Archaeology Branch
Ministry of Forests

Archaeological Overview Assessment Guidelines

Updated: November 22, 2023

This operational policy supplements the Archaeological Impact Assessment Guidelines[1] (AIA Guidelines) and the Site Form and Mapping Requirements.[2] It replaces the Archaeological Overview Assessments Provincial Standards and Guidelines (2009).

Contents

1. Purpose 2
2. Background 2
3. Authority 3
4. Types of Archaeological Overview Assessments 3
5. First Nations Engagement 5
6. Background Research 6
7. Desktop AOA Submissions 7
8. Additional Requirements for GIS-Based AOAs 8
9. Change Log 12

Appendix A: Requirements for GIS-Based AOA Reports 13

Appendix B: Requirements for GIS-Based AOA Spatial Data 15

[1] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/archaeology/forms-publications/archaeological_impact_assessment_guidelines.pdf
[2] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/archaeology/forms-publications/site_form_mapping_and_spatial_requirements.pdf

1. Purpose

The Archaeological Overview Assessment Guidelines:

1. Explain the difference between desktop Archaeological Overview Assessments (desktop AOAs) and Geographic Information System-based Archaeological Overview Assessments (GIS-based AOAs), and their respective uses, strengths, and limitations.
2. Supplement the requirements for desktop AOAs provided in section 3.4 of the AIA Guidelines.
3. Outline the requirements for developing, documenting, analyzing, evaluating, and reporting on GIS-based AOAs.

This document does not provide detailed advice regarding Preliminary Field Reconnaissance (PFR). Please see section 3.4.3 of the AIA Guidelines.

2. Background

Archaeological Overview Assessment (AOA) is a broad term to describe studies of archaeological potential ranging from preliminary desktop reviews of individual properties to models generated using GIS to determine the potential for as-yet unrecorded archaeological sites over a large area. AOAs assist archaeologists, First Nations, developers, regulators, and decision makers with strategic and operational planning and decision making.

> An AOA is a risk-assessment tool that can support land use decisions, but archaeological sites may still be present in areas assessed as having low archaeological potential.

However, AOAs do not explicitly indicate where archaeological sites are located. There are inherent risks to AOAs – no tool can perfectly predict the presence or absence of an archaeological site at a given location on the landscape. Factors include:

- There is an inherent bias towards site types and geographic areas that are well-studied by archaeologists.
- Older AOAs do not include recently recorded sites and typically incorporate less information shared by First Nations, making them less accurate.

- Some site types (e.g., rock art, sites containing ancestral remains) may be located in areas that diverge from standard indicators of archaeological potential.
- As technology improves and additional archaeological sites are identified, all GIS-based AOA models will benefit from updates.

The Archaeology Branch (the Branch) maintains a public map of provincially approved GIS-based AOAs[3] that are shared with authorized users, including First Nations, archaeologists, researchers, and federal, provincial, and local governments via the Remote Access to Archaeological Data system (RAAD).[4]

3. Authority

Archaeological sites in B.C. are protected under provisions of the *Heritage Conservation Act* (HCA).[5] The Minister of Forests must establish and maintain the Provincial Heritage Register, and the minister and their delegates have the authority to issue permits and establish terms and conditions for assessments conducted under the authority of the HCA.

4. Types of Archaeological Overview Assessments

There are two predominant approaches to developing an AOA:

1. **Desktop AOAs**, typically limited to specific development locations
2. **GIS-based AOAs**, typically encompassing large study areas to inform land use planning and decision making

Both approaches consider Indigenous knowledge and perspectives, land use patterns, environmental history (e.g., paleolandscapes), previous archaeological studies, proximity to recorded archaeological sites, and environmental variables (e.g., slope, access to potable water).

Desktop AOAs assess the archaeological potential of small areas based on research and map review and may lead to recommendations for fieldwork. While a cost effective and quick approach to assess the archaeological potential of specific

[3] https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/archaeology/systems/raad/overview-assessment
[4] https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/archaeology/systems/raad
[5] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96187_01

development locations, this manual approach is difficult to replicate and scales poorly with larger study areas.

GIS-based AOAs typically cover larger areas of thousands of hectares and provide a heat map showing the potential that archaeological sites may be present in different sub-areas. Where locations with similar characteristics to recorded sites are identified on the landscape, they are identified as having high potential to contain sites. This approach also incorporates background research and professional judgement to consider resources that cannot be modelled accurately with GIS.

Table 1: Comparison of Desktop AOAs and GIS-based AOAs

Desktop AOA	**GIS-Based AOA**
Cost effective and efficient means to assess the archaeological potential of specific development or project areas	Used to inform land use planning and decision making for large study areas (e.g., >100,000 ha)
Assessment is based on research, map review, and consideration of cultural and environmental factors	Modelling requires digital environmental information at appropriate scale
More difficult to revise to incorporate new information	Can be revised based on new information
Subjective, based on qualitative criteria and limited variables	Accuracy depends on the scale and detail of available data. Model efficiency and data suitability can be analyzed statistically. Requires more quality control to address edge effects caused by data resolution or model complexity.

5. First Nations Engagement

Engagement with affected First Nations is strongly encouraged for desktop AOAs and is required for GIS-based AOAs.

Other groups who may have relevant information to share include local museums, cultural heritage specialists (e.g., archaeologists, ethnohistorians), or residents with knowledge of the area (e.g., hunters, foresters).

Additional knowledge may be shared as new information becomes known and/or relationships develop.

> Engagement provides a critical opportunity to incorporate First Nations environmental and cultural knowledge and land use histories and practices into the AOA. Engagement should allow for different approaches such as interviews and maps generated by the First Nation, as well as adequate time for building relationships and discussion.

A. Desktop AOAs

Unless linked to an HCA permit, desktop AOAs are often conducted outside the jurisdiction of the HCA. However, many First Nations have requested to be informed, involved, and to receive the results of desktop AOAs.

Archaeologists are strongly encouraged to contact affected First Nations prior to initiating a desktop AOA, to incorporate any knowledge and concerns provided by First Nations, and to share the results of the study with them.

B. GIS-Based AOAs

GIS-based AOAs now require Heritage Investigation Permits. The Branch consults with First Nations prior to deciding whether to issue HCA permits. Permit applicants are encouraged to contact affected First Nations early in the planning process to identify key requirements and to discuss the scope, objectives, methods, and anticipated outcomes of the proposed AOA.

During the development of GIS-based AOA models, there are two approaches to incorporating information from First Nations or other informed contributors:

- Development of the predictive model
- Contributions to the separate layer to reflect specific areas of cultural significance (the Informed Contributors Layer)

C. Informed Contributor Layer

The Branch developed the Informed Contributor Layer (ICL) to address a knowledge gap in cultural heritage areas by creating a dynamic, updateable spatial layer that indicates cultural areas or areas of high potential identified by informed individuals or groups that otherwise would not be captured in provincial records (e.g., archaeological site records, AOAs). These areas may include unrecorded archaeological sites or reflect cultural heritage values that are not presently subject to automatic protection under the HCA, but that may still require consideration during land use planning. ICL data may influence the criteria used to develop an AOA, and through discussions with First Nations, the ICL may be updated during AOA development.

The Archaeology Branch is open to entering information sharing agreements with First Nations interested to participate in this initiative. An ICL factsheet will be available on the Branch's website and may be subject to regular updates.

6. Background Research

Background research for AOAs is critical to identifying archaeological site types and locations appropriate to the study area.

Research should include, but not be limited to:

- Site records relevant to the study area:
- The Branch maintains B.C.'s archaeological site data within the Provincial Heritage Register.
- Spatial accuracy and site location data are variable.
- In addition to consulting the Unreviewed Site Record Updates layer in RAAD, archaeologists are directed to contact the Branch to identify any unprocessed site updates within the project area that would affect the AOA.
- First Nations may maintain their own site registers.
- Previous archaeological studies within or relevant to the study area (e.g., alpine studies of nearby mountains):
- HCA permit reports available from the Provincial Archaeological Report

Library (PARL)[6]

- Other reports available from the Branch's non-permitted report library or other sources
- Spatial records maintained by the Branch:
- The study area layer has been maintained since 2008.
- Areas of Potential (AOPs) and Subsurface Testing Areas (STAs) for permitted assessments have been maintained since 2019.
- Previous AOAs relevant to the study area
- Information shared by First Nations (e.g., map review, interviews)
- Relevant information from published and unpublished sources describing local and regional history and ethnography
- Relevant palaeoecological studies to assess past environmental conditions that may have influenced cultural adaptations
- Available maps and topographic data
- High-resolution LiDAR (where available)[7]
- Aerial photographs, satellite images, and geomorphological and pedological information
    - Imagery may be available via Google Imagery, EarthExplorer, and Sentinel Hub.

7. Desktop AOA Submissions

Where a desktop AOA informs a permit application or permitted assessment (e.g., an assessment under a section 12.2 Heritage Inspection Permit), it must be provided to the Branch. Deliverables include a map and a brief report to summarize the methods, research, data, and recommendations.

While the Branch will accept desktop AOAs, the data will not be distributed via RAAD.

[6] https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/archaeology/systems/parl
[7] https://www2.gov.bc.ca/gov/content/data/geographic-data-services/topographic-data/lidarbc

8. Additional Requirements for GIS-Based AOAs

A. Heritage Investigation Permit

GIS-based AOAs will be conducted under the authority of a Heritage Investigation Permit issued under section 12.2 of the HCA. This ensures that:

- Affected First Nations are consulted about the project, have an opportunity to share relevant information and knowledge, and receive the results of the AOA.
- GIS-based AOAs are undertaken by individuals with appropriate training and experience.
- The Branch will review and approve the methods, results, and recommendations of the AOA.
- The report and spatial data can be made available through PARL and RAAD.

The permit may also authorize field assessments to ground-truth models.

The permit holder will provide copies of the AOA report and spatial data (see Appendices A and B) to the proponent(s), First Nations, and the Branch. Upon review and approval, the Branch will make the report, spatial data, and metadata available through RAAD and/or PARL.

B. Data Acquisition and Processing

The results of the background research will guide selection of the appropriate variables for developing a model of archaeological potential within the study area. Variables require robust definitions and should (to the extent possible) be independent from each other. Most variables should comprise quantitative data (e.g., terrain slope). Multiple data sets can be combined to create a single variable (e.g., suitability for large mammal hunting might be derived from a combination of slope, aspect, elevation, vegetation, and viewshed). Poorly approximated data (e.g., sediments, soil drainage) can lead to less reliable predictions in the final model.

Variables typically used to model archaeological potential in British Columbia include:

- Proximity to known archaeological or heritage sites

- Proximity to known traditional use sites (e.g., fishing sites, trails, berry patches)
- Proximity to areas of cultural or heritage significance to First Nations
- Proximity to potable water
- Slope, aspect, and elevation
- Sediments and soil drainage
- Geological, terrain, or microtopographic features
- Viewsheds
- Vegetation and forest cover, including presence of tree species with potential for culturally modified tree (CMT) sites
- Weather or climate variables (e.g., wind direction, precipitation)
- Shorelines and foreshore areas with potential to contain archaeological sites (e.g., fish weirs, clam gardens)
- Ice patch
- Areas of significant natural or human disturbance
- Any of the above conditions that existed in the past that are not present today (e.g., paleolandscapes, landforms modified by agriculture or development)

The most difficult aspect of assembling an appropriate set of predictive variables may be measuring or inferring their change through time. Coastlines, watercourses, and environmental conditions (e.g., vegetation, wildlife) have varied significantly over time. Recent developments (e.g., reservoir inundation, urban development) have also affected the landscape. Documentation must clearly identify which data are applicable to a specific timeframe (e.g., current vs. past drainage patterns, seasonally accessible resources).

C. Predictive Modelling Methodology

The modelling of archaeological potential using purely environmental criteria is no longer considered an effective approach to developing AOAs. Instead, environmental variables are considered alongside several qualitative dimensions, including background research, information provided by First Nations, methods

related to model development, and predictive performance.

There are two general approaches to developing GIS-based AOA models at the regional scale: inductive (correlative) and deductive (hypothesis testing). Both approaches may be applied to a single project. Locations rich in recorded archaeological sites and predictive variables should incorporate an inductive approach. Areas that have fewer available datasets may need to be modelled using a deductive approach. The report must provide a rationale for these decisions.

Generally, three layers will be developed (see Appendix B):

1. Culturally Modified Trees (CMT) model layer
2. Archaeological Sites Except CMTs (ASEC) model layer
3. Informed Contributors Layer (ICL)

> While fieldwork has been historically proposed to test a deductive approach, the Branch recommends modelers consider the data generated by all permitted assessments conducted within the project area, such as areas of potential, subsurface test areas, study areas, and new and revised sites, submitted to the Branch and uploaded to RAAD regularly.

The report must describe the approach taken to produce the final model layers showing areas of high and low potential. For example, reports will document the criteria used to identify archaeological potential, the individuals or groups that made any judgments, and a descriptive rationale when elevated archaeological potential has been determined in a unique area. Criteria for high or low potential should be made explicit for a model that estimates a continuous output like probability, density, or score, and the rationale and risk assessment for why certain values of the output are rated high or low potential should be explained.

D. Predictive Performance

Archaeologists must analyze the predictive performance of GIS-based AOA models. Typically, this is done through desktop testing using recorded archaeological site locations and the results of previous field assessments. Field testing may also be an appropriate method to demonstrate the effectiveness of a model.

The report must detail the proportion of the study area that is modelled as high or low potential and the proportion of known sites that fall within each of these areas. The predictive performance must also be compared to relevant previous and adjacent AOAs. The report must also consider whether the model accounts for potential biases from issues such as uneven survey coverage (e.g., site distribution that reflects areas of modern development, rather than past land use patterns). The report will identify the model's limitations and how the assumptions affected the results.

At a minimum, new models should capture 75% of known archaeological sites.

Given its origin as an archaeology-specific metric, a Kvamme Gain statistic is typically expected as part of the AOA submission.[8] However, the Branch recognizes this statistic has its limitations and welcomes discussions about other metrics that may be more appropriate.

E. Deliverables

Deliverables for GIS-based AOAs include:

- A report describing the background research, methods, assumptions, and results and providing an analysis and evaluation of the effectiveness of the model (see Appendix A)
- Model-specific files:
    - Submit the geoprocessing workflow as a diagram (e.g., ArcGIS ModelBuilder diagram) and/or a script (e.g., Python or R script).
    - These must be adequately annotated to allow the workflow to be reproducible.
- Spatial data consisting of the shapefiles or geodatabases for the three layers (see Appendix B)

[8] For further information on the Kvamme Gain statistic, see: K.L. Kvamme 1988. "Development and Testing of Quantitative Models," in *Quantifying the Present and Predicting the Past: Theory, Method, and Application of Archaeological Predictive Modeling*, edited by W. J. Judge and L. Sebastian, pp. 325-428. Washington, D. C.: U.S. Government Printing Office. https://ia600309.us.archive.org/7/items/quantifyingprese00judg/quantifyingprese00judg.pdf [accessed November 22, 2023]

F. Review and Distribution

GIS-based AOA models reviewed and approved by the Branch will be available via RAAD. Given the high sensitivity of the data contained in AOAs, they are subject to the Archaeological Information Sharing Agreement[9] and access is limited to authorized users, including First Nations, archaeological consultants, academic researchers, and federal, provincial, and local governments.

9. Change Log

Version Date	Key Changes
July 2009	Archaeological Overview Assessments Provincial Standards and Guidelines issued.
November 2023	Modernization of guidelines, introduction of Informed Contributor Layer, and addition of requirement for HCA section 12.2 Heritage Investigation Permit.

[9] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/archaeology/forms-publications/archaeological_information_sharing_agreement.pdf

Appendix A: Requirements for GIS-Based AOA Reports

Refer to Appendix A of the AIA Guidelines for general guidance on report layout and content.

A. Methodology

Describe:

- Data preparation and processing:
    - spatial data sources and resolution
    - measures taken to improve the accuracy of recorded site locations
    - integration of background research and consultation
    - use of environmental variables
    - construction of data proxies such as paleo-shorelines
- Major stages of model development, detailing spatial layers and statistical analysis

B. Results and Analysis

Include:

- Descriptions of the models of archaeological potential for the CMT and ASEC layers
- Statistical analysis of model effectiveness and efficiency based on recorded site locations
- Analysis of model performance by site type and by sub-region
- Comparison of the models with the results of relevant previous and adjacent AOAs

C. Evaluation

Discuss:

- Coverage of the archaeological record in relation to the models
- Quality and coverage of spatial data
- Limitations and appropriate use of the models

- Areas that would benefit from ground-truthing or further investigation (e.g., areas infrequently subject to archaeological studies, such as alpine settings)
- Recommendations to maintain the models
- Recommendations for future models

D. Statement of Limitations

All GIS-based AOA reports must include the following statement of limitations:

- The AOA is based on archaeological and spatial data available on [date].
- The AOA will benefit from periodic revision to incorporate additional data as it becomes available and to review model effectiveness and efficiency.
- An AOA is a tool to determine the risk a proposed development poses to archaeological sites, but it does not replace the need to engage an archaeologist and to engage with affected First Nations.
- Archaeological sites may be present in areas assessed as having low archaeological potential.

Appendix B: Requirements for GIS-Based AOA Spatial Data

GIS-based AOAs will consist of three layers:

1. Culturally Modified Trees (CMT) model layer
2. Archaeological Sites Except CMTs (ASEC) model layer
3. Informed Contributor Layer (ICL)

A. Culturally Modified Trees (CMT) Model Layer

The CMT predictive model layer is represented by a polygon spatial file (shapefile or geodatabase), classifying all regions within the study area as either high or low potential. A separate model for CMTs is needed because they are especially reliant on vegetation. While a model may predict the locations of CMTs regardless of their age, only pre-1846 CMTs are automatically protected under section 12.1 of the HCA.

When the entire study area has low potential for CMTs, it may not be appropriate to develop this layer (e.g., the Fort Nelson Natural Resource District). Contact the Branch before making this decision and provide a rationale if a CMT model layer is not included as a deliverable.

B. Archaeological Sites Except CMTs (ASEC) Model Layer

The ASEC predictive model layer identifies areas of potential for archaeological sites other than CMTs, acknowledging that some site types may benefit from area-specific considerations (e.g., rock art). The ASEC model layer is represented by a polygon spatial file (shapefile or geodatabase), classifying all regions within the study area as either high or low potential.

Sublayers may increase the sensitivity of the overall model, for example when there are:

- Strong correlations between terrain and site types (e.g., fish traps in intertidal zones, rock art on steep cliffs)
- Divergent cultural or environmental characteristics between sub-regions (e.g., highlands and lowlands, ecoregions)
- Glacial lakes or isostatic rebound with significant impacts on paleolandscapes

C. Informed Contributors Layer (ICL)

The ICL documents areas of significance identified by First Nations, archaeologists, and other informed contributors to enhance GIS-based models. The ICL is not a predictive model but serves as a repository for information that indicates high archaeological potential. The ICL contains spatially defined areas including:

- Areas of cultural and heritage significance to First Nations, including sites with intangible values
- Traditional use areas
- Previously unrecorded archaeological sites known to the community
- Post-1846 CMTs and other archaeological sites that are culturally significant but that are not automatically protected under the HCA

Confidential areas must be identified with a unique ID attribute for each polygon, so the source can be referenced if necessary. The contributor (e.g., First Nation) may provide spatial data, but may define special requirements (e.g., further details may only be shared by the First Nation). This must be clearly explained in the metadata (see Spatial Data Attributes section below).

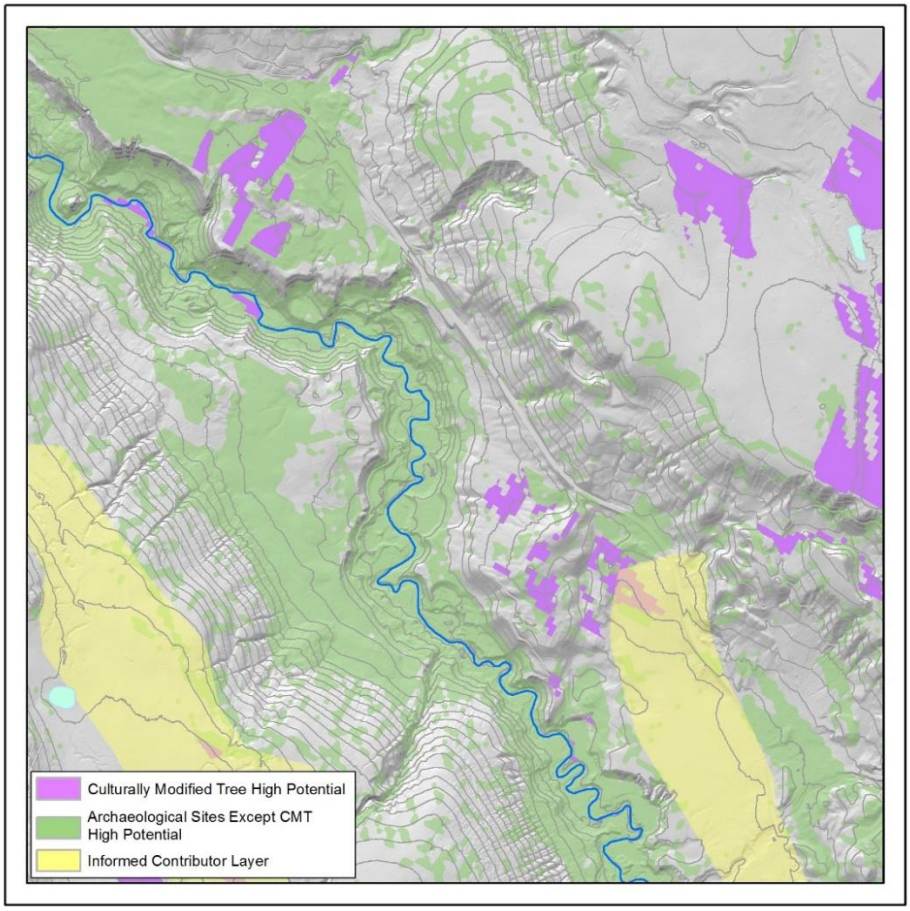

Figure 1: Example of Geospatial Deliverables for AOAs

D. Metadata

Complete a metadata statement for each layer (even if there is no data) and include:

- Study title, author, affiliation and date
- Permit number(s)
- Description of both study areas and potential areas
- Modelling approach
- Scale of analysis, precision, or coverage resolution
- Any special requirements for information stored in the ICL (e.g., confidential information is held by the First Nation)
- Any other relevant information concerning the accuracy and

effectiveness of the layers

E. Corrected Site Location Data

Discussions with the Inventory Section of the Branch must take place prior to the project to determine how corrected site information will be provided to the Branch to update the Provincial Heritage Register.

F. Spatial Data File Delivery

Spatial Standards

Deliver spatial data to the Branch as follows:

- CMT and ASEC model spatial file polygons must have accurate geometric topology with no gaps, no self-intersects, and no multipart polygons.
- ICL spatial files may have gaps since data is location specific.
- Potential polygons and locations identified in the ICL should follow the Archaeology Branch Site Form and Mapping Requirements.[10]
- Use provincial standard NAD 1983 BC Environment Albers projection as described on the B.C. Geographic Warehouse webpage.[11]
- Save each model layer in a different file and deliver all layers in one folder:
    - Name files with the following convention "Layer_Permit_Number" (e.g., ICL_2023_0123.shp).
    - Create a single composite spatial file for each model.
- Submit a single polygon for the AOA study area, named "Study_Area_Permit_Number" (e.g., Study_Area_2023_0123).
- Submit a polygon layer showing the locations of the archaeological sites used in developing the model, named "Modelled_Arch_Sites_Permit_Number" (e.g., Modelled_Arch_Sites_2023_0123).

[10] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/archaeology/forms-publications/site_form_mapping_and_spatial_requirements.pdf
[11] https://www2.gov.bc.ca/gov/content/data/finding-and-sharing/bc-geographic-warehouse

- Use ESRI shapefile or geodatabase format only.
- Shapefiles must include at minimum .prj, .dbf, .shp, and .shx files.
- Any emails with password-protected attachments with executable content or with the following file extensions .7z, .zip, .tgz, .zi, and .iso will be blocked and not be received by the Branch, with no notification to the sender or the Branch.

Spatial Data Attributes

CMT and ASEC model spatial files must contain the following attribute field:

POTENTIAL: Text field with a length of 4 characters – values are HIGH or LOW

ICL model spatial files must contain the following attribute fields:

NAME: Unique reference name, for confidential information

DESC: Meaningful description of the area (no more than 100 characters)

DESCBRANCH: Meaningful description only visible to Archaeology Branch

CONTACT: Name of organization that can provide additional information, as required (e.g., the resource department of a First Nation)

DATES: When data was last added/updated

REFERENCE: Data type (e.g., shapefile, red circle on map)

INPUT: Data collection method (e.g., GIS, hand drawn map)

SOURCE: How information was gathered (e.g., interview)

INSTRUCT: Additional instructions