABLES
178	Sugarbeets	FRUIT-VEGETABLES
179	Other Vegetables	FRUIT-VEGETABLES
180	Fruits	FRUIT-VEGETABLES
181	Berries	FRUIT-VEGETABLES
182	Blueberry	FRUIT-VEGETABLES
183	Cranberry	FRUIT-VEGETABLES
185	Other Berry	FRUIT-VEGETABLES
188	Orchards	FRUIT-VEGETABLES
189	Other Fruits	FRUIT-VEGETABLES
190	Vineyards	AGRICULTURE-OTHER
191	Hops	AGRICULTURE-OTHER
192	Sod	AGRICULTURE-OTHER
193	Herbs	FRUIT-VEGETABLES
194	Nursery	AGRICULTURE-OTHER
195	Buckwheat	CROP
196	Canaryseed	CROP
197	Hemp	CROP
198	Vetch	TAME-PASTURE
199	Other Crops	AGRICULTURE-OTHER
200	Forest	NATIVE-NATURAL
210	Coniferous	NATIVE-NATURAL
220	Broadleaf	NATIVE-NATURAL
230	Mixedwood	NATIVE-NATURAL

18 HARVESTED AREAS

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
CUTBLOCK	1801	Cut Blocks	Forestry	18	Areas where forestry operations have occurred (clearcut, selective harvest, salvage logging, etc.)

Definition:

Areas where forestry operations have occurred (clearcut, selective harvest, salvage logging, etc.)

Source:

AVI, ABMI, ABMI14

Interpretation Elements and Rules:

SIZE: Variable.

SHAPE: Variable

SHADOW: no shadows

COLOR: Usually shades of green - depending on imagery acquisition date.

TEXTURE: Coarser texture for new clearings, smoother for old ones.

STRUCTURE: There might be remains of cleared wood/shrub lands on new clearings– wood piles, timber.

ASSOCIATED RELATIONSHIP or CONTEXT: Usually still surrounded by forest or wooded/shrubby remains.

Feature type: **CUTBLOCK**

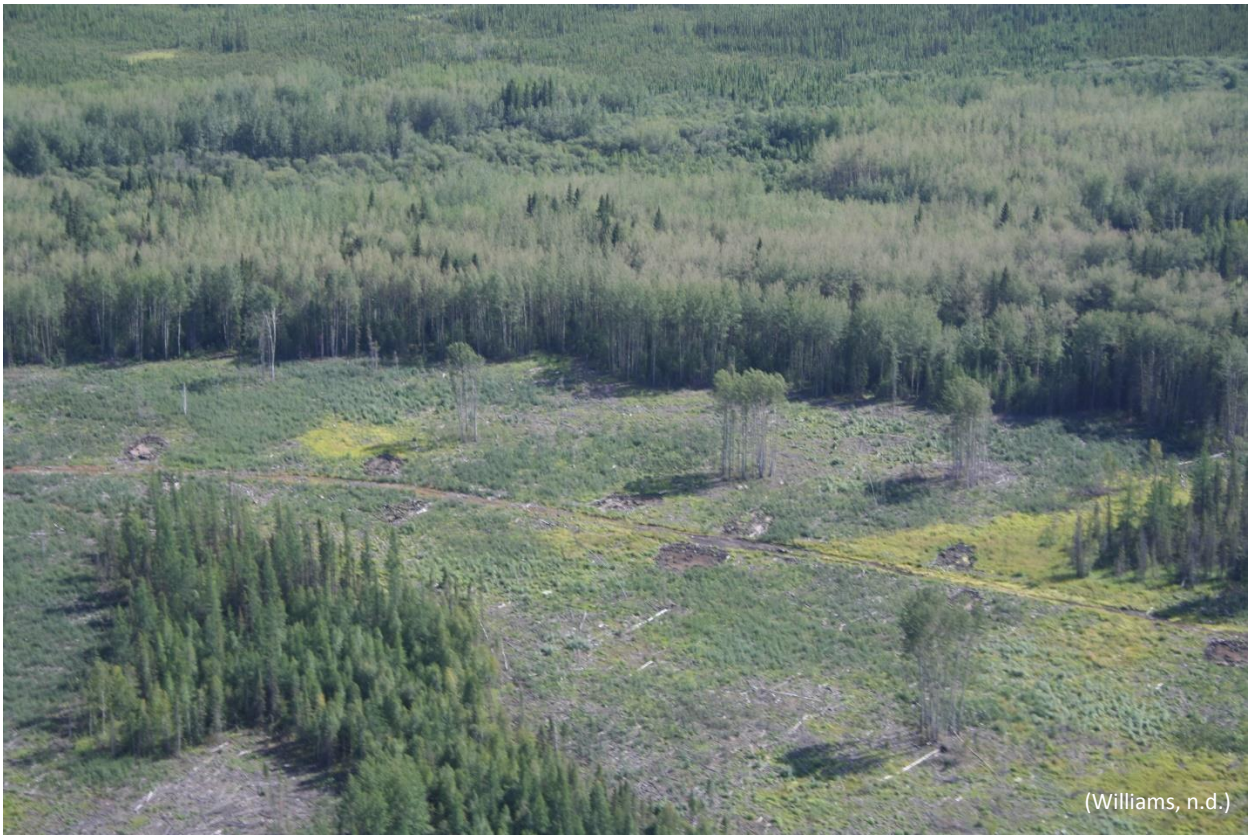
Satellite snapshot:

Feature type: **CUTBLOCK**

Aerial Photo:

Feature type: **CUTBLOCK**

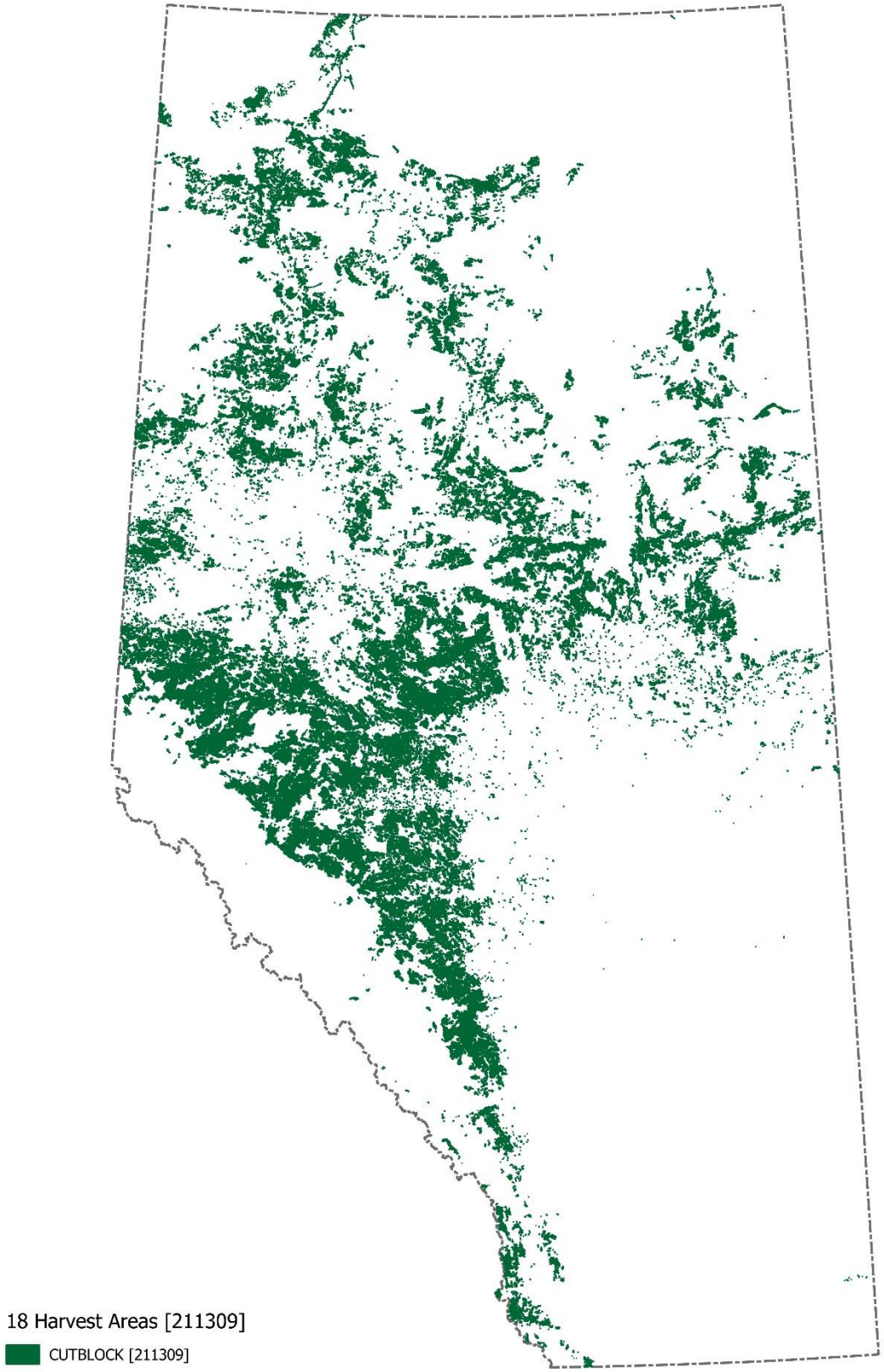
Aerial Photo:



Feature type: **CUTBLOCK**

Terrestrial Photo:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: 1920 to 2014

HFI_ID – Type: Guid

19 PIPELINES

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
PIPELINE	1901	Pipeline	Energy and Mining	19	A line of underground and over ground pipes, of substantial length and capacity, used for the conveyance of petrochemicals.
RIS-PIPELINE	1902	Pipeline	Energy and Mining	19	Includes areas disturbed for pipelines and the right of way area designated for pipeline.

Note: "RIS" features were imported from Reclamation Information System (GoA) based on Cross-reference table (Table 2.)

Definition:

A line of underground and over ground pipes, of substantial length and capacity, used for the conveyance of petrochemicals. Construction creates linear disturbance features >10 m wide.

Source:

ABMI, ABMI14, BASEFE, RIS

Interpretation Elements and Rules:

SIZE: Variable.

SHAPE: Variable

SHADOW: no shadows

COLOR: shades of green or brown/grey depending on vegetation cover of the corridor

TEXTURE: usually finer texture as a result even vegetation on the corridor

ASSOCIATED RELATIONSHIP or CONTEXT:

Corridor connects energy users with energy providers.

Feature type: **PIPELINES**

Satellite snapshot:

Feature type: **PIPELINES**

Orthophoto Snapshots:

Feature type: **PIPELINES**

Terrestrial Photo:

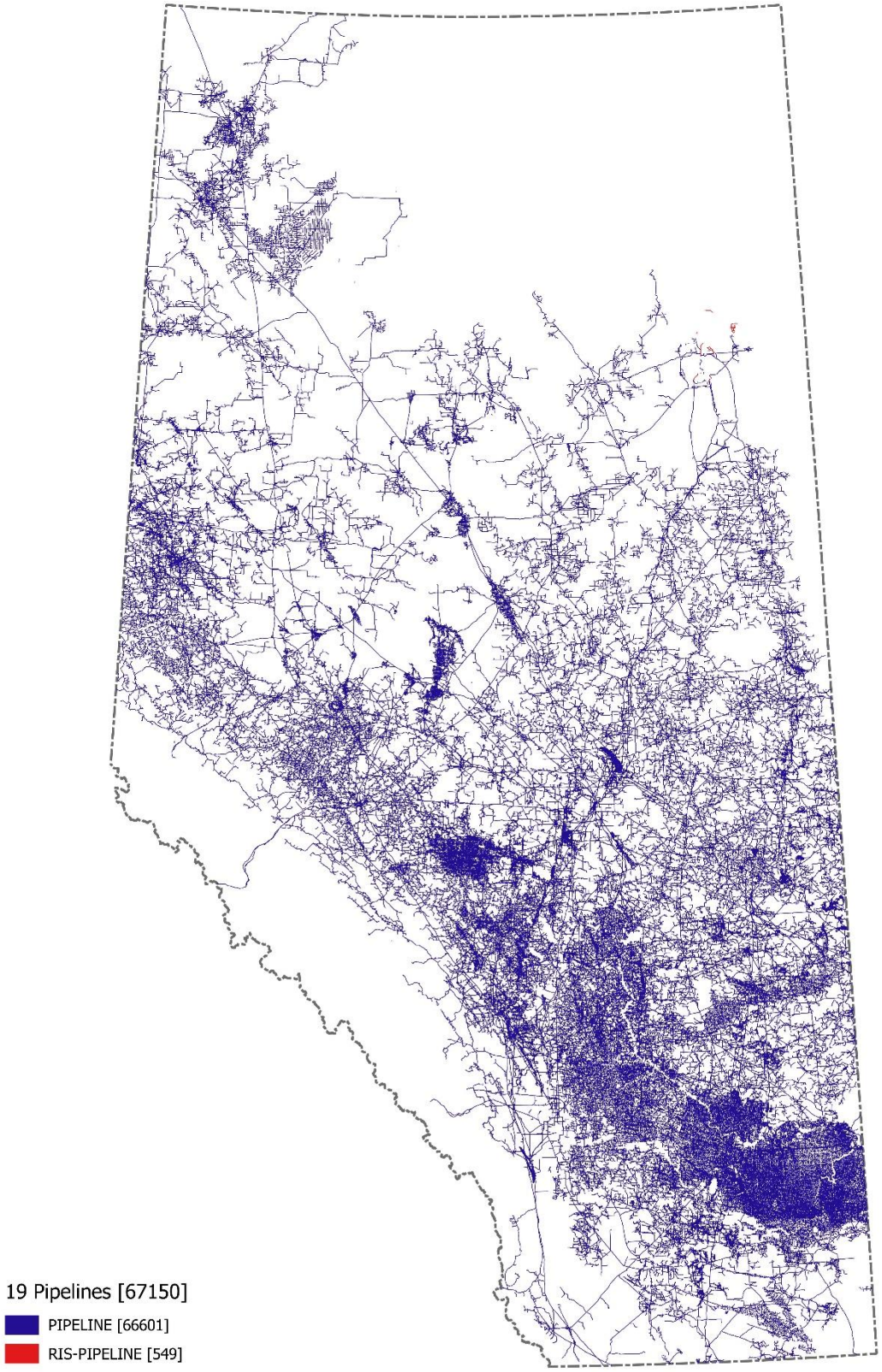
Feature type: **PIPELINES**

Terrestrial Photo:

Feature type: **PIPELINES**

Terrestrial Photo:

Spatial Distribution [Number of features]:



Attributes:

FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/2014

HFI_ID – Type: Guid

20 SEISMIC LINES

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
LOW-IMPACT-SEISMIC	2001	Seismic line	Energy and Mining	20	A polygon feature class derived from a 1.5-meter buffer (3 meter total width) of a pre-low-impact-seismic centerline.
PRE-LOW-IMPACT-SEISMIC	2002	Seismic line	Energy and Mining	20	A polygon feature class derived from a 3-meter buffer (6 meter total width) of a pre-low-impact-seismic centerline.
TRAIL	2003	Seismic line	Energy and Mining	20	A polygon feature class derived from a 2-meter buffer (4 meter total width) of a pre-low-impact-seismic centerline.

Source:

ABMI, AHFMP

Details of AHFMP processing steps and User Guide are included in these documents:

AHFMP - Seismic User Guide 2014 Footprint Ver3.docx

Feature type: **PRE-LOW-IMPACT-SEISMIC**

Aerial Photo:

Feature type: **PRE-LOW-IMPACT-SEISMIC**

Aerial Photo:

Feature type: **PRE-LOW-IMPACT-SEISMIC**

Terrestrial Photo:

Attributes:

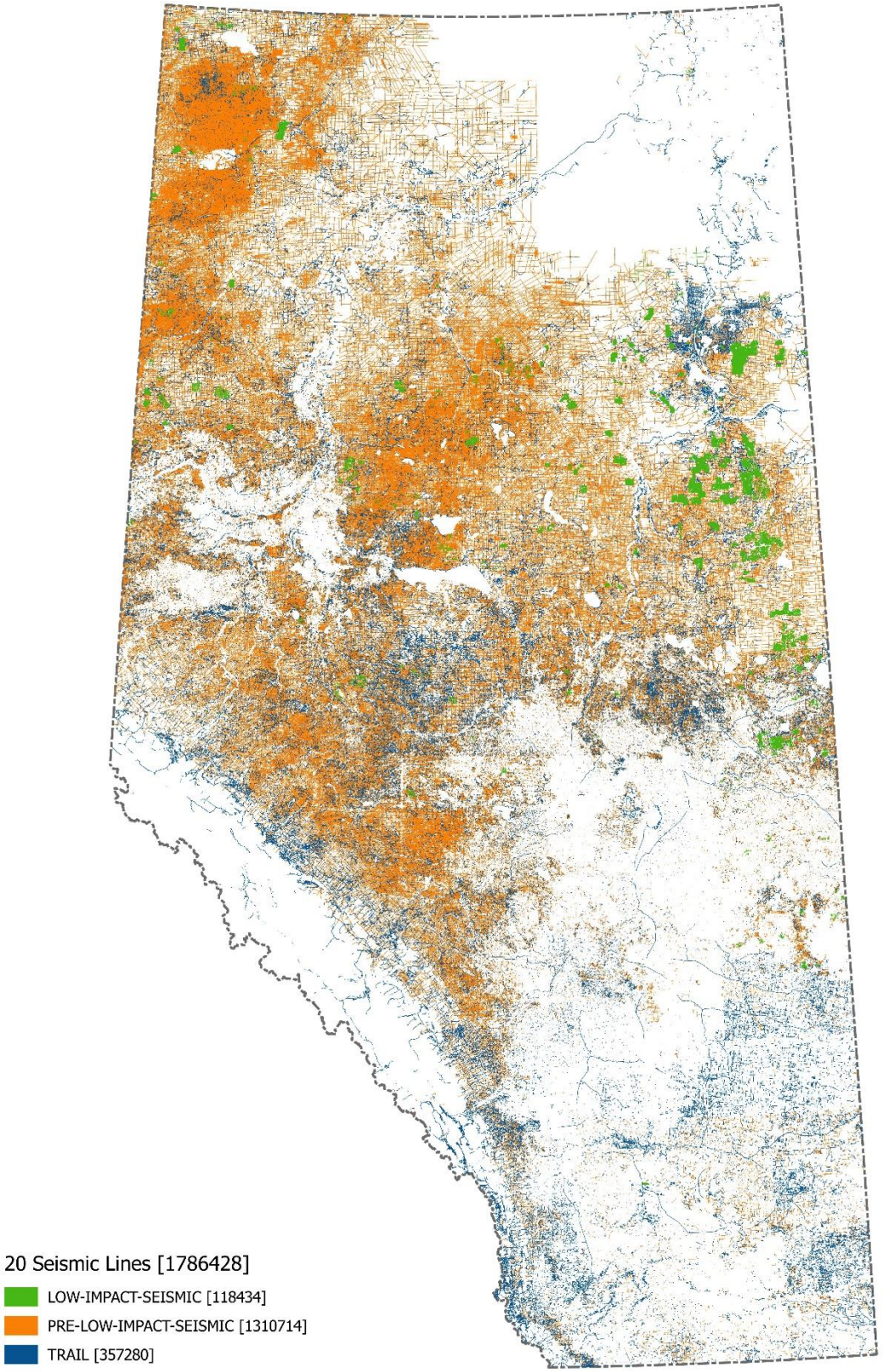
FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL to 2014

HFI_ID – Type: Guid

Spatial Distribution [Number of features]:



21 DISTURBED VEGETATION

Feature types:

FEATURE_TY	Code	Public Code	Category	Order	Feature Description
DISTURB_VEG	2101	Other Disturbed Vegetation	Residential and Recreation	21	Disturbed vegetation that does not fit any other category of human footprint.

Source:

ABMI, ABMI14

Attributes:

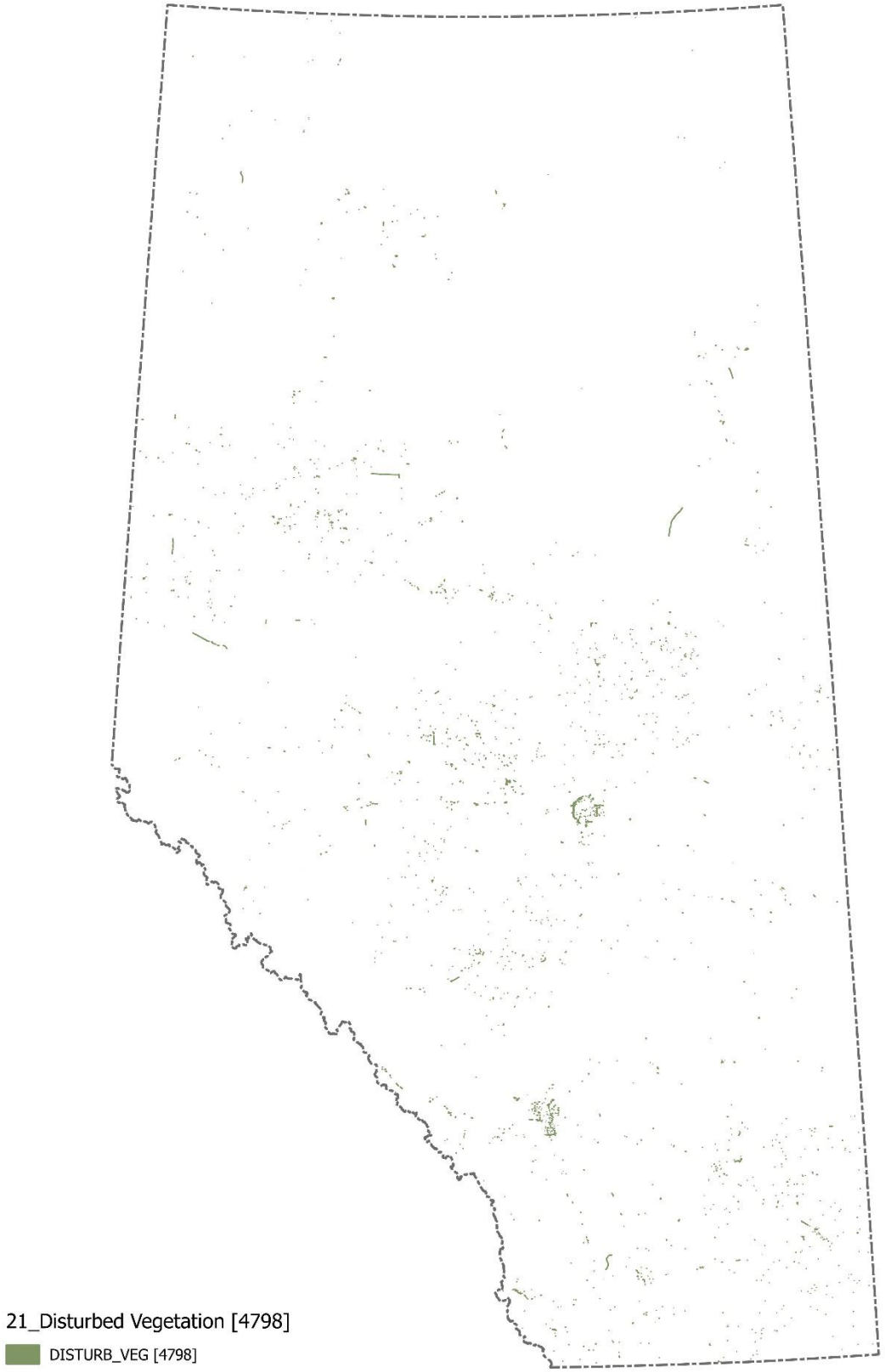
FEATURE_TY – Type: String; Length: 30

SOURCE – Type: String; Length: 6

YEAR – Type: Short Integer; Range: NULL/ 1950 to 2014

HFI_ID – Type: Guid

Spatial Distribution [Number of features]:



Appendix

Attribute List

		FEATURE_TY	SOURCE	YEAR	HFI_ID	BNDRY_SOURCE	RECLAMATION_STATUS_2014	PERCENT_LANDCOVER*	NAME	AREA_TYPE	STATUS_2014
21	Disturbed Vegetation										
20	Seismic Lines										
19	Pipelines										
18	Harvest Areas			✓							
17	Cultivation										
16	Well Sites Abandoned			✓							
15	Residential Areas										
14	CFO										
13	Transmission Lines										
12	Wind_Gen_Facilities			✓							
11	Other Vegetated Surfaces and Recreation										
10	Landfill			✓							
9	Well Sites Active			✓							
8	Industrial Sites										
7	Mine Sites			✓							
6	Verge										
5	Canals										
4	Railways										
3	Roads										
2	Borrow Pits, Sumps, Dugouts, Lagoons										
1	Reservoirs			✓							

YEAR – approximate HF year of origin

PERCENT_LANDOVER – include multiple categories of land cover

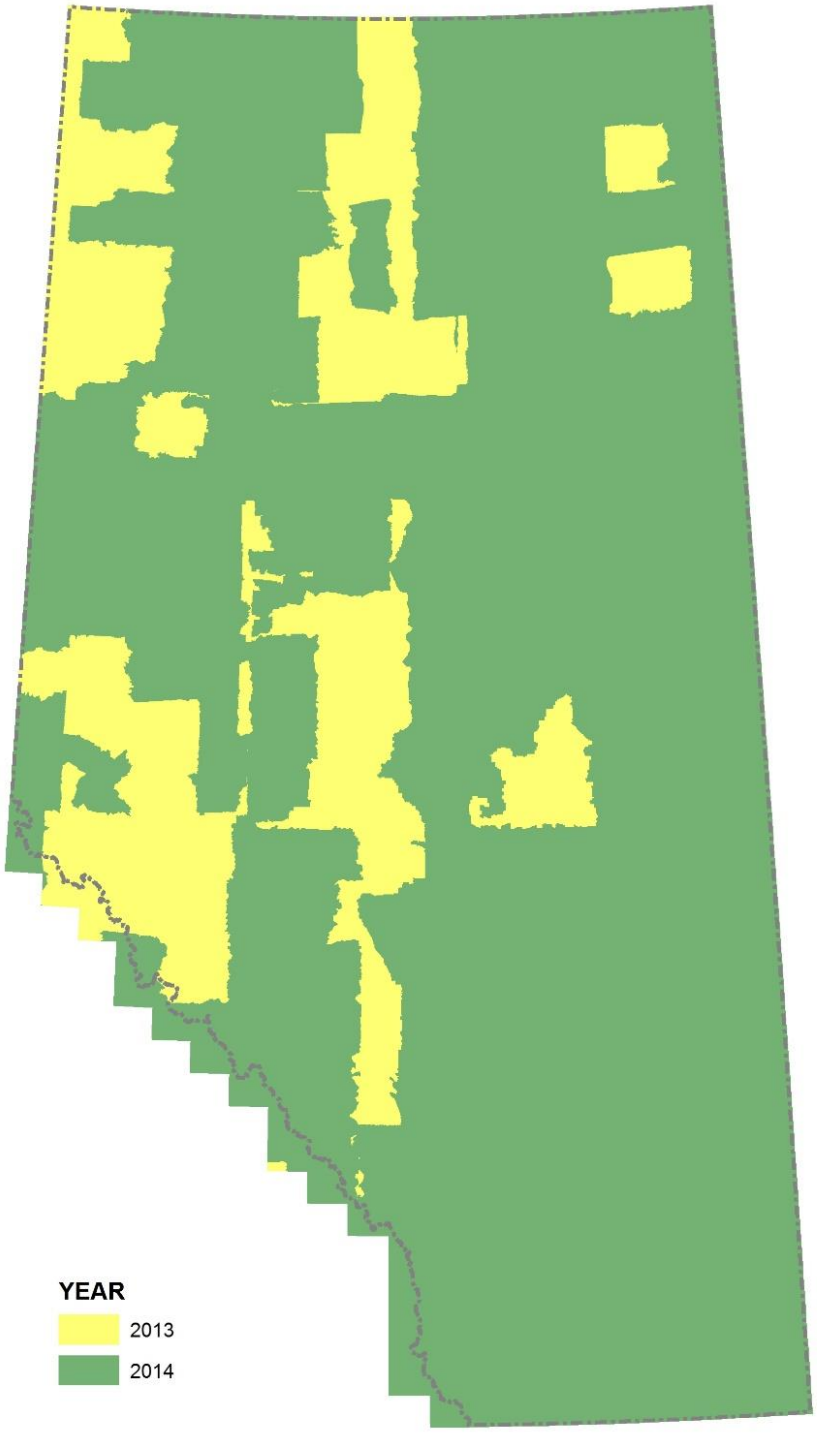


Figure 1: Spatial distribution of satellite imagery available for 2014 SPOT6 mosaic

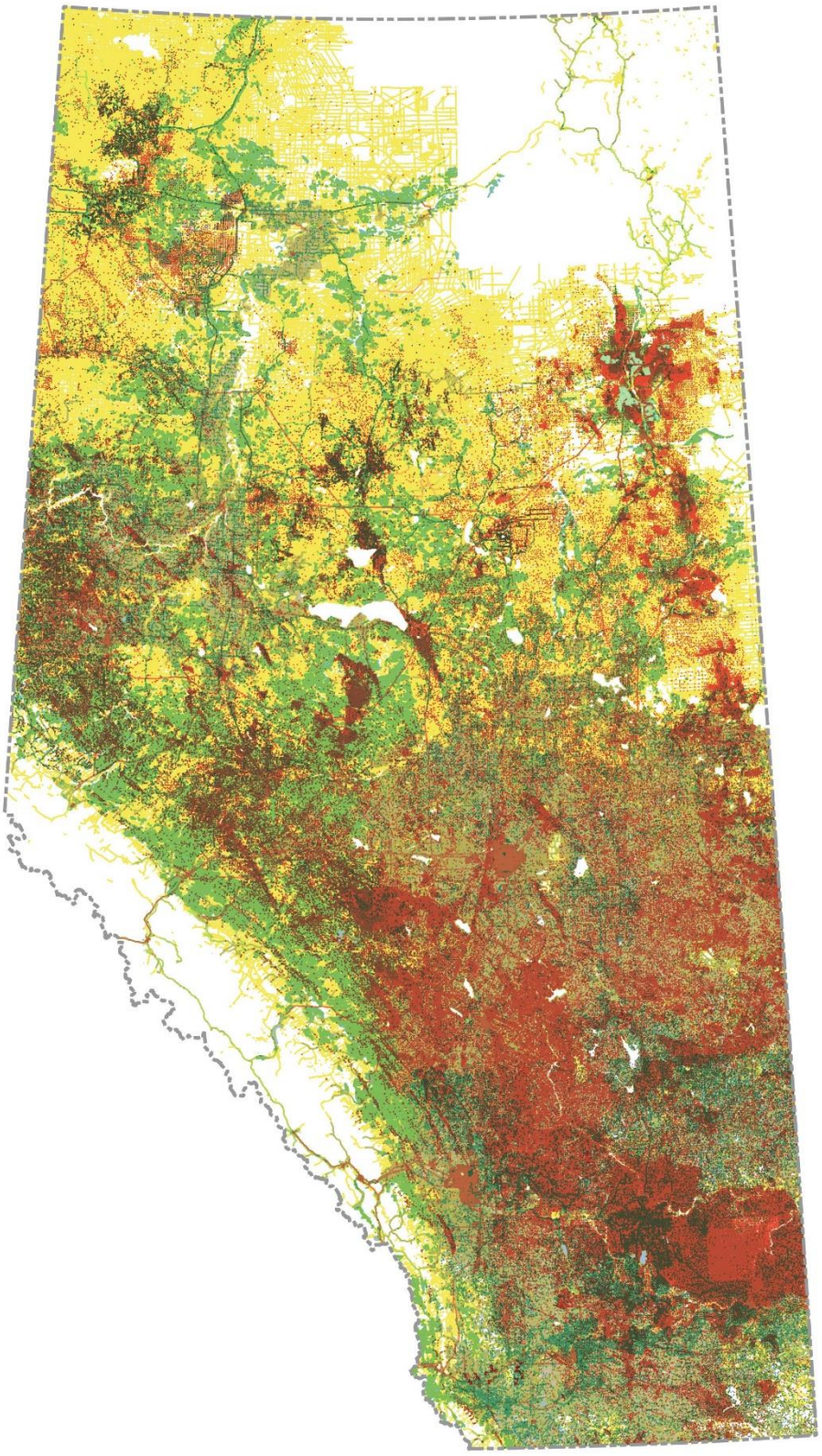


Figure 2: Spatial distribution of 2014 Human Footprint features

Data References

Title	Association Type	Location/Reference
Alberta Vegetation Inventory (AVI)	Source	
Grassland Vegetation Inventory (GVI)	Source	
Primary Land and Vegetation Inventory (PLVI)	Source	
Alberta Human Footprint Mapping Project (AHFMP)	Source	
Reclamation Information System (RIS)	Source	
Government of Alberta (SRDSPT)	Source	
Digitally Integrated Dispositions (DIDs)	Source	
Alberta Vegetation Inventory Enhanced (AVIE)	Source	
Special Areas (SPAREA)	Source	
SPOT6 Satellite Imagery 2014	Source	Alberta Environment and Sustainable Resource Development, 2014. *Informatics Branch, 1.5 m Colour SPOT 6 Mosaic.* Retrieved from http://environment.alberta.ca/
Valtus Orthophoto Mosaic	Reference	
IRS Satellite	Reference	
Base Features (BASEFE)	Source	altalis.com
Google Maps	Reference	https://maps.google.ca
Google Earth Engine-Google Time-lapse	Reference	https://earthengine.google.com/timelapse/
Alberta Recycling Management Authority	Reference	http://www.albertarecycling.ca/collection-site-search-results
City of Calgary	Source	https://data.calgary.ca/Base-Maps/Land-Use-Polygons/gbpb-ymc5/about

Alberta Environment and Sustainable Resource Development	Reference	Alberta Environment and Sustainable Resource Development, 2014. *Informatics Branch, 1.5 m Colour SPOT 6 Mosaic.* Retrieved from http://environment.alberta.ca/
Hricko	Reference	Hricko, B., n.d. *ABMI Human Footprint Image*. Unpublished photograph.
Valtus Imagery Services	Reference	Valtus Imagery Services, 2010. *Valtus Imagery*. Retrieved from http://www.valtus.com/
Valtus Imagery Services	Reference	Valtus Imagery Services, 2011. *Valtus Imagery*. Retrieved from http://www.valtus.com/
Valtus Imagery Services	Reference	Valtus Imagery Services, 2012. *Valtus Imagery*. Retrieved from http://www.valtus.com/
Valtus Imagery Services	Reference	Valtus Imagery Services, 2013. *Valtus Imagery*. Retrieved from http://www.valtus.com/
Valtus Imagery Services	Reference	Valtus Imagery Services, n.d. *Valtus Imagery*. Retrieved from http://www.valtus.com/
Venskaitis	Reference	Venskaitis, S., n.d. *Human Footprint Image*. Unpublished photograph.
Williams	Reference	Williams, E., n.d. *ABMI Human Footprint Image*. Unpublished photograph.
Quality Farm Dugouts (3rd Edition)	Reference	http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex15866
Alberta Vegetation Inventory Standards and Data Model Documents	Reference	https://www.agriculture.alberta.ca/app21/forestrypage?cat1=Vegetation%20Inventory%20Standards
Grassland Vegetation Inventory Standards	Reference	https://geodiscover.alberta.ca/geoportal/catalog/search/resource/details.page?uuid=%7BD3AB9031-8EC0-4589-9335-C1E50AE05992%7D
Primary Land and Vegetation Inventory Standards	Reference	https://geodiscover.alberta.ca/geoportal/catalog/search/resource/details.page?uuid=%7BF640CD9D-C232-481D-9CFF-7A7B66E51E49%7D
road_album_2.ppt	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)

Alberta Transportation Guide to Reclaiming Borrow Excavations – 2013 Edition	Reference	www.transportation.alberta.ca/Content/docType245/Production/borrowguide.pdf
AHFMP - Road Processing 2014 Footprint.pdf	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
AHFMP - Well Pad User Guide 2014 Footprint.pdf	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
AHFMP - Well Pad Procedures for 2014 Footprint.pdf	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
AHFMP - Well Pad User Guide 2014 Footprint.pdf	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
AHFMP_Cultivation_User_Guide_Footprint_HFI_2014FTv2.pdf	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
AHFMP_Cultivation_User_Guide_HFI_2014.pdf	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
ISO 19131_AAFC_Annual_Crop_Inventory_Data_Product_Specifications.pdf	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
AHFMP - Seismic User Guide 2014 Footprint Ver3.docx	Reference	Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP)
AAFC Annual Crop Inventory Data	Source	http://www.agr.gc.ca/atlas/data_donnees/agr/annualCropInventory/tif/

Spatial (Horizontal) Accuracy

SOURCE	Collection	Source Category	Accuracy [+-m]
External	Base features	1:20 000 Provincial Digital Mapping Program	5
		Alberta 1:50 000 Access Mapping	50
		GPS field data	25
		IRS-1C/1D imagery	25
		NTDB data	100
		Federal hydrography	100
		Orthophoto imagery	10
		Aerial photography	10
		SRD regional investigation	25
		Ikonos imagery	10
		Derived from supplementary data	25
		SPOT imagery	2.5
	Inventories	Alberta Vegetation Inventory	20
		GVI upland	5
		GVI wetland	2
		PLVI	5
	Cadastral	Cadastral urban	0.15
		Cadastral rural	3
ABMI	ABMI	Heads-up digitization SPOT "green zone"	10
		Heads-up digitization SPOT "red zone"	20
Buffer	Buffer	Calculated RMSE per feature type	

Figure 2: Accuracy of SPOT 2014 (Green and red zone). Source: Government of Alberta document, provided by Alberta Human Footprint Mapping Project (AHFMP).

Thematic Accuracy

SOURCE	Collection	Source Category	Accuracy [%]
External	Inventories	AVI - Photo Interpretation Audit	≥ 90%
		GVI	≥ 65%
		PLVI	≥ 90%

Feature Type List

BORROWPITS
BORROWPIT-WET
CAMPGROUND
CAMP-INDUSTRIAL
CANAL
CFO
CLEARING-UNKNOWN
CLEARING-WELLPAD-UNCONFIRMED
COUNTRY-RESIDENCE
CROP
CULTIVATION_ABANDONED
CUTBLOCK
DISTURB_VEG
DUGOUT
FACILITY-OTHER
FACILITY-UNKNOWN
FRUIT-VEGETABLES
GOLFCOURSE
GREENSPACE
GRVL-SAND-PIT
INTERCHANGE-RAMP
LAGOON
LANDFILL
LOW-IMPACT-SEISMIC
MILL
MINES-COAL
MINES-OILSANDS
MINES-PITLAKE
OPEN-PIT-MINE
PEAT
PIPELINE
PRE-LOW-IMPACT-SEISMIC
RECREATION
RESERVOIR
RESIDENCE_CLEARING
RIS-AIRP-RUNWAY
RIS-BORROWPITS
RIS-CAMP-INDUSTRIAL
RIS-CLEARING-UNKNOWN
RIS-DRAINAGE
RIS-FACILITY-OPERATIONS
RIS-FACILITY-UNKNOWN
RIS-MINES-OILSANDS
RIS-OILSANDS-RMS
RIS-OVERBURDEN-DUMP
RIS-PIPELINE
RIS-PLANT
RIS-RECLAIMED-CERTIFIED
RIS-RECLAIMED-PERMANENT
RIS-RECLAIMED-TEMP
RIS-RECLAIM-READY
RIS-ROAD
RIS-SOIL-REPLACED
RIS-SOIL-SALVAGED
RIS-TRANSMISSION-LINE
RIS-UTILITIES
RIS-WASTE
RIS-WELL
RIS-WINDROW
RLWY-ABANDONED
RLWY-DBL-TRACK
RLWY-MLT-TRACK
RLWY-SGL-TRACK
RLWY-SPUR
ROAD-GRAVEL-1L
ROAD-GRAVEL-2L
ROAD-PAVED-1L
ROAD-PAVED-2L
ROAD-PAVED-3L
ROAD-PAVED-4L
ROAD-PAVED-5L
ROAD-PAVED-6L
ROAD-PAVED-7L
ROAD-PAVED-DIV
ROAD-PAVED-UNDIV-1L
ROAD-PAVED-UNDIV-2L
ROAD-PAVED-UNDIV-4L
ROAD-UNCLASSIFIED
ROAD-UNIMPROVED
ROAD-UNPAVED-1L
ROAD-UNPAVED-2L
ROAD-WINTER-ACCESS
ROUGH_PASTURE
RUNWAY
RURAL-RESIDENCE
SUMP
SURROUNDING-VEG
TAILING-PILE
TAILING-POND
TAME_PASTURE
TRAIL
TRAIL-ATV
TRANSFER_STATION
TRANSMISSION-LINE
TRUCK-TRAIL
URBAN-INDUSTRIAL
URBAN-RESIDENCE
VEGETATED-EDGE-RAILWAYS
VEGETATED-EDGE-ROADS
WELL-ABAND
WELL-BIT
WELL-CASED
WELL-CLEARED-DRILLED
WELL-CLEARED-NOT-DRILLED
WELL-DRILLED-OTHER
WELL-GAS
WELL-OIL
WELL-OTHER
WINDMILLS

Cross-reference table to Public Codes

FEATURE_TY HFI 2014	PUBLIC CODE
AIRP-RUNWAY	Airport Runway – Hard Surface
BORROWPIT-DRY	Borrow-Pits/Dugouts/Sumps
BORROWPITS	Borrow-Pits/Dugouts/Sumps
BORROWPIT-WET	Borrow-Pits/Dugouts/Sumps
CAMPGROUND	Other Disturbed Vegetation
CAMP-INDUSTRIAL	Industrial Site Rural
CANAL	Canals
CFO	High Density Livestock Operation
CLEARING-UNKNOWN	Industrial Site Rural
CLEARING-WELLPAD-UNCONFIRMED	Industrial Site Rural
COUNTRY-RESIDENCE	Rural (Residential/Industrial)
CROP	Cultivation (Crop/Pasture/Bare Ground)
CULTIVATION_ABANDONED	Cultivation (Crop/Pasture/Bare Ground)
CUTBLOCK	Cut Blocks
DISTURB_VEG	Other Disturbed Vegetation
DUGOUT	Borrow-Pits/Dugouts/Sumps
FACILITY-OTHER	Industrial Site Rural
FACILITY-UNKNOWN	Industrial Site Rural
GOLFCOURSE	Other Disturbed Vegetation
GREENSPACE	Other Disturbed Vegetation
GRVL-SAND-PIT	Mine Site
INTERCHANGE-RAMP	Road – Hard Surface
LAGOON	Municipal (Water and Sewage)
LANDFILL	Industrial Site Rural
LOW-IMPACT-SEISMIC	Seismic line
MILL	Industrial Site Rural
MINES-COAL	Mine Site
MINES-OILSANDS	Mine Site
MINES-PITLAKE	Mine Site
MISC-OIL-GAS-FACILITY	Industrial Site Rural
OIL-GAS-PLANT	Industrial Site Rural
OPEN-PIT-MINE	Mine Site

FEATURE_TY HFI 2014	PUBLIC CODE
PIPELINE	Pipeline
PRE-LOW-IMPACT-SEISMIC	Seismic line
RECREATION	Other Disturbed Vegetation
RESERVOIR	Reservoirs
RESIDENCE_CLEARING	Urban
RIS-AIRP-RUNWAY	Airport Runway – Hard Surface
RIS-BORROWPITS	Borrow-Pits/Dugouts/Sumps
RIS-CAMP-INDUSTRIAL	Industrial Site Rural
RIS-CLEARING-UNKNOWN	Industrial Site Rural
RIS-DRAINAGE	Mine Site
RIS-FACILITY-OPERATIONS	Industrial Site Rural
RIS-FACILITY-UNKNOWN	Industrial Site Rural
RIS-MINES-OILSANDS	Mine Site
RIS-OILSANDS-RMS	Mine Site
RIS-OVERBURDEN-DUMP	Mine Site
RIS-PIPELINE	Pipeline
RIS-PLANT	Industrial Site Rural
RIS-RECLAIMED-CERTIFIED	Mine Site
RIS-RECLAIMED-PERMANENT	Mine Site
RIS-RECLAIMED-TEMP	Mine Site
RIS-RECLAIM-READY	Mine Site
RIS-RESERVOIR	Reservoirs
RIS-ROAD	Road – Hard Surface
RIS-SOIL-REPLACED	Mine Site
RIS-SOIL-SALVAGED	Mine Site
RIS-TAILING-POND	Mine Site
RIS-TANK-FARM	Industrial Site Rural
RIS-TRANSMISSION-LINE	Transmission Line
RIS-UTILITIES	Industrial Site Rural
RIS-WASTE	Mine Site
RIS-WELL	Well Site
RIS-WINDROW	Mine Site
RLWY-ABANDONED	Rail – Hard Surface

FEATURE_TY HFI 2014	PUBLIC CODE
RLWY-MLT-TRACK	Rail – Hard Surface
RLWY-SGL-TRACK	Rail – Hard Surface
RLWY-SPUR	Rail – Hard Surface
ROAD-GRAVEL-1L	Road – Hard Surface
ROAD-GRAVEL-2L	Road – Hard Surface
ROAD-PAVED-1L	Road – Hard Surface
ROAD-PAVED-2L	Road – Hard Surface
ROAD-PAVED-3L	Road – Hard Surface
ROAD-PAVED-4L	Road – Hard Surface
ROAD-PAVED-5L	Road – Hard Surface
ROAD-PAVED-6L	Road – Hard Surface
ROAD-PAVED-7L	Road – Hard Surface
ROAD-PAVED-DIV	Road – Hard Surface
ROAD-PAVED-UNDIV-1L	Road – Hard Surface
ROAD-PAVED-UNDIV-2L	Road – Hard Surface
ROAD-PAVED-UNDIV-4L	Road – Hard Surface
ROAD-UNCLASSIFIED	Road/Trail (Vegetated)
ROAD-UNIMPROVED	Road/Trail (Vegetated)
ROAD-UNPAVED-1L	Road/Trail (Vegetated)
ROAD-UNPAVED-2L	Road/Trail (Vegetated)
ROAD-WINTER-ACCESS	Road/Trail (Vegetated)
ROUGH_PASTURE	Cultivation (Crop/Pasture/Bare Ground)
RUNWAY	Other Disturbed Vegetation
RURAL-RESIDENCE	Rural (Residential/Industrial)
SUMP	Borrow-Pits/Dugouts/Sumps
SURROUNDING-VEG	Other Disturbed Vegetation
TAILING-PILE	Mine Site
TAILING-POND	Mine Site
TAME_PASTURE	Cultivation (Crop/Pasture/Bare Ground)
TRAIL	Seismic line
TRAIL-ATV	Road/Trail (Vegetated)
TRANSFER_STATION	Industrial Site Rural
TRANSMISSION-LINE	Transmission Line

FEATURE_TY HFI 2014	PUBLIC CODE
URBAN-INDUSTRIAL	Urban
URBAN-RESIDENCE	Urban
VEGETATED-EDGE-RAILWAYS	Rail – Vegetated Verge
VEGETATED-EDGE-ROADS	Road – Vegetated Verge
WELL-ABAND	Well Site
WELL-BIT	Well Site
WELL-CASED	Well Site
WELL-CLEARED-DRILLED	Well Site
WELL-CLEARED-NOT-DRILLED	Well Site
WELL-DRILLED-OTHER	Well Site
WELL-GAS	Well Site
WELL-OIL	Well Site
WELL-OTHER	Well Site
WINDMILLS	Wind Generation Facility
FRUIT-VEGETABLES	Cultivation (Crop/Pasture/Bare Ground)

Terms of Reference

ABMI	Alberta Biodiversity Monitoring Institute
ABMI14	Code for feature source when heads up digitization based on SPOT6-2014 imagery was used.
ABMI37	Code for feature source when existing polygons from sampling scale ABMI's human footprint dataset were used.
AHFMP	Alberta Human Footprint Mapping Program
AVIE	Alberta Vegetation Inventory Enhanced
BASEFE	Base Features is a GIS ready dataset that has been complied internally within the Provincial Government since 1996, and is now available to the private sector through its distributor, AltaLIS Ltd.
DID	Digitally Integrated Dispositions
GVI	Grassland Vegetation Inventory
PLVI	Primary Land and Vegetation Inventory

RIS	Reclamation Information System
SPAREA	Special Areas