GSC BEDROCK GEODATABASE: MODEL DESIGN AND DESCRIPTION

VERSION 2.9

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INTRODUCTION

The GSC Bedrock Model design is heavily influenced by some of the GSC's corporate requirements, including that to comply with the Geological Map Flow (GMF) process for the production of CGM maps (i.e. Canadian Geoscience Map), and the obligation to use the ESRI® commercial platform. The latter requires the addition of proprietary functionalities of the ESRI® File Geodatabase such as *SubTypes*, *Domain Values* and *Relationship Class*.

Based on a data-centric approach and using a modular design, the GSC Bedrock Model extends data management beyond the standard geological map. It covers the essentials for managing a bedrock mapping project including its governance and all associated metadata. However, this document is not intended to describe the entire model, but it provides a complete and detailed description of a subset of the model representing the published dataset.

NAMING CONVENTION

A naming convention for all the database components is presented below. The names of these components (*Feature Dataset*, *Feature Class*, *Table* and *Domain Values*) were chosen based on the following criteria:

- the names must be simple and comprehensible to geoscientists
- the names must make it possible to situate each element in the general context of the model:
  - for field data, the name begins with the prefix "F_" (Field)
  - for project-specific data, the name begins with the prefix "P_" (Project)
- the names must be in upper case letters, but their alias is in upper case and lower case letters
- the name of a *Domain Value* must reflect its level, whether corporate or project-specific:
  - if corporate and controlled by a *Subtype*, the name ends with the suffix "_SID"
  - if corporate but not controlled by a *Subtype*, the name ends with the suffix "_DID"
  - if non-corporate but project-specific, the name ends with the suffix "_PID"
- the use of the suffix "ID" is reserved for attributes used as a primary key.

To highlight the various database components, as well as terms specific to the ArcGIS platform, the following font conventions were adopted throughout this document:

- the terms specific to the ArcCatalog^{TM} and ArcMap^{TM} software are shown in italics (e.g. *Geodatabase, Feature Class, Subtype, Domain Values*)
- the name of a *Feature Dataset* is shown in upper case, bold (e.g. **FIELD_OBS**)
- the name of a *Feature Class* or *Table* is shown in upper case, bold/italics (e.g. ***GEO_LINES, P_SOURCE***)
- the name of an attribute is replaced by its alias and shown in upper case/lower case, bold/italics (e.g. ***StationID***, ***Source Name***)
- the name of a *Domain Value* is shown in upper case/lower case, bold/italics (e.g. ***Participant_PID***, ***MapUnit_PID)***

1 GEODATABASE DESIGN

As mentioned in the introduction, the GSC Bedrock Geodatabase is designed to manage all the data generated by a geological mapping project at the GSC. Figure 1 illustrates the modular design of the geodatabase as well as the functional links between the various modules and their components.
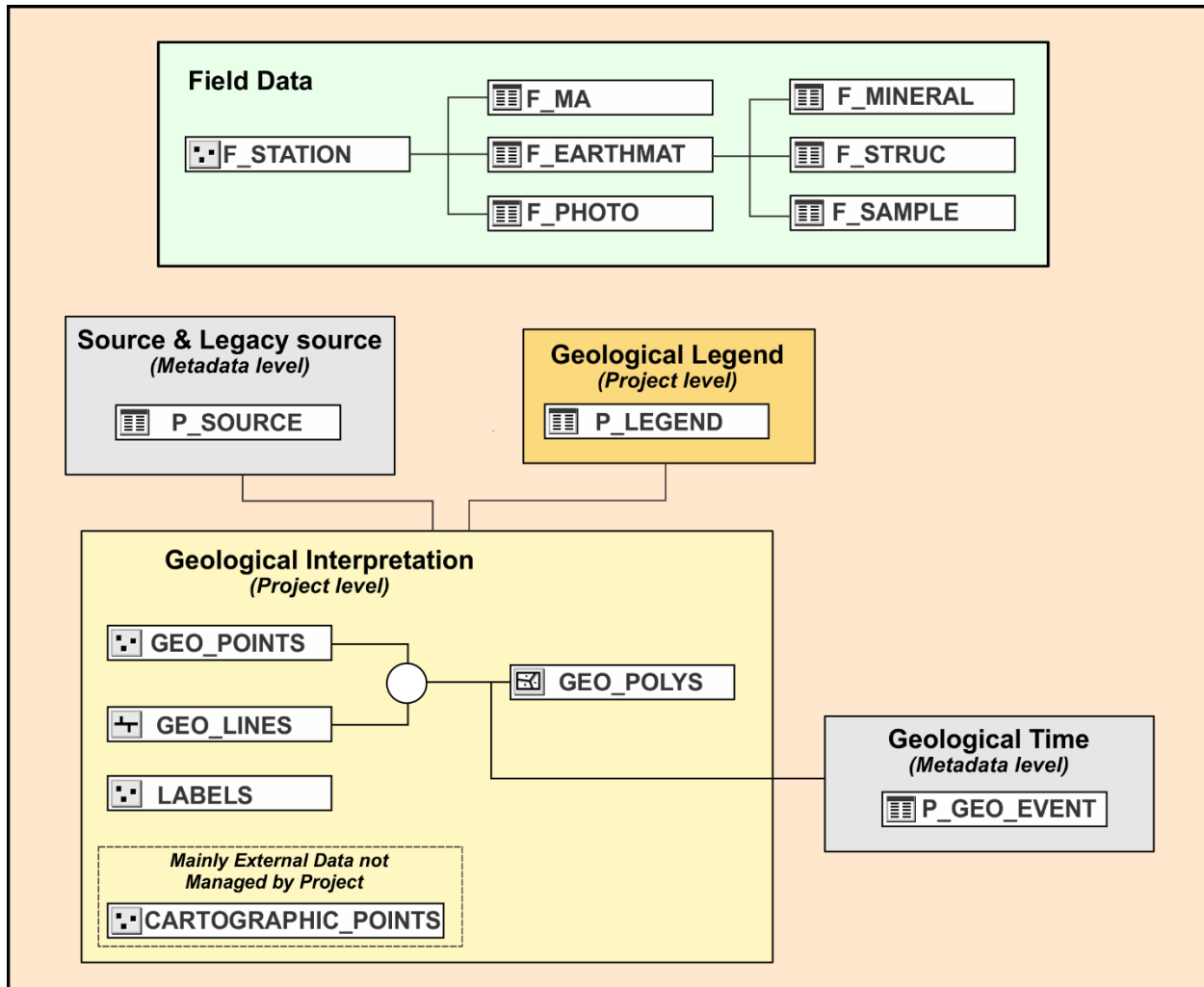
Figure 1 - Simplified schema of GSC's Bedrock Geodatabase model

2   GEODATABASE DESCRIPTION

The following sections provide a brief explanation of the published Geodatabase followed by a complete description of all its components. **Error! Reference source not found.** provides an overview of the tree structure of the database in the ArcCatalog™ environment. This structure includes a series of *Feature Classes*, *Tables* and *Relationship Classes,* as well as two *Feature Datasets* called **FIELD_OBS** and **GEO**. The **FIELD_OBS** *Feature Dataset* contains all the elements downloaded from the GanFeld system, while **GEO** contains the four *Feature Classes* that are used to create and manage the geological interpretation. Two different *Feature Datasets* are used since the field observation data is often in a different projection than the interpreted/published data.
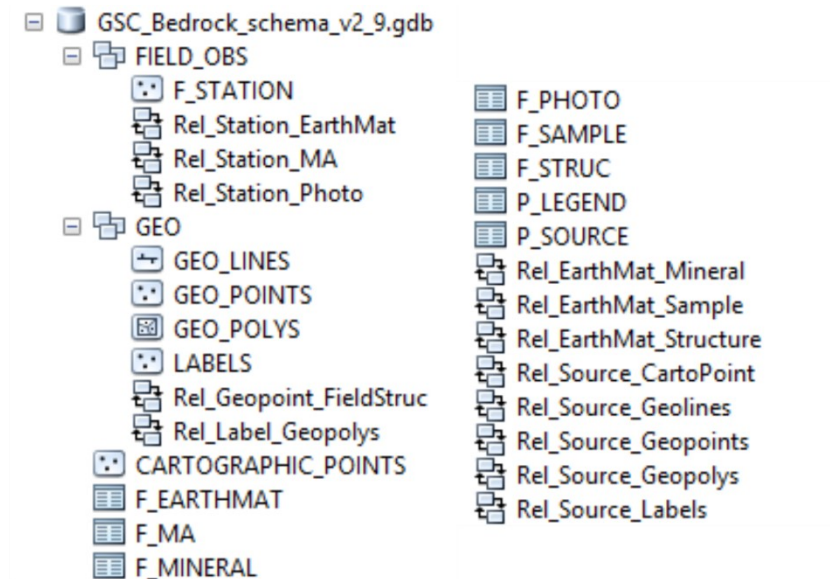
Figure 2 - ArcCatalog view of GSC's Bedrock Geodatabase version 2.9

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2.1 FIELD DATA MODULE

The **Field Data** module contains all the field data acquired using GanFeld, a portable digital data acquisition system developed at the GSC (Shimamura et al., 2008). This module contains all the elements from the direct translation of the GanFeld system (based on ShapeFiles) to a normalized entity-relationship model in a geodatabase.

2.1.1 F_STATION FEATURE CLASS

F_STATION is a point *Feature Class* which identifies and describes a geographic location for which geological observations are made. It contains the geographic coordinates as well as a series of attributes which describe the type and quality of the observation locality.

Table 1 - Field properties and descriptions for *F_STATION*

| Field	DataType	Length	AliasName	Description	IsNullable
STATIONID	String	25	StationID	Unique identification of an outcrop or point where observations are made (format: 2 digit "year", 2 or 3 letter "officer code", three digit station #; e.g. 2016ABC-123)	FALSE
STATIONNO	LongInteger		StationNo	Sequential number of the station, used for administrative purposes (e.g. 1, 2, 3, 4)	FALSE
TRAVNO	Short Integer		TraverseNo	Traverse number (1, 2, 3, etc.)	TRUE
VISITDATE	Date		Visit Date	Date of traverse (numerical; mm/dd/yy)	FALSE
VISITTIME	String	50	Visit Time	Time of day for station observation (hh:mm:ss AM/PM)	FALSE
LATITUDE	Double		Latitude	Latitude in decimal degrees	FALSE
LONGITUDE	Double		Longitude	Longitude in decimal degrees	FALSE
EASTING	Double		Easting	UTM Easting (2 decimal places - cm precision)	FALSE
NORTHING	Double		Northing	UTM Northing (2 decimal places - cm precision)	FALSE
DATUMZONE	String	25	Datum Zone	UTM longitudinal zone (9, 10, 11, etc.)	FALSE
ELEVATION	Float		Elevation	Elevation in metres	TRUE
ELEVMETHOD	String	15	Elevation Method	Method of elevation capture	TRUE
ENTRYTYPE	String	7	Entry Type	Method of location entry (built-in GPS, manual coordinate entry, screen tap)	TRUE
PDOP	Float	4	PDOP	Position Dilution of Precision (e.g. position error factor)	TRUE
SATSUSED	Short Integer		Sat Used	Number of satellites used for GPS position fix	TRUE
OBSTYPE	String	25	Observation Type	Nature of station (visited outcrop, photograph only, etc.)	TRUE
OCQUALITY	String	25	Outcrop Qual	Quality of outcrop	TRUE
PHYSENV	String	25	Physical Environment	Physical environment of the station (ridgeline, shoreline, etc.)	TRUE
OCSIZE	String	50	Outcrop Size	Outcrop size estimate	TRUE
AIRPHOTO	String	50	Airphoto No	Air photo number	TRUE
METAID	String	30	MetaID	For internal use only. Added by the GanFeld Data Management Tools to maintain a unique Station code. Composed of the [YearofFieldwork][OfficerCode][ProjectCode].	FALSE
REPORT_LINK	String	254	Report Link	Link to an XML document which is a summary of the field observation of a STATIONID	TRUE

2.1.2 F_EARTHMAT TABLE

The **F_EARTHMAT** table contains the lithological observations made at each station of **F_STATION.** A "one-to-many" type relationship (*Relationship Class*) named **Rel_Station_EarthMat** exists between the two. In other words, a station can have one or more earth materials.

Table 2 - Field properties and description for *F_EARTHMAT*

Field	DataType	Length	AliasName	Description	IsNullable
STATIONID	String	25	STATIONID	Unique identification of an outcrop or point where earth material observations are made	FALSE
EARTHMATLT	String	5	EARTHMATLT	Sequential letter for earth material at a station	FALSE
EARTHMATNO	Short Integer		EARTHMATNO	Sequential number for earth material at a station	FALSE
EARTHMATID	String	25	EARTHMATID	Earth material unique identifier	FALSE
LITHGROUP	String	50	LITHGROUP	General rock grouping (for GanFeld functionality)	FALSE
LITHTYPE	String	50	LITHTYPE	Subdivision of the general rock grouping (for GanFeld functionality).	FALSE
LITHDETAIL	String	50	LITHDETAIL	Detailed rock name. This field stores the functional rock name of an earth material	FALSE
MAPUNIT	String	50	MAPUNIT	Map unit to which the described earth material belongs.	TRUE
OCCURAS	String	50	OCCURAS	Nature of the occurrence of earth material (e.g. pluton, dyke, etc)	TRUE
MODSTRUC	String	254	MODSTRUC	Qualifiers relating to primary structures of the earth material	TRUE
MODTEXTURE	String	254	MODTEXTURE	Qualifiers relating to textural properties of the earth material	TRUE
MODCOMP	String	254	MODCOMP	Qualifiers relating to the composition of the earth material	TRUE
GRCRYSIZE	String	254	GRCRYSIZE	Earth material grain size	TRUE
DEFFABRIC	String	254	DEFFABRIC	Deformational fabrics of the earth material	TRUE
BEDTHICK	String	254	BEDTHICK	Bedding thickness	TRUE
MINERAL	String	254	MINERAL	List of minerals observed in the earth material with respective mode (i.e. %)	TRUE
COLOURF	String	50	COLOURF	Earth material fresh colour	TRUE
COLOURW	String	50	COLOURW	Earth material weathered colour	TRUE
COLOURIND	Short Integer		COLOURIND	Earth material colour index value from 0 to 100	TRUE
MAGSUSCEPT	Double		MAGSUSCEPT	Magnetic susceptibility value of the earth material (in SI units)	TRUE
FOSSILS	String	254	FOSSILS	List of fossils observed in the earth material	TRUE
CONTACT	String	254	CONTACT	Further notes or remarks about the contacts	TRUE
CONTACTUP	String	50	CONTACTUP	Nature of upper contact	TRUE
CONTACTLOW	String	50	CONTACTLOW	Nature of lower contact	TRUE
INTERPCONF	String	10	INTERPCONF	Level of confidence with the earth material interpretation	TRUE

2.1.3 F_MINERAL TABLE

The **F_MINERAL** table has a "one-to-many" type relationship (*Relationship Class*) with the **F_EARTHMAT** table (**Rel_EarthMat_Mineral**). In other words, an earth material can have one or more minerals. This table contains all the attributes necessary to record the observations related to the form of the mineral, its mode of occurrence, size and colour.

Table 3 - Field properties and description for *F_MINERAL*

Field	DataType	Length	AliasName	Description	IsNullable
STATIONID	String	25	STATIONID	Unique identification of an outcrop or point where mineral observations are made	FALSE
EARTHMATID	String	25	EARTHMATID	Unique identifier of the earth material in which a mineral is described	FALSE
MINERALID	String	25	MINERALID	Unique identifier of a mineral within the observed earth material	FALSE
MINERALNO	Short Integer		MINERALNO	Sequential number of a mineral within the observed earth material (e.g 1, 2, 3)	FALSE
MINERAL	String	25	MINERAL	Name of the mineral being described	FALSE
FORM	String	25	FORM	Form of the mineral (e.g. euhedral, anhedral, subhedral)	TRUE
HABIT	String	25	HABIT	Habit of the mineral (e.g. acicular, columnar, equant, fibrous)	TRUE
OCCURRENCE	String	25	OCCURRENCE	Nature of the occurrence of the mineral within the earth material (e.g. accessory, constituent, clot, phenocryst, porphyroblast)	TRUE
COLOUR	String	25	COLOUR	Colour of the mineral	TRUE
SIZEMINMM	Short Integer		SIZEMINMM	Minimum size of the mineral in mm	TRUE
SIZEMAXMM	Short Integer		SIZEMAXMM	Maximum size of the mineral in mm	TRUE
MODE	Short Integer		MODE	Proportion of rock unit comprised by the mineral (value range 0-100)	FALSE

2.1.4 F_SAMPLE TABLE

This table contains a list of all the samples collected in the field for each of the lithologies being described. It therefore has a "one-to-many" type relationship (*Relationship Class*) with the **F_EARTHMAT** table (**Rel_EarthMat_Mineral**). In other words, an earth material can have one or more samples.

Table 4 - Field properties and description for *F_SAMPLE*

Field	DataType	Length	AliasName	Description	IsNullable
STATIONID	String	25	STATIONID	Unique identification of an outcrop or point where samples are collected	FALSE
EARTHMATID	String	25	EARTHMATID	Unique identifier of the earth material in which a sample is collected	FALSE
SAMPLEID	String	25	SAMPLEID	Unique identifier of a collected sample	FALSE
SAMPLENO	Short Integer		SAMPLENO	Sequential number of a collected sample within an earth material (e.g 1, 2, 3)	FALSE
SAMPLETYPE	String	25	SAMPLETYPE	Sample type (e.g. hand, oriented; chip sample; core, etc.)	FALSE
PURPOSE	String	254	Purpose	Purpose(s) regarding why the sample is collected	FALSE
FORMAT	String	25	Format	Measurement format for oriented samples (e.g. RHR (right-hand rule), DDD (dip direction, dip), TRND-PLNG (trend and plunge))	TRUE
AZIMUTH	Short Integer		AZIMUTH	Strike, dip direction or trend measurement of oriented samples (in degrees)	TRUE
DIPPLUNGE	Short Integer		DIPPLUNGE	Dip or plunge measurement of oriented samples (in degrees)	TRUE
SURFACE	String	10	SURFACE	Indication of whether the upper or lower surface of the oriented sample was marked in the field	TRUE

2.1.5 F_STRUC TABLE

The **F_STRUC** table also has a "one-to-many" type relationship (*Relationship Class*) with the **F_EARTHMAT** table (**Rel_EarthMat_Structure**). In other words, an earth material can have one or more structures. It contains all the structural data measured for each of the lithologies being described. The design of the **F_STRUC** table makes it possible to record both planar and linear structural measurements.

Table 5 - Field properties and description for *F_STRUC*

Field	DataType	Length	AliasName	Description	IsNullable
STATIONID	String	25	STATIONID	Unique identification of an outcrop or point where structural measurements are collected	FALSE
EARTHMATID	String	25	EARTHMATID	Unique identifier of the earth material in which a structural measurement is collected	FALSE
STRUCID	String	25	STRUCID	Unique identifier of a planar or linear structural measurement	FALSE
STRUCNO	Short Integer		STRUCNO	Sequential number of a collected structural measurement within an earth material (e.g 1, 2, 3)	FALSE
STRUCCLASS	String	10	STRUCCLASS	Class of structural feature (linear or planar).	FALSE
STRUCTYPE	String	30	STRUCTYPE	Subdivision of the structural feature (for GanFeld functionality)	FALSE
DETAIL	String	50	DETAIL	Detailed structural measurement name (e.g. bedding, fault plane, fracture, joint, cleavage, schistosity)	FALSE
METHOD	String	50	METHOD	Method of acquisition (e.g. measured at station, estimated at station, calculated from data)	FALSE
FORMAT	String	25	Format	Measurement format (e.g. strike/dip, trend/plunge, etc.)	FALSE
ATTITUDE	String	50	Attitude	Attitude of planar feature (e.g. upright, overturned, etc.)	TRUE
YOUNGING	String	50	YOUNGING	Confidence in attitude of primary layering as assessed from evidence for younging direction (e.g. known, sedimentary structure; inferred, stratigraphic order; assumed, no evidence)	TRUE
GENERATION	String	50	Generation	Generation phase	TRUE
STRAIN	String	50	STRAIN	Strain intensity (e.g. no strain, weak, moderate, intense)	TRUE
FLATTENING	String	50	FLATTENING	Relative intensity of planar (S) fabric over linear (L) fabric (e.g. L tectonite, L>S, L=S, L<S, S tectonite)	TRUE
RELATED	String	50	RELATED	Unique identifier for related planar or linear measurement	TRUE
AZIMUTH	Short Integer		AZIMUTH	Strike, dip direction or trend of measurement [Range=0-360]	FALSE
DIPPLUNGE	Short Integer		DIPPLUNGE	Dip value of the planar feature or plunge value of the linear feature in degrees. [Range=0-90]	FALSE
SYMANG	Short Integer		SYMANG	Rotational angle for plotting symbol	TRUE

2.1.6 F_PHOTO TABLE

The **F_PHOTO** table is used to save the information collected while taking photographs, for each of the stations being described. It therefore has a "one-to-many" type relationship (*Relationship Class*) with the **F_STATION** *Feature Class* (**rel_Station_Photo**). In other words, a station can have one or more photographs.

Table 6 - Field properties and description for F_PHOTO

Field	DataType	Length	AliasName	Description	IsNullable
STATIONID	String	25	STATIONID	Unique identification of an outcrop or point where the photograph was taken	FALSE
PHOTOID	String	25	PHOTOID	Unique identifier of the photograph	FALSE
PHOTONO	Short Integer		PHOTONO	Sequential photo number for the station (e.g. 1, 2, 3, etc.)	FALSE
CATEGORY	String	50	CATEGORY	General subject matter of the photograph (e.g. outcrop, structure, landscape, wildlife)	FALSE
DIRECTION	Short Integer		DIRECTION	Direction (value in degrees) toward which the photograph was taken	TRUE

2.1.7 F_MA TABLE

This table includes elements relevant to the identification of mineralization and/or alteration for each of the stations being described. It therefore has a "one-to-many" type relationship (*Relationship Class*) with the **F_STATION** *Feature Class* (**rel_Station_MA**). In other words, a station can have one or more mineralization and/or alterations.

Table 7 - Field properties and description for *F_MA*

Field	DataType	Length	AliasName	Description	IsNullable
STATIONID	String	25	STATIONID	Unique identification of an outcrop or point where alteration or mineralization occurs	FALSE
MAID	String	25	MAID	Unique identifier for the occurrence of alteration or mineralization	FALSE
MANO	Short Integer		MANO	Sequential number for alteration/mineralization occurrence(s) at a station (e.g. 1, 2, 3, etc.)	FALSE
MA	String	15	MA	Type of feature (alteration or mineralization)	FALSE
UNIT	String	15	UNIT	Rock type or unit in which the alteration or mineralization occurs	TRUE
MINERAL	String	100	MINERAL	Name of the alteration mineral or economic mineral	TRUE
MODE	Short Integer		MODE	Proportion (%) of the rock unit comprised by the mineral (range is 0-100)	TRUE
DISTRIBUTE	String	100	DISTRIBUTE	Nature of the distribution of the alteration mineral or economic mineral (e.g. pervasive, replacement, etc.)	TRUE

2.2   GEOLOGICAL INTERPRETATION MODULE

This section describes in detail the *Feature Classes* and the *Tables* comprising the core of the GSC Bedrock Model.

2.2.1   GEO_LINES FEATURE CLASS

The **GEO_LINES** *Feature Class* is one of the central components of the model because it contains all the linear elements supporting the interpretation of a geological mapping project. **GEO_LINES** is composed of eleven *Subtypes* (**Geoline Type**) (see ANNEX A), each representing a type of line required to create a geological interpretation. When combined with the values of the **GeoLine Qualifier**, **Confidence**, **Attitude** and **Generation** fields, these *Subtypes* define a set of more than 10,000 line types, all individually represented by a unique **GEOLINEID**.

The **GEO_LINES** *Feature Class* also contains the attributes required to interpret the movement of certain linear geological concepts (**Fault Movement**, **HangWall Direction**, **Fold Trend**) as well as attributes that serve to assign a name (**Geological Name**) to all the linear elements.

The automated process of creating geological polygons is essentially controlled by the value assigned in the **Is Boundary** attribute. The "Yes" or "No" value of this attribute therefore determines the selection of the linear elements that are used to create the polygons. For example, a normal fault limiting contact between two different geological units must have the value "Yes" in the **Is Boundary** attribute. In the current version of the model, the **contact, unit construct line, isograd and overprint** *Subtypes* have the **Is Boundary** attribute set to "Yes" by default.

Table 8 - Field properties and description for *GEO_LINES*

FieldName	DataType	Length	AliasName	Description	IsNullable	Domain Name
GEOLINEID	String	12	GeoLineID	Calculated field obtained by concatenating the CODES associated with fields GeoLine Type, Geoline Qualifier, Confidence, Attitude and Generation	TRUE	n/a
GEOLINETYPE	Long Integer		GeoLine Type	SubType (Type of GeoLine)	FALSE	n/a
QUALIFIER	String	4	GeoLine Qualifier	GeoLine Qualifier	FALSE	Controlled by the Subtype (see Annexe A)
CONFIDENCE	String	2	Confidence	Certainty in the position of the Feature	FALSE	Controlled by the Subtype (see Annexe A)
ATTITUDE	String	2	Attitude	Position of the fault, shear or fold	FALSE	Controlled by the Subtype (see Annexe A)
GENERATION	String	2	Generation	The phase of generation	FALSE	Controlled by the Subtype (see Annexe A)
NAME	String	255	Geological Name	Name of the geological feature (Cadillac Fault, Mackenzie Dykes, etc.)	TRUE	n/a
MOVEMENT	String	2	Fault Movement	Description of fault movement where the hanging wall cannot be established (e.g. generic, steep dip faults)	TRUE	Controlled by the Subtype (see Annexe A)
HWALLDIR	String	2	HangWall Direction	Direction of the side of the fault on which the hanging wall occurs (for faults where a hanging wall can be identified, (e.g. normal, reverse, thrust)	TRUE	Controlled by the Subtype (see Annexe A)

FieldName	DataType	Length	AliasName	Description	IsNullable	Domain Name
FOLDTREND	String	2	Fold Trend	Approximate direction of plunge (e.g. trend) of the fold axis	TRUE	Controlled by the Subtype (see Annexe A)
FOLDPLUNGE	String	25	Fold Plunge	Approximate magnitude of plunge of the fold axis	TRUE	n/a
ARROWDIR	String	2	Arrow Direction	Direction in which the arrows for the limbs point for overturned and monocline symbols, or direction of short arrow (steep limb) for asymmetrical fold symbols	TRUE	Controlled by the Subtype (see Annexe A)
ISBOUNDARY	String	2	Is Boundary	Identifies a line segment shared by more than one subtype (default is set to YES for SubTypes Contact, Unit Construct Line, Overprint and Isograd)	FALSE	Boundary_DID
GSC_SYMBOL	String	12	GSC SYMBOL	GSC symbol value as defined by the GSC's Legend Committee	TRUE	n/a
SOURCEID	String	30	SourceID	Foreign key to P_SOURCE	TRUE	SourceRef_PID
GEOEVENT_ID	Long Integer		Event ID	Foreign key to P_GEO_EVENT	TRUE	n/a
ORIGCODE	String	50	Original Code	Original code of the GEOLINE (original code assigned to a GEOLINE, from previous version, external database, etc.)	TRUE	n/a
DISPLAYPUB	Short Integer		Display In Publication	To be shown on (map) publication	TRUE	n/a

2.2.2 LABELS FEATURE CLASS

The **LABELS** *Feature Class* also constitutes a central component of the model. Used in conjunction with the **GEO_LINES** *Feature Class*, **LABELS** participates in the automated creation of geological polygons.

Table 9 - Field properties and description for *LABELS*

FieldName	DataType	Length	AliasName	Description	IsNullable	Domain Name
LABELID	String	10	Label	Common use for LABELID is the code (annotation) used for a lithological unit (i.e. Map Unit)	FALSE	MapUnit_PID
SOURCEID	String	15	SourceID	Reference of original data source. (foreign key to P_SOURCE table)	TRUE	SourceRef_PID
GEOEVENT_ID	Long Integer		Event ID	Foreign key to P_GEO_EVENT	TRUE	n/a

2.2.3 GEO_POLYS FEATURE CLASS

The **GEO_POLYS** *Feature Class* contains the geological polygons (i.e. *map unit polygons or map unit*) resulting from the interpretation recorded in the **GEO_LINES** and **LABELS** *Feature Classes*. All the attributes of this Feature Class are assigned the same values as those belonging to the **LABELS** *Feature Class* with the exception of **Remarks**.

Table 10 - Field properties and description for *GEO_POLY*

Field	DataType	Length	AliasName	Description	IsNullable	Domain Name
LABELID	String	10	Label	Common use for LABELID is the code (annotation) used for a lithological unit (i.e. Map Unit)	FALSE	MapUnit_PID
SOURCEID	String	15	SourceID	Reference of original data source	TRUE	SourceRef_PID

2.2.4 GEO_POINTS FEATURE CLASS

The **GEO_POINTS** *Feature Class* contains all the structural point data as well as map units that are too small to be represented as polygons. The structural information that was acquired in the field using the GanFeld system and stored in the **F_STRUC** attribute table are transferred automatically to **GEO_POINTS**. The structural data from compilation work (imported or digitized *in situ*) are also stored in **GEO_POINTS**.

GEO_POINTS is characterized by three *Subtypes* (**GeoPoint_Type**) that have the value of either *Planar*, *Linear or Map Unit* (the latter has not been implemented in this version of the model). When combined with the values of the **GeoPoint Subset**, **Attitude**, **Generation**, **Younging** and **Method** fields, these *Subtypes* define a set of more than 9,000 types of points, all individually represented by a unique **GEOPOINTID**.

The **GEO_POINTS** *Feature Class* also contains the attributes **Azimuth** and **DipPlunge** as well as the **F_StrucID** attribute which is used to link the structural elements to their original **F_STRUC** table. The **Display From** and **Display To** attributes are used to manage the visualization of data based on a range of scales.

Table 11 - Field properties and description for *GEO_POINTS*

Field	DataType	Length	AliasName	Description	IsNullable	Domain Name
GEOPOINTID	String	13	GeopointID	Calculated field obtained by concatenating the CODES associated with GeoPoints SubTypes (GeoPoint Type, GeoPoint Subset, Attitude, Generation, Younging and Method)	TRUE	n/a
GEOPOINTTYPE	Long Integer		GeoPoint Type	Type of GeoPoint (Valid GeoPoint Type are: planar, linear and map unit)	TRUE	n/a
GEOPOINTSUBSET	String	4	GeoPoint Subset	GeoPoint subset values are controlled by domain values Subset_Planar_SID and Subset_Linear_SID. (e.g. bedding, axial plane, anticline, etc.)	TRUE	Controlled by the Subtype (see Annexe A)
STRUCATTITUDE	String	2	Attitude	Attitude of the structural measurement (e.g. upright, overturned < 180, vertical, etc.)	TRUE	Controlled by the Subtype (see Annexe A)
STRUCGENERATION	String	2	Generation	Phase of generation (ex. primary, first, second, etc.)	TRUE	Controlled by the Subtype (see Annexe A)
STRUCYOUNGING	String	2	Younging	Confidence in attitude of primary layering as assessed from evidence for younging direction (e.g. known, stratigraphic order)	TRUE	Controlled by the Subtype (see Annexe A)
STRUCMETHOD	String	2	Method	Method of acquisition (e.g. measured at station, estimated remotely, etc.)	TRUE	Controlled by the Subtype (see Annexe A)
RELATEDSTRUC	String	15	Related Structure	Unique identifier for related planar or linear measurements (e.g. StrucID value from F_STRUC table)	TRUE	n/a
AZIMUTH	Short Integer		Azimuth	Right-hand rule strike value of structural Feature (from 1 to 360)	TRUE	n/a
DIPPLUNGE	Short Integer		DipPlunge	Dip/plunge value of the structural feature in degrees (from 0 to 90)	TRUE	n/a
DIPDESC	String	30	Dip Description	To capture non-numerical dip values for dedicated symbols	TRUE	n/a
SENSE_EVID	String	50	Sense Evidence	Evidence of sense of motion from kinematic indicators	TRUE	n/a
STRAIN	String	2	Strain	Strain intensity associated with the fabric measurements	TRUE	Controlled by the Subtype (see Annexe A)
FLATTENING	String	2	Flattening	Relative intensity of planar (S) fabric over linear (L) fabric	TRUE	Controlled by the Subtype (see Annexe A)
F_STRUCID	String	25	F_StrucID	Foreign key to F_STRUC table	TRUE	n/a
GSC_SYMBOL	String	15	GSC Symbol	GSC symbol value as defined by the GSC's Legend Committee	TRUE	n/a
SOURCEID	String	15	SourceID	Reference of the original data source (foreign key to P_SOURCE)	TRUE	SourceRef_PID

Field	DataType	Length	AliasName	Description	IsNullable	Domain Name
ORIGCODE	String	50	Original Code	Original code of the GEOPOINT (original code assigned to a GEOPOINT, from previous version, external database, etc.)	TRUE	n/a
DISPLAY_FROM	String	20	Display from	Minimum scale at which point objects must be displayed	TRUE	Scale_PID
DISPLAY_TO	String	20	Display To	Maximum scale at which point objects must be displayed	TRUE	Scale_PID
DISPLAYPUB	Short Integer		Display In Publication	To be shown on (map) publication	TRUE	n/a

2.2.5 CARTOGRAPHIC_POINTS FEATURE CLASS

CARTOGRAPHIC_POINTS is intended to store the spatial geometries of external sources datasets like geochronology, legacy field data, drill holes, etc. Attributes of this *Feature_Class* hold information essentially related to the spatial representation. Any tabular information related to the **Cartographic_Points** is managed within an auto generated table, and linked with field **PointID**. Thus, the purpose of this *Feature_Class* is to display datasets that are not managed by the GSC's Bedrock Data Model but are needed for the geological compilation/interpretation processes.

Table 12 - Field properties and description for *CARTOGRAPHIC_POINTS*

Field	DataType	Length	AliasName	Description	IsNullable	Domain Name
LEGENDITEMID	String	36	Legend Item ID	Auto-generated unique identifier. Foreign key to **P_LEGEND** table	FALSE	n/a
POINTID	String	36	Point Identification	Auto-generated unique identifier	FALSE	n/a
THEME	String	50	Cartographic Theme	Current version of the model implements seven themes but the application allows adding new themes	TRUE	CartoTheme_PID
SYMBOL	String	12	GSC Symbol	GSC symbol value as defined by the GSC's Legend Committee	TRUE	n/a
SYM_ANGLE	Short Integer		Azimuth	The right-hand rule value of the cartographic point symbol (from 1 to 360)	TRUE	n/a
DISPLAY_FROM	String	20	Display from	Minimum scale at which point objects must be displayed	TRUE	Scale_PID
DISPLAY_TO	String	20	Display To	Maximum scale at which point objects must be displayed	TRUE	Scale_PID
EASTING	Double		Easting	UTM Easting (to 2 decimal places - cm precision)	TRUE	n/a
NORTHING	Double		Northing	UTM Northing (to 2 decimal places - cm precision)	TRUE	n/a
LATITUDE	Double		Latitude	Latitude in decimal degrees	TRUE	n/a
LONGITUDE	Double		Longitude	Longitude in decimal degrees	TRUE	n/a
ALTITUDE	Double		Altitude	Elevation in metres	TRUE	n/a
DATUMZONE	String	25	Datum Zone	UTM longitudinal zone	TRUE	n/a
SOURCEID	String	15	Source ID	Foreign key to P_SOURCE	TRUE	SourceRef_PID

2.3 METADATA

This module contains a subset of the metadata manage within the GSC Bedrock geodatabase.

2.3.1 P_SOURCE TABLE

This table is one of the essential elements of the model because it makes it possible to associate a source with all the spatial objects of the database.

Table 13 - Field properties and description for *P_SOURCE*

Field	DataType	Length	AliasName	Description	IsNullable
SOURCEID	String	15	SourceID	Auto-generated unique identification number	FALSE
SOURCENAME	String	255	Source Name	Abbreviated publication reference for the original data source (e.g. Gordon, T; Okulitch, A.V., 1977, Open File 442)	TRUE
DOI	String	25	DOI	Unique **D**igital **O**bject **I**dentifier (e.g. doi:10.4095/290088)	TRUE
ABBREVIATION	String	50	Abbreviation	Abbreviation name that can be used as label in ArcMAP (e.g. OF442)	FALSE
EXTENDED_SOURCE	String	2000	Extended Source	Bibliographical record and authors or any other information related to source.	TRUE

The **P_SOURCE** table makes it possible to manage the minimum information required to identify a source (**SourceName**) and locate its presence on the web (**DOI**).

2.3.2 P_GEO_EVENT TABLE

The table **P_GEO_EVENT** contains age related information linked to the geological events represented by map units, geolines, etc. For each event the user can assign age, specified either numerically or using a named era from the International Commission on Stratigraphy.

Table 14 - Field properties and description for *P_GEO_EVENT*

Field	DataType	Length	AliasName	Description	IsNullable	Domain Name
GEOEVENT_ID	Long Integer		Event ID	Auto-generated unique identification number	FALSE	n/a
GEOEVENT_NAME	String	254	Event Name	Name given to the geological event	TRUE	n/a
AGEMIN_PREFIX	String	50	Minimum Age Prefix	Prefix added to AGEMIN_TIMESCALE in order to further specify the age	TRUE	AgePrefix_DID
AGEMIN_TIMESCALE	String	50	Minimum Age Time Scale	Minimum age of a geological event represented by the name of a geological time scale in which the age terms are defined	TRUE	AgeDesignator_DID
AGEMIN_VALUE	Double		Minimum Age Value (Ma)	Younger boundary of interval for age of the geological event	TRUE	ActivityRole_DID
AGEMIN_CERTAINTY	Double		Minimum Age Value Certainty (Ma)	Value of the range of uncertainty for AGEMIN_VALUE	TRUE	n/a
AGEMAX_PREFIX	String	50	Maximum Age Prefix	Prefix added to AGEMIN_TIMESCALE in order to further specify the age	TRUE	AgePrefix_DID
AGEMAX_TIMESCALE	String	50	Maximum Age Time Scale	Maximum age of a geological event represented by the name of a geological time scale in which the age terms are defined	TRUE	AgeDesignator_DID

Field	DataType	Length	AliasName	Description	IsNullable	Domain Name
AGEMAX_VALUE	Double		Maximum Age Value (Ma)	Older bound of interval for age of the geological event	TRUE	n/a
AGEMAX_CERTAINTY	Double		Maximum Age Value Certainty (Ma)	Value of the range of uncertainty for AGEMAX_VALUE	TRUE	n/a
SOURCEID	String	15	Source ID	Foreign key to P_SOURCE	TRUE	SourceRef_PID

2.4 LEGEND MANAGEMENT

The *P_LEGEND* table contains all the necessary elements to reproduce the legend of the map. The *Symbol Type* attribute is used to identify the type of legend item (line, header, marker point, etc.). The *Symbol*, *Indent* and *Legend Order* attributes make it possible to symbolize and position each of the legend item correctly relative to one another. The *Map Unit* and *Annotation* attributes are used to correctly symbolize the legend and map annotations. Finally, the attribute *Description* contains the complete description of each of the legend item.

Table 15 - Field properties and description for *P_LEGEND*

Field	DataType	Length	AliasName	Description	IsNullable	Domain Name
LEGENDITEMID	String	36	Legend ItemID	Unique Legend Item identifier. Values stored in this field represent a legend item whether it's a Label name, a GeoPoint type or a GeoLine type (values stored are either LabelID, GeoLineID, GeoPointID or headerID but the interface displays the Description for all items)	TRUE	n/a
LEGEND_ITEMTYPE	String	50	Legend Item Type	Legend item theme (e.g. Geoline, Geopoint. Headers, etc.)	TRUE	LegendItemTheme_PID
GSC_DISPLAY_NAME	String	254	Display Name	Editable legend item name that is displayed in ArcMap environment (e.g. Table of Content, the Feature Templates, etc.)	TRUE	n/a
GSC_SYMBOL	String	15	Symbol	GSC symbol value as decided by the GSC's Legend Committee	TRUE	n/a
SYM_TYPE	String	2	Symbol Type	Type of symbol (e.g. fill, Line 1, Line 2, Header 1, Marker Point, etc.)	FALSE	LegendSymbolType_DID
INDENT	Short Integer		Indent	Number from 0 to 6 indicating the amount of indent for the legend item	TRUE	n/a
NAME	String	254	Geological Name	Geological Name of the legend item (e.g. Victoria Island formation, etc.)	TRUE	n/a
MAPUNIT	String	254	Map Unit	Coded value of the map unit as it appears on the map. e.g. the MAPUNIT of the Silurian Allen Bay Formation (Sa) is : (FNT name = "GSCGeology" size = "8")^A(/FNT)	TRUE	n/a
ANNOTATION	String	254	Annotation	Coded value of the map unit as it appears on the legend of the map. e.g. the MAPUNIT of the Silurian Allen Bay Formation (Sa) is : ^A	TRUE	n/a
GEOLRANK	String	25	Geological Rank	Geological rank (terms are from the 201202 CGI Simple Lithology vocabulary)	TRUE	RankTerm_DID
LEGEND_ORD	Single	4	Legend_Order	Item order in the legend	TRUE	n/a
DESCRIPTION	String	2000	Description	Complete description of a legend item as it appears on the legend of a specific CGM Map	TRUE	n/a

REFERENCES

Bow, J., Adlam, KAM., and Turner, P., 2013. BGS•SIGMA 2012 Open Source User Guide; British Geological Survey Internal Report, OR/13/021, 60 p.

Cocking, R., 2013. Field Data Model, Version 1.0; Geological Survey of Canada.

Deblonde, C., Plouffe, A., Eagles, S., Everett, D., Huntley, D.H., Inglis, E., Kerr, D.E., Moore, A., Parent, M., Robertson, L., Smith, I.R., St-Onge, D.A., and Weatherston, A., 2014. Science language for an integrated Geological Survey of Canada data model for surficial geology maps, Version 2; Geological Survey of Canada, Open File 7631, 2014, 464 pages (1 sheet), https://doi.org/10.4095/294225.

Fowler, M., 2002. Patterns of Enterprise Application Architecture. ISBN-13: 978-0321127426.

Haugerud, R.A., Richard, S.M., Soller, D.R, and Thoms, E.E., 2010. NCGMP09—Draft Standard Format for Digital Publication of Geologic Maps, Version 1.1. Digital Mapping Techniques '09—Workshop Proceedings; U.S. Geological Survey Open-File Report 2010–1335, 54 p.

Shimamura, K., Williams, SP., and Buller, G., 2008. GanFeld user guide: a map-based field data capture system for geologists; Geological Survey of Canada, Open File 5912, 2008, 90 p. https://doi.org/10.4095/226214

WEB SITES

NMBGMR Draft Geological Data Model – v. 1.0.4 (New Mexico Bureau of Geological and Mineral Resources)
http://geoinfo.nmt.edu/statemap/datamodel/home.html

CGM Bedrock Data Model – v. 4.0.0 (Canadian Geoscience Map)
http://wiki.nrcan.gc.ca/index.php/Geological_Map_Flow_Documents#Version_4.0.0

NCGMP09 Geological Data Model – v. 1.1
http://ngmdb.usgs.gov/Info/standards/NCGMP09/

http://downloads2.esri.com/support/TechArticles/Geology_Data_Model.pdf

North American Data Model (NADM)
http://ngmdb.usgs.gov/www-nadm//

http://pubs.usgs.gov/of/2004/1334/2004-1334.pdf

National Park Service
http://science.nature.nps.gov/im/inventory/geology/GeologyGISDataModel.cfm

ESRI – Geology Data Model

http://downloads2.esri.com/support/TechArticles/Geology_Data_Model.pdf

ANNEXES

The following annexes describe the geological terminology used for a bedrock mapping project. They also help to understand the relationship between the subtypes, their associated domains values as well as the default values.

ANNEX A

Subtypes are used in the **GEO_LINES** and **GEO_POINTS** *Features Classes*. The **GeolineType** and **GeopointType** fields control the value of the *Subtype*. The following table shows a list of the *Subtypes* used for the *Features Class* **GEO_LINES** with their code and corresponding description.

SUBTYPE FIELD	CODE	DESCRIPTION
GEOLINETYPE	10	contact
GEOLINETYPE	11	fault
GEOLINETYPE	12	shear
GEOLINETYPE	14	fold
GEOLINETYPE	15	thin lithology
GEOLINETYPE	16	unit construct line
GEOLINETYPE	17	trace
GEOLINETYPE	18	limit
GEOLINETYPE	19	overprint
GEOLINETYPE	20	isograd

As shown in **Error! Reference source not found.** of section 2.2.1, several *Domain Values* are fully controlled by the value of the *Subtype*. The following tables show the list of *Domain Values* associated with eight fields of the **GEO_LINES** *Feature Class*, depending on the value of each *Subtype*.

Subtype Code: 10
Subtype Name: contact

FIELD NAME	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_contact_SID	1001
CONFIDENCE	Confid_SID	01
ATTITUDE	NA_DID	99
GENERATION	NA_DID	99
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 11
Subtype Name: Fault

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_fault_SID	2001
CONFIDENCE	Confid_SID	01
ATTITUDE	Attitude_SID	66
GENERATION	Gen_FaultShear_SID	88
MOVEMENT	Fault_move_SID	66
HWALLDIR	Fault_direct_SID	66
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 12
Subtype Name: shear

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_shear_SID	2050
CONFIDENCE	Confid_SID	01
ATTITUDE	Attitude_SID	66
GENERATION	Gen_FaultShear_SID	88
MOVEMENT	Fault_move_SID	66
HWALLDIR	Fault_direct_SID	66
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 14
Subtype Name: fold

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_fold_SID	3001
CONFIDENCE	Confid_fold_SID	01
ATTITUDE	Attitude_SID	01
GENERATION	Gen_fold_SID	88
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	Fold_direct_SID	66
ARROWDIR	Fold_direct_SID	66

Subtype Code: 15
Subtype Name: thin lithology

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_ThinLitho_SID	4006
CONFIDENCE	Confid_SID	01
ATTITUDE	NA_DID	99
GENERATION	NA_DID	99
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 16
Subtype Name: unit construct line

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_construct_SID	5001
CONFIDENCE	NA_DID	99
ATTITUDE	NA_DID	99
GENERATION	NA_DID	99
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 17
Subtype Name: trace

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_trace_SID	5031
CONFIDENCE	Confid_SID	01
ATTITUDE	NA_DID	99
GENERATION	NA_DID	99
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 18
Subtype Name: limit

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_limit_SID	5056
CONFIDENCE	Confid_SID	02
ATTITUDE	NA_DID	99
GENERATION	NA_DID	99
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 19
Subtype Name: overprint

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_overprint_SID	6001
CONFIDENCE	Confid_SID	02
ATTITUDE	NA_DID	99
GENERATION	NA_DID	99
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

Subtype Code: 20
Subtype Name: isograd

FIELD	DOMAIN NAME	DEFAULT VALUE
QUALIFIER	Qualif_isograd_SID	7004
CONFIDENCE	Confid_SID	02
ATTITUDE	NA_DID	99
GENERATION	NA_DID	99
MOVEMENT	NA_DID	99
HWALLDIR	NA_DID	99
FOLDTREND	NA_DID	99
ARROWDIR	NA_DID	99

The following table shows a list of the *Subtypes* used for the **GEO_POINTS** *Features Class* with their code and respective description.

SUBTYPE FIELD	CODE	DESCRIPTION
GEOPOINTTYPE	1	planar

GEOPOINTTYPE	2	linear
GEOPOINTTYPE	3	map unit

As shown in **Error! Reference source not found.** of section 0, several *Domain Values* are fully controlled by the value of the *Subtype*. The following two tables show the list of *Domain Values* associated with nine fields of the *Feature Class* **GEO_POINTS**, depending on the value of each *Subtype*.

Subtype Code: 1
Subtype Name: planar

FIELD	DOMAIN NAME	DEFAULT VALUE
GEOPOINTSUBSET	Subset_Planar_SID	1001
STRUCATTITUDE	Struc_Attitude_Planar_SID	05
STRUCGENERATION	Struc_Generation_SID	88
STRUCYOUNGING	Planar_Younging_SID	07
STRUCMETHOD	Struc_Method_SID	01
DIPDESC	Dip_Desc_SID	66
SENSE_EVID	Sense_Evid_SID	66
STRAIN	Struc_Strain_SID	66
FLATTENING	Struc_Flattening_SID	66

Subtype Code: 2
Subtype Name: linear

FIELD	DOMAIN NAME	DEFAULT VALUE
GEOPOINTSUBSET	Subset_Linear_SID	2029
STRUCATTITUDE	NA_DID	99
STRUCGENERATION	Struc_Generation_SID	88
STRUCYOUNGING	NA_DID	99
STRUCMETHOD	Struc_Method_SID	01
DIPDESC	NA_DID	99
SENSE_EVID	NA_DID	99
STRAIN	Struc_Strain_SID	66
FLATTENING	Struc_Flattening_SID	66

Subtype Code: 3
Subtype Name: map unit

FIELD	DOMAIN NAME	DEFAULT VALUE
GEOPOINTSUBSET	NA_DID	99
STRUCATTITUDE	NA_DID	99
STRUCGENERATION	NA_DID	99
STRUCYOUNGING	NA_DID	99
STRUCMETHOD	NA_DID	99
DIPDESC	NA_DID	99
SENSE_EVID	NA_DID	99
STRAIN	NA_DID	99
FLATTENING	NA_DID	99

ANNEX B

This annex contains all corporate *Domain Values* controlled by the *Subtype*. A list of codes and descriptions are presented for each of the *Domain Values*.

Domain Name: Qualif_Contact_SID

Code	Description
1001	depositional
1002	depositional-conformable
1003	depositional-escarpment
1004	depositional-unconformable
1005	intrusive
1006	metamorphic
1007	sheared
1008	faulted
1010	facies change
1011	drift contact
1012	undefined

Domain Name: Qualif_Fault_SID

Code	Description
2001	normal
2002	reverse
2003	thrust
2004	strike-slip, dextral
2005	strike-slip, sinistral
2006	oblique-slip, dextral, extensional
2007	oblique-slip, dextral, contractional
2008	oblique-slip, sinistral, extensional
2009	oblique-slip, sinistral, contractional
2012	back-thrust
2013	transverse, motion undefined
2014	generic, moderate dip
2015	generic, shallow dip
2016	generic, steep dip
2017	tear
2018	motion undefined
2019	detachment, extensional
2020	detachment, contractional
2021	transform, dextral
2022	transform, sinistral
2023	generic, downthrown

Domain Name: Qualif_Shear_SID

Code	Description
2050	normal
2051	reverse
2052	strike-slip, dextral
2053	strike-slip, sinistral
2054	oblique-slip, dextral, extensional
2055	oblique-slip, dextral, contractional
2056	oblique-slip, sinistral, extensional
2057	oblique-slip, sinistral, contractional
2059	generic, moderate dip
2060	generic, shallow dip
2061	generic, steep dip
2062	motion undefined
2063	thrust
2064	detachment, extensional
2065	detachment, contractional
2066	transform, dextral
2067	transform, sinistral

Domain Name: Qualif_Fold_SID

Code	Description
3001	anticline
3002	anticline, asymmetrical
3003	anticline, synformal
3004	syncline
3005	syncline, antiformal
3006	syncline, asymmetrical
3007	antiform
3008	antiform, asymmetrical
3009	antiformal sheath
3010	synform
3011	synform, asymmetrical
3012	synformal sheath
3013	monocline, anticlinal bend
3014	monocline, synclinal bend
3015	anticlinorium
3016	synclinorium
3017	neutral
3018	trough
3019	arch
3020	anticline, homeoclinic
3021	syncline, homeoclinic
3022	anticline, contraclinic
3023	syncline, contraclinic
3024	anticline, homeoclinic, synformal
3025	syncline, homeoclinic, antiformal
3026	anticline, contraclinic, synformal
3027	syncline, contraclinic, antiformal
3031	recumbent, anticlinal
3032	recumbent, synclinal

Domain Name: Qualif_ThinLitho_SID

Code	Description
4001	dyke
4002	sill
4003	vein
4004	marker bed
4005	distinctive lithology
4006	thin stratigraphic unit
4007	discontinuous thin unit

Domain Name: Qualif_Construct_SID

Code	Description
5001	limit of mapping
5002	map neat line
5004	mapping precision change
5005	nomenclature change
5007	other, see remarks

Domain Name: Qualif_Trace_SID

Code	Description
5025	bedding form line
5026	foliation form line
5027	undefined form line
5028	joint / fracture
5029	geophysical anomaly, positive
5030	geophysical anomaly, negative
5031	structural line of section
5032	seismic survey line
5033	geophysical survey line
5034	ductile structural trend
5035	other - see remark
5036	lineament
5037	measured section
5038	cross-section

Domain Name: Qualif_Limit_SID

Code	Description
5050	outcrop extent
5051	gas field
5052	oil field
5053	extent of bitumen
5054	geothermal field
5055	mine, surface
5056	quarry
5057	edge of sinkhole
5058	lava flow margin
5059	edge of crater
5060	edge of caldera
5061	front of penetrative strain
5062	front of alteration
5063	extent of gossan or mineralization
5066	unique - see description

Domain Name: Qualif_Overprint_SID

Code	Description
6001	drift contact
6002	fault zone
6003	shear zone
6004	breccia zone
6005	alteration zone
6006	mineralization zone
6008	gossan zone
6009	porphyritic zone

Domain Name: Qualif_Isograd_SID

Code	Description
7001	actinolite in
7002	andalusite in
7003	biotite in
7004	chlorite in
7005	clinopyroxene in
7006	cordierite in
7007	diopside in
7008	forsterite in
7009	garnet in
7010	hornblende in
7011	K-feldspar in
7012	kyanite in
7013	melt in
7014	muscovite in
7015	orthopyroxene in
7016	prehnite-pumpellyite in
7017	sillimanite in
7018	staurolite in
7019	tremolite in
7020	wollastonite in
7021	zeolite in

Domain Name: Confid_SID

Code	Description
01	defined
02	approximate
03	inferred
04	concealed
99	not applicable

Domain Name: Attitude_SID

Code	Description
01	upright
02	overturned
03	upright, assumed from archival data
99	not applicable
66	not entered
77	unknown

Domain Name: Generation_SID

Code	Description
01	first
02	second
03	third
04	fourth
10	primary
20	multi-generation
66	Not entered
88	undefined

Domain Name: Fault_Move_SID

Code	Description
01	N side down
02	NE side down
03	E side down
04	SE side down
05	S side down
06	SW side down
07	W side down
08	NW side down
66	not entered
88	undefined
99	not applicable

Domain Name: Fault_Direct_SID

Code	Description
01	N
02	NE
03	E
04	SE
05	S
06	SW
07	W
08	NW
09	inward
10	outward
66	not entered
88	undefined
99	not applicable

Domain Name: Fold_Direct_SID

Code	Description
01	N
02	NE
03	E
04	SE
05	S
06	SW
07	W
08	NW
66	not entered
88	undefined
99	not applicable

Domain Name: Subset_Planar_SID

Code	Description
1001	bedding
1002	eutaxitic layering
1003	igneous layering
1004	igneous layering, pillows
1005	flow layering
1006	compositional layering
1007	crossbed foreset
1008	contact
1009	dyke margin
1010	sill margin
1011	vein margin
1012	joint
1013	fracture
1014	fracture zone margin
1015	fault plane, unknown sense
1016	fault plane, normal
1017	fault plane, reverse
1018	fault plane, thrust
1019	fault plane, dextral
1020	fault plane, sinistral
1021	fault plane, oblique
1022	shear band, unknown sense
1023	shear band, normal
1024	shear band, reverse
1025	shear band, dextral
1026	shear band, sinistral
1027	shear zone, unknown sense
1028	shear zone, normal
1029	shear zone, reverse
1030	shear zone, dextral
1031	shear zone, sinistral
1032	shear zone, dextral-normal
1033	shear zone, dextral-reverse
1034	shear zone, sinistral-normal

Code	Description
1035	shear zone, sinistral-reverse
1036	axial plane
1037	axial plane, anticline
1038	axial plane, syncline
1039	axial plane, crenulation
1040	axial plane, kink-band
1041	axial plane, minor S fold
1042	axial plane, minor Z fold
1043	axial plane, minor U fold
1044	axial plane, transposition fold
1045	cleavage
1046	cleavage, slaty
1047	cleavage, spaced
1048	cleavage, crenulation
1049	schistosity
1050	gneissosity
1051	foliation
1052	foliation, mylonitic
1053	foliation, transposed bedding
1055	stylolitic surface
1056	fault plane, horizontal
1057	fault plane, vertical dip-slip
1058	shear band, horizontal
1059	shear band, vertical dip-slip
1060	shear zone, horizontal
1061	shear zone, vertical dip-slip
1062	fault plane, dextral extensional
1063	fault plane, dextral contractional
1064	fault plane, sinistral extensional
1065	fault plane, sinistral contractional
1999	other, see remarks

Domain Name: Subset_Linear_SID

Code	Description
2001	symmetrical ripple crest
2002	asymmetrical ripple paleoflow
2003	imbrication paleoflow
2004	flute
2005	tool mark
2006	prod mark
2007	parting lineation
2008	trough axis
2009	slump fold hinge
2010	slump fold hinge, Z
2011	slump fold hinge, S
2012	igneous flow lineation
2013	fold hinge
2014	fold hinge, soft-sediment
2015	fold hinge, anticline
2016	fold hinge, syncline
2017	fold hinge, antiform
2018	fold hinge, synform
2019	fold hinge, minor S
2020	fold hinge, S crenulation
2021	fold hinge, minor Z
2022	fold hinge, Z crenulation
2023	fold hinge, minor U
2024	fold hinge, U crenulation
2025	fold hinge, crenulation
2026	axis of sheath fold
2027	axis of sheath antiform
2028	axis of sheath synform
2029	intersection lineation
2030	intersection, cleavage-bedding
2031	intersection, cleavage-cleavage
2032	fault striae
2033	fault grooves
2034	slickensides
2035	mineral growth fibres
2036	mineral lineation
2037	stretching lineation
2038	boudinage axis
2039	rodding
2040	mullions
2041	boudins
2042	glacial striae
2043	glacial grooves
2044	flute, down plunge
2045	flute, up plunge
2999	other, see remarks

Domain Name: Struc_Attitude_Planar_SID

Code	Description
01	inclined, upright
02	inclined, overturned < 180
03	inclined, overturned > 180
04	vertical
05	horizontal
06	inclined
07	horizontal, upright
08	horizontal, overturned
66	not entered
88	undefined

Domain Name: Struc_Generation_SID

Code	Description
01	first
02	second
03	third
04	fourth
05	fifth
10	primary
11	multi-generation
88	undefined
66	not entered

Domain Name: Struc_Method_SID

Code	Description
01	measured at station
02	estimated at station
03	estimated remotely
04	calculated from data
05	calculated from imagery
06	acquired from historical data
66	not entered

Domain Name: Planar_Younging_SID

Code	Description
01	younging known, sedimentary structure
02	younging known, igneous structure
03	younging known, stratigraphic order
04	younging inferred, stratigraphic order
05	younging inferred, bedding-cleavage
06	younging evidence unknown, historical data
07	no younging evidence
99	younging evidence not applicable
66	not entered

Domain Name: Dip_Desc_SID

Code	Description
01	gently inclined (0-30)
02	moderately inclined (31-60)
03	steeply inclined (61-90)
66	not entered
99	not applicable

Domain Name: Sense_Evid_SID

Code	Description
01	asymmetric deformable fibres
02	asymmetric extensional shear bands
03	asymmetric fold
04	asymmetric inclusion trail
05	asymmetric rigid fibres
06	back-rotated swell
07	C/S fabric
08	deflection of foliation
09	foliation fish
10	mineral fibres
11	offset of marker
12	pressure fringes
13	pressure shadows
14	quarter structures
15	quartz fabric
16	rotated porphyroblast
17	sheath folds
18	sigmoid tension gashes
19	striae or grooves
20	winged inclusion
21	winged porphyroclast
22	no sense of motion evidence
66	not entered

Domain Name: Struc_Strain_SID

Code	Description
01	no strain
02	massive
03	weak
04	moderate
05	strong
06	intense
66	not entered

Domain Name: Struc_Flattening_SID

Code	Description
01	S tectonite
03	S>L
04	S>=L
05	S=L
06	S<=L
07	S<L
09	L tectonite
66	not entered
99	not applicable

This annex contains all corporate *Domain Values* not controlled by a *Subtype*. A list of codes and descriptions are presented for each of the *Domain Values*.

Domain Name: ActivityRole_DID

Code	Description
01	Project leader
02	Project co-leader
03	Activity leader
04	Activity co-leader
05	Geologist
06	Bedrock mapper
07	Surficial mapper
08	Assistant geologist
09	Student
10	Master degree student
11	PhD degree student
12	Student supervisor
13	IM specialist
14	GIS specialist
15	Scientific colleague
16	Volunteer

Domain Name: AgeDesignator_DID

Code	Description
Ar	Archean
Cl	Calymmian
Cm	Cambrian
Cb	Carboniferous
Cn	Cenozoic
Ct	Cretaceous
Cy	Cryogenian
Dv	Devonian
Et	Ectasian
Ed	Ediacaran
Ea	Eoarchean
Ec	Eocene
Ha	Hadean
Ho	Holocene
Jr	Jurassic
Ma	Mesoarchean
Mp	Mesoproterozoic
Mz	Mesozoic
Mi	Miocene
Ms	Mississippian
Na	Neoarchean
Ng	Neogene
Np	Neoproterozoic
Og	Oligocene
Od	Ordovician
Os	Orosirian
Pa	Paleoarchean
Pc	Paleocene
Pg	Paleogene
Pp	Paleoproterozoic
Pz	Paleozoic
Pn	Pennsylvanian
Pr	Permian
Ps	Pleistocene
Pi	Pliocene
Pt	Proterozoic
Qt	Quaternary
Rh	Rhyacian
Sd	Siderian
Sl	Silurian
St	Statherian
Se	Stenian
To	Tonian
Tr	Triassic

Domain Name: AgePrefix_DID

Code	Description
early	Early
mid	Mid
late	Late

Domain Name: Boundary_DID

Code	Description
01	no
02	yes

Domain Name: LegendSymbolType_DID

Code	Description

F	Fill
L	Line
L1	Line 1
L2	Line 2
L3	Line 3
L4	Line 4
L5	Line 5
H1	Header 1
H2	Header 2
H3	Header 3
M	Marker Point

Domain Name: NA_DID

Code	Description
99	not applicable

Domain Name: RankTerm_DID

Code	Description
bed	Bed
complex	Complex
formation	Formation
group	Group
lithodem	Lithodem
megasequence	Megasequence
member	Member
not_specified	Rank not specified
sequence	Sequence
subgroup	Subgroup
suite	Suite
supergroup	Supergroup
supersequence	Supersequence
supersuite	Supersuite
not entered	not entered

This annex contains all project related *Domain Values* not controlled by a *Subtype*. A list of codes and descriptions are presented for each of the *Domain Values*.

Domain Name: BooleanTruth_PID

Code	Description
0	No
1	Yes

Domain Name: CartoTheme_PID

Code	Description
geochronology	Geochronology
fossil	Fossil
wells	Wells
drill	Drill Holes
fieldLegacy	Field (Legacy)
mineral_occurences	Mineral Occurrences
gossans	Gossans

Domain Name: LegendItemTheme_PID

Code	Description
mapUnit	Map Unit
geoline	Geoline
geopoint	Geopoint
header	Headers
fieldPoint	Field Stations
cartographicPoint_FieldLegacy	Field (Legacy)

Domain Name: Scale_PID

Code	Description
0	Do not display
1	1:1
66	not entered

Domain Name: SourceRef_PID

Code	Description
1	Geological Survey of Canada
2	historical source
3	undefined source