Archaeological Impact Assessment Guidelines

Preface

This document applies principally to development projects which are reviewable under British Columbia's Environmental Assessment Act. As such, the procedures for archaeological resource assessment and review articulate with the three stage assessment process provided for in that legislation. Although these guidelines apply mainly to development projects which undergo provincial review, they may also be applied, with minor modification, to all other developments.

A particularly important characteristic of these guidelines is their flexibility. They are not intended to be used as a "cookbook" approach to all development projects. Although certain categories of information are needed for decision-making, each archaeological study must be tailored to meet specific project characteristics and needs. It is recognized that the extent of work, particularly in the preliminary stages of project planning, needs to be coordinated with the proponent's level of commitment to the project.

Therefore, representatives of the Archaeology Branch (hereinafter the Branch) will meet directly with the proponent to provide project-specific clarification and interpretation of the guidelines where necessary. Depending upon the project, considerable flexibility can be expected in the staging of impact assessment and management studies, the level of detail at which the studies are undertaken, and the reporting requirements.

Archaeological assessment and review procedures are under continual review and are subject to change as the Provincial Government's overall environment al impact assessment and review process evolves. These guidelines have reflected this evolutionary process since their initial appearance as the GUIDELINES FOR HERITAGE RESOURCE IMPACT ASSESSMENT IN BRITISH COLUMBIA published by the Heritage Conservation Branch in 1982.

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2.1 Legislation

British Columbia's archaeological resources are protected under the Heritage Conservation Act. The provisions of the Act apply whether archaeological sites are located on public or private land. Archaeological sites are protected through designation as "Provincial heritage sites" (section 9), or through automatic protection by virtue of being of particular historic or archaeological value (section 13). Protected archaeological sites may not be altered, i.e. changed in any manner, without a permit issued by the Minister or designate. The Act affords considerable discretionary authority in determining if, and under what conditions, such permits are to be granted (sections 12 and 14).
Section 14 of the Act empowers the Minister to order a "heritage inspection" or a "heritage investigation" where, in the minister's opinion, land contains an archaeological site protected under section 13, or the land may be subject to subdivision, alienation from government ownership, or alteration by natural or human causes. The purpose of a heritage inspection is to assess the archaeological significance of land or other property. In this regard, the inspection determines the presence of archaeological sites which warrant protection, or are already protected, under the Act. A heritage investigation is undertaken in order to recover information which might otherwise be lost as a result of site alteration or destruction.

2.2 Administration

Sections of the Heritage Conservation Act pertaining to archaeological resources are administered by the Branch. The role of the Branch is not to prohibit or impede land use and development, but rather to assist the Provincial Government in making decisions which will ensure optimal land use. When the benefits of a project are sufficient to outweigh the benefits of archaeological preservation, the Branch's primary concern is to work with the proponent in determining how the project may be implemented with minimal loss to archaeological resource values. If appropriate impact management practices are adopted, it is usually possible to minimize the loss of archaeological resource values in a cost-effective manner. Where the loss of significant archaeological values cannot be adequately mitigated, the role of the Branch is to ensure that appropriate compensatory measures are implemented.

The following objectives reflect archaeological resource management policy in British Columbia:

a. to preserve representative samples of the province's archaeological resources for the scientific and educational benefit of present and future generations;
b. to ensure that development proponents consider archaeological resource values and concerns in the course of project planning; and
c. to ensure where decisions are made to develop land, the proponents adopt one of the following actions:
    i. avoid archaeological sites wherever possible;
    ii. implement measures which will mitigate project impacts on archaeological sites; or
    iii. compensate British Columbians for unavoidable losses of significant archaeological value.

In managing archaeological resources, the Branch endeavors to develop a cooperative relationship with project proponents.

3.0 Archaeological Impact Assessment and Review Process

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3.1 Introduction

Archaeological impact assessment studies are initiated in response to development proposals which will potentially disturb or alter the landscape, thereby endangering archaeological sites. Major development projects of this nature normally proceed through four general stages of project planning:

1. prospectus;
2. feasibility or preliminary planning and design;
3. final design, licencing and approval; and
4. implementation and operation.

At each stage of this general planning process a particular type of archaeological study is undertaken to meet specific project objectives and needs.

The archaeological assessment process is composed of two principal components: **assessment** and **impact** management. Assessment is primarily concerned with the inventory and evaluation of archaeological resources, and the assessment of impacts during the initial stages of project planning. Impact management follows directly from assessment and is primarily concerned with managing unavoidable adverse impacts as well as unanticipated impacts. It is important to recognize that the assessment and impact management stages are approached sequentially in association with specific levels of project planning. Moreover, each new stage in the process is highly dependent upon results and recommendations made in the preceding stage. The success of this process is also dependent upon effective communication and cooperation between project proponents and the Branch, and their mutual respect for development and archaeological resource management objectives.

3.2 Roles and Responsibilities

The main participants in the archaeological assessment process usually include: project proponents, archaeological consultants, Branch staff, and project committees established under the Environmental Assessment Act.

3.2.1 Project Proponents and Consultants

The branch exercises various responsibilities that include:

a. establishing impact assessment and management guidelines, study standards, and reporting requirements;
b. reviewing development proposals to determine the proponent's level of involvement in the archaeological resource assessment process;
c. preparation of orders and permits pursuant to the Heritage Conservation Act in assistance to the Minister;
d. providing guidance or direction to the proponent throughout the archaeological assessment process;
e. ensuring that First Nations who could be affected by decisions are given an opportunity to have their concerns considered prior to making decisions;
f. providing consultants with access to archaeological site files, maps, and other documentary materials maintained within the Ministry;
g. monitoring field aspects of archaeological impact assessment and management studies for compliance with terms and conditions of orders and permits;
h. reviewing reports and research proposals for relevance, completeness and objectivity; and
i. establishing terms and conditions for project approval.

3.2.3 Project Committees

Committees set up for each project review incorporate the archaeological resource assessment process by providing general direction and coordination of the province's overall environmental assessment and review process. These committees work directly with the proponent and the Branch to clarify requirements or provide general advice on assessment and review procedures at various stages in the approval process. They also coordinate review comments, advice and queries the Branch may have regarding a proponent's archaeological impact studies.

3.3 Review Procedures

The Branch may conduct as many as three formal reviews. The first involves an examination of the proponent's application for a Project Approval Certificate to determine whether further involvement in the archaeological resource assessment process is required. Therefore, the application should include an archaeological overview. The second review is to evaluate the Project Report which should include the results of an archaeological impact assessment. The third review is to assist in the preparation of the terms of reference for an Environmental Assessment Board hearing, if required, and will address archaeological impact management issues.

The Branch may request that report deficiencies either be rectified immediately or, depending on the nature of these deficiencies, in a following stage of the assessment process. In this regard, the Branch will advise the proponent of the nature of deficiencies and how they may be rectified.
Archaeological assessment reports should be received by the Branch as early as possible in the project planning process. Early Branch review will provide maximum lead time for correcting report deficiencies and/or designing and implementing subsequent archaeological investigations. This practice will minimize expense and delay to the proponent.

Unless the proponent requests otherwise, final reports received by the Branch are considered public information.

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3.4 Overview

The archaeological resource overview is intended to identify and assess archaeological resource potential or sensitivity within a proposed study area. Recommendations concerning the appropriate methodology and scope of work for subsequent inventory and/or impact assessment studies are also expected.

Typical overview studies should entail (see Appendix A):

a. a background library and records search of ethnographic, archaeological and historical documents pertinent to the study area;
b. a statement of archaeological resource potential and distribution in the study area;
c. a preliminary assessment of anticipated impacts in light of proposed development plans; and
d. recommendations concerning the need for further archaeological impact assessment studies.

These studies are of fundamental importance in assessing the archaeological resource potential of a study area, and should result in predictions regarding archaeological site variability, density and distribution. In addition, it may also be possible to develop a preliminary evaluatory framework within which to judge the significance of archaeological sites. Depending on the availability and quality of existing data, it may be possible to achieve these research objectives without undertaking field survey; however, documentary research and, where practical, direct consultation with knowledgeable persons and organizations is essential.

Overview studies are particularly important with respect to large-scale development projects such as hydro-electric dams, electrical transmission lines, pipelines, etc. More site specific projects involving small, well-defined localities such as residential subdivisions, manufacturing plants, and port facilities may effectively combine an overview and impact assessment study. However, the most appropriate type of study to be undertaken at this stage should be established through consultation with the Branch.

3.4.1 Documentary Research

This aspect of the overview study should involve a thorough review of library and archival literature as well as other relevant data sources. The research should include, but need not be limited to:

a. a check of extant records including the B.C. Archaeological Site Inventory, legal land survey records, and other pertinent records and inventory files;
b. a review of all previous archaeological investigations in the study area or in immediately adjacent areas;
c. a review of relevant information from published and unpublished sources such as local and regional history, prehistory and ethnography;
d. a review of relevant paleoecological studies to assess past environmental conditions that may have influenced cultural adaptations; and
e. examination and interpretation of air photographs and geomorphological and pedological information as an aid for assessing the potential for human habitation.

Occasionally, access to relevant unpublished data may be seriously hindered. For example, some institutions or organizations that maintain archaeological documents, records, files, etc. may have, except under special arrangement, a confidential policy regarding use of the material. Such a policy usually reflects legitimate concerns about the integrity of the documents. In other cases, the researcher may face a long waiting period before access

to the data is permitted. Problems in accessing pertinent and necessary documentary sources should be ascertained as early as possible, and those problems which cannot be immediately resolved should be brought to the attention of the Branch.

3.4.2 Direct Consultation

Individuals and organizations with knowledge of archaeological resources in the study area should be contacted where appropriate. The objective is to compile information concerning the location, distribution and significance of reported archaeological sites. Interviews should be designed to elicit information which may facilitate reconstructing or confirming ethnographic and historic patterns of settlement, land use and subsistence. Among those who should be consulted are aboriginal groups, local museums, archaeological or historical societies, long-time residents, and specialists having local or regional expertise in the area. Specialists may include archaeologists, historians and ethnohistorians, among others.

Local perceptions and attitudes may have a significant bearing on resource management decision-making, and therefore should be reported. This is especially true when there is strong local interest and concern regarding the safety of a particular archaeological site or a group of such sites. Interviews with various persons can provide the researcher with an opportunity to document public or community attitudes toward impacts which a proposed development may have on local archaeological resources. However, particularly in the early project planning phases where speculation may be a concern, these interviews must be conducted only with the approval of the proponent, and must be handled very objectively.

3.4.3 Preliminary Field Reconnaissance

The archaeological overview may require a preliminary field reconnaissance, which may involve a simple overflight of the study area or, if greater intensity is demanded, a field survey using either systematic or judgemental site sampling techniques. Reconnaissance survey should be undertaken in the event that historical, archaeological, ethnological, or other documentary sources necessary for assessing the archaeological resource potential of the study area are insufficient or unavailable. A field reconnaissance is also warranted in the case where many alternatives are under consideration for the location of project facilities. In this case, an overview of the resource potential of an area, based entirely on documentary research, may be inadequate for providing effective guidance in project planning. The Branch will provide assistance in determining the need and appropriate intensity of preliminary field reconnaissance for specific development projects.

The reconnaissance survey should be designed to assess the archaeological resource potential of the study area, and to identify the need and appropriate scope of further field studies. Although this may involve some ground reconnaissance, areal coverage will usually be quite small relative to the overall size of the study area. This preliminary survey will seldom provide sufficient data to ensure an adequate estimate of all archaeological sites in an area. However, information resulting from preliminary field reconnaissance should:

a. confirm or refute the existence of archaeological sites reported or predicted from documentary research;
b. allow further predictions to be made about the distribution, density and potential significance of archaeological sites within the study area;
c. identify areas where sites are apparently absent, implying low or no potential;
d. verify, wherever possible, potential impacts imposed by the development project;
e. suggest the most appropriate survey methods or techniques to be used in an intensive field survey should such a survey be necessary.

By accomplishing these research objectives, the reconnaissance survey serves as a useful preliminary study for designing and subsequently implementing a more intensive site survey.
Techniques employed in reconnaissance survey will vary depending on such factors as terrain, vegetation, land use, ease of access, urbanization, the size of the project area, and the types of archaeological resources being

sought. Where archaeological sites are anticipated, it may be necessary to undertake some subsurface testing to locate sites lacking surface evidence, to delineate site boundaries or, where necessary, to obtain sufficient information for preliminary site evaluation.

In undertaking an archaeological overview the development proponent, or his consultant, is encouraged to develop innovative approaches to predicting or evaluating overall resource sensitivity or potential within the study area. In this respect, it is important to consult all relevant data sources. Furthermore, the services of specialists such as ethnohistorians and geologists should be drawn upon so as to make the fullest use of the data. A comprehensive overview will ultimately result in more efficient and cost-effective research in later stages of the assessment process.

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3.5 Impact Assessment

An archaeological impact assessment will be required where potential impacts to archaeological resources are identified in the overview study. The impact assessment is designed to gain the fullest possible understanding of archaeological resources which would be affected by the project.

The primary objectives of the impact assessment are to:

a. identify and evaluate archaeological resources within the project area;
b. identify and assess all impacts on archaeological resources which might result from the project; and
c. recommend viable alternatives for managing unavoidable adverse impacts including a preliminary program for;
    i. implementing and scheduling impact management actions and, where necessary,
    ii. conducting surveillance and/or monitoring

Information provided by the impact assessment is intended to assist the proponent in choosing a suitable approach to designing, planning and implementing the proposed project while giving consideration to archaeological resources. In the course of fulfilling these basic objectives, it is often possible to conduct problem-oriented research aimed at enhancing scientific knowledge and public appreciation of British Columbia's archaeological resources. The effective integration of management and research is a desirable quality of impact assessment studies and should be recognized as an integral part of such studies.

Two basic research activities are associated with the impact assessment level of study: (1) inventory, and (2) impact identification and assessment. Due to uncertainty as to the number or types of archaeological sites which might be encountered during the inventory stage, it is often preferable to separate that stage from the impact identification and assessment stage.

3.5.1 Inventory

- *3.5.1.1 Site Surveying*
- *3.5.1.2 Survey Sampling*
- *3.5.1.3 Systematic Survey Sampling*
- *3.5.1.4 Judgemental Survey Sampling*
- *3.5.1.5 Site Recording*

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

There are a number of different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with an archaeological consultant, must develop an inventory plan for review and approval by the Branch prior to implementation.

3.5.1.1 Site Surveying

Site surveying is the process by which archaeological sites are located and identified on the ground. Archaeological site surveys often involve both surface inspection and subsurface testing.
A systematic surface inspection involves a foot traverse along pre-defined linear transects which are spaced at systematic intervals across the survey area. This approach is designed to achieve representative areal coverage. Alternatively, an archaeological site survey may involve a non-systematic or random walk across the survey area.
Subsurface testing is an integral part of archaeological site survey. The purpose of subsurface testing, commonly called "shovel testing", is to:

a. assist in the location of archaeological sites which are buried or obscured from the surveyor's view, and
b. help determine the horizontal and vertical dimensions and internal structure of a site.

In this respect, subsurface testing should not be confused with evaluative testing (section 3.5.2.1), which is a considerably more intensive method of assessing site significance.

Once a site is located, subsurface testing is conducted to record horizontal extent, depth of the cultural matrix, and degree of internal stratification. Because subsurface testing, like any form of site excavation, is destructive it should be conducted only when necessary and in moderation.
Subsurface testing is usually accomplished by shovel, although augers and core samplers are also used where conditions are suitable. Shovel test units averaging 40 square cm are generally appropriate, and are excavated to a sterile stratum (i.e. C Horizon, glacial till, etc.). Depending on the site survey strategy, subsurface testing is conducted systematically or randomly across the survey area. Other considerations such as test unit location, frequency, depth and interval spacing will also depend on the survey design as well as various biophysical factors. All test units placed on a site must be accurately recorded and mapped.

3.5.1.2 Survey Sampling

Site survey involves the complete or partial inspection of a proposed project area for the purpose of locating archaeological sites. Since there are many possible approaches to field survey, it is important to consider the biophysical conditions and archaeological site potential of the survey area in designing the survey strategy. Ideally, the archaeological site inventory should be based on intensive survey of every portion of the impact area, as maximum areal coverage will provide the most comprehensive understanding of archaeological resource density and distribution. However, in many cases the size of the project area may render a complete survey impractical because of time and cost considerations.

In some situations it may be practical to intensively survey only a sample of the entire project area. Sample selection is approached systematically, based on accepted statistical sampling procedures, or judgementally, relying primarily on subjective criteria.

3.5.1.4 Judgemental Survey Sampling

Under certain circumstances, it is appropriate to survey a sample of the project area based entirely on professional judgement regarding the location of sites. Only those areas which can reasonably be expected to contain archaeological sites are surveyed.
However, a sufficient understanding of the cultural and biophysical factors which influenced or accounted for the distribution of these sites over the landscape is essential. Careful consideration must be given to ethnographic patterns of settlement, land use and resource exploitation; the kinds and distribution of aboriginal food sources; and restrictions on site location imposed by physical terrain, climatic regimes, soil chemistry or other factors. A judgemental sample survey is not desirable if statistically valid estimates of total archaeological resource density and variability are required.

3.5.1.5 Site Recording

Site survey includes the complete documentation of each identified site. All archaeological sites in British Columbia are recorded on standard site inventory forms available from the Branch.
The Archaeological Site Inventory Form Guide must be consulted when recording archaeological sites. This manual identifies the kinds of information to record and the procedures to follow in completing site inventory forms. Site forms should include a description of site characteristics, along with a map of the site drawn to scale. The map should illustrate the arrangement of site features, as well as the location of the site relative to the nearest recognizable and permanent landmark. Since these sites are often situated in remote areas, the map must be drawn in sufficient detail to allow easy relocation in the field. Legal descriptions should be provided wherever possible.

Site recording should also include a thorough description of all observed cultural materials. It is recommended that a representative selection of diagnostic artifacts or features be drawn to scale or photographed in situ. Drawings and photographs should be included with the inventory form.
Once completed, site inventory forms must be forwarded to the Branch. The Branch will assign a "Borden" identification number to each site and subsequently notify the proponent and/or his archaeological consultant as to which numbers have been assigned. Since Borden numbers can only be assigned by Branch staff, temporary site numbers must be used in the field.

3.5.2 Assessment

- *3.5.2.1 Site Evaluation*
- *3.5.2.2 Significance Criteria*
- *3.5.2.3 Assessing Impacts*

Impact assessment studies are only required where conflicts have been identified between archaeological resources and a proposed development. These studies require an evaluation of the archaeological resource to be impacted, as well as an assessment of project impacts. The purpose of the assessment is to provide recommendations as to the most appropriate manner in which the resource may be managed in light of the identified impacts. Management options may include alteration of proposed development plans to avoid resource impact, mitigative studies directed at retrieving resource values prior to impact, or compensation for the unavoidable loss of resource values.

There are several methodological approaches that can be utilized in conducting an impact assessment. Therefore, the proponent's archaeological consultant must develop an impact assessment proposal for review and approval by the Branch prior to implementation.

It is especially important to utilize specialists at this stage of assessment. The evaluation of any archaeological resource should be performed by professionally qualified individuals. The involvement of researchers with varied expertise throughout this stage will help ensure that potentially significant data are not inadvertently overlooked.

3.5.2.1 Site Evaluation

Techniques utilized in evaluating the significance of an archaeological site include systematic surface collecting and evaluative testing. Systematic surface collection is employed wherever archaeological remains are evident on the ground surface. However, where these sites contain buried deposits, some degree of evaluative testing is also required.
Surface collecting involves:

a. placing an appropriate grid over the site area or some portion thereof;
b. mapping, measuring, and recording all cultural items and other relevant materials observed within the grid system; and
c. collecting and cataloguing recorded materials.

Systematic surface collection from archaeological sites should be limited, insofar as possible, to a representative sample of materials. Unless a site is exceptionally small and limited to the surface, no attempt should be made at this stage to collect all or even a major portion of the materials. Intensive surface collecting should be reserved for full scale data recovery if mitigative studies are required. Site significance is determined following an analysis of the surface collected and/or excavated materials.

Evaluative testing or "test excavation" is appropriate at archaeological sites containing buried cultural materials. Evaluative testing implies "controlled" excavation of a portion of such sites using established data recovery techniques. The objective is to gain a sufficient impression of the content and structure of a site so that a reliable evaluation of significance can be made. Evaluative testing will also provide necessary information for estimating the cost of full-scale excavation should this activity be necessary.
Evaluative testing involves:

a. systematic excavation of one or more units by stratigraphic or arbitrary levels;
b. mapping, measuring, and recording the horizontal and vertical provenience of all cultural items or other relevant materials observed within each excavation unit; and
c. recovery and cataloguing of all cultural materials.

Profile drawings of the stratigraphy and features exposed in the walls of excavation units should also be prepared where appropriate. Site significance is based on the subsequent analysis and interpretation of recovered materials and the context in which they were found.

Evaluative testing should not be interpreted as a full-scale data recovery or mitigation operation since it is not intended to alleviate adverse impacts or resolve conflicts with a proposed project. The appropriate number of units to excavate for evaluative purposes will vary according to site characteristics such as horizontal and vertical extent, artifact density, and structural complexity. In some cases, a single excavation unit will be appropriate. In others, several units systematically or judgementally placed across the site area will be required. Natural and artificial exposures, such as stream cut-banks and vehicle trails, should be used where possible to supplement data from excavation units.

3.5.2.2 Significance Criteria

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating archaeological resources. For any site, explicit criteria are used to measure these values. Checklists of criteria for evaluating pre-contact and post-contact archaeological sites are provided in Appendix D and Appendix E. These checklists are not intended to be exhaustive or inflexible, and the user should add to and revise them as necessary. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluatory criteria.

Site integrity, or the degree to which an archaeological site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Archaeological resources may be of scientific value in two respects. The potential to yield information which, if properly recovered, will enhance understanding of British Columbia's human history is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of archaeological resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to archaeological sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data (i.e. ethnologists, behavioral scientists, etc.).

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of an archaeological site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of an archaeological site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population.

3.5.2.3 Assessing Impacts

An archaeological resource impact may be broadly defined as the net change between the integrity of an archaeological site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances an archaeological resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a

protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on archaeological sites are of an adverse nature. Adverse impacts occur under conditions that include:

a. destruction or alteration of all or part of an archaeological site;
b. isolation of a site from its natural setting; and
c. introduction of physical, chemical or visual elements that are out-of-character with the archaeological resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon archaeological sites. Increased vandalism of archaeological sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on archaeological resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what archaeological values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined in Appendix F:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment.

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3.6 Impact Management

The management of unavoidable and unanticipated adverse impacts on archaeological resources is achieved through the implementation of mitigation, compensation, surveillance, monitoring and emergency impact management measures. These measures are only implemented in situations where unavoidable conflicts are identified between archaeological resources and a proposed development. The nature and extent of these measures will have been determined in the impact assessment stage.

In practice, defining the optimum level of impact management is hindered by the fact that archaeological resource values and preservation benefits are not easily measured in economic terms. Determining publicly and professionally acceptable levels will usually necessitate discussion with the Branch. The overriding objectives are to promote efficiency and equity, and ensure that the benefits of such measures exceed the costs.

3.6.1 Mitigation

Mitigation refers to measures that reduce the deleterious effects of project construction, operation and maintenance on archaeological resource values. Actions designed to prevent or avoid adverse impacts are also regarded as mitigation.

In the case of mitigative management, some form of systematic data recovery, analysis and interpretation will be involved. The proponent and/or his archeological consultant will be required to submit a detailed research proposal to the Branch prior to implementation.

This level of study involves the effective, professional management of endangered archaeological sites within the project area. The primary objectives are to:

a. implement acceptable measures for mitigating adverse impacts or compensating for resource losses;
b. report the objectives, methods and results of impact management; and
c. report the need for and general scope of any follow-up surveillance or monitoring.

Various options are available for the mitigation of adverse impacts on archaeological sites including changes in project design, the implementation of site protection measures, and systematic data recovery. The mitigative measure(s) which should be implemented in any specific case depends on:

a. the significance of the resource;
b. the nature and extent of the impact;
c. the relative effectiveness of the measure;
d. research and resource management priorities and needs; and
e. project objectives, conditions and constraints.

3.6.1.1 Project Design Changes

An important means of mitigating adverse project impacts on archaeological sites is to institute changes in the design or location of a project, or to alter the level of development intensity. Design alternatives are recommended in the impact assessment study and subsequently incorporated in the final project design.

Alterations in project design are viable mitigation measures wherever adverse impacts on archaeological sites are avoided or reduced as a result. Impacts can be avoided by relocating project facilities such as construction camps, stockpiles and transmission towers, or re-aligning linear developments such as oil and gas pipelines, transmission lines, railways, and roads.
Fences or other suitable barriers should be erected, despite avoidance measures, as an added precaution where archaeological sites are situated close to a construction area. Avoidance is always the preferred mitigation measure as it ensures complete in situ protection of the resource for future investigation or use. Moreover, it is often the least costly measure to implement.
Reducing the effects of project actions on archaeological sites can also be accomplished by decreasing the amount of development or by using construction practices which minimize ground disturbance. Examples include restricting the use of heavy machinery on a site, clearing land over suitable snow cover, and using project buildings without subsurface foundations.

3.6.1.2 Site Protection

Archaeological preservation can also be achieved through measures that prevent or forestall site destruction. Site protection measures include protective covering, stabilization, and physical barriers. The feasibility and suitability of implementing one or other of these protective measures may require a geophysical assessment.

Site capping or burial involves judiciously covering an archaeological site with fill, asphalt, peat, concrete, etc. Once capped, project construction or other activities may be permitted to occur unimpeded over the site. However, site capping is an appropriate mitigative measure only when it can be demonstrated that important data will not be irrevocably lost through compaction, accelerated decomposition, horizontal displacement, or subtle changes in soil chemistry. In addition, capping must take into account the degree to which future investigation and use may be foreclosed because of inaccessibility.

Stabilization measures and the use of protective barriers may be appropriate in cases where archaeological sites are adjacent to the construction zone, and in areas where erosion or slope failure are anticipated. Under these conditions, the destruction or erosion of archaeological sites may be prevented by constructing barriers such as fences, dykes and gabions, or by utilizing landscaping practices such as differential clearing and slope terracing. Water diversion channels, designed to minimize erosional processes, may also be considered protective barriers. In addition, a suitable buffer zone, within which no land alteration or other activity is permitted, is often necessary to ensure adequate site protection. Buffer width should depend on the degree of uncertainty concerning site size and the type of activity proposed.
Archaeological site vandalism and the unlicensed collection of artifacts and "digging" of sites, are often indirect consequences of a project. Vandalism may be precipitated by disclosing site locations or by facilitating public access to otherwise inaccessible areas. Although site protection measures can play an important role in controlling

vandalism, other approaches are usually required. Since site vandalism is primarily an educational problem, one approach is to conduct information programs for project personnel that promote archaeological conservation. In addition, the development of archaeological sites as special interest areas can also serve to deter vandalism, while allowing the resource to be of direct public benefit. An ongoing program of patrolling and monitoring archaeological sites should also be considered.

3.6.1.3 Systematic Data Recovery

The systematic investigation and recovery of data from archaeological sites represents a third, but less desirable, mitigation option. A principle disadvantage is that the recovery process itself is destructive; foreclosing future opportunities for scientific research, preservation or public appreciation. Furthermore, even the most intensive and sophisticated recovery program is seldom able to retrieve all the data in an archaeological site; invariably a great deal of information is lost. Proper data recovery and analysis is also very time consuming and expensive, and recovery costs are often difficult to estimate accurately. Therefore, systematic data recovery should be considered only as a last resort when both avoidance and site protection measures are impractical.

Where data recovery is the only viable mitigative option, it should be based on an adaptive, flexible research design and employ professionally accepted methods and techniques. Data recovery should aim to generate further scientific understanding and enhance public appreciation and awareness of the resource. Multi-disciplinary collaboration and problem-oriented research are encouraged.

Archaeological research goals will vary depending on current regional research and resource management priorities and needs. However, once defined, the specific research problems and objectives constitute the limits of a proponent's responsibility in data recovery and analysis. The level or intensity of data recovery will depend on the number of sites involved, site significance, size and structural complexity, and the level of adverse effect. Because proper understanding of an archaeological site depends on knowledge of the larger settlement/subsistence system into which it fits, adequate mitigation may require investigation of other unaffected sites.
Systematic data recovery from archaeological sites involves:

a. a complete or partial systematic surface collection, excavation, or both;
b. a comparative analysis and interpretation of content and contextual information; and
c. production of an investigative report.

All recovered data must be analyzed, interpreted and reported, and artifact curation must be arranged beforehand. The materials and records of the investigation must be available and accessible to future researchers.

3.6.2 Compensation

The unavoidable loss of significant archaeological resources as a result of project impacts should be compensated in-cash or in-kind. Compensation in-cash refers to direct monetary payment. The Branch will determine, depending on equity and efficiency considerations, to whom the payment should be made.

Compensation in-kind refers to measures other than direct cash payment. An important form of compensation in-kind is the acquisition of property, unaffected by project development, for the purpose of establishing archaeological reserves. In principle, the land or archaeological property to be acquired should be equivalent to the foreclosed resources in terms of topographic setting, types of resources, integrity, significance and other factors. Site surveys or investigations, including systematic data recovery in areas unaffected by a project, may also be suitable compensative measures.

Compensation in-kind also includes a wide range of public-oriented archaeological programs and specific investigative projects. These programs, whether of local, regional or provincial scale, are often of a thematic

nature and include site restoration, reconstruction or development. The objective is to enhance public understanding and awareness of British Columbia's archaeological resources.

3.6.3 Surveillance

Surveillance is undertaken in order to protect archaeological resources during project construction by ensuring compliance with and proper execution of adopted mitigation measures; particularly any conditions or restrictions on the nature of construction or level of development. Surveillance may be necessary where archaeological site protection measures are implemented both before and during project construction.

3.6.4 Monitoring

Monitoring is undertaken to ensure that adverse project impacts on archaeological sites which could not be predicted or evaluated prior to construction are addressed. Project actions that may unexpectedly expose and disturb recorded as well as previously unknown sites warrant at least periodic monitoring. For example, the shoreline of a newly created reservoir should be monitored during the stabilization period to document unanticipated impacts on archaeological sites resulting from slope failure and shoreline erosion. In addition, monitoring is undertaken in order to assess the effectiveness of mitigation measures, as well as the magnitude, severity or duration of an impact.

3.6.5 Emergency Impact Management

It is occasionally necessary to implement emergency measures to mitigate unanticipated impacts on archaeological sites. These measures may be required where mitigation efforts are found to be ineffective or fail outright, or where project actions have inadvertently uncovered significant archaeological sites.

Emergency impact management involves one or more of the following actions:

a. avoidance through partial or complete project redesign or relocation;
b. application of site protection measures; and
c. salvage or emergency excavation.

Salvage excavation implies rapid data recovery with little or no opportunity for problem-oriented research. The principal objective is simply to recover data which would otherwise be lost. Salvage excavation differs significantly from systematic data recovery, which is initiated before construction. Neither strategy is intended to replace the other.

In situations where unpredicted impacts occur, construction activities must be stopped and the Branch should be notified immediately. The overriding objective, where remedial action is warranted, is to minimize disruption in construction scheduling while recovering archaeological data.

Appendix A (Part 1 of 3): Guidelines for Report Content

Overview Report

- *Title Page*
- *Credit Sheet*
- *Management Summary*
- *Table of Contents*
- *List of Figures, Tables, Appendices*
- *Introduction*
- *Proposed Project*
- *Study Area*
- *Methodology*
- *Results*
- *Evaluation and Discussion*
- *Recommendations*
- *References Cited*
- *Appendices*

Title Page

The title page should include:

a. the official project name and location,
b. the type of archaeological resource assessment,
c. the number of the permit or ministerial order under which the research activities were authorized, if applicable,
d. the name and address of the agency for which the report was prepared,
e. the report date, and
f. the author's signature and title.

Credit Sheet

The credit sheet should contain the names, addresses and professional affiliations of the principal contributors to the overview study including:

a. the director or supervisor,
b. researchers, and
c. report author.

Management Summary

The table of contents should be arranged in accordance with the sequence of topical headings and their corresponding page numbers.

List of Figures, Tables, Appendices

All figures, tables and appendices should be referenced by title and page number, and listed according to the order in which they appear in the text of the report.

Introduction

The introduction should include:

a. the name of the proponent and general nature of the proposed development,
b. project planning objectives,
c. the objectives and general scope of the archaeological overview,
d. the agency and persons conducting the assessment, as well as the kinds of professional expertise involved,
e. the dates and duration of the study, and
f. the organizational format of the report.

Proposed Project

This section should contain a brief summary of all pertinent development aspects of the proposed project. With the aid of maps, engineering plans, photos and other materials, the discussion should include, insofar as possible:

a. boundaries of the projected impact zone or study area for each project alternative considered,
b. the kinds and anticipated locations of all ancillary facilities,
c. general kinds of impacts the proposed project would likely have on archaeological resources in the study area,
d. aspects of project scheduling, and
e. alternative project designs or locations.

Study Area

This section should contain a brief description of the study area. The discussion should emphasize biophysical characteristics, both past and present, which may have influenced the density, distribution, variety and potential significance of archaeological resources.

Methodology

The basic research plan and the precise methods and equipment used to implement the plan should be documented in this section. Where the overview focuses on selecting a preferred project design from among several alternatives, the role of archaeological data in the selection process should be described.

Results

This section should contain the results of documentary research, direct consultation, and if applicable, preliminary field reconnaissance. Information should be reported here only to the extent that it relates to the basic objectives of the overview.
Results of the background research should include:

a. a description of past land uses,
b. a summary of previous archaeological sites reported in the study area and a map showing their location.
c. a brief narrative description of all archaeological sites reported in the study area and a map showing their location.

Results of the preliminary field reconnaissance should include:

d. maps showing areas surveyed,
e. maps showing the location of all sites observed and recorded,
f. a brief narrative description and photo record of all recorded sites,
g. results of subsurface testing, surface collecting, or both, if applicable,
h. a description of all cultural materials observed or collected, and
i. results of experiments to determine a suitable archaeological site survey strategy for the study area.

Evaluation and Discussion

The assessment of archaeological resource potential in the study area, based on the major findings of background research and preliminary field reconnaissance, should be presented here. The assessment should be made from a local, regional and provincial perspective and should be based on known archaeological sites, as well as reported and predicted sites. In this section, the consultant should:

a. identify major information gaps in the archaeological resource base,
b. state predictions about the kinds and number of archaeological sites to be expected,
c. discuss and, insofar as possible, interpret the nature, distribution, and potential significance of archaeological resource values within the study area,
d. discuss, in general terms, potential impacts on the archaeological resource base and possible options for managing impacts, and
e. discuss local public attitude toward potential project impacts on archaeological resources.

Recommendations

The need for further archaeological studies, as well as the scope of these studies, should be identified and discussed here. If appropriate, the discussion should be directed toward the preferred project alternative selected on the basis of engineering, socio-economic and environmental considerations. Recommendations for further assessment should include:

a. maps showing precise areas requiring intensive field survey,
b. justification for no survey action in areas suggesting high archaeological resource potential,
c. a description of areas requiring special field consideration, and
d. the site survey strategy and methods to be used.

References Cited

A comprehensive list of all literary sources cited in the overview report such as publications, documents and records should be presented in this section. The reference list should also include names and dates of all personal communications.

Appendices

A variety of items should be appended to the overview report including:

a. a copy of the proponent's or consultant's terms of reference for the overview studies,
b. a bibliography of data sources consulted, but not necessarily cited in the report, which may be useful for future research,
c. names and addresses of persons or organizations interviewed during the background research stage of the study, and

d. a list of all recorded archaeological sites in the study area, as well as unrecorded sites reported in the literature or through informant interviews.

An impact assessment research proposal indicating specific study objectives, inventory, evaluation and impact assessment methods, work schedules, and other information may also be appended to the overview report. In some cases, the report itself may constitute the impact assessment proposal.

Appendix A (Part 2 of 3): Guidelines for Report Content
Impact Assessment Report

- *Title Page*
- *Credit Sheet*
- *Management Summary*
- *Table of Contents*
- *List of Figures, Tables, Appendices*
- *Introduction*
- *Proposed Project*
- *Project Area*
- *Methodology*
    - *Inventory*
    - *Site Evaluation*
    - *Impact Identification and Assessment*
- *Resource Inventory*
- *Resource Evaluation*
- *Impact Identification and Assessment*
- *Evaluation of Research*
- *Impact Management Recommendations*
- *References Cited*
- *Appendices*

Title Page

The title page should include:

a. the official project name and location,
b. the type of archaeological resource assessment,
c. the number of the permit or ministerial order under which the research activities were authorized, if applicable,
d. the name and address of the agency for which the report was prepared,
e. the report date, and
f. the author's signature and title.

Credit Sheet

The credit sheet should contain the names, addresses and professional affiliations of the principal contributors to the overview study including:

a. the director or supervisor,
b. researchers, and
c. report author.

Management Summary

The management summary should contain a brief overview of the study. Important findings and major recommendations should be emphasized.

Table of Contents

The table of contents should be arranged in accordance with the sequence of topical headings and their corresponding page numbers.

List of Figures, Tables, Appendices

All figures, tables and appendices should be referenced by title and page number, and listed according to the order in which they appear in the text of the report.

Introduction

The introduction should include:

a. the proponent's name and general nature of the project,
b. the objective and scope of the impact assessment,
c. the persons conducting the assessment and the kinds of professional expertise involved,
d. the dates and duration of the study, and
e. the organizational format of the report.

Proposed Project

This section should contain a progress report on project planning. Engineering plans, photos and other illustrative materials should be used to discuss:

a. project design planning and archaeological resource assessment to date,
b. any changes in the original project design or in the level of development,
c. precise boundaries of the project area including locations of all ancillary activities and facilities,
d. the projected extent and level of land alteration or disturbance, and
e. project scheduling.

Project Area

This section should contain a brief description of the project area. Emphasis should be placed on relating the project area to the natural and cultural environments. The area of project impact may have been sufficiently described in the overview report, in which case a brief summary of and proper reference to the document will suffice. Description of the project area should include:

a. biophysical features such a physiography, drainage, fauna, and flora,
b. a discussion of past and present ecological conditions that bear upon human settlement and land use,
c. past and present land use practices
d. the condition of the land, particularly the extent of alteration from agricultural activity, forest harvesting, or other intensive land uses, and
e. weather conditions and patterns, particularly as they relate to or affect the conduct and scheduling of fieldwork.

Methodology

- *Inventory*
- *Site Evaluation*
- *Impact Identification and Assessment*

The basic research plan and the precise methods and equipment used to implement the plan should be outlined in this section. Each assessment activity (inventory, site evaluation, and impact identification and assessment) should be described individually. The discussions should include:

Inventory

a. a thorough account of the sampling design, particularly sample selection and size,
b. the rationale underlying any stratification of the project area according to the archaeological potential, and the level of survey intensity in these strata,
c. the number of surveyors, the manner in which they were deployed over the survey area including distance intervals and direction of travel, and the amount of time spent surveying any one area,
d. location of areas exempt from survey,
e. where and how often subsurface testing was employed, and the particular techniques or practices used including test frequency, interval spacing and unit dimensions,
f. site recording practices, and
g. sources consulted in designing the site inventory strategy.

Site Evaluation

h. information sources used such as evaluative testing, surface collecting, direct consultation and documentary research,
i. evaluative testing procedures including unit sampling or selection, test frequency, unit dimensions, mapping, recording and data recovery practices,
j. surface collecting procedures including sampling design, recording and collection practices,
k. the process used to derive a measure of relative site significance including the system of ranking or weighting various significance criteria and the rationale underlying the process,
l. the kinds of professional expertise involved.

Impact Identification and Assessment

m. how project impacts were identified, and
n. the process used to assess impacts on archaeological resources including assessment criteria, their relative weighting, and the rationale underlying the process.

Resource Inventory

This section should contain results of the archaeological site inventory including:

a. maps showing areas surveyed, including the locations of survey transects and subsurface tests, as well as the ranking of archaeological site potential where appropriate,
b. maps showing all recorded archaeological sites in relation to the proposed project,
c. the number of archaeological sites recorded and the total anticipated in the project area,
d. a brief narrative or tabular description of each site including present condition and use, distinguishing features, and its general relationship to the regional environment and cultural setting,
e. a qualitative and quantitative summary of all cultural material or features observed or collected,
f. an interpretation of the archaeological resource inventory including observed spatial patterning of sites in the project area, temporal, functional and contextual characteristics, and comparisons with other local or regional resources,
g. an explanation of negative results, such as where and why archaeological sites were absent in areas suspected of having moderate to high resource potential, and
h. any further predictions concerning potential resource variability, density, distribution and importance in the project area.

Resource Evaluation

The relative significance of each evaluated site should be present here. The discussion should include:

a. specific criteria used to measure relative site significance,
b. site-specific assessments in tabular form, and
c. a map illustrating archaeological sites of high, medium, and low significance in relation to the proposed project.

Impact Identification and Assessment

This section should contain a comprehensive statement of impacts and a thorough assessment of their level-of-effect. An impact matrix relating development actions to recorded archaeological resources is recommended. The impact assessment should include:

a. a map of the project delineating areas of direct and indirect impact, and showing all recorded archaeological sites,
b. impacts which have occurred to date from exploration, engineering and other feasibility studies,
c. the level of effect of project impacts on archaeological values,
d. areas of uncertainty regarding the impact assessment,
e. a schedule relating the timing of impacts to development stages, and
f. impacts and the rate of resource depletion expected without the proposed project.

Evaluation of Research

This section should contain a critical evaluation of the impact assessment study. The discussion should address:

a. the accuracy of overview predictions regarding archaeological resource density, distribution, variety and significance in the project area,
b. the suitability of the inventory strategy and site survey techniques employed, and the level of confidence that can be placed on the survey results,
c. the suitability and reliability of the site evaluation and impact assessment methods employed,
d. the relationship between the results and the stated objectives of the assessment study, including problem-oriented research objectives if applicable, and
e. appropriate research goals, objectives or opportunities for any subsequent archaeological studies in the project area.

Impact Management Recommendations

The proponent's recommendations for managing unavoidable adverse impacts on archaeological sites are presented here. Mitigation measures should be recommended for each impacted site. Recommendations should be presented in sufficient detail to allow the Branch to comment on their appropriateness. This section should also include:

a. a reference to those archaeological sites which can be avoided by project design modifications,
b. a discussion of the process used to select an impact management action from among various possible alternative actions for any specific site,
c. justification for not recommending site-specific action,
d. archaeological compensation recommendations, and
e. recommendations or a tentative schedule for conducting surveillance and/or monitoring during project implementation and operation.

References Cited

A comprehensive list of all literary sources cited in the report such as publications, documents and records should be presented in this section. The reference list should also include names and dates of all personal communications.

Appendices

A variety of items should be appended to the report including:

a. a copy of the consultant's terms of reference for the impact assessment study,
b. appropriate tables, charts, graphs, maps, photos and other supportive materials, and
c. a list of all recorded archaeological sites, referenced by their appropriate "Borden" number and arranged according to either adverse impact or no adverse impact.

A detailed proposal for implementing mitigation or compensation studies may also be appended to the report. However, the proposal may require supervision if deficiencies in the report are identified.

Appendix A (Part 3 of 3): Guidelines for Report Content Mitigation Report

- *Title Page*
- *Credit Sheet*
- *Management Summary*
- *Table of Contents*
- *List of Figures, Tables, Appendices*
- *Introduction*
- *Study Area*
- *Methodology*
- *Results and Discussion*
- *Interpretation*
- *Conclusions and Recommendations*
- *References Cited*
- *Appendices*

Title Page

The title page should include:

a. the official project name and location,
b. the type of archaeological resource assessment,
c. the number of the permit or ministerial order under which the research activities were authorized, if applicable,
d. the name and address of the agency for which the report was prepared,
e. the report date, and
f. the author's signature and title.

Credit Sheet

The credit sheet should contain the names, addresses and professional affiliations of the principal contributors to the overview study including:

a. the director or supervisor,
b. researchers, and
c. report author.

Management Summary

The management summary should contain a brief overview of the study. Important findings and major recommendations should be emphasized.

Table of Contents

The table of contents should be arranged in accordance with the sequence of topical headings and their corresponding page numbers.

List of Figures, Tables, Appendices

All figures, tables and appendices should be referenced by title and page number, and listed according to the order in which they appear in the text of the report.

Introduction

The introduction should include:

a. the name of the proponent and general nature of the project,
b. how the study integrates or coordinates with project planning and scheduling,
c. the objectives and scope of the impact management program including specific research problems,
d. the dates and duration of the study,
e. the persons conducting the study and the kinds of professional expertise involved, and
f. the organization format of the report.

Study Area

This section should contain a succinct description of the location and boundaries of the study area, including specific areas in which mitigation activities were undertaken. Previous studies which provide comprehensive descriptions of the study area should be referenced. However, biophysical, socio-economic, political or cultural factors which have a direct and pertinent bearing on the study should be explicitly stated.

Methodology

The basic research plan and the precise methods and equipment used to implement the plan should be documented in this section. All relevant aspects of the operating environment should be discussed.

Results and Discussion

The results of mitigation or compensation should be presented and discussed here. A thorough analysis of all recovered data should be provided.

Evaluation and Discussion

The assessment of archaeological resource potential in the study area, based on the major findings of background research and preliminary field reconnaissance, should be presented here. The assessment should be made from a local, regional and provincial perspective and should be based on known archaeological sites, as well as reported and predicted sites. In this section, the consultant should:

a. identify major information gaps in the archaeological resource base,
b. state predictions about the kinds and number of archaeological sites to be expected,
c. discuss and, insofar as possible, interpret the nature, distribution, and potential significance of archaeological resource values within the study area,
d. discuss, in general terms, potential impacts on the archaeological resource base and possible options for managing impacts, and
e. discuss local public attitude toward potential project impacts on archaeological resources.

Interpretation

An interpretation of results is primarily required for systematic data recovery and other investigative projects. The interpretation should focus on the research problems and study objectives initially identified.

Conclusions and Recommendations

This section should contain a synthesis of the impact management studies. New research problems and hypotheses generated by systematic data recovery or for future research and resource management should also be included.

References Cited

All literary sources cited in the report such as publications, documents and records, as well as names and dates of all personal communications should be listed here.

Appendices

A variety of items should be appended to the report including:

a. appropriate tables, charts, graphs, maps and other supportive materials,
b. a list of recorded archaeological sites directly relevant to the study, and
c. a complete catalogue of all cultural materials, faunal and floral remains, and ancillary samples collected during systematic data recovery operations.

Archaeological Impact Assessment Guidelines - Appendix C

Recommended Qualifications for Professional Archaeological Consultants

The following recommended provisions are intended to ensure the professional treatment of archaeological resources as outlined in the British Columbia Archaeological Impact Assessment Guidelines. These provisions apply to all persons responsible for coordinating, directing or reporting archaeological impact assessment and management studies. These recommendations are designed to be flexible and qualifications should be reviewed on a case by case basis.

- MA in archaeology or anthropology with a specialty in archaeology, or BA with an equivalent combination of post-graduate training and experience.
- must be eligible to hold an archaeological permit in British Columbia
- demonstrated ability to design and conduct archaeological research, and to complete a final report in a timely manner.
- compliance with all conditions of previous permits or ministerial orders.
- access to facilities necessary to carry out field work, analysis and report preparation.
- access to the services of related specialists such as faunal and floral analysis, geomorphologists and pedologists when required.
- can serve as a repository for the proper curation of recovered cultural materials, or establish a satisfactory arrangement with such a repository.

Archaeological Impact Assessment Guidelines - Appendix D

Checklist of Criteria for Pre-Contact Site Evaluation

- *Scientific Significance*
- *Public Significance*
- *Ethnic Significance*
- *Economic Significance*

Scientific Significance

a. Does the site contain evidence which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

    - internal stratification and depth
    - chronologically sensitive cultural items
      materials for absolute dating
    - association with ancient landforms
    - quantity and variety of tool type
    - distinct intra-site activity areas
    - tool types indicative of specific socio-economic or religious activity
    - cultural features such as burials, dwellings, hearths, etc.
    - diagnostic faunal and floral remains
    - exotic cultural items and materials
    - uniqueness or representativeness of the site
    - integrity of the site

b. Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?

- monitoring impacts from artificial or natural agents
- site preservation or conservation experiments
- data recovery experiments
- sampling experiments
- intra-site spatial analysis

c. Does the site contain evidence which can make important contributions to paleoenvironmental studies?

- topographical, geomorphological context
- depositional character
- diagnostic faunal, floral data

d. Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

Public Significance

a. Does the site have potential for public use in an interpretive, educational or recreational capacity?

- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public
- opportunities for protection against vandalism
- representativeness and uniqueness of the site
- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration
- legal and jurisdictional status
- local community attitude toward development

b. Does the site receive visitation or use by tourists, local residents or school groups?

Ethnic Significance

a. Does the site presently have traditional, social or religious importance to a particular group or community?

- *ethnographic or ethnohistoric reference*
- *documented local community recognition or, and concern for, the site*

Archaeological Impact Assessment Guidelines - Appendix E

Checklist of Criteria for Post-Contact Site Evaluation

- *Scientific Significance*
- *Historic Significance*
- *Public Significance*
- *Ethnic Significance*
- *Economic Significance*
- *Integrity and Condition*
- *Other*

Scientific Significance

a. Does the site contain evidence which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?
b. Does the site contain evidence which can make important contributions to other scientific disciplines or industry?

Historic Significance

a. Is the site associated with the early exploration, settlement, land use, or other aspect of British Columbia's cultural development?
b. Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?
c. Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?
d. Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

Public Significance

a. Does the site have potential for public use in an interpretive, educational or recreational capacity?

    - visibility and accessibility to the public
    - ability of the site to be easily interpreted
    - opportunities for protection against vandalism
    - economic and engineering feasibility of reconstruction, restoration and maintenance
    - representativeness and uniqueness of the site
    - proximity to established recreation areas
    - compatibility with surrounding zoning regulations or land use
    - land ownership and administration
    - local community attitude toward site preservation, development or destruction
    - present use of site

b. Does the site receive visitation or use by tourists, local residents or school groups?

Ethnic Significance

a. Does the site presently have traditional, social or religious importance to a particular group or community?

Economic Significance

a. What value of user-benefits may be placed on the site?

- visitors' willingness-to-pay
- visitors' travel costs

Integrity and Condition

a. Does the site occupy its original location?
b. Has the site undergone structural alterations? If so, to what degree has the site maintained its original structure?
c. Does the original site retain most of its original materials?
d. Has the site been disturbed by either natural or artificial means?

Other

a. Is the site a commonly acknowledged landmark?
b. Does, or could, the site contribute to a sense of continuity or identity either alone or in conjunction with similar sites in the vicinity?
c. Is the site a good typical example of an early structure or device commonly used for a specific purpose throughout an area or period of time?
d. Is the site representative of a particular architectural style or pattern?

Archaeological Impact Assessment Guidelines - Appendix F
Indicators for Assessing Impacts on Archaeological Sites

- *Magnitude*
- *Severity*
- *Duration*
- *Range*
- *Frequency*
- *Diversity*
- *Cumulative Effect*
- *Rate of Change*

Magnitude

The amount of physical alteration or destruction which can be expected. The resultant loss of archaeological value is measured either in amount or degree of disturbance.

Severity

The irreversibility of an impact. Adverse impacts which result in a totally irreversible and irretrievable loss of archaeological value are of the highest severity.

Duration

The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on archaeological sites.

Range

The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency

The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or ongoing nature

Diversity

The number of different kinds of project-related actions expected to affect an archaeological site.

Cumulative Effect

A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change

The rate at which an impact will effectively alter the integrity or physical condition of an archaeological site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.