GeoNetBC
Web Application

User Manual v1.2

DRAFT

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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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1.0 OVERVIEW

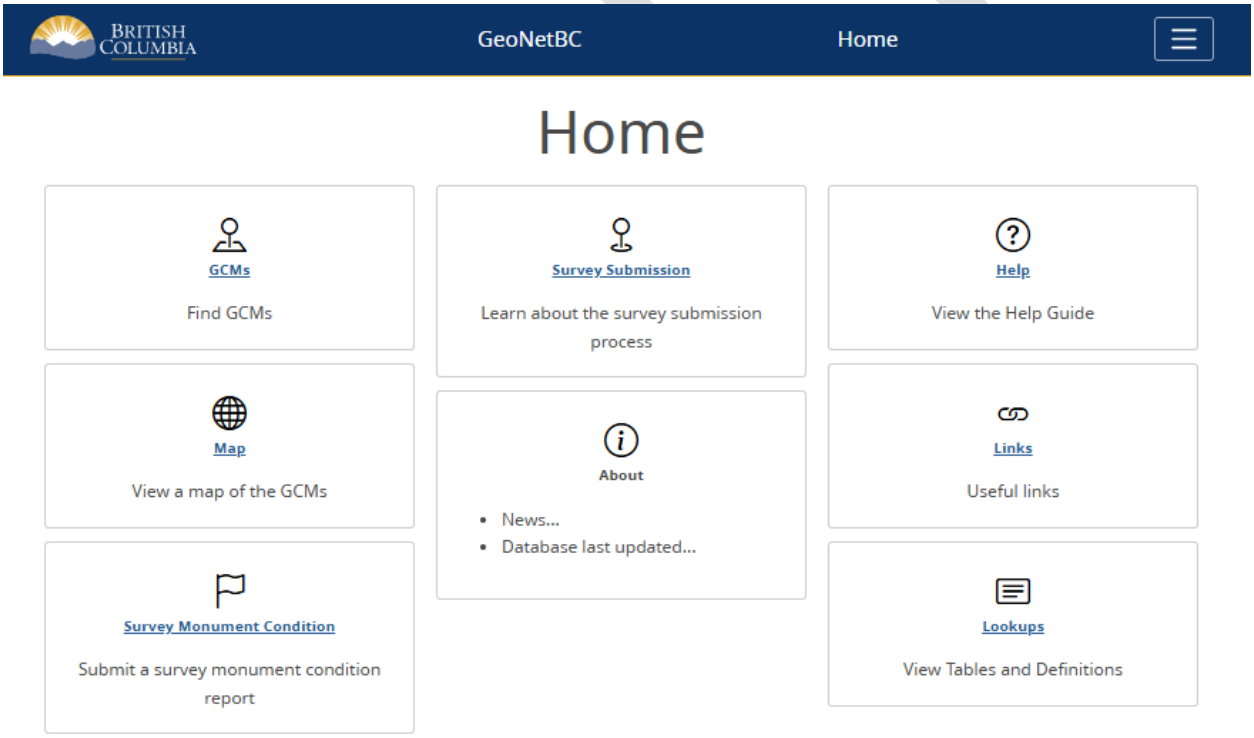
The GeoNetBC (Geodetic Network British Columbia), formerly known as MASCOT (Management of Survey Control Operations & Tasks) system, is a network of over 50,000 survey monuments throughout British Columbia. These monuments are situated within remote valleys or mountains and within urban/rural communities.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



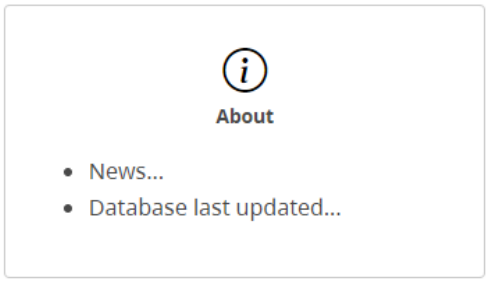
The GeoNetBC Home page is the main navigation page for the application and allows users to navigate to the functionality that they are interested in. Users can click on the blue hyperlink to navigate to a section of the application. Once you are in a particular section, you can navigate back to the main 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

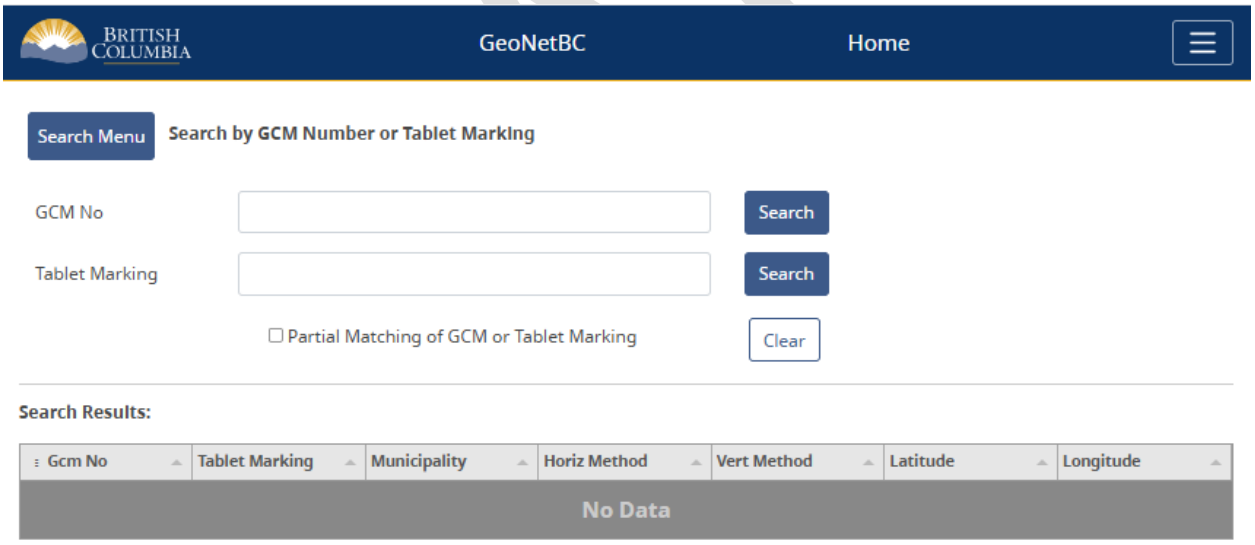
Users have multiple options to search and find a specific GCM or groups of GCMs. Users can Search by: GCM or Tablet Marking, Attributes, UTM Coordinates or Latitude and Longitude (Figure 5).

Figure 5. Search GCMs

2.1.1 GCM or Tablet Marking

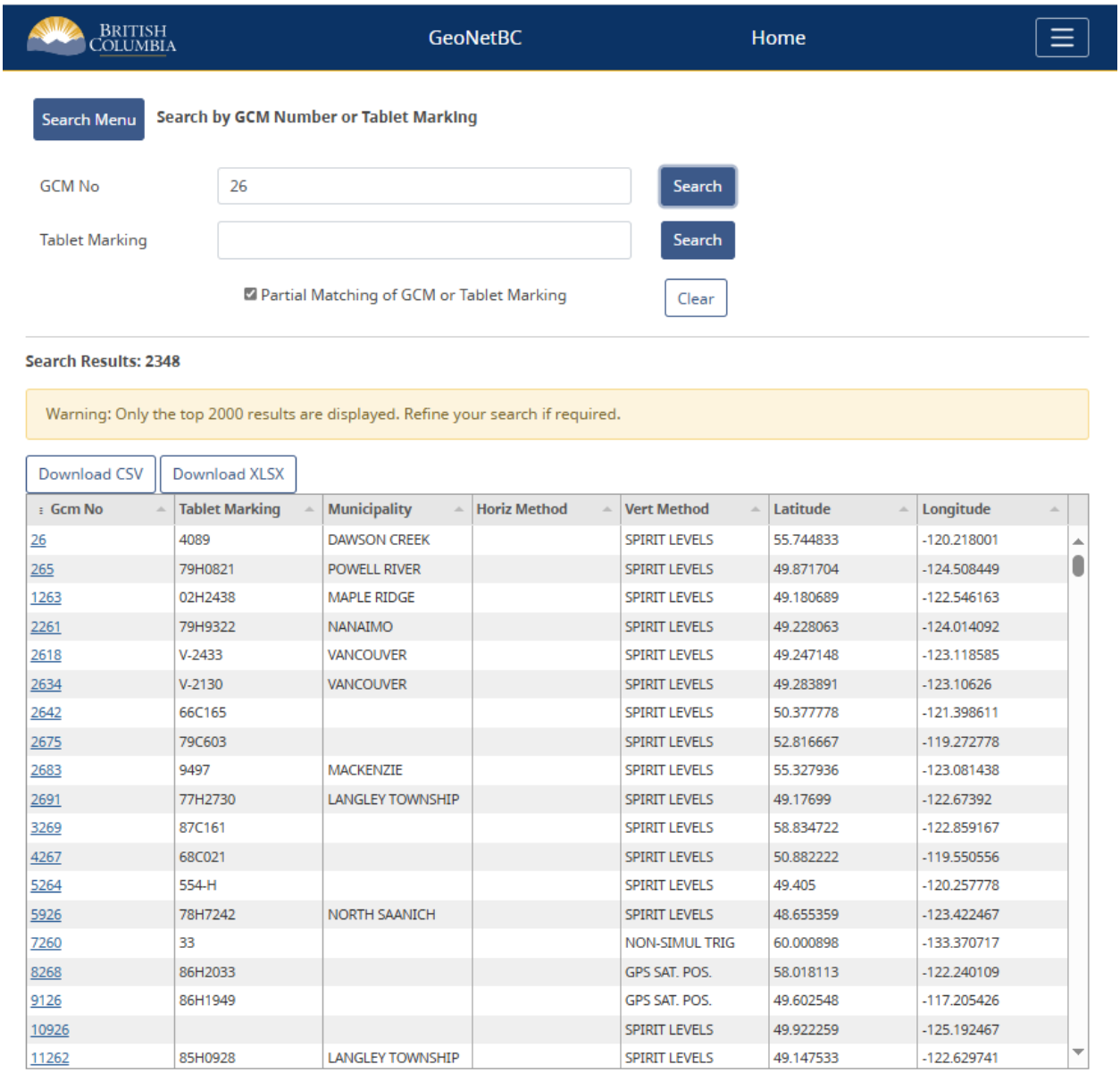
Users can search by GCM or Tablet Marking. Type in a GCM Number or Tablet Marking and click the corresponding 'Search' button (Figure 6).

Figure 6. Search By GCM or Tablet Marking



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

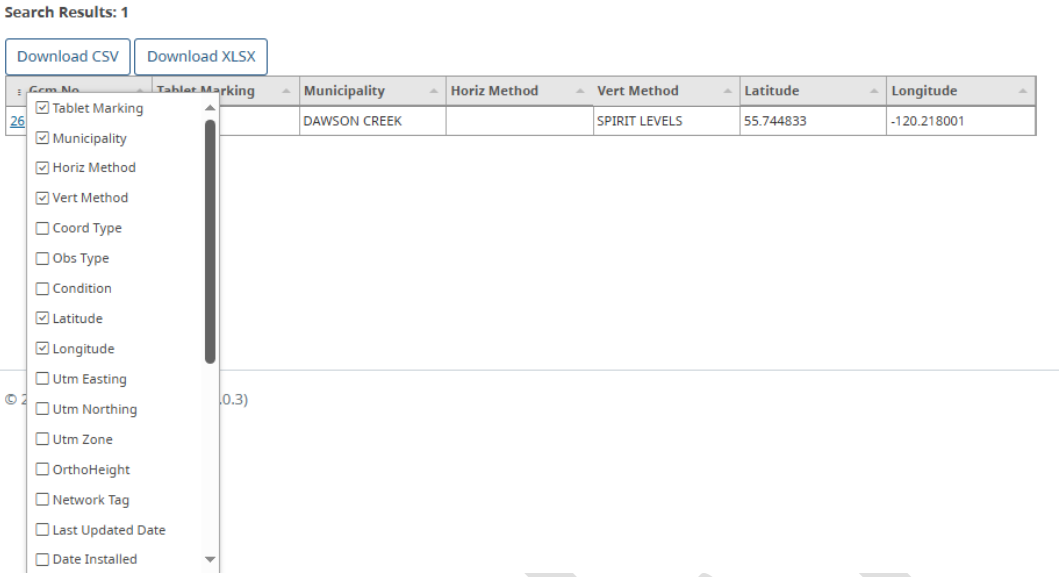


Gcm No	Tablet Marking	Municipality	Horiz Method	Vert Method	Latitude	Longitude
26	4089	DAWSON CREEK		SPIRIT LEVELS	55.744833	-120.218001
265	79H0821	POWELL RIVER		SPIRIT LEVELS	49.871704	-124.508449
1263	02H2438	MAPLE RIDGE		SPIRIT LEVELS	49.180689	-122.546163
2261	79H9322	NANAIMO		SPIRIT LEVELS	49.228063	-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



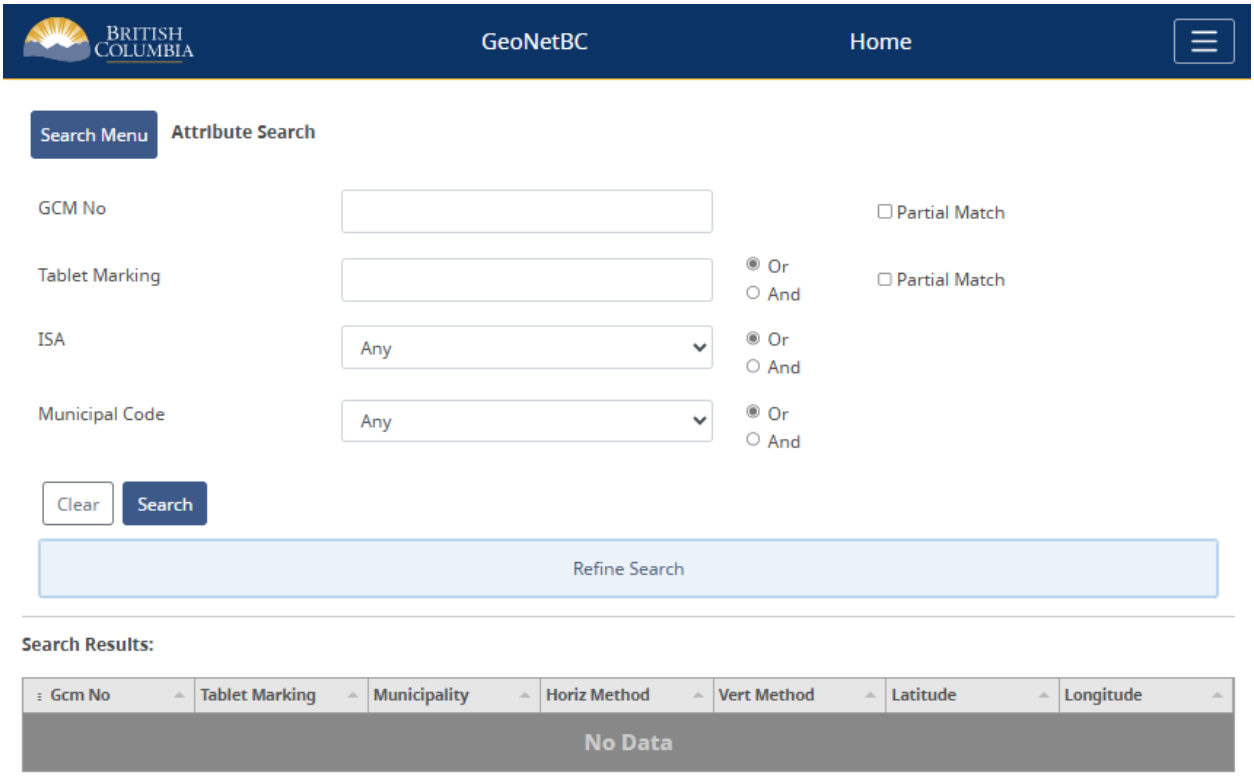
Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

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

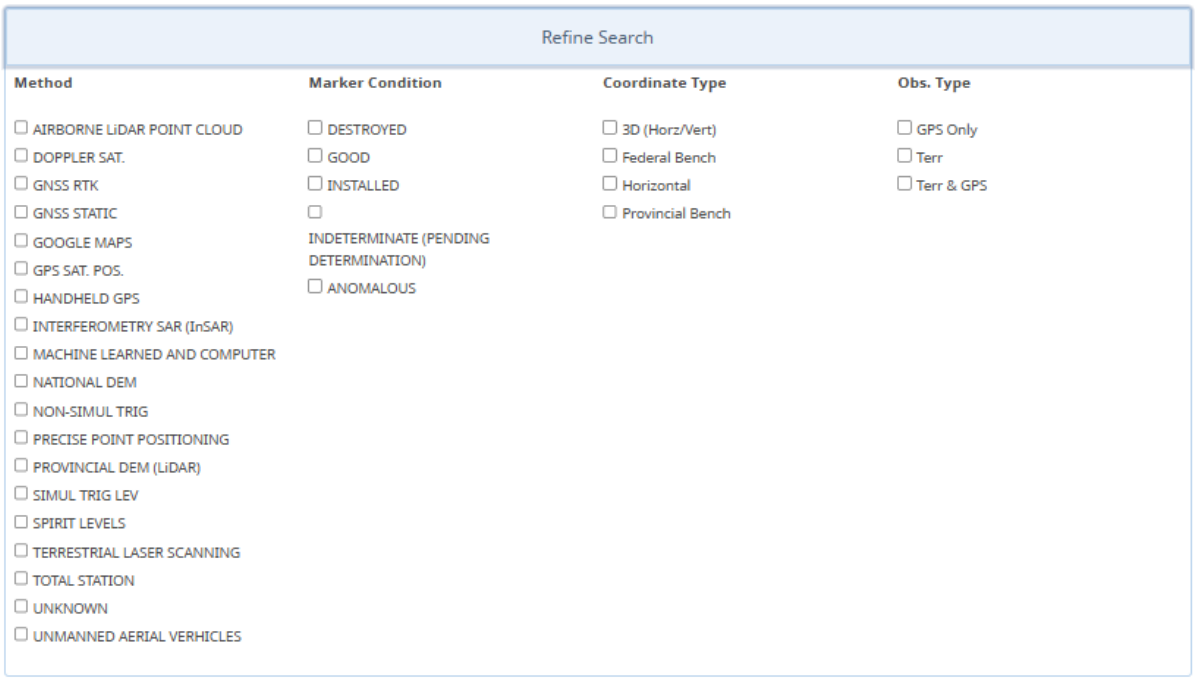
Users can search for GCMs based on a set of attributes. The search can be basic or refined depending on the requirements. By default, the search opens with the basic search options (Figure 9). These include: GCM number, Tablet Marking, Integrated Survey Area (ISA) and Municipal Code. The GCM number and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



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



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.

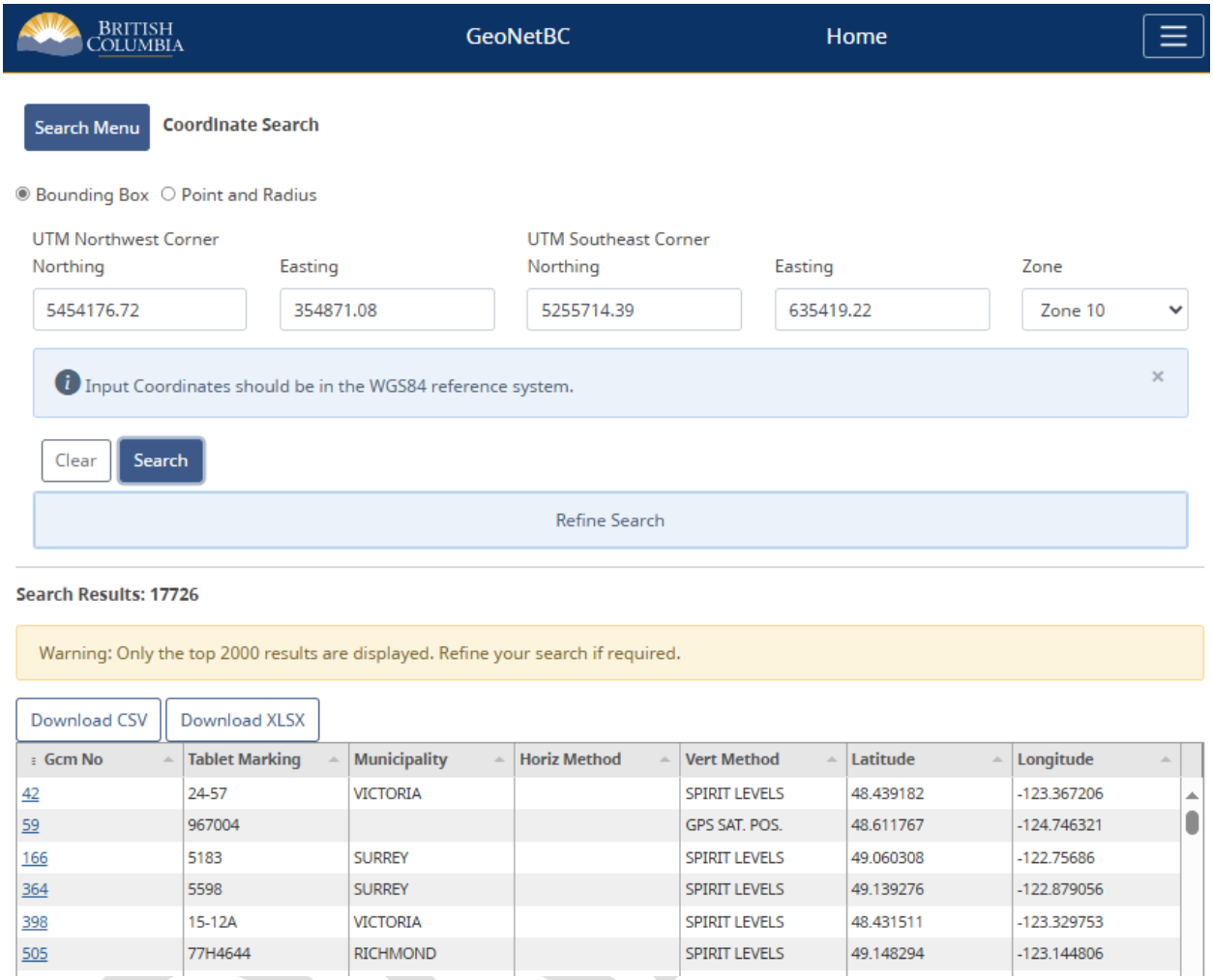
2.1.3 UTM Coordinates

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

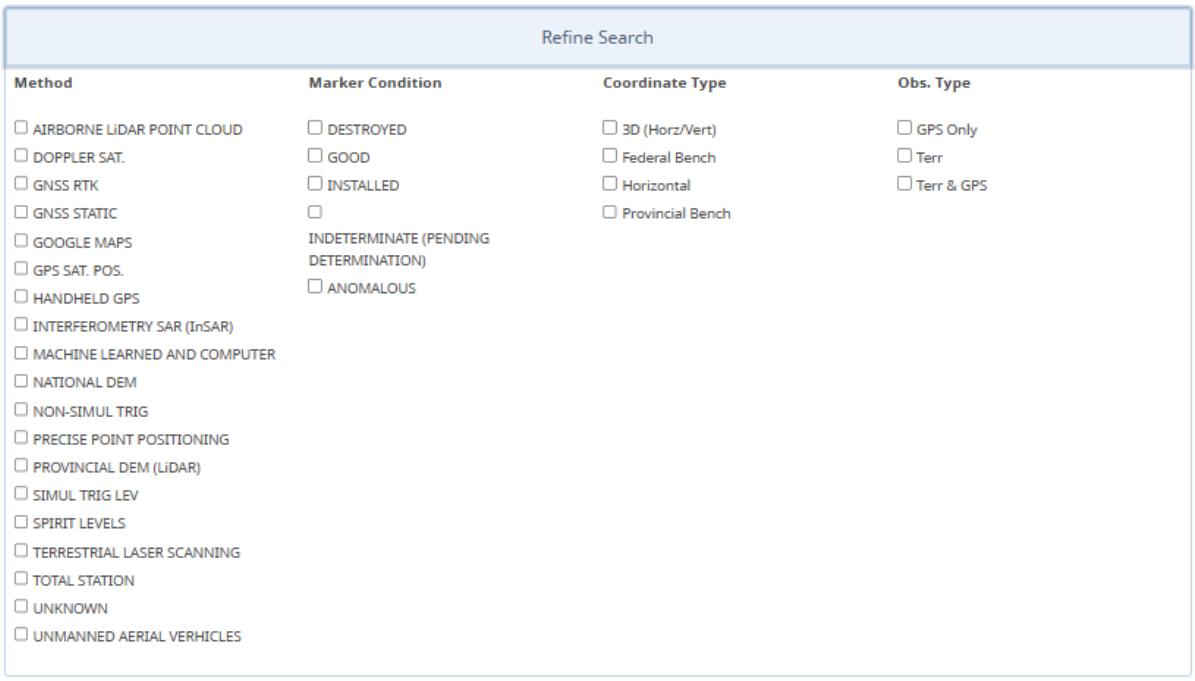
With the bounding box coordinate search, users define the UTM Northwest Corner Easting and Northing, as well as the UTM Southeast Corner Northing and Easting. Users can also define the UTM zone, if known (Figure 11). Note that the search is approximate as the coordinates in the database will be projected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

Figure 11. UTM Coordinate Search – Bounding Box



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



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.

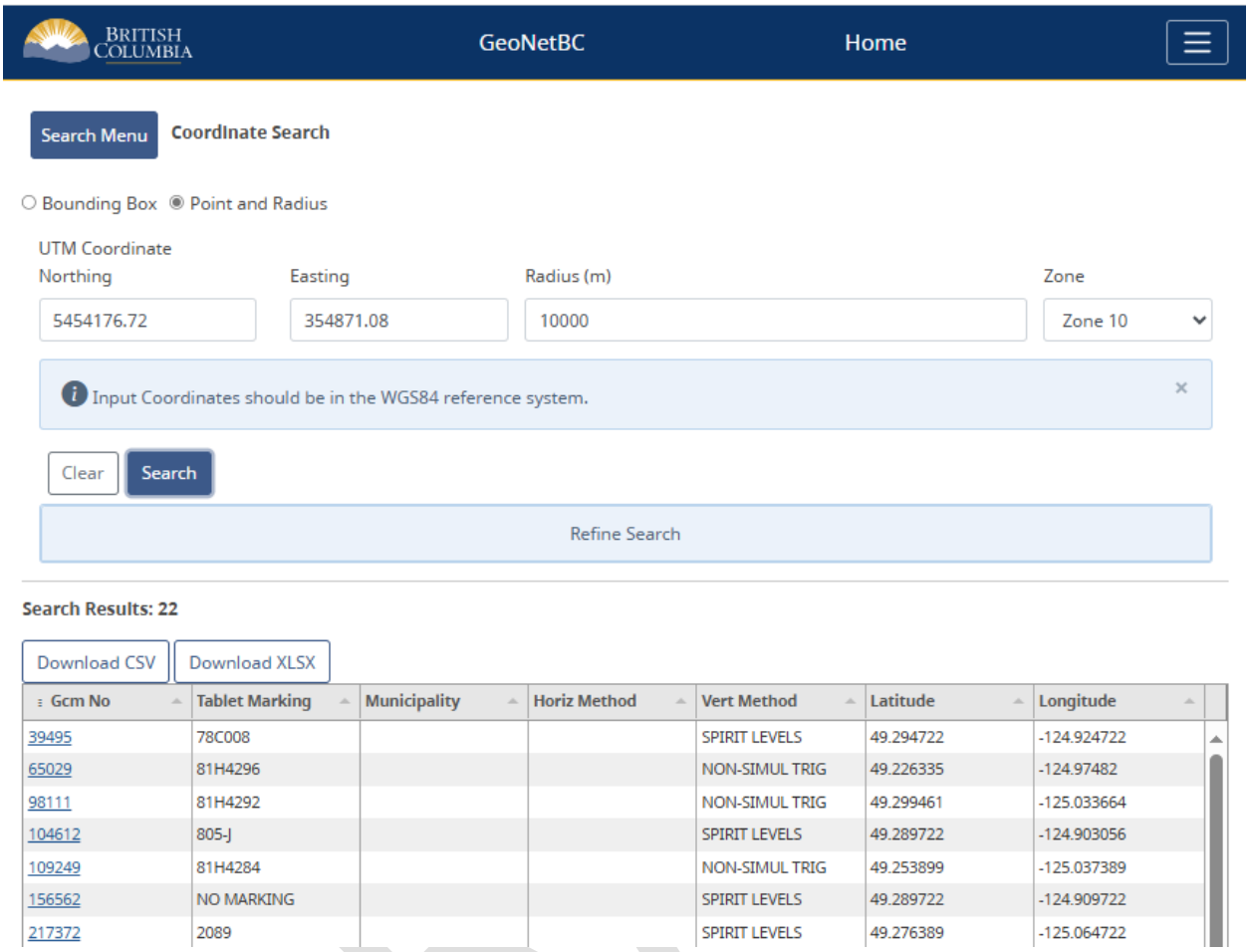
Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

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



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.

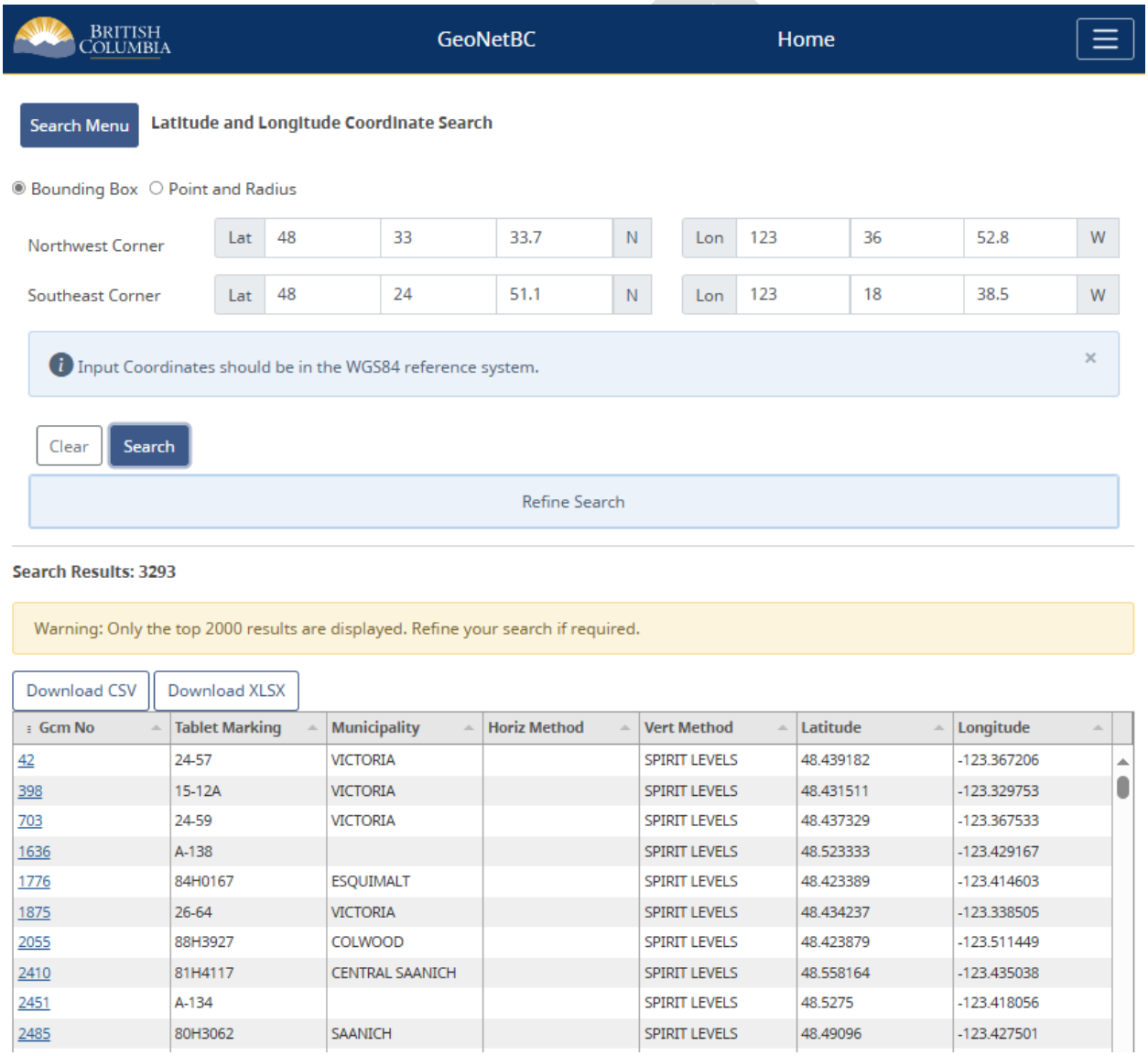
2.1.4 Latitude and Longitude

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).

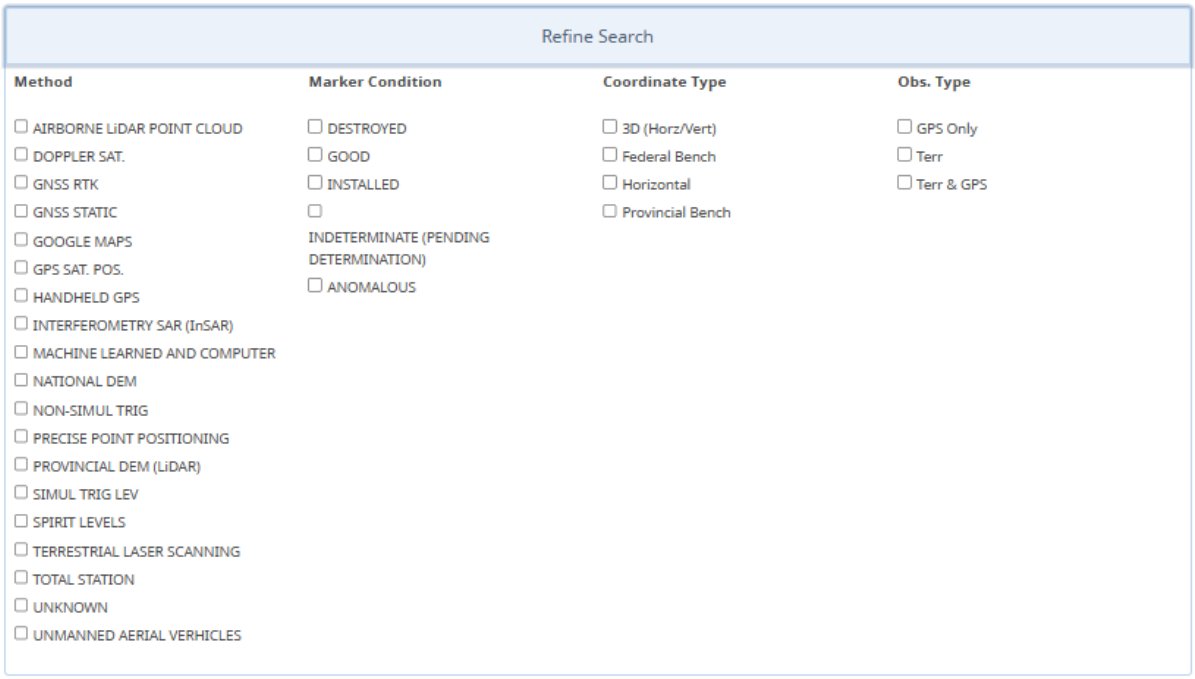
Figure 14. Latitude and Longitude Coordinate Search – Bounding Box



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



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.

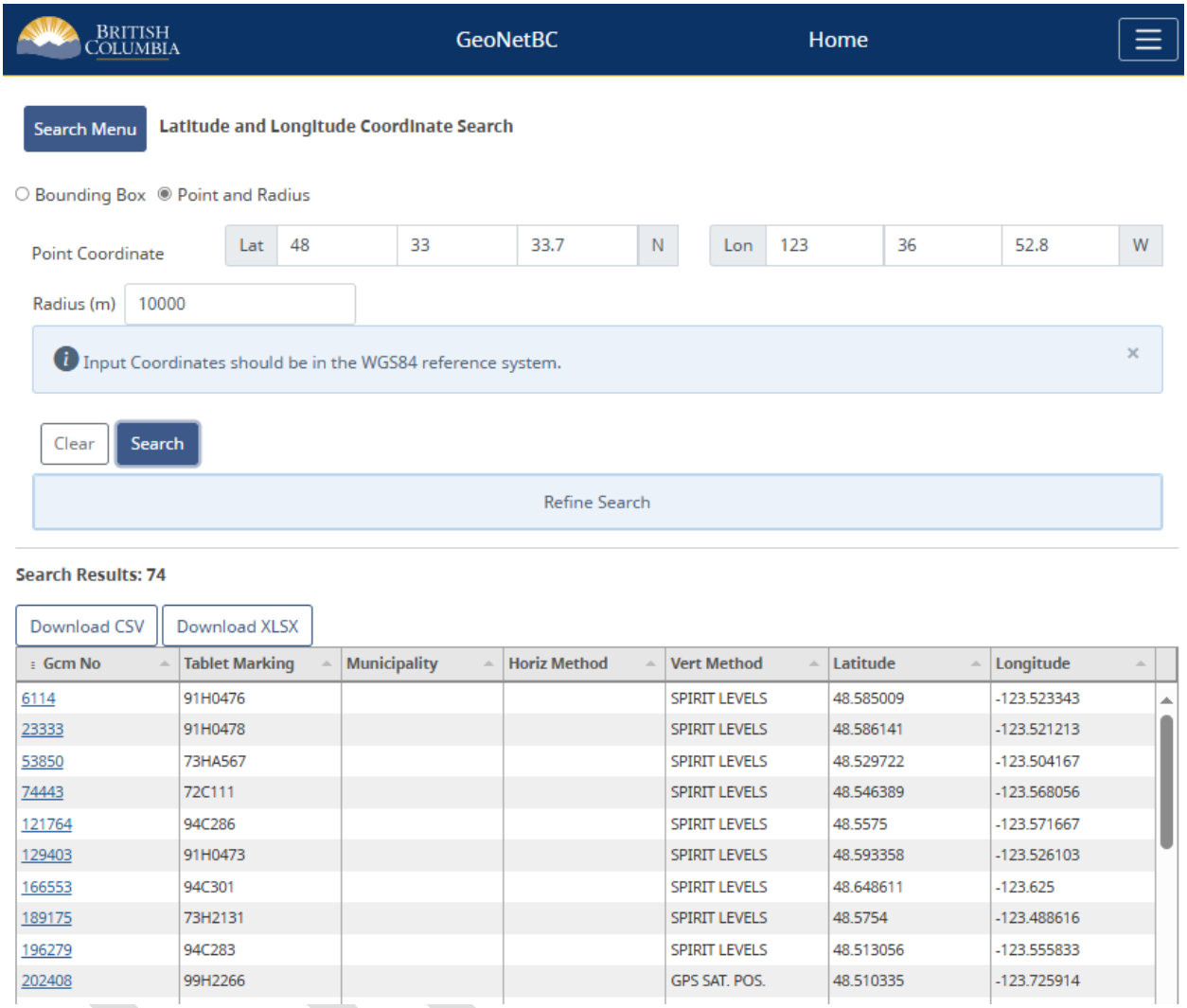
Click on one of the GCM records where there is a blue hyperlink to navigate to the details of the record that is of interest.

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



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.

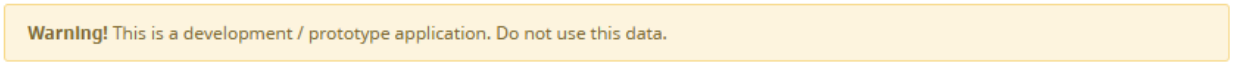
Click the 'Clear' button to clear the search and click the 'Search Menu' button to return to the main GCM Search page.

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.

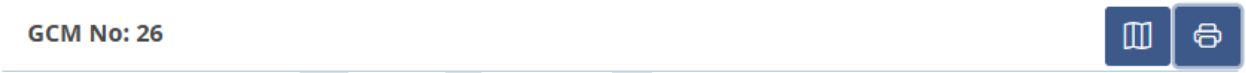
Currently, the application is still in development, therefore at the top of the page a Warning! Message states to not use the data while the application is in development/prototype (Figure 17). This warning will be removed once the application is in Production.

Figure 17. Warning!



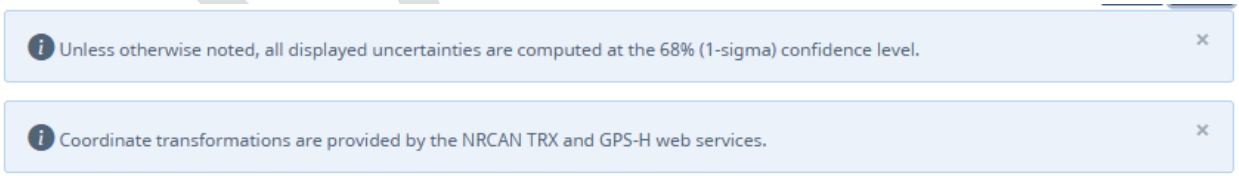
Users can navigate to the GCMs map location by clicking the map icon at the top right corner of the details page. This button navigates the user to the GeoNetBC iMap location in a new web browser. Users can also print the details page of the GCM by clicking the print icon, a print form opens and users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

Figure 18. iMap and Printing



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



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

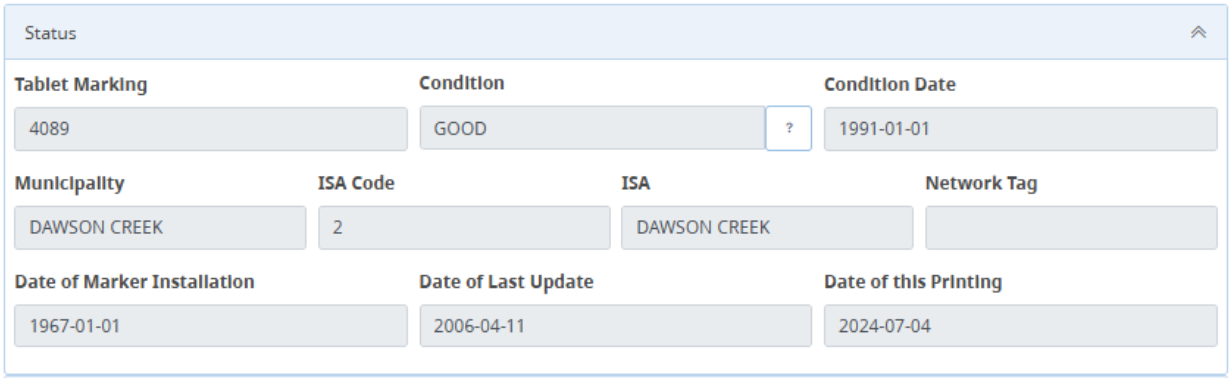
names, current and historical marker conditions, marker classification comments and any photos or diagrams. The following sections describe these in more detail.

Figure 20. GCM Details

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.

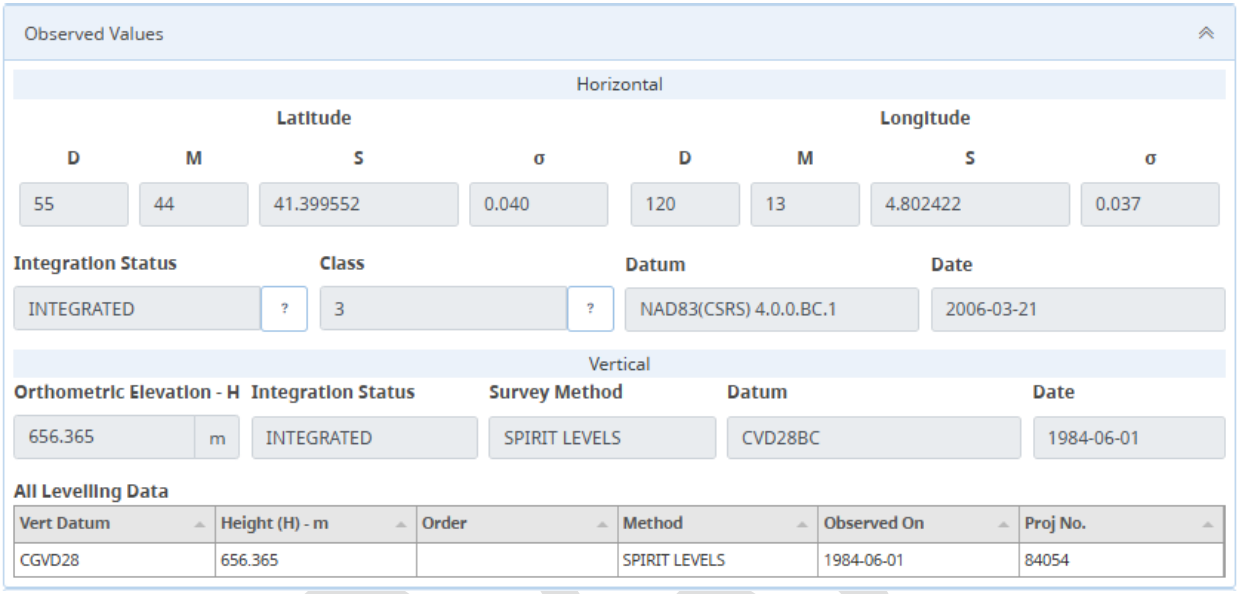
Figure 21. GCM Status



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.

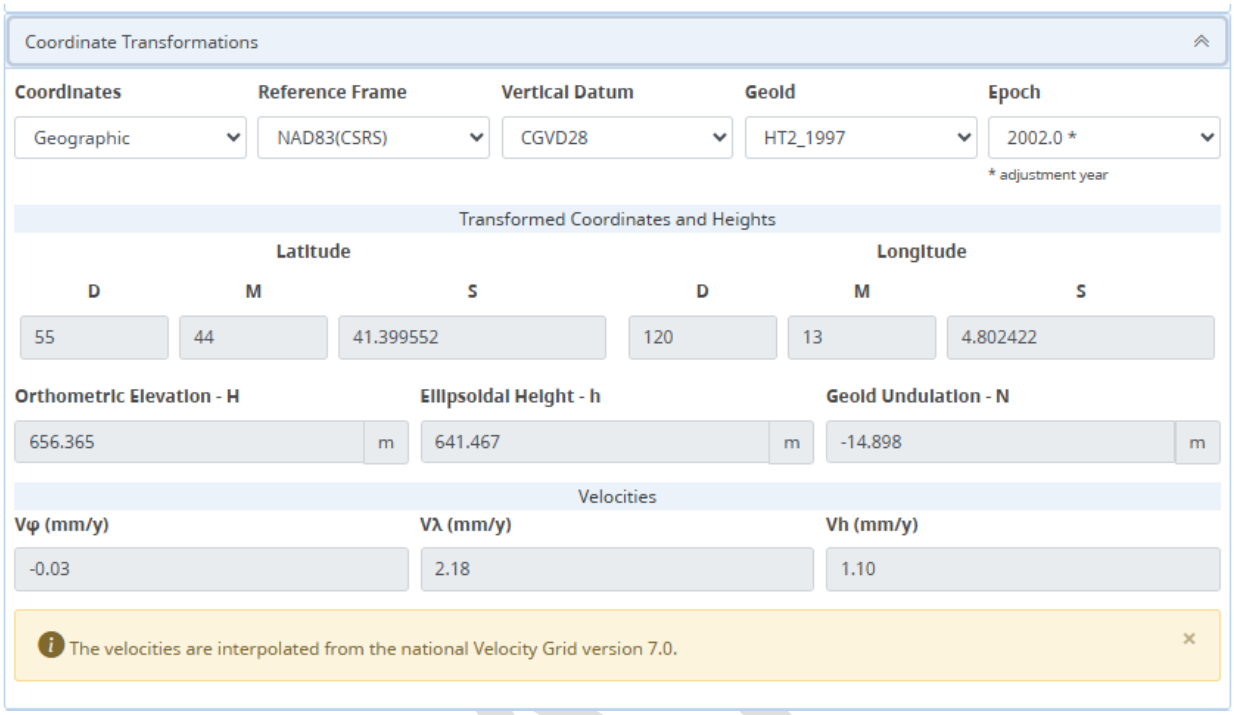
Figure 22. GCM Details - Observed Values



2.2.3 Coordinate Transformations

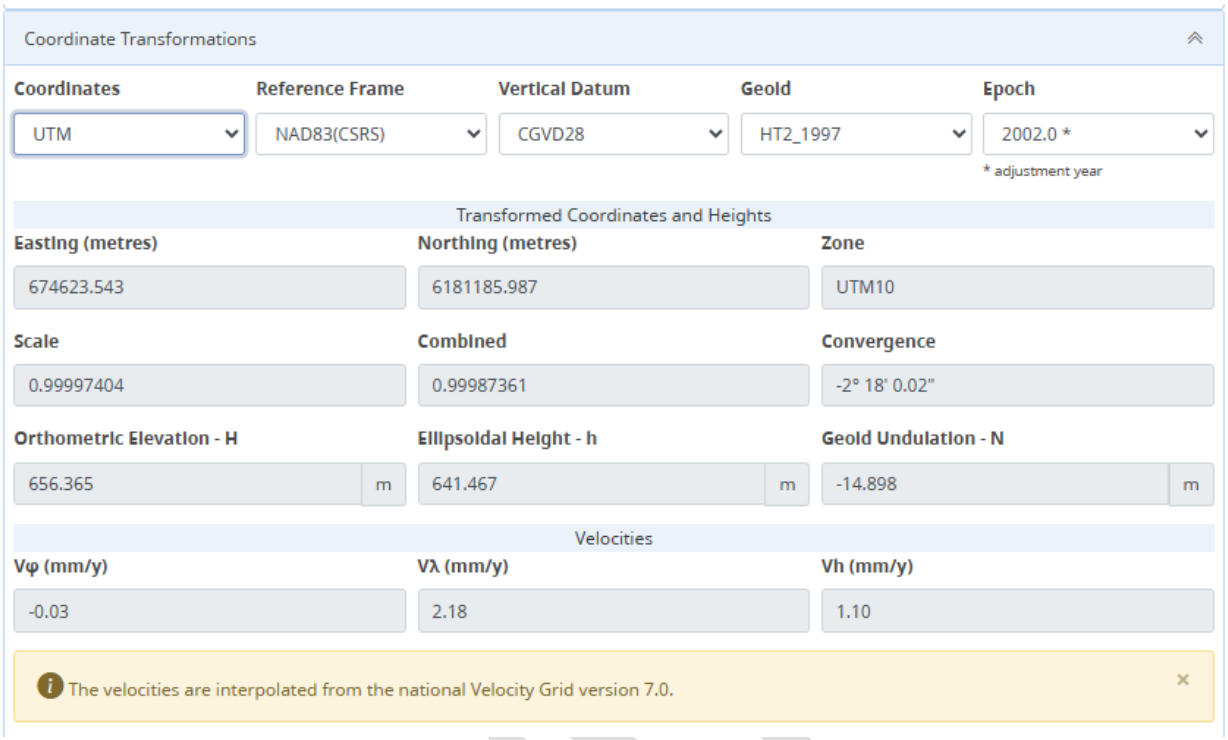
By default, the page provides the last surveyed horizontal and vertical coordinate information for the GCM. The geographic coordinates would be displayed by default as shown in Figure 23. Users can adjust a set of dropdowns to adjust the Type of Coordinates, Reference Frame, Vertical Datum, Geoid, and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

Figure 23. Coordinate Transformation – Geographic



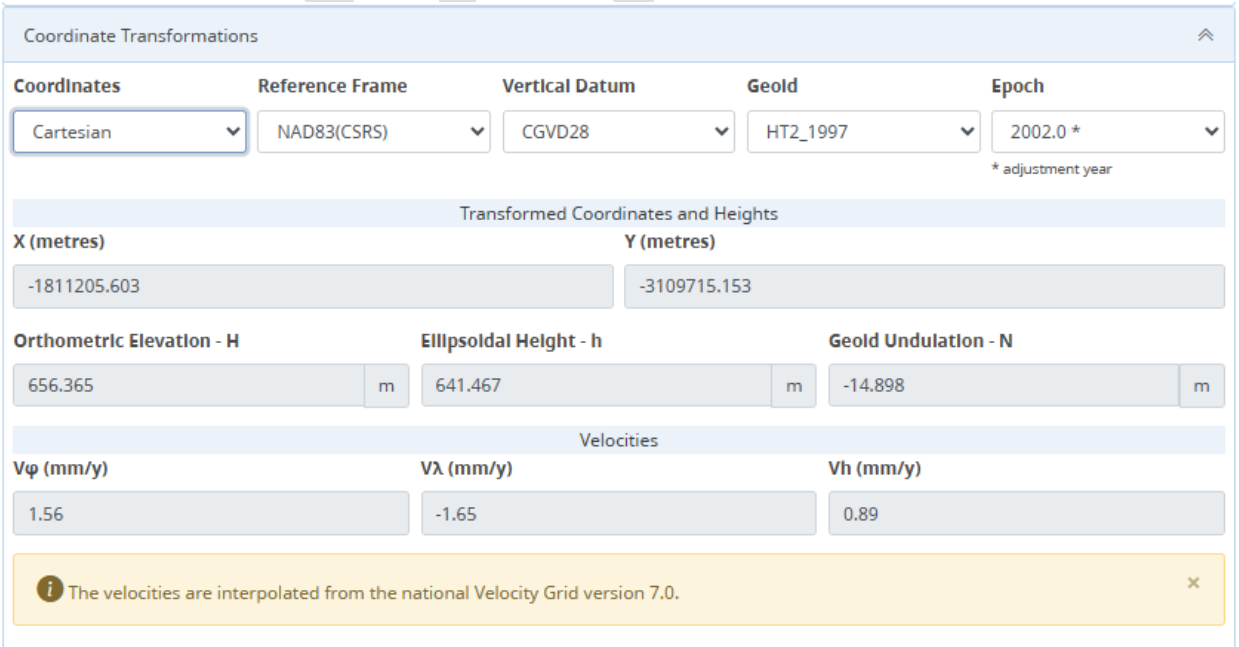
When users change between Coordinate systems, then the available parameters change on the form. When the geographic coordinates are displayed, the coordinates are displayed in Degree Minutes Seconds. However, if UTM is chosen, the coordinates are shown in Easting/Northing with UTM Zone (Figure 24).

Figure 24. Coordinate Transformation – UTM



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

Figure 25. Coordinate Transformation – Cartesian



2.2.4 Velocities

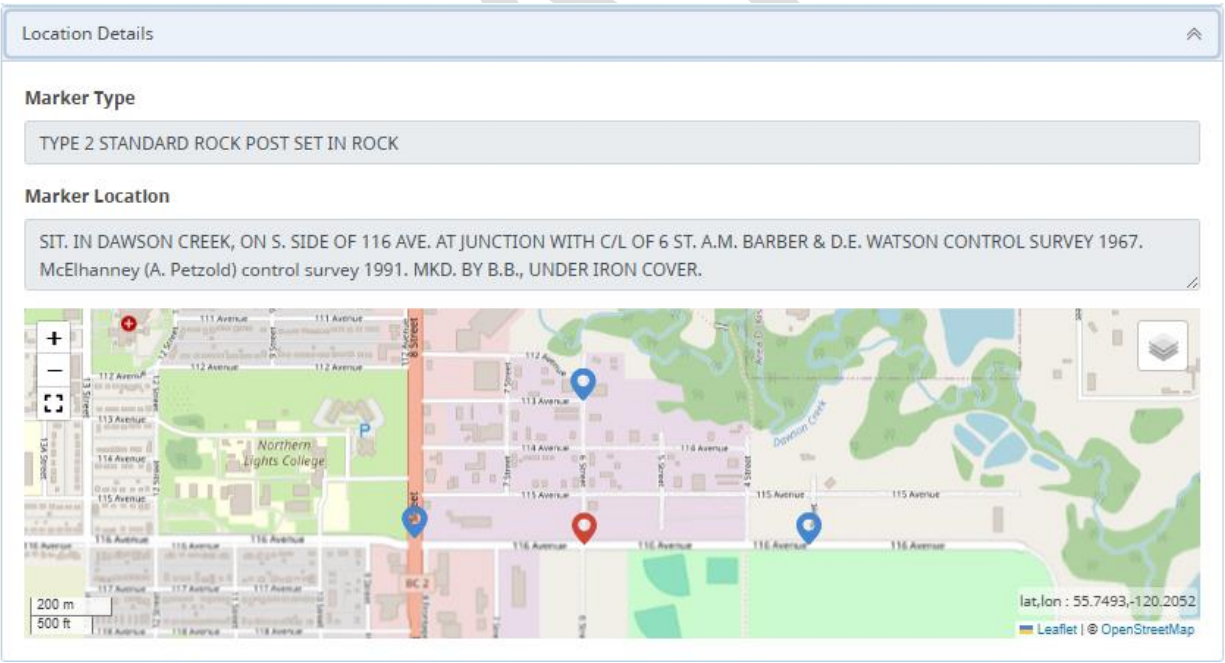
Velocity information is also provided, Figure 26; these are interpolated from the national Canadian Velocity Grid (CVG). The version is provided as a note within the section.

Figure 26. Velocity

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



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

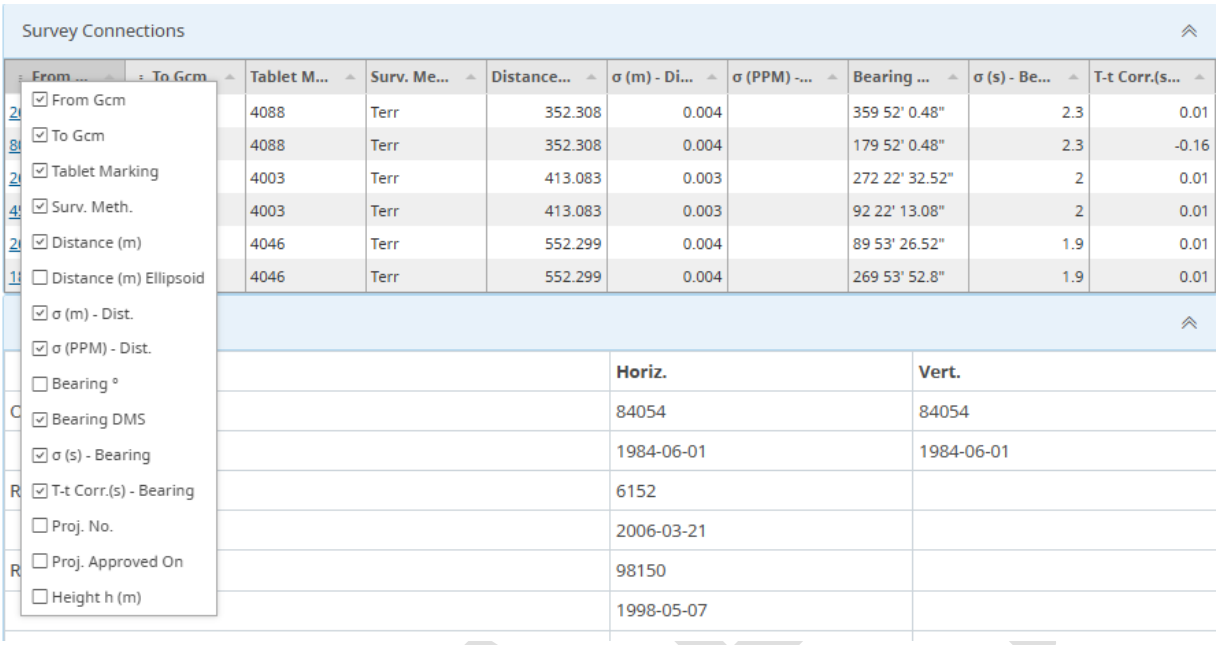
Loading...

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).

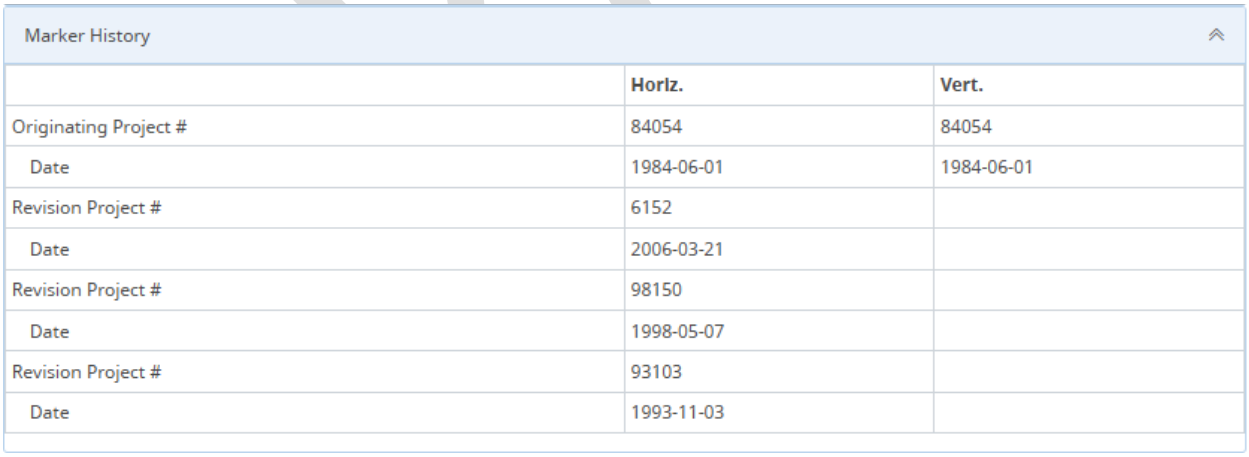
Figure 30. Survey Connections - Adjust Columns



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

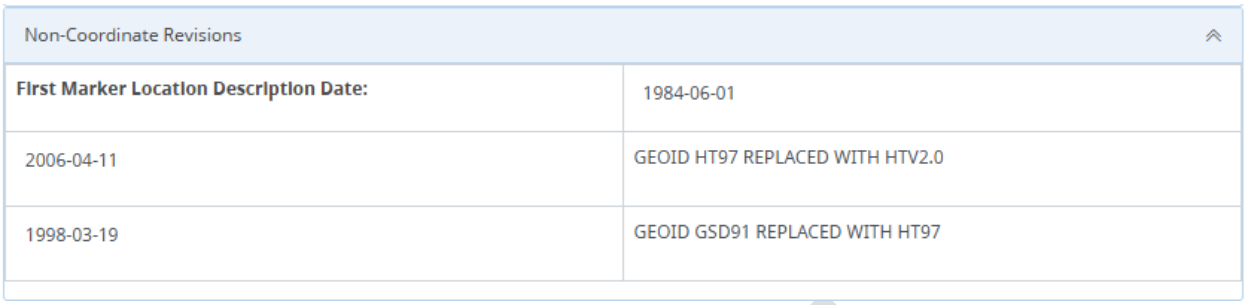


	Horiz.	Vert.
Originating Project #	84054	84054
Date	1984-06-01	1984-06-01
Revision Project #	6152	
Date	2006-03-21	
Revision Project #	98150	
Date	1998-05-07	
Revision Project #	93103	
Date	1993-11-03	

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.

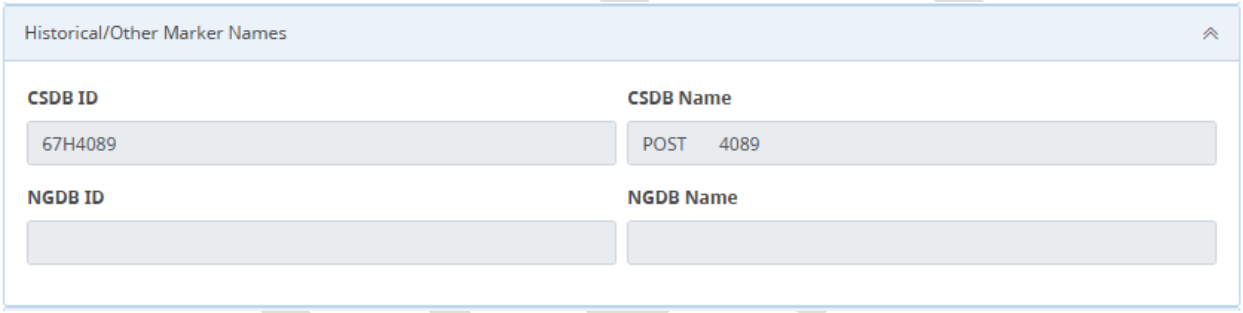
Figure 32. Non-Coordinate Revisions



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).

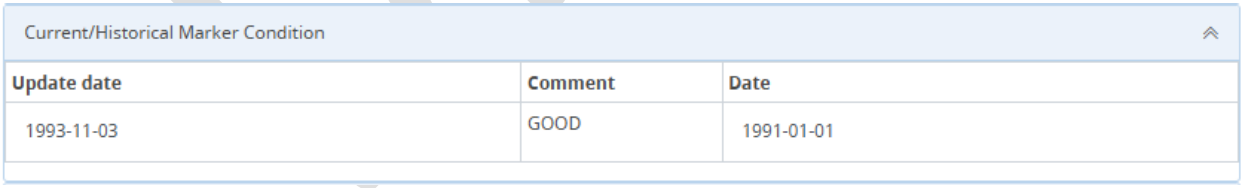
Figure 33. Historical/Other Markers



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



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

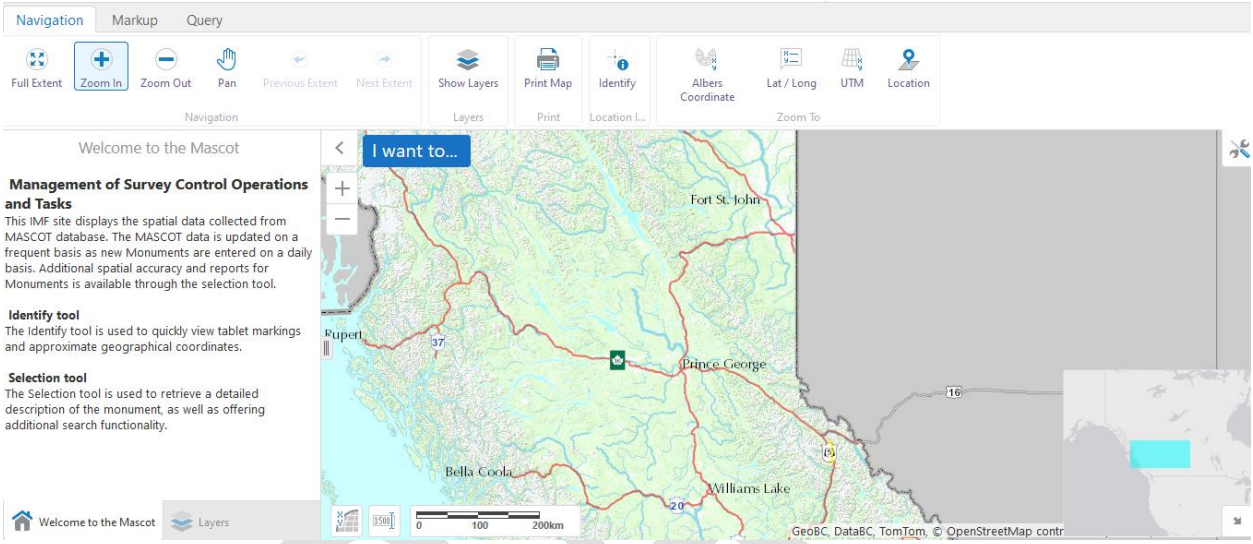
Photos and Diagrams

Photo	Name	Description	Date	Diagram
	26.gif			Yes

3.0 MAP

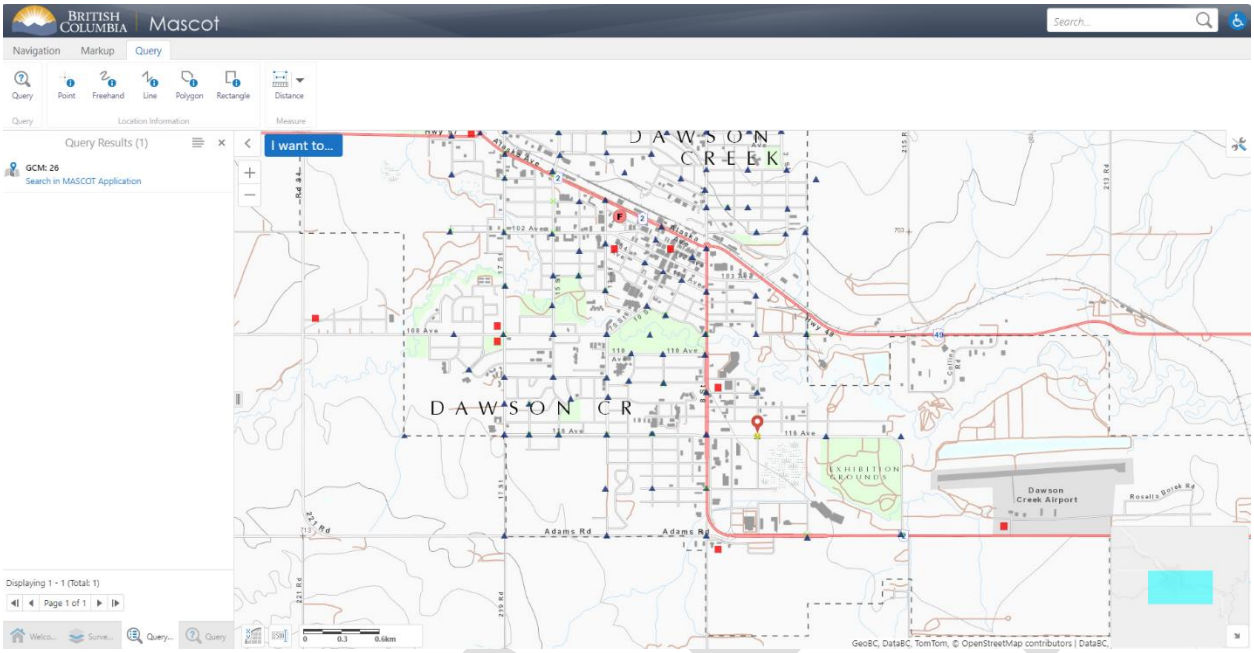
The Map link on the Home page links directly to the GeoNetBC Web Application and provides a direct link to the GeoNetBC iMap Viewer (Figure 37). By default, the map opens to the full extent of the province. Users can zoom into areas, turn on/off layers or define queries to find specific monuments. There 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.

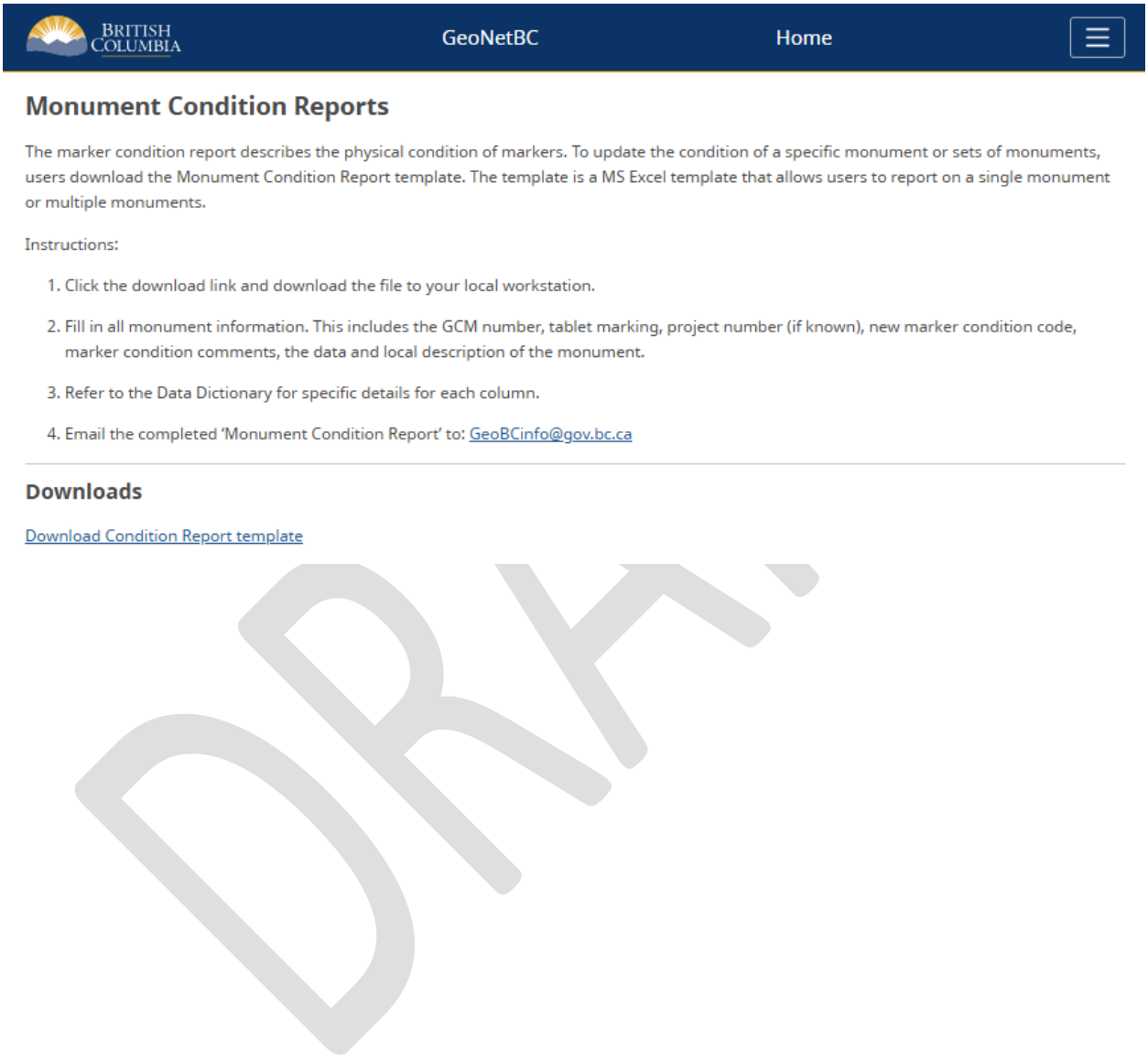
Figure 38. Map Query



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.

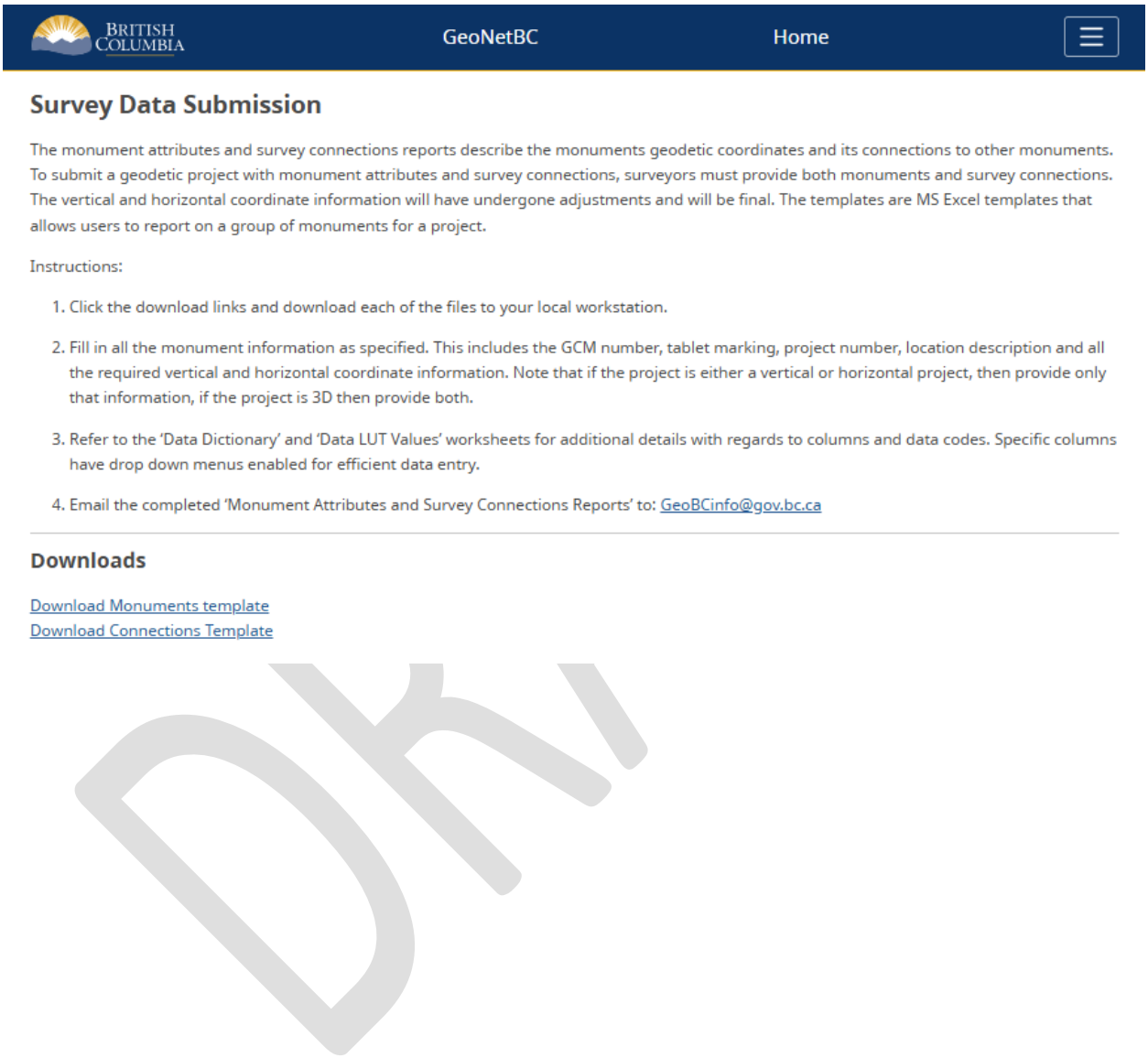
Figure 39. Monument Condition Reports



5.0 SURVEY SUBMISSION

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

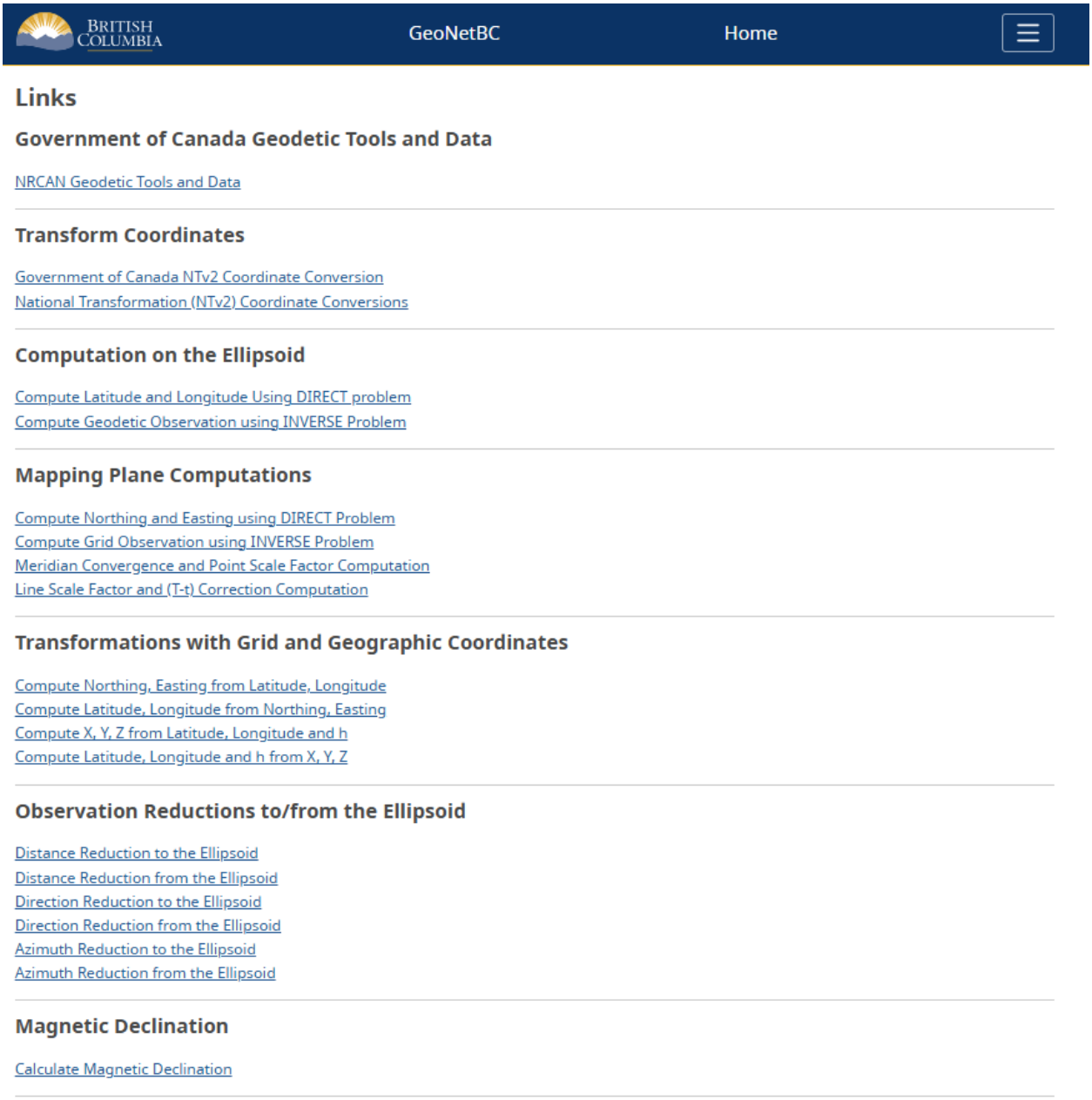
Figure 40. Survey Data Submission



6.0 LINKS

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

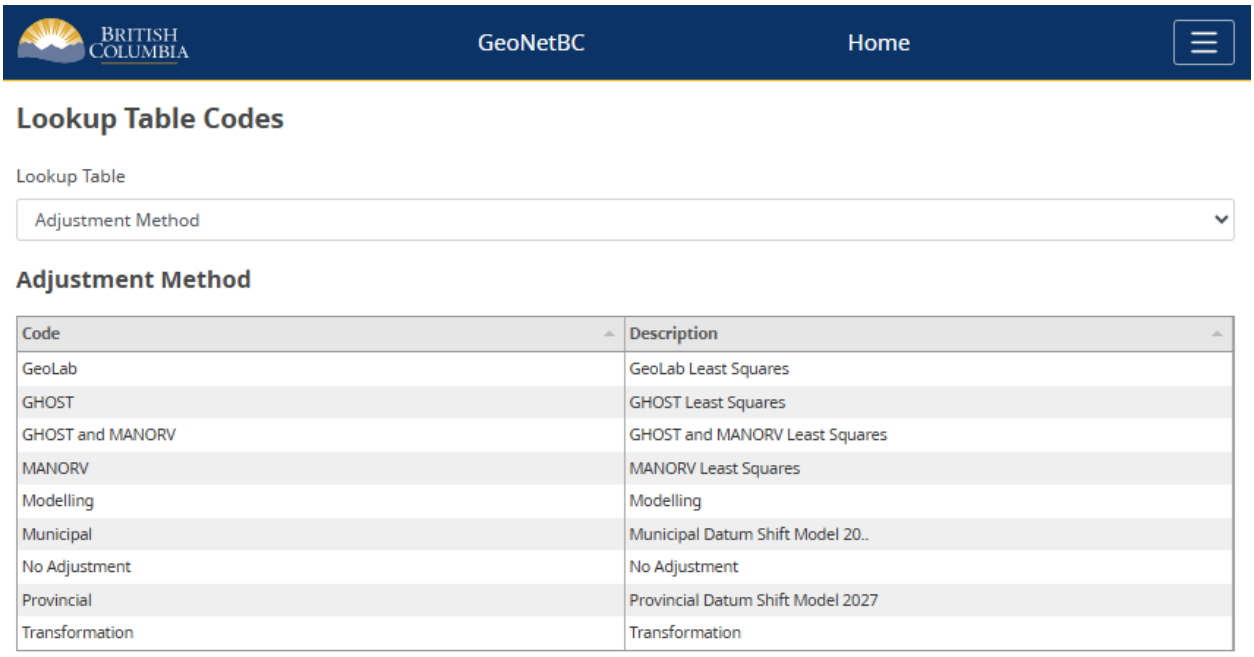
Figure 41. Links



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.

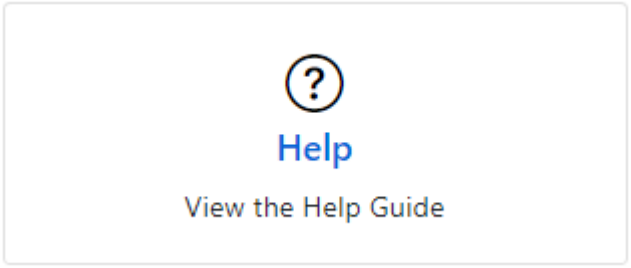
Figure 42. Lookups



8.0 HELP

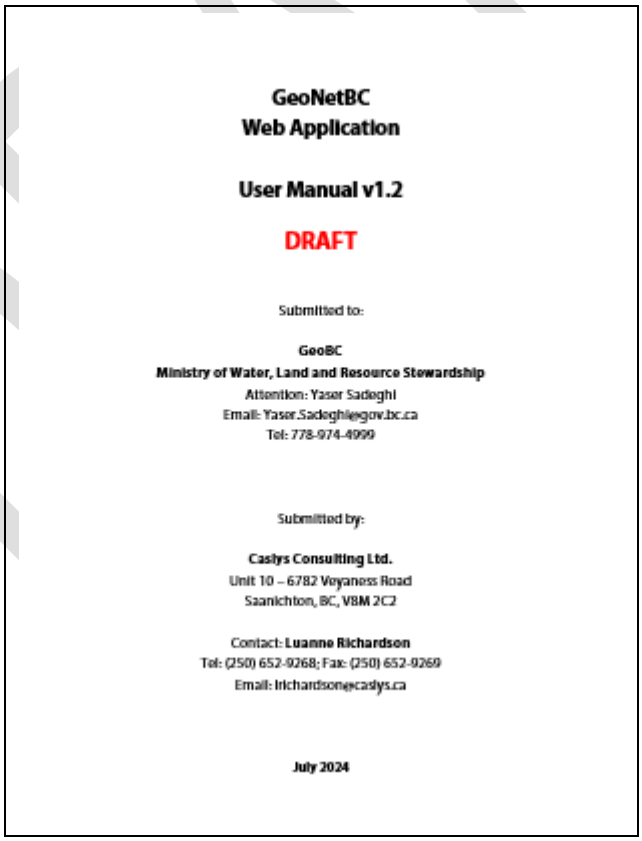
The Help module, Figure 43, allows users to easily view the latest User Manual with the click of a button, rather than having to find the document in the document's library.

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



GeoNetBC
Web Application

User Manual v1.2

DRAFT

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