

GeoNetBC Web Application

User Manual v1.2

DRAFT

Submitted to:

**GeoBC
Ministry of Water, Land and Resource Stewardship**

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PREFACE

This user manual provides an overview of the GeoNetBC public Web Interface functionality and information on the GCMs, Search GCMs, Map, and reporting functionality.

Table 1. Record of Amendments

Version	Description	Revision Made By	Date
1.0	Creation of Document	Caslys Consulting Ltd.	September 2023
1.1	Updates based on development functionality changes	Caslys Consulting Ltd.	March 2024
1.2	Name change from MASCOT to GeoNetBC and updates based on development functionality changes	Caslys Consulting Ltd.	July 2024

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Table 1. Record of Amendments ii

DRAFT

1.0 OVERVIEW

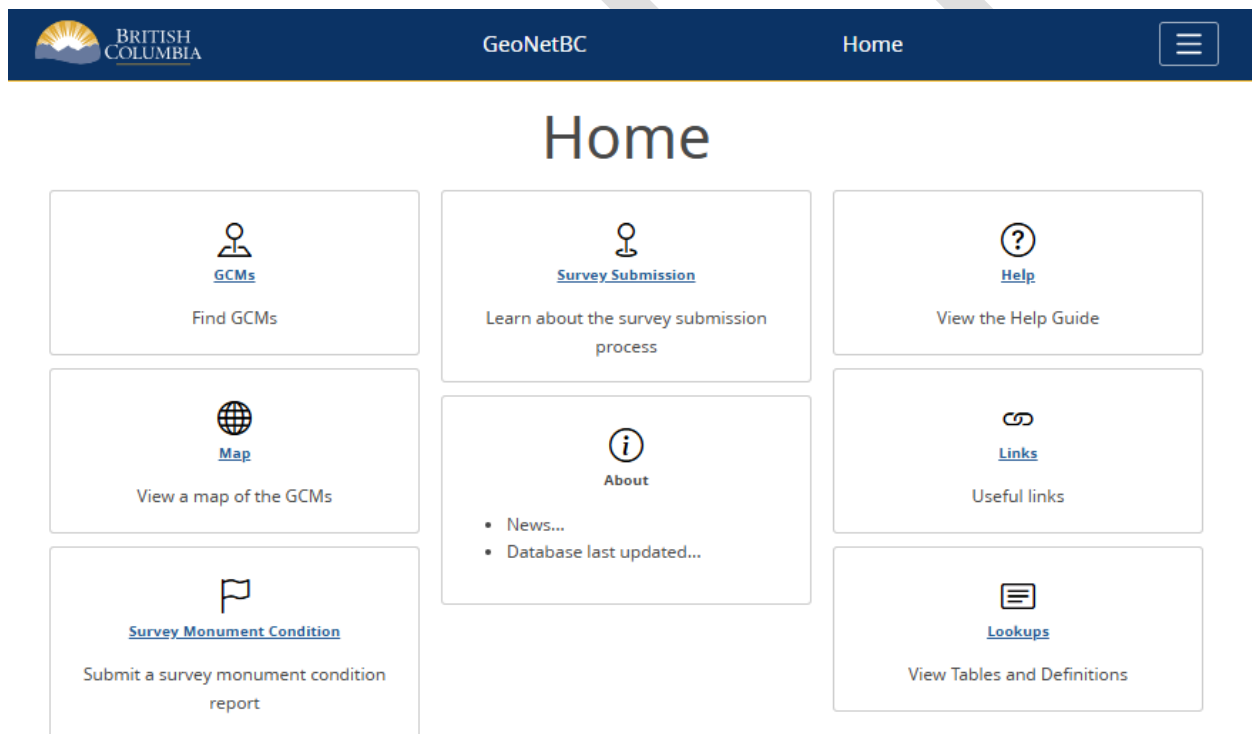
The GeoNetBC (Geodetic Network British Columbia), formerly known as MASCOT (Management of Survey Control Operations & Tasks) system, is a network of over 50,000 survey monuments throughout British Columbia. These monuments are situated within remote valleys or mountains and within urban/rural communities. The system is managed within a database system that stores survey monument data over the last century.

The GeoNetBC Web Application is designed to allow users to have simple and easy access to this monument information that is stored within the GeoNetBC database. The web application is a portal for read-only access and allows users to search, review, map and submit reports.

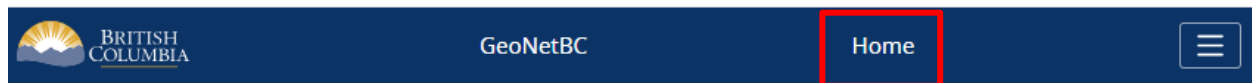
1.1 GeoNetBC Web Application

The web application is designed with a simple 'Home' page (Figure 1) where users can access all the different modules such as GCMs (Geodetic Control Monument), Search, Map, Survey Monument Condition Report, Survey Submission, About, Help, Links and Lookups.

Figure 1. Web Application Overview

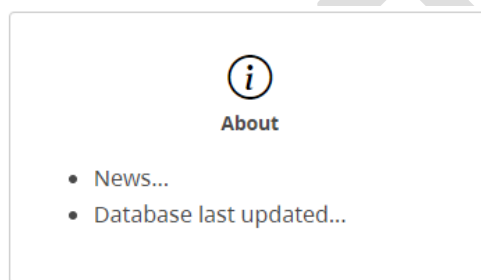


The GeoNetBC Home page is the main navigation page for the application and allows users to navigate to the functionality that they are interested in. Users can click on the blue hyperlink to navigate to a section of the application. Once you are in a particular section, you can navigate back to the main Home page at any point by clicking on the Home button in the top main navigation bar (Figure 2).

Figure 2. Home

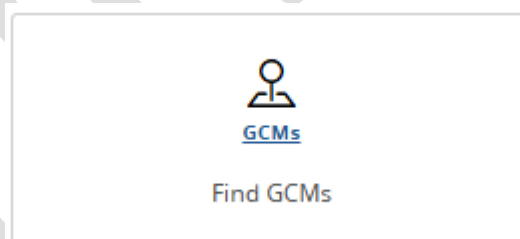
1.2 About

Review the 'About' section to review any updates to the GeoNetBC Database and the Web Application (Figure 3). Any updates will be listed in this section, allowing users to be informed with the latest news as soon as they navigate to the web application.

Figure 3. About

2.0 GCMS

The GCMS module allows users to review the full list of GCMS within the GeoNetBC system. Users can navigate to this module by clicking on the GCMS hyperlink on the Home Page (Figure 4).

Figure 4. GCMS Module

2.1 Search By

Users have multiple options to search and find a specific GCM or groups of GCMS. Users can Search by: GCM or Tablet Marking, Attributes, UTM Coordinates or Latitude and Longitude (Figure 5).

Figure 5. Search GCMs

The screenshot shows the top navigation bar of the GeoNetBC web application with the British Columbia logo, the text 'GeoNetBC', a 'Home' link, and a hamburger menu icon. Below the navigation bar, the heading 'Search By' is followed by four blue rectangular buttons stacked vertically: 'GCM or Tablet Marking', 'Attributes', 'UTM Coordinates', and 'Latitude and Longitude'.

2.1.1 GCM or Tablet Marking

Users can search by GCM or Tablet Marking. Type in a GCM Number or Tablet Marking and click the corresponding 'Search' button (Figure 6).



Figure 6. Search By GCM or Tablet Marking

The screenshot shows the search interface for GCM or Tablet Marking. The top navigation bar is identical to Figure 5. Below it, a 'Search Menu' button is followed by the text 'Search by GCM Number or Tablet Marking'. There are two input fields: 'GCM No' and 'Tablet Marking', each with a corresponding 'Search' button. Below these is a checkbox labeled 'Partial Matching of GCM or Tablet Marking' and a 'Clear' button. The 'Search Results:' section shows a table with columns: Gcm No, Tablet Marking, Municipality, Horiz Method, Vert Method, Latitude, and Longitude. The table body contains a single row with the text 'No Data'.

Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
No Data						

Click the 'Partial Matching of GCM or Tablet Marking' (Figure 7) to make a partial string text match. A full match will return fewer records than a partial match. The partial match returns any number of GCM numbers or Tablet Markings that may meet that criterion. Depending on which 'Search' button is selected will depend on the results returned.

Figure 7. Search by GCM - Partial Match


GeoNetBC
Home


Search Menu

Search by GCM Number or Tablet Marking

GCM No

26

Search

Tablet Marking

Search

☒ Partial Matching of GCM or Tablet Marking

Clear

Search Results: 2348

Warning: Only the top 2000 results are displayed. Refine your search if required.

Download CSV

Download XLSX

Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
26	4089	DAWSON CREEK		SPIRIT LEVELS	55.744833	-120.218001
265	79H0821	POWELL RIVER		SPIRIT LEVELS	49.871704	-124.508449
1263	02H2438	MAPLE RIDGE		SPIRIT LEVELS	49.180689	-122.546163
2261	79H9322	NANAIMO		SPIRIT LEVELS	49.228063	-124.014092
2618	V-2433	VANCOUVER		SPIRIT LEVELS	49.247148	-123.118585
2634	V-2130	VANCOUVER		SPIRIT LEVELS	49.283891	-123.10626
2642	66C165			SPIRIT LEVELS	50.377778	-121.398611
2675	79C603			SPIRIT LEVELS	52.816667	-119.272778
2683	9497	MACKENZIE		SPIRIT LEVELS	55.327936	-123.081438
2691	77H2730	LANGLEY TOWNSHIP		SPIRIT LEVELS	49.17699	-122.67392
3269	87C161			SPIRIT LEVELS	58.834722	-122.859167
4267	68C021			SPIRIT LEVELS	50.882222	-119.550556
5264	554-H			SPIRIT LEVELS	49.405	-120.257778
5926	78H7242	NORTH SAANICH		SPIRIT LEVELS	48.655359	-123.422467
7260	33			NON-SIMUL TRIG	60.000898	-133.370717
8268	86H2033			GPS SAT. POS.	58.018113	-122.240109
9126	86H1949			GPS SAT. POS.	49.602548	-117.205426
10926				SPIRIT LEVELS	49.922259	-125.192467
11262	85H0928	LANGLEY TOWNSHIP		SPIRIT LEVELS	49.147533	-122.629741

Users can export the results into either a .CSV or .XLSX format by clicking the respective button. Users can also change the order of the table by clicking on the small arrow beside any of the column headers. The order will switch from descending or ascending depending on the current sort order.

Adjust the columns available in the table by clicking the three vertical dots to the left of the 'GCM No' column (Figure 8). Users can check columns on and off by scrolling through the list and selecting what they would like to see.

Figure 8. Adjust Columns

Search Results: 1

Download CSV Download XLSX

GCM No.	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
26	<input checked="" type="checkbox"/>	DAWSON CREEK		SPIRIT LEVELS	55.744833	-120.218001

☒ Tablet Marking
☒ Municipality
☒ Horiz Method
☒ Vert Method
☐ Coord Type
☐ Obs Type
☐ Condition
☒ Latitude
☒ Longitude
☐ Utm Easting
☐ Utm Northing
☐ Utm Zone
☐ OrthoHeight
☐ Network Tag
☐ Last Updated Date
☐ Date Installed

Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

Click the 'Clear' button to clear the search and click the 'Search Menu' button to return to the main GCM Search page.

2.1.2 Attributes

Users can search for GCMs based on a set of attributes. The search can be basic or refined depending on the requirements. By default, the search opens with the basic search options (Figure 9). These include: GCM number, Tablet Marking, Integrated Survey Area (ISA) and Municipal Code. The GCM number and Tablet Marking attributes can be a full or partial match. Tablet Marking, ISA and Municipal Code may all be an 'AND' or 'OR' criteria depending on the requirements.

Figure 9. Search by Attribute

Search Menu **Attribute Search**

GCM No ☐ Partial Match

Tablet Marking ☒ Or ☐ Partial Match
☐ And

ISA ☒ Or
☐ And

Municipal Code ☒ Or
☐ And

Search Results:

Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
No Data						

Users can 'Refine' the search by including some additional attributes, click the 'Refine Search' header to review all the additional attributes. Additional attributes include Survey Method, Marker Condition, Coordinate Type and Observation Type (Figure 10).

Figure 10. Attributes -Refine Search

Refine Search			
Method	Marker Condition	Coordinate Type	Obs. Type
<input type="checkbox"/> AIRBORNE LIDAR POINT CLOUD	<input type="checkbox"/> DESTROYED	<input type="checkbox"/> 3D (Horz/Vert)	<input type="checkbox"/> GPS Only
<input type="checkbox"/> DOPPLER SAT.	<input type="checkbox"/> GOOD	<input type="checkbox"/> Federal Bench	<input type="checkbox"/> Terr
<input type="checkbox"/> GNSS RTK	<input type="checkbox"/> INSTALLED	<input type="checkbox"/> Horizontal	<input type="checkbox"/> Terr & GPS
<input type="checkbox"/> GNSS STATIC	<input type="checkbox"/>	<input type="checkbox"/> Provincial Bench	
<input type="checkbox"/> GOOGLE MAPS	INDETERMINATE (PENDING DETERMINATION)		
<input type="checkbox"/> GPS SAT. POS.	<input type="checkbox"/> ANOMALOUS		
<input type="checkbox"/> HANDHELD GPS			
<input type="checkbox"/> INTERFEROMETRY SAR (InSAR)			
<input type="checkbox"/> MACHINE LEARNED AND COMPUTER			
<input type="checkbox"/> NATIONAL DEM			
<input type="checkbox"/> NON-SIMUL TRIG			
<input type="checkbox"/> PRECISE POINT POSITIONING			
<input type="checkbox"/> PROVINCIAL DEM (LIDAR)			
<input type="checkbox"/> SIMUL TRIG LEV			
<input type="checkbox"/> SPIRIT LEVELS			
<input type="checkbox"/> TERRESTRIAL LASER SCANNING			
<input type="checkbox"/> TOTAL STATION			
<input type="checkbox"/> UNKNOWN			
<input type="checkbox"/> UNMANNED AERIAL VEHICLES			

Click the 'Search' button once all the attributes have been defined. Click the 'Refine Search' header to collapse the additional attributes.

Adjust the columns available in the table by clicking the three vertical dots to the left of the 'GCM No' column (Figure 8). Users can check columns on and off by scrolling through the list and selecting what they would like to see.

Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

2.1.3 UTM Coordinates

The UTM Coordinate search allows users to find GCMs based on a bounding box or point and radius. Users toggle between the two options by clicking the corresponding radial button. Depending on which option is selected, the search options will change.

2.1.3.1 Bounding Box

With the bounding box coordinate search, users define the UTM Northwest Corner Easting and Northing, as well as the UTM Southeast Corner Northing and Easting. Users can also define the UTM zone, if known (Figure 11). Note that the search is approximate as the coordinates in the database will be projected on the fly to meet the search criteria.

Figure 11. UTM Coordinate Search – Bounding Box

Search Menu **Coordinate Search**

☒ Bounding Box ☐ Point and Radius

UTM Northwest Corner
Northing: Easting:

UTM Southeast Corner
Northing: Easting: Zone:

Input Coordinates should be in the WGS84 reference system.

Search Results: 17726

Warning: Only the top 2000 results are displayed. Refine your search if required.

Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
42	24-57	VICTORIA		SPIRIT LEVELS	48.439182	-123.367206
59	967004			GPS SAT. POS.	48.611767	-124.746321
166	5183	SURREY		SPIRIT LEVELS	49.060308	-122.75686
364	5598	SURREY		SPIRIT LEVELS	49.139276	-122.879056
398	15-12A	VICTORIA		SPIRIT LEVELS	48.431511	-123.329753
505	77H4644	RICHMOND		SPIRIT LEVELS	49.148294	-123.144806

Users can 'Refine' the search by including some additional attributes, click the 'Refine Search' header to review all the additional attributes. Additional attributes include Survey Method, Marker Condition, Coordinate Type and Observation Type (Figure 12).

Figure 12. Attributes - Refine Search

Refine Search			
Method	Marker Condition	Coordinate Type	Obs. Type
<input type="checkbox"/> AIRBORNE LIDAR POINT CLOUD	<input type="checkbox"/> DESTROYED	<input type="checkbox"/> 3D (Horz/Vert)	<input type="checkbox"/> GPS Only
<input type="checkbox"/> DOPPLER SAT.	<input type="checkbox"/> GOOD	<input type="checkbox"/> Federal Bench	<input type="checkbox"/> Terr
<input type="checkbox"/> GNSS RTK	<input type="checkbox"/> INSTALLED	<input type="checkbox"/> Horizontal	<input type="checkbox"/> Terr & GPS
<input type="checkbox"/> GNSS STATIC	<input type="checkbox"/>	<input type="checkbox"/> Provincial Bench	
<input type="checkbox"/> GOOGLE MAPS	INDETERMINATE (PENDING DETERMINATION)		
<input type="checkbox"/> GPS SAT. POS.	<input type="checkbox"/> ANOMALOUS		
<input type="checkbox"/> HANDHELD GPS			
<input type="checkbox"/> INTERFEROMETRY SAR (InSAR)			
<input type="checkbox"/> MACHINE LEARNED AND COMPUTER			
<input type="checkbox"/> NATIONAL DEM			
<input type="checkbox"/> NON-SIMUL TRIG			
<input type="checkbox"/> PRECISE POINT POSITIONING			
<input type="checkbox"/> PROVINCIAL DEM (LIDAR)			
<input type="checkbox"/> SIMUL TRIG LEV			
<input type="checkbox"/> SPIRIT LEVELS			
<input type="checkbox"/> TERRESTRIAL LASER SCANNING			
<input type="checkbox"/> TOTAL STATION			
<input type="checkbox"/> UNKNOWN			
<input type="checkbox"/> UNMANNED AERIAL VEHICLES			

Users can export the results into either a .CSV or .XLSX format by clicking the respective button. Users can also change the order of the table by clicking on the small arrow beside any of the column headers. The order will switch from descending or ascending depending on the current sort order.

Adjust the columns available in the table by clicking the three vertical dots to the left of the 'GCM No' column (Figure 8). Users can check columns on and off by scrolling through the list and selecting what they would like to see.

Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

Click the 'Clear' button to clear the search and click the 'Search Menu' button to return to the main GCM Search page.

2.1.3.2 Point and Radius

With the Point and Radius search, users define a UTM Coordinate Northing and Easting, define a radius in metres (m) and define the UTM zone (Figure 13). UTM Zone must be defined for this search. Users can refine the search by clicking on the 'Refine Search' header and adding any additional parameters.

Figure 13. UTM Coordinate Search - Point and Radius

Search Menu **Coordinate Search**

☐ Bounding Box ☒ Point and Radius

UTM Coordinate

Northing:
 Easting:
 Radius (m):
 Zone:

Input Coordinates should be in the WGS84 reference system.

Search Results: 22

Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
39495	78C008			SPIRIT LEVELS	49.294722	-124.924722
65029	81H4296			NON-SIMUL TRIG	49.226335	-124.97482
98111	81H4292			NON-SIMUL TRIG	49.299461	-125.033664
104612	805-J			SPIRIT LEVELS	49.289722	-124.903056
109249	81H4284			NON-SIMUL TRIG	49.253899	-125.037389
156562	NO MARKING			SPIRIT LEVELS	49.289722	-124.909722
217372	2089			SPIRIT LEVELS	49.276389	-125.064722

Users can 'Refine' the search by including some additional attributes, click the 'Refine Search' header to review all the additional attributes. Additional attributes include Survey Method, Marker Condition, Coordinate Type and Observation Type. See Figure 12.

Users can export the results into either a .CSV or .XLSX format by clicking the respective button. Users can also change the order of the table by clicking on the small arrow beside any of the column headers. The order will switch from descending or ascending depending on the current sort order.

Adjust the columns available in the table by clicking the three vertical dots to the left of the 'GCM No' column (Figure 8). Users can check columns on and off by scrolling through the list and selecting what they would like to see.

Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

Click the 'Clear' button to clear the search and click the 'Search Menu' button to return to the main GCM Search page.

2.1.4 Latitude and Longitude

The Latitude and Longitude search allows users to find GCMs based on a bounding box or point and radius. Users toggle between the two options by clicking the corresponding radial button. Depending on which option is selected, the search options will change.

2.1.4.1 Bounding Box

With the bounding box coordinate search, users define the Northwest Corner Latitude and Longitude in Degrees Minutes and Seconds, as well as the Southeast Corner Latitude and Longitude in Degrees Minutes and Second (Figure 14).

Figure 14. Latitude and Longitude Coordinate Search – Bounding Box

Search Menu Latitude and Longitude Coordinate Search

☒ Bounding Box ☐ Point and Radius

Northwest Corner

Lat	48	33	33.7	N	Lon	123	36	52.8	W
-----	----	----	------	---	-----	-----	----	------	---

Southeast Corner

Lat	48	24	51.1	N	Lon	123	18	38.5	W
-----	----	----	------	---	-----	-----	----	------	---

i Input Coordinates should be in the WGS84 reference system. ×

Search Results: 3293

Warning: Only the top 2000 results are displayed. Refine your search if required.

Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
42	24-57	VICTORIA		SPIRIT LEVELS	48.439182	-123.367206
398	15-12A	VICTORIA		SPIRIT LEVELS	48.431511	-123.329753
703	24-59	VICTORIA		SPIRIT LEVELS	48.437329	-123.367533
1636	A-138			SPIRIT LEVELS	48.523333	-123.429167
1776	84H0167	ESQUIMALT		SPIRIT LEVELS	48.423389	-123.414603
1875	26-64	VICTORIA		SPIRIT LEVELS	48.434237	-123.338505
2055	88H3927	COLWOOD		SPIRIT LEVELS	48.423879	-123.511449
2410	81H4117	CENTRAL SAANICH		SPIRIT LEVELS	48.558164	-123.435038
2451	A-134			SPIRIT LEVELS	48.5275	-123.418056
2485	80H3062	SAANICH		SPIRIT LEVELS	48.49096	-123.427501

Users can 'Refine' the search by including some additional attributes, click the 'Refine Search' header to review all the additional attributes. Additional attributes include Survey Method, Marker Condition, Coordinate Type and Observation Type (Figure 15).

Figure 15. Attributes - Refine Search

Refine Search			
Method	Marker Condition	Coordinate Type	Obs. Type
<input type="checkbox"/> AIRBORNE LIDAR POINT CLOUD	<input type="checkbox"/> DESTROYED	<input type="checkbox"/> 3D (Horz/Vert)	<input type="checkbox"/> GPS Only
<input type="checkbox"/> DOPPLER SAT.	<input type="checkbox"/> GOOD	<input type="checkbox"/> Federal Bench	<input type="checkbox"/> Terr
<input type="checkbox"/> GNSS RTK	<input type="checkbox"/> INSTALLED	<input type="checkbox"/> Horizontal	<input type="checkbox"/> Terr & GPS
<input type="checkbox"/> GNSS STATIC	<input type="checkbox"/>	<input type="checkbox"/> Provincial Bench	
<input type="checkbox"/> GOOGLE MAPS	INDETERMINATE (PENDING DETERMINATION)		
<input type="checkbox"/> GPS SAT. POS.	<input type="checkbox"/> ANOMALOUS		
<input type="checkbox"/> HANDHELD GPS			
<input type="checkbox"/> INTERFEROMETRY SAR (InSAR)			
<input type="checkbox"/> MACHINE LEARNED AND COMPUTER			
<input type="checkbox"/> NATIONAL DEM			
<input type="checkbox"/> NON-SIMUL TRIG			
<input type="checkbox"/> PRECISE POINT POSITIONING			
<input type="checkbox"/> PROVINCIAL DEM (LiDAR)			
<input type="checkbox"/> SIMUL TRIG LEV			
<input type="checkbox"/> SPIRIT LEVELS			
<input type="checkbox"/> TERRESTRIAL LASER SCANNING			
<input type="checkbox"/> TOTAL STATION			
<input type="checkbox"/> UNKNOWN			
<input type="checkbox"/> UNMANNED AERIAL VEHICLES			

Users can export the results into either a .CSV or .XLSX format by clicking the respective button. Users can also change the order of the table by clicking on the small arrow beside any of the column headers. The order will switch from descending or ascending depending on the current sort order.

Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

Click the 'Clear' button to clear the search and click the 'Search Menu' button to return to the main GCM Search page.

2.1.4.2 Point and Radius

With the Point and Radius search, users define a define Latitude and Longitude in Degrees, Minutes, and Seconds, and define a radius in metres (m) (Figure 16). Users can refine the search by clicking on the 'Refine Search' header and adding any additional parameters.

Figure 16. Latitude and Longitude Coordinate Search – Point and Radius

Search Menu Latitude and Longitude Coordinate Search

☐ Bounding Box ☒ Point and Radius

Point Coordinate

Lat	48	33	33.7	N	Lon	123	36	52.8	W
-----	----	----	------	---	-----	-----	----	------	---

Radius (m) 10000

i Input Coordinates should be in the WGS84 reference system. ×

Search Results: 74

Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
6114	91H0476			SPIRIT LEVELS	48.585009	-123.523343
23333	91H0478			SPIRIT LEVELS	48.586141	-123.521213
53850	73HA567			SPIRIT LEVELS	48.529722	-123.504167
74443	72C111			SPIRIT LEVELS	48.546389	-123.568056
121764	94C286			SPIRIT LEVELS	48.5575	-123.571667
129403	91H0473			SPIRIT LEVELS	48.593358	-123.526103
166553	94C301			SPIRIT LEVELS	48.648611	-123.625
189175	73H2131			SPIRIT LEVELS	48.5754	-123.488616
196279	94C283			SPIRIT LEVELS	48.513056	-123.555833
202408	99H2266			GPS SAT. POS.	48.510335	-123.725914

Users can 'Refine' the search by including some additional attributes, click the 'Refine Search' header to review all the additional attributes. Additional attributes include Survey Method, Marker Condition, Coordinate Type and Observation Type (See Figure 15).

Users can export the results into either a .CSV or .XLSX format by clicking the respective button. Users can also change the order of the table by clicking on the small arrow beside any of the column headers. The order will switch from descending or ascending depending on the current sort order.

Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

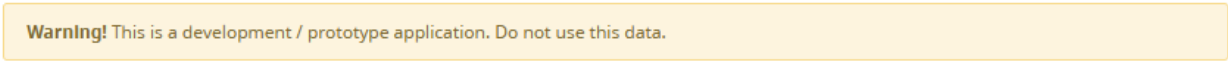
Click the 'Clear' button to clear the search and click the 'Search Menu' button to return to the main GCM Search page.

2.2 GCM Details

As indicated in the previous section, there are a lot of details provided for each GCM record. Some monuments have been surveyed multiple times throughout the history of the GeoNetBC system. The status of the monument changes over time, as do the horizontal and vertical coordinate systems with changing epochs and reference systems. The following sections review specific types of information that are provided by GeoNetBC and describes the details of these.

Currently, the application is still in development, therefore at the top of the page a Warning! Message states to not use the data while the application is in development/prototype (Figure 17). This warning will be removed once the application is in Production.

Figure 17. Warning!



Warning! This is a development / prototype application. Do not use this data.

Users can navigate to the GCMs map location by clicking the map icon at the top right corner of the details page. This button navigates the user to the GeoNetBC iMap location in a new web browser. Users can also print the details page of the GCM by clicking the print icon, a print form opens and users can utilize the workstations printer settings to output the report as required (Figure 18).

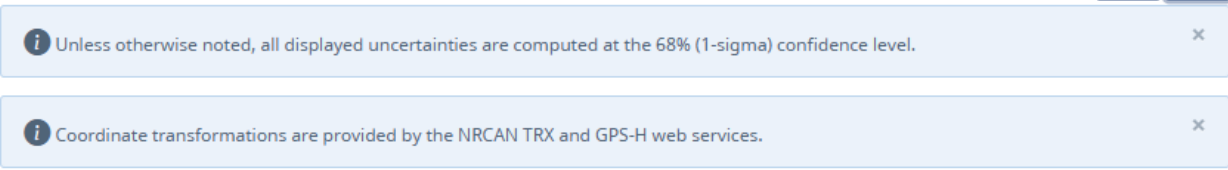
Figure 18. iMap and Printing

GCM No: 26



Note that there are two additional notes (Figure 19); all displayed certainties are at 68% and Coordinate transformations are provided by NRCAN TRX and GPS-H web services. This provides the necessary information for users to understand the data and functionality as provided in the web application.

Figure 19. Notes



Unless otherwise noted, all displayed uncertainties are computed at the 68% (1-sigma) confidence level.

Coordinate transformations are provided by the NRCAN TRX and GPS-H web services.

The GCMs details are separated out into multiple sections. Users can click on any of the headers to expand or collapse sections based on their interest (Figure 20). By default, all sections are expanded to show the full details.

The GCM details include information about the GCM's status and locational information, Coordinate information as observed, as well as coordinate transformations as provided by the NRCAN TRX and GPS-H web services. Location Details, Survey Connections, Marker History, any non-coordinate revisions, historical or other marker

names, current and historical marker conditions, marker classification comments and any photos or diagrams. The following sections describe these in more detail.

Figure 20. GCM Details

Status	⌵
Observed Values	⌵
Coordinate Transformations	⌵
Location Details	⌵
Survey Connections	⌵
Marker History	⌵
Non-Coordinate Revisions	⌵
Historical/Other Marker Names	⌵
Current/Historical Marker Condition	⌵
Current Marker Classification Comment	⌵
Photos and Diagrams	⌵

2.2.1 Status

The status of the GCM, Figure 21, provides the current condition of the marker, tablet marking, municipality, Integrated Survey Area (ISA) code and name, Network Tag, when the marker was installed and the last date the marker was updated. Today's date is also provided on the page so that if a report is generated, users have the specific date of this snapshot in time.


Figure 21. GCM Status

Status				⌵
Tablet Marking		Condition		Condition Date
4089		GOOD		1991-01-01
Municipality		ISA Code	ISA	Network Tag
DAWSON CREEK		2	DAWSON CREEK	
Date of Marker Installation		Date of Last Update		Date of this Printing
1967-01-01		2006-04-11		2024-07-04

2.2.2 Observed Values

The last surveyed horizontal and vertical coordinate information, as observed, are displayed within the 'Observed Values' section (Figure 22). These can be helpful for users to view observed values and the coordinate transformation at the same time to observe any changes.

Figure 22. GCM Details - Observed Values

Observed Values 

Horizontal

Latitude				Longitude			
D	M	S	σ	D	M	S	σ
55	44	41.399552	0.040	120	13	4.802422	0.037

Integration Status

Class

Datum

Date

INTEGRATED

?

3

?

NAD83(CSR) 4.0.0.BC.1

2006-03-21

Vertical

Orthometric Elevation - H	Integration Status	Survey Method	Datum	Date
656.365 m	INTEGRATED	SPIRIT LEVELS	CVD28BC	1984-06-01

All Levelling Data

Vert Datum	Height (H) - m	Order	Method	Observed On	Proj No.
CGVD28	656.365		SPIRIT LEVELS	1984-06-01	84054

2.2.3 Coordinate Transformations

By default, the page provides the last surveyed horizontal and vertical coordinate information for the GCM. The geographic coordinates would be displayed by default as shown in Figure 23. Users can adjust a set of dropdowns to adjust the Type of Coordinates, Reference Frame, Vertical Datum, Geoid, and Epoch. Users can adjust each of the drop downs individually to determine changes in values with these different options.

Figure 23. Coordinate Transformation – Geographic

Coordinate Transformations

Coordinates	Reference Frame	Vertical Datum	Geoid	Epoch
Geographic	NAD83(CSR)	CGVD28	HT2_1997	2002.0 *
* adjustment year				

Transformed Coordinates and Heights

Latitude			Longitude		
D	M	S	D	M	S
55	44	41.399552	120	13	4.802422

Orthometric Elevation - H	Ellipsoidal Height - h	Geoid Undulation - N
656.365 m	641.467 m	-14.898 m

Velocities

V ϕ (mm/y)	V λ (mm/y)	V h (mm/y)
-0.03	2.18	1.10

i The velocities are interpolated from the national Velocity Grid version 7.0.

When users change between Coordinate systems, then the available parameters change on the form. When the geographic coordinates are displayed, the coordinates are displayed in Degree Minutes Seconds. However, if UTM is chosen, the coordinates are shown in Easting/Northing with UTM Zone (Figure 24).

Figure 24. Coordinate Transformation – UTM

Coordinate Transformations				
Coordinates	Reference Frame	Vertical Datum	Geoid	Epoch
UTM	NAD83(CSRs)	CGVD28	HT2_1997	2002.0 *
* adjustment year				
Transformed Coordinates and Heights				
Easting (metres)	Northing (metres)		Zone	
674623.543	6181185.987		UTM10	
Scale	Combined		Convergence	
0.99997404	0.99987361		-2° 18' 0.02"	
Orthometric Elevation - H	Ellipsoidal Height - h		Geoid Undulation - N	
656.365 m	641.467 m		-14.898 m	
Velocities				
Vφ (mm/y)	Vλ (mm/y)		Vh (mm/y)	
-0.03	2.18		1.10	
<i>i</i> The velocities are interpolated from the national Velocity Grid version 7.0.				

If Cartesian is chosen (Figure 25), the coordinates are shown in X/Y.

Figure 25. Coordinate Transformation – Cartesian

Coordinate Transformations				
Coordinates	Reference Frame	Vertical Datum	Geoid	Epoch
Cartesian	NAD83(CSRs)	CGVD28	HT2_1997	2002.0 *
* adjustment year				
Transformed Coordinates and Heights				
X (metres)	Y (metres)			
-1811205.603	-3109715.153			
Orthometric Elevation - H	Ellipsoidal Height - h		Geoid Undulation - N	
656.365 m	641.467 m		-14.898 m	
Velocities				
Vφ (mm/y)	Vλ (mm/y)		Vh (mm/y)	
1.56	-1.65		0.89	
<i>i</i> The velocities are interpolated from the national Velocity Grid version 7.0.				

2.2.4 Velocities

Velocity information is also provided, Figure 26; these are interpolated from the national Canadian Velocity Grid (CVG). The version is provided as a note within the section.

Figure 26. Velocity

Velocities		
V ϕ (mm/y)	V λ (mm/y)	V h (mm/y)
1.56	-1.65	0.89

i The velocities are interpolated from the national Velocity Grid version 7.0.

2.2.5 Location Details

The location details include the marker type information and the marker location description. The location is as described by the surveyor at the time the last survey completed. A general overview map with current GCM as the centre red point and any GCMs are identified within the survey connections in blue points (Figure 27).

Figure 27. Marker Type Details

Location Details

Marker Type
TYPE 2 STANDARD ROCK POST SET IN ROCK

Marker Location
SIT. IN DAWSON CREEK, ON S. SIDE OF 116 AVE. AT JUNCTION WITH C/L OF 6 ST. A.M. BARBER & D.E. WATSON CONTROL SURVEY 1967. McElhanney (A. Petzold) control survey 1991. MKD. BY B.B., UNDER IRON COVER.

2.2.6 Survey Connections

During each survey, a monument is surveyed in accordance with a set of monuments within the network. The calculations between the selected GCM and other monuments are calculated based on a set of attributes, as observed, that are then passed along to the NRCAN web service. The list of survey connections by default are ordered by distance; however, the table order can be changed by the user depending on what they would like to

see. The table (Figure 28) shows the GCM to which the selected GCM was calculated to, the tablet marking of the GCM, survey method, distance, distance standard deviation, bearing, bearing standard deviation, standard deviation PPM and T-t Corr.

Figure 28. Survey Connections

Survey Connections									
From ...	To Gcm	Tablet M...	Surv. Me...	Distance...	σ (m) - Di...	σ (PPM) -...	Bearing ...	σ (s) - Be...	T-t Corr.(s...
26	45922	4003	Terr	5248390.680	0.003		272 22' 32.52"	2	0.01
45922	26	4003	Terr	5248390.680	0.003		92 22' 13.08"	2	0.01
26	185611	4046	Terr	5248393.139	0.004		89 53' 26.52"	1.9	0.01
185611	26	4046	Terr	5248393.139	0.004		269 53' 52.8"	1.9	0.01
26	808741	4088	Terr	5248393.601	0.004		359 52' 0.48"	2.3	0.01
808741	26	4088	Terr	5248393.601	0.004		179 52' 0.48"	2.3	-0.16

It may take some time to load the survey connections, you may notice a 'Loading...' message. Wait for this to complete (Figure 29).

Figure 29. Survey Connections - Loading...

Survey Connections									
Loading...									
From ...	To Gcm	Tablet M...	Surv. Me...	Distance...	σ (m) - Di...	σ (PPM) -...	Bearing ...	σ (s) - Be...	T-t Corr.(s...
No Data									

Once the survey connections are displayed, users can click the three vertical dots beside the 'From GCM No' column to adjust the columns visible in the table. Users can scroll through the list and turn columns on and off by checking the box beside the column name (Figure 30).

Figure 30. Survey Connections - Adjust Columns

Survey Connections									
From ...	To Gcm	Tablet M...	Surv. Me...	Distance...	σ (m) - Di...	σ (PPM) ~...	Bearing ...	σ (s) - Be...	T-t Corr.(s...
<input checked="" type="checkbox"/> From Gcm		4088	Terr	352.308	0.004		359 52' 0.48"	2.3	0.01
<input checked="" type="checkbox"/> To Gcm		4088	Terr	352.308	0.004		179 52' 0.48"	2.3	-0.16
<input checked="" type="checkbox"/> Tablet Marking		4003	Terr	413.083	0.003		272 22' 32.52"	2	0.01
<input checked="" type="checkbox"/> Surv. Meth.		4003	Terr	413.083	0.003		92 22' 13.08"	2	0.01
<input checked="" type="checkbox"/> Distance (m)		4046	Terr	552.299	0.004		89 53' 26.52"	1.9	0.01
<input type="checkbox"/> Distance (m) Ellipsoid		4046	Terr	552.299	0.004		269 53' 52.8"	1.9	0.01
<input checked="" type="checkbox"/> σ (m) - Dist.									
<input checked="" type="checkbox"/> σ (PPM) - Dist.									
<input type="checkbox"/> Bearing °									
<input checked="" type="checkbox"/> Bearing DMS									
<input checked="" type="checkbox"/> σ (s) - Bearing									
<input checked="" type="checkbox"/> T-t Corr.(s) - Bearing									
<input type="checkbox"/> Proj. No.									
<input type="checkbox"/> Proj. Approved On									
<input type="checkbox"/> Height h (m)									
					Horiz.	Vert.			
					84054	84054			
					1984-06-01	1984-06-01			
					6152				
					2006-03-21				
					98150				
					1998-05-07				

2.2.7 Marker History

This section lists the originating project for both horizontal and vertical, and then the horizontal and vertical projects completed for the selected GCM. The table, shown in Figure 31, is ordered by date, with the originating project at the top (the oldest date) and then the most recent projects ordered from most recent.

Figure 31. Marker History

Marker History		
	Horiz.	Vert.
Originating Project #	84054	84054
Date	1984-06-01	1984-06-01
Revision Project #	6152	
Date	2006-03-21	
Revision Project #	98150	
Date	1998-05-07	
Revision Project #	93103	
Date	1993-11-03	

2.2.8 Non-Coordinate Revisions

This section displays any non-coordinate revisions (Figure 32), these are revisions based on geoid upgrades or other revisions that are not related to actual survey submissions. Typically, these are completed by the Province and generic in nature. For example, in 2006, a section of monuments had their geoid updated from HT97 to HTV2.0.

Figure 32. Non-Coordinate Revisions

Non-Coordinate Revisions	
First Marker Location Description Date:	1984-06-01
2006-04-11	GEOID HT97 REPLACED WITH HTV2.0
1998-03-19	GEOID GSD91 REPLACED WITH HT97

2.2.9 Historical/Other Marker Names

This section lists other known names for the selected monument, see Figure 33. These include Canadian Survey Database (CSDB) ID and name, national geodetic database name (NGDB).

Figure 33. Historical/Other Markers

Historical/Other Marker Names	
CSDB ID	CSDB Name
67H4089	POST 4089
NGDB ID	NGDB Name

2.2.10 Current/Historic Marker Condition

This section displays all the marker conditions recorded for the selected GCM, as shown in Figure 34. These are ordered by the most recent first, with any older conditions listed in order from newest to oldest.

Figure 34. Current/Historic Marker Condition

Current/Historical Marker Condition		
Update date	Comment	Date
1993-11-03	GOOD	1991-01-01

2.2.11 Current Marker Classification Comment

This section lists additional horizontal and vertical coordinate details, such as the shift azimuth and shift distance between previous surveys (Figure 35). These are separated by Horizontal/Vertical and ordered by newest date to oldest, and include additional comments, which may describe the values in greater detail.


Figure 35. Current Marker Classification Comment

Current Marker Classification Comment			
Horizontal			
Completion Date	Shift Azi.	Shift Dist.	Comment
2006-03-21	267° 48' 41.00"	0.203	NAD83 PROV. REFRESH 2005 ON CAN. SPATIAL REF. SYS.
1998-05-07	304° 20' 41.00"	0.183	NAD83 PROV. REFRESH 1998 ON CAN. SPATIAL REF. SYS.
1993-11-03	334° 58' 25.00"	226.435	NAD83 WESTERN CANADA OCT/93 ADJUSTMENT VALUES
1984-06-01	0° 0' 0.00"	0	FINAL NAD27 VALUES - PERMANENTLY RETIRED
Vertical			
Completion Date	Shift Elev.	Comment	
1984-06-01	0		

2.2.12 Photos

The most recent images of the selected GCM are listed in the Photos section (Figure 36). These provide the captures of the monument at the time that the GCM was observed.

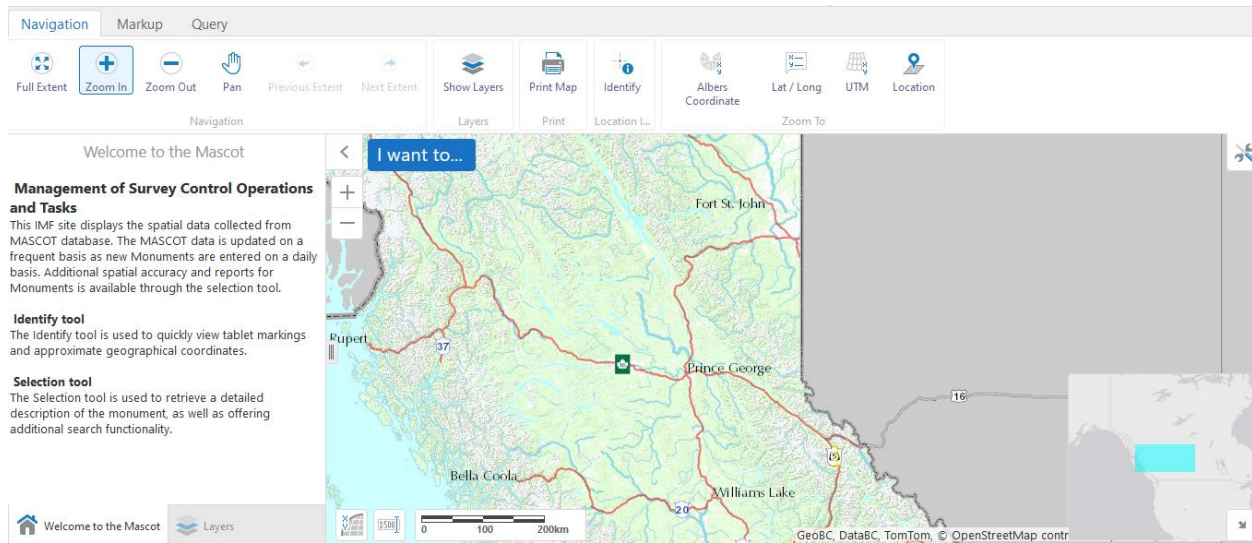
Figure 36. Photos

Photos and Diagrams				
Photo	Name	Description	Date	Diagram
	26.gif			Yes

3.0 MAP

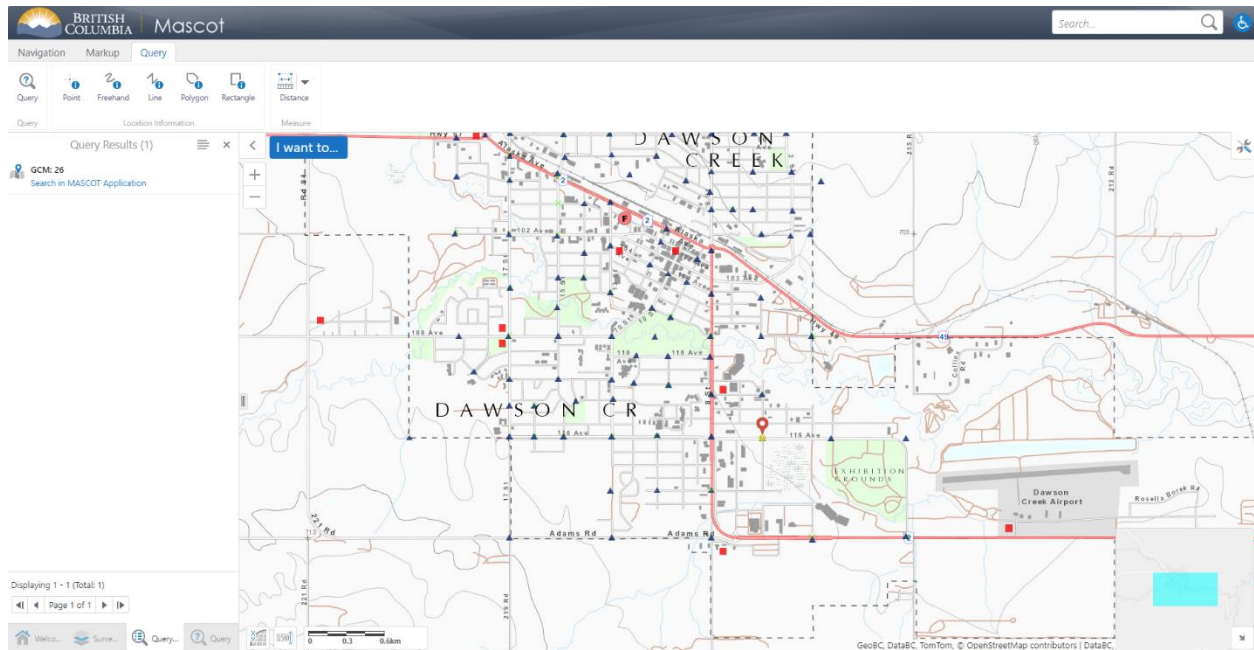
The Map link on the Home page links directly to the GeoNetBC Web Application and provides a direct link to the GeoNetBC iMap Viewer (Figure 37). By default, the map opens to the full extent of the province. Users can zoom into areas, turn on/off layers or define queries to find specific monuments. There are several built-in tools available for users. Only basic information is available for each GCM; however, if users require more, they will be directed back to the GeoNetBC web application.

Figure 37. Map



The Map Viewer is a map application that allows users to query out specific GCMs based on a spatial extent. There are several tools that can help users query monuments by attributes or spatial extent. See Figure 38.

Figure 38. Map Query



4.0 SURVEY MONUMENT CONDITION

The Survey Monument Condition Module (Figure 39) provides details on the specific instructions and file specifications for submitting condition reports.

Figure 39. Monument Condition Reports

Monument Condition Reports

The marker condition report describes the physical condition of markers. To update the condition of a specific monument or sets of monuments, users download the Monument Condition Report template. The template is a MS Excel template that allows users to report on a single monument or multiple monuments.

Instructions:

1. Click the download link and download the file to your local workstation.
2. Fill in all monument information. This includes the GCM number, tablet marking, project number (if known), new marker condition code, marker condition comments, the data and local description of the monument.
3. Refer to the Data Dictionary for specific details for each column.
4. Email the completed 'Monument Condition Report' to: GeoBCinfo@gov.bc.ca

Downloads

[Download Condition Report template](#)

DRAFT

5.0 SURVEY SUBMISSION

The Survey Submission Module (Figure 40) provides details on the specific instructions and file specifications for submitting survey monument data.

Figure 40. Survey Data Submission

Survey Data Submission

The monument attributes and survey connections reports describe the monuments geodetic coordinates and its connections to other monuments. To submit a geodetic project with monument attributes and survey connections, surveyors must provide both monuments and survey connections. The vertical and horizontal coordinate information will have undergone adjustments and will be final. The templates are MS Excel templates that allows users to report on a group of monuments for a project.

Instructions:

1. Click the download links and download each of the files to your local workstation.
2. Fill in all the monument information as specified. This includes the GCM number, tablet marking, project number, location description and all the required vertical and horizontal coordinate information. Note that if the project is either a vertical or horizontal project, then provide only that information, if the project is 3D then provide both.
3. Refer to the 'Data Dictionary' and 'Data LUT Values' worksheets for additional details with regards to columns and data codes. Specific columns have drop down menus enabled for efficient data entry.
4. Email the completed 'Monument Attributes and Survey Connections Reports' to: GeoBCinfo@gov.bc.ca

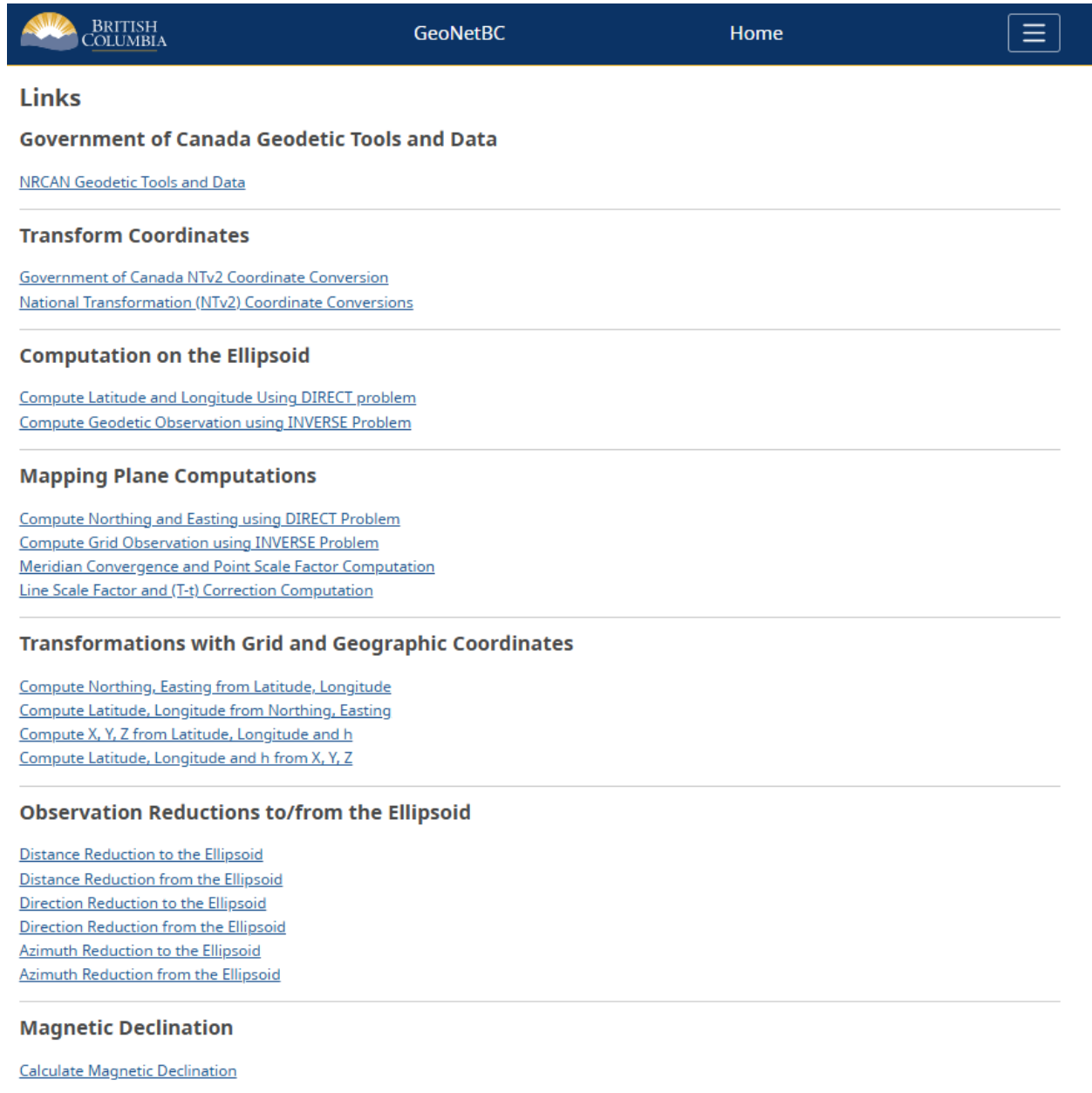
Downloads

[Download Monuments template](#)
[Download Connections Template](#)

6.0 LINKS

The 'Links' tab (Figure 41) provides links to specific geodetic tools or resources that may be beneficial to users.

Figure 41. Links



Links

Government of Canada Geodetic Tools and Data

[NRCAN Geodetic Tools and Data](#)

Transform Coordinates

[Government of Canada NTv2 Coordinate Conversion](#)
[National Transformation \(NTv2\) Coordinate Conversions](#)

Computation on the Ellipsoid

[Compute Latitude and Longitude Using DIRECT problem](#)
[Compute Geodetic Observation using INVERSE Problem](#)

Mapping Plane Computations

[Compute Northing and Easting using DIRECT Problem](#)
[Compute Grid Observation using INVERSE Problem](#)
[Meridian Convergence and Point Scale Factor Computation](#)
[Line Scale Factor and \(T-t\) Correction Computation](#)

Transformations with Grid and Geographic Coordinates

[Compute Northing, Easting from Latitude, Longitude](#)
[Compute Latitude, Longitude from Northing, Easting](#)
[Compute X, Y, Z from Latitude, Longitude and h](#)
[Compute Latitude, Longitude and h from X, Y, Z](#)

Observation Reductions to/from the Ellipsoid

[Distance Reduction to the Ellipsoid](#)
[Distance Reduction from the Ellipsoid](#)
[Direction Reduction to the Ellipsoid](#)
[Direction Reduction from the Ellipsoid](#)
[Azimuth Reduction to the Ellipsoid](#)
[Azimuth Reduction from the Ellipsoid](#)

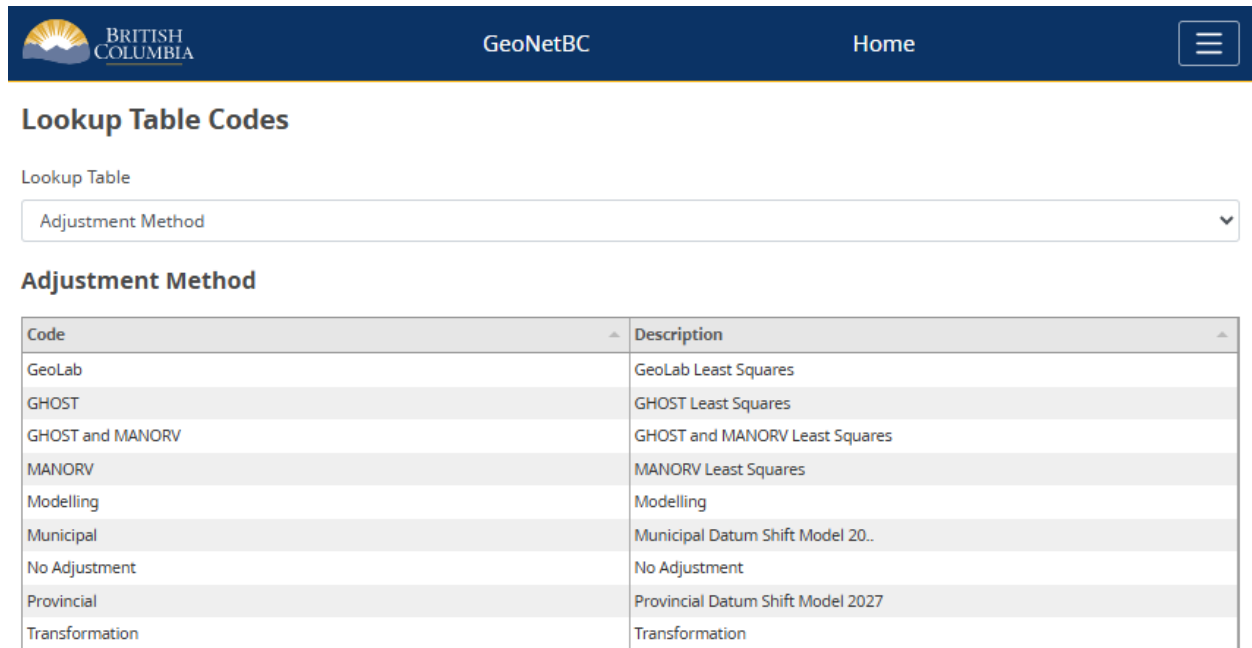
Magnetic Declination

[Calculate Magnetic Declination](#)

7.0 LOOKUPS

The 'Lookups' tab provides a drop-down of Lookup Table categories and the associated Lookup Table Code and Description from the database. An example of one of the Lookup Table categories, 'Adjustment Method' is depicted in Figure 42.

Figure 42. Lookups



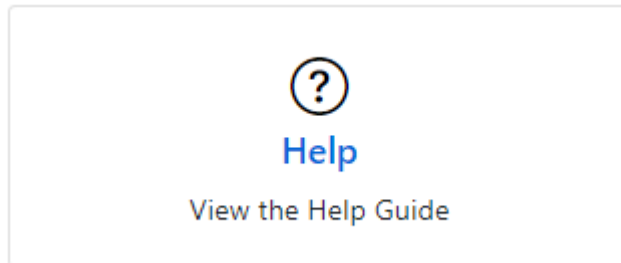
The screenshot shows the GeoNetBC web application interface. At the top is a dark blue header with the British Columbia logo, 'GeoNetBC' text, a 'Home' link, and a menu icon. Below the header, the page title 'Lookup Table Codes' is displayed. A 'Lookup Table' dropdown menu is set to 'Adjustment Method'. Below this, the 'Adjustment Method' section contains a table with two columns: 'Code' and 'Description'.

Code	Description
GeoLab	GeoLab Least Squares
GHOST	GHOST Least Squares
GHOST and MANORV	GHOST and MANORV Least Squares
MANORV	MANORV Least Squares
Modelling	Modelling
Municipal	Municipal Datum Shift Model 20..
No Adjustment	No Adjustment
Provincial	Provincial Datum Shift Model 2027
Transformation	Transformation

8.0 HELP

The Help module, Figure 43, allows users to easily view the latest User Manual with the click of a button, rather than having to find the document in the document's library.

Figure 43. Help



Click on the blue 'Help' hyperlink to have the PDF copy (Figure 44) of the User Manual to open in a new web browser.

Figure 44. User Manual

