20 ARCHAEOLOGICAL AND HERITAGE RESOURCES

20.1 Introduction

Archaeological and Heritage Resources are a Valued Component (VC) because of the potential for the Project to affect these resources within the project development area (PDA). These resources are important to scientific and cultural communities and the public. Archaeological and heritage resources are also important to First Nations communities because they demonstrate the long-term use of their traditional territories and provide a physical link to their cultural history. Traditional sites such as named geographical features, culturally modified trees (CMTs) unprotected by legislation, and other resources are also important to First Nations. Historical features such as cabins, trails and historic (post-1846) artifact scatters or middens may be important to local communities and/or First Nations. These archaeological and heritage resources are vulnerable to surface and subsurface alteration from project activities.

Potential effects on Current Use of Land and Resources for Traditional Purposes related to Archaeological and Heritage Resources are assessed in Section 21.

20.2 Scope of Assessment

20.2.1 Regulatory and Policy Setting

Although, generally, archaeological and heritage resources in BC are protected under provincial legislation (see below), the majority of the PDA, including all of Lelu Island, is within federal lands, which fall under the jurisdiction of the Prince Rupert Port Authority (PRPA). Therefore, this study was conducted based on PRPA directive referencing the Treasury Board Policy on Management of Material (Treasury Board of Canada Secretariat 2006). The policy states that these assets are to be identified and protected, their heritage value is to be assessed, and a record that includes accurate information about their nature and condition is to be kept. In order to satisfy this directive, the study was designed with reference to the professional standards of the British Columbia Association of Professional Archaeologists (BCAPA) and federal guidelines for archaeological resources provided by Parks Canada, which default to provincial standards as a best practice. BCAPA standards must be followed by member archaeologists conducting any type of study in BC.

Heritage collections defined in the Treasury Board Policy on Management of Material (2006) are "collections of art, historical artifacts, archaeological artifacts and archival collections that are of artistic, historical, ceremonial, documentary, technological or associative importance and that are owned by federal departments (excepting those managed by Parks Canada under its legislative mandate). New objects of potential heritage value are also considered to be valid cultural property."

An archaeological site defined by Parks Canada in the Archaeological Recording Manual: Excavations and Surveys (2009) is "a place or area where tangible evidence of past human activity is, or was, located in-situ on, below or above the ground, or lands under water, the identification, recovery and understanding of which can be achieved using archaeological research methods". For the relatively small portion of the Project located on private or Provincial Crown land, heritage sites and objects that predate AD 1846 are protected under the Heritage Conservation Act (HCA), which
is administered by the Archaeology Branch of the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO). Heritage resources specifically protected under the Act include provincial heritage sites, burial places with historic or archaeological value, aboriginal rock paintings or carvings, sites with evidence of human habitation or use before 1846, and heritage wrecks. Airplane crash sites may also be protected under the Act. The Provincial Archaeology Branch has established standards, policies, and guidelines for the conduct of archaeological assessment in BC.

The HCA defines heritage site to mean, “whether designated or not, land, including land covered by water, that has heritage value to British Columbia, a community, or an aboriginal people”. The HCA also defines “heritage value” as the “historical, cultural, aesthetic, scientific or educational worth or usefulness of a site or object.”

The HCA does not define archaeological sites but they are commonly defined as places that contain physical evidence of past human activity.

Because some portions of the project infrastructure will be on private land or Provincial land, including bridge footings on the BC mainland, they fall under provincial authority. The HCA and standards, policies, and guidelines established by the Archaeology Branch were followed to conduct the archaeological assessment on the portion of project infrastructure that is on private land. The CEAA Reference Guide on Physical and Cultural Heritage Resources (Canadian Environmental Assessment Agency 1996) details the kinds of considerations that are required for heritage resources as detailed in Section 5 of the Canadian Environmental Assessment Act (CEAA) 2012. This guide defines a cultural heritage resource as “…a human work or a place that gives evidence of human activity or has spiritual or cultural meaning, and that has historic value”.

20.2.2 Influence of Consultation on the Assessment

First Nations identified concerns about potential effects of the Project on archaeological and heritage resources. Metlakatla First Nation specifically requested that, for the geotechnical drilling program related to the Project, “all culturally modified trees be protected and preserved regardless of age and type” (Usborne 2013, Appendix R). As such, all CMTs in the PDA were recorded in accordance with Metlakatla First Nation guidelines and did not exclude post-1846 features (Appendix S). The study was also conducted in consideration of heritage interests and concerns expressed by participating members of Lax Kw’alaams First Nation.

20.2.3 Selection of Potential Effects

The following potential effects were used to assess the Archaeological and Heritage Resources VC:

- Destruction or disturbance of culturally modified trees (CMTs)
- Destruction or disturbance of other archaeological or heritage sites.

20.2.4 Selection of Measurable Parameters

The selected measurable parameters for the assessment of the Archaeological and Heritage Resources VC are outlined in Table 20-1.
Table 20-1: Measurable Parameters for Archaeological and Heritage Resources

<table>
<thead>
<tr>
<th>Potential Effect</th>
<th>Measurable Parameter(s) and Units of Measurement</th>
<th>Notes or Rationale for Selection of the Measurable Parameter</th>
</tr>
</thead>
</table>
| Destruction or disturbance of CMTs                   | Number, area, density, uniqueness and value of CMT sites/individual CMTs destroyed through clearing and/or grubbing | To comply with the HCA, provincial and federal (PRPA) regulatory requirements and First Nations concerns  
To mitigate the loss of CMTs through appropriate data collection and management |
| Destruction or disturbance of other archaeological or heritage sites | Number, volume, density and value of sites disturbed or destroyed | To comply with the HCA, Provincial and Federal (PRPA) regulatory requirements, and First Nations concerns  
To avoid or minimize effects on archaeological or heritage sites  
To Mitigate the loss of archaeological or heritage sites through appropriate data collection, potentially including systematic data recovery and subsequent analysis and reporting |

20.2.5 Boundaries

20.2.5.1 Temporal Boundaries

The temporal boundaries used for the assessment include:

- **Construction:** Q1 2015 – Q4 2018
- **Operations:** Q1 2019 - 2048+
- **Decommissioning:** 2048+

20.2.5.2 Spatial Boundaries

Figure 20-1 illustrates the spatial boundaries for this VC.

The PDA is the area of direct physical disturbance for construction and operation. This assessment focuses on areas where direct physical effects on heritage resources could possibly occur (i.e., within the PDA). These activities primarily involve tree removal and areas to be leveled and graded for construction.

The local assessment area (LAA) includes the proposed PDA on Lelu Island, Stapledon Island, and the portion of the mainland southwest of Skeena Drive across from Lelu and Stapledon Islands. It is very unlikely that potential effects on heritage sites would extend outside of the PDA, which includes Lelu Island and a portion of the mainland where ground disturbance will occur during the construction of a bridge to the island.

The regional assessment area (RAA) is also the same as the PDA because effects occur through direct physical disturbance to archaeological and heritage resources. However, background research was conducted for the broader cultural region (coastal BC cultural region as defined by the Archaeology Branch which included those lands located within approximately 133 km of the continental coast line) in which the PDA occurs, to provide an appropriate archaeological and heritage context.
20.2.5.3 Administrative and Technical Boundaries

For the majority of the PDA/LAA, situated on federal lands under the jurisdiction of the PRPA, this study follows federal guidelines of the Treasury Board Policy on Management of Material (Treasury Board of Canada Secretariat 2006) and federal guidelines for archaeological resources provided by Parks Canada to identify and record archaeological and heritage resources. However, federal guidelines do not provide direction on archaeological or heritage management recommendations nor the mitigation of effects to these resources. Therefore, so that disturbance or destruction of archaeological and heritage resources is mitigated, provincial standards and best practices, in conjunction with agreements resulting from consultation with First Nations, are followed.

For those portions of the PDA/LAA located on private or provincial land, archaeological resources are protected by the HCA as administered by the provincial government, which has established standards, policies, and guidelines that direct the archaeological assessment process in BC. Mitigation measures for disturbance to identified archaeological resources are determined by provincial regulators; construction clearance is granted once mitigation requirements are fulfilled. The assessment and resource management process typically includes the completion of an archaeological impact assessment (AIA) within the LAA under the authority of an HCA Section 14 heritage inspection permit. Protected resources, identified by the AIA, that cannot be avoided require mitigation under the authority of an HCA Section 14 heritage investigation permit and/or an HCA Section 12 alteration permit. For sites of high heritage value, required mitigation measures may include completion of systematic data recovery (SDR) or archaeological monitoring during construction.

Technical boundaries associated with the assessment of this VC include potential data gaps in the relevant literature as well as in information gathered during field surveys. Even the most thorough study may fail to identify all archaeological materials that could be present, and subsurface conditions observed during development may differ from those on which the assessment is based.

20.2.6 Residual Effects Description Criteria

The terminology defined in Table 20-2 is used to describe residual effects.
### Table 20-2: Characterization of Residual Effects on Archaeological and Heritage Resources

<table>
<thead>
<tr>
<th>Characterization of Residual Effects</th>
<th>Description</th>
<th>Quantitative Measure or Definition of Qualitative Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
<td>The condition of an archaeological or heritage site</td>
<td><strong>Disturbed</strong>—The amount of previous disturbance to CMT and/or other archaeological or heritage site as a percent and magnitude of total site area</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Undisturbed</strong>—There are no known existing disturbances to the recorded site</td>
</tr>
<tr>
<td><strong>Magnitude</strong></td>
<td>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.</td>
<td><strong>Negligible</strong>—no measurable change</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Low</strong>—Effect is detectable but is limited to small portions of CMT and/or other archaeological or heritage sites of low significance or to portions of CMT and/or other archaeological or heritage sites already substantially disturbed by previous developments</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Moderate</strong>—Affects small but intact portions of archaeological or heritage sites of moderate or high significance, or substantial, intact portions of archaeological or heritage sites of low significance(^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>High</strong>—Affects substantial, intact portions of at least one archaeological or heritage site of moderate or high significance</td>
</tr>
<tr>
<td><strong>Extent</strong></td>
<td>The spatial scale over which the residual effect is expected to occur.</td>
<td><strong>LAA</strong>— Limited to the LAA</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>The length of time the residual effect persists.</td>
<td><strong>Permanent</strong>—measurable parameter unlikely to recover to baseline. Effects to archaeological and heritage resources are always permanent since they are non-renewable resources</td>
</tr>
<tr>
<td><strong>Reversibility</strong></td>
<td>Whether or not the residual effect on the VC can be reversed once the physical work or activity causing the disturbance ceases.</td>
<td><strong>Irreversible</strong>—Effects will persist after the life of the Project. Similar to duration, all effects to archaeological and heritage resources are irreversible.</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>How often the residual effect occurs and is usually closely related to the frequency of the physical work or activity causing the residual effect.</td>
<td><strong>Single event</strong>—Effect occurs once (by far the most common frequency of effects on CMTs and/or other archaeological or heritage sites)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Multiple irregular event</strong> (no set schedule)— Occurs sporadically at irregular intervals</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Multiple regular event</strong>—Effect occurs daily</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Continuous</strong>—Effect occurs continuously</td>
</tr>
</tbody>
</table>

**Likelihood of Residual Effects**

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>The likelihood that a residual effect will occur</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low</strong></td>
<td>Low— low probability of occurrence</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>Medium—medium probability of occurrence</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td>High— high probability of occurrence</td>
</tr>
</tbody>
</table>

**NOTES:**

\(^1\) In the assessment of archaeological and heritage resources, the use of the term “significance” is consistent with the use of “significance” in the BC Archaeological Impact Assessment Guidelines.
20.2.7 Significance Thresholds for Residual Effects

A significant adverse residual effect on archaeological or heritage resources is defined as a project-related effect that results in any unmitigated project-related disturbance to, or destruction of, heritage resources. Following regulated mitigation of CMT and/or other archaeological and heritage sites, no residual effects are expected. A chance-find protocol for archaeological and heritage resources is provided to address project-related effects (Appendix R).

The significance of all identified Archaeological or Heritage Resources were assessed using the standards described in BC’s Archaeological Impact Assessment Guidelines (Archaeology Branch 1998). Potential effects to sites will also be evaluated using criteria from these guidelines. The guidelines outline the following aspects of evaluating significance:

- Site integrity: the degree of impairment or disturbance of the site
- Scientific value: the potential to contribute to scientific knowledge
- Public significance: the potential for enhancing public understanding of the past
- Ethnic significance: value to distinct ethnic communities or groups
- Historic value: related to individuals or events of particular importance
- Economic value: Potential monetary benefits that could be derived from the site.

Unless there is specific federal direction to guide the management of Archaeological and Heritage Resources in federal environmental assessments (EA), provincial standards are normally followed. These standards include criteria to characterize effects developed primarily for projects reviewable under the BCEAA, but they are very similar to those outlined in Table 20-2. These standards do not differ in any substantive way from guidelines provided by the PRPA.

20.3 Baseline Conditions

20.3.1 Baseline Methods and Data Sources

Available information on archaeological sites near and within the PDA/LAA, including site forms and maps, acquired using the Remote Access to Archaeological Data (RAAD) application maintained by the BC Archaeology Branch. Previous studies within the PDA/LAA were also reviewed (Archer 1983; Eldridge and Gretzinger 2012; Appendices R and S; Willows 2013). An AIA of proposed geotechnical locations judged to have high potential for archaeological or CMT site presence was undertaken in the summer of 2013 (Appendix R; Willows 2013). First Nations field assistants formed part of the survey crew. For CMT recording, Metlakatla First Nation guidelines were followed in that no distinction was made between pre- and post-1846 CMTs. The study was also conducted in consideration of heritage interests and concerns expressed by participating members of Lax Kw’alaams First Nation. A field inventory within the LAA was also conducted (Appendix S).

20.3.2 Overview of Baseline Conditions

Six CMT sites were recorded on Lelu Island in the early 1980s (Archer 1983). Subsequent inventories resulted in the identification of 431 individual CMTs with 558 modification features (Eldridge and Gretzinger 2012; Appendix S), all within the Lelu Island portion of the LAA.
The field study confirmed the presence of several CMT sites previously recorded within the LAA (GbTn-24, GbTn-41, GbTn-42, GbTn-43, GbTn-44 AND GbTn-46). Reexamination of the sites resulted in an increase in the sizes of the CMT sites, effectively resulting in more or less continuous CMTs across the island. Given this increase in CMT site size and the close association of different CMTs located on Lelu Island, it is recommended that all CMTs on Lelu Island be combined into one larger site, GbTn-24 (the first site number recorded on Lelu Island).

A historic cabin of recent age was identified on a point overlooking Porpoise Channel and Ridley Island to the north and was determined not to have heritage or archaeological value.

### 20.4 Project Interactions with Archaeological and Heritage Resources

Table 20-3 ranks the potential interactions between the Archaeological and Heritage Resources VC and project activities.

<table>
<thead>
<tr>
<th>Project Activities and Physical Works</th>
<th>Destruction or Disturbance of CMTs</th>
<th>Destruction or Disturbance of other Archaeological or Heritage Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Preparation (land-based)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Onshore Construction</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Vehicle Traffic</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dredging</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Marine Construction</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Waste Management and Disposal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disposal at Sea</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Operational Testing and Commissioning</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Site Clean Up and Reclamation</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation of LNG Facility and Supporting Infrastructure on Lelu Island</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Marine Terminal Use</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Shipping</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Waste Management and Disposal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fish Habitat Compensation</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wetland Habitat Compensation</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### Project Activities and Physical Works

<table>
<thead>
<tr>
<th>Decommissioning</th>
<th>Destruction or Disturbance of CMTs</th>
<th>Destruction or Disturbance of other Archaeological or Heritage Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dismantling Facility and Supporting Infrastructure</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dismantling of Marine Terminal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Waste Disposal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Site Clean Up and Reclamation</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**KEY:**
- 0 = No interaction.
- 1 = Potential adverse effect requiring mitigation, but further consideration determines that any residual adverse effects will be eliminated or reduced to negligible levels by existing codified practices, proven effective mitigation measures, or best management practices (BMPs).
- 2 = Interaction may occur and the resulting environmental effect may exceed acceptable levels without implementation of project-specific mitigation. Further assessment is warranted.

### Justification of Interaction Rankings

For the operation and decommissioning phases, potential interactions are ranked as 0 because site disturbance would have already been mitigated at the construction stage; these interactions are not assessed further. No interactions are ranked as 1. Dredging and marine construction are ranked as 2 because intertidal and/or off shore archaeological or heritage resources may be present. No archaeological work was undertaken for intertidal or offshore archaeological or heritage sites.

Interactions ranked as 2 are discussed in detail in Section 20.5.

### 20.5 Effects Assessment

#### 20.5.1 Analytical Methods

#### 20.5.1.1 Analytical Assessment Techniques

Information gathered from the review of archaeological literature, provincial archaeological and heritage site records, previous field studies and the project-specific inventory and AIA were used to assess potential effects on archaeological and heritage resources.

The following documents were used to guide the assessment:

- British Columbia Association of Professional Archaeologists (BCAPA) guidelines
- Federal guidelines for archaeological resources provided by Parks Canada
- British Columbia Archaeology Branch’s Archaeological Impact Assessment Guidelines.
20.5.1.2 Assumptions and the Conservative Approach

Even the most thorough study may fail to identify all archaeological materials that could be present, and subsurface conditions observed during development may differ from those on which the assessment is based. As a result, a chance-find protocol document will be developed (and used during construction) to address any unanticipated archaeological finds to work in conjunction with the planned mitigations. No archaeological work was undertaken for intertidal or offshore archaeological or heritage sites. Furthermore, in the event previously unrecorded/unidentified resources are encountered the effect of the Project may be significant and adverse if standard mitigation measures are not implemented.

20.5.2 Destruction or Disturbance of Culturally Modified Trees

20.5.2.1 Potential Effects

Clearing of vegetation from the PDA prior to grading and construction would result in the destruction of CMTs within the PDA. It is possible, however, that CMTs would be disturbed rather than destroyed; for example, a canoe blank may be removed from its original context but not be destroyed. Some standing CMTs could be removed but not destroyed, resulting only in loss of context.

It is possible that unrecorded CMTs will be encountered within the PDA. If this occurs, work affecting these features will cease until the trees can be properly assessed by a professional archaeologist.

20.5.2.2 Mitigation

Site-specific mitigation recommendations are based on the results of the AIA studies (Appendix R) and inventory studies (Appendix S), following professional standards of the BCAPA and federal guidelines for archaeological resources provided by Parks Canada. The following measures will be applied:

- Systematic Data Recovery (SDR) studies for CMT sites will be conducted by systematically recording a representative sample of CMT features, consisting of:
  - Detailed recording as outlined in the CMT Handbook (Archaeology Branch 2001)
  - Stem round collection
  - Monitoring of CMT removal by a crew comprised of a professional archaeologist and a local First Nations representative
  - Direct dating by stem-round sampling
  - Production of a comprehensive report.
- A chance find protocol document will be used during project construction in the event that unrecorded CMTs are encountered.

As no impacts are anticipated in the 30 m riparian buffer zone surrounding Lelu Island, CMTs and other archaeological and/or heritage sites will not require mitigation.
20.5.2.3 Characterization of Residual Effects

Although the Project will likely result in the destruction or disturbance to numerous CMTs, the implementation of appropriate mitigation measures means that little archaeological information associated with CMTs will be lost. Critical archaeological data is recorded and maintained throughout the SDR procedures. In the unlikely event that additional, presently unrecorded CMTs are found in conflict with clearing and construction activities, the mitigation measures outlined above will be implemented.

Any disturbance or destruction of CMTs that is not mitigated as described in Section 20.5.2.2 would result in adverse residual effects within an undisturbed archaeological context, of low to moderate magnitude, that are site-specific in extent. While these effects would occur only once, they would be permanent and irreversible.

20.5.2.4 Likelihood

Likelihood of destruction or disturbance of CMTs is high, as their presence has been recorded throughout the LAA. However, it is unlikely that after mitigation, unrecorded CMTs will be found in conflict with clearing and construction activities.

20.5.2.5 Determination of Significance of Residual Effects

The potential for development to conflict with unrecorded CMTs is low, given their high visibility and the likelihood that any CMTs were recorded during previous AIA and inventory programs. As a result, the probability of adverse residual effects associated with unrecorded resources is also low. Therefore, residual effects on CMTs are considered to be not significant.

20.5.2.6 Confidence and Risk

A high degree of confidence is placed on the results of the archaeological Inventory of Lelu Island and completed AIA of the Geotechnical Drilling Program through in-depth pre-field research within the LAA. A comprehensive survey identified over 430 CMTs on Lelu Island. Since the confidence in these results is not low, no additional risk analysis has been conducted.

20.5.3 Destruction or Disturbance of other Archaeological or Heritage Sites

20.5.3.1 Potential Effects

Field studies have not identified any other archaeological sites within the LAA. However, it is possible that such sites are present and could be affected by project activities.

Archaeological or heritage sites, comprising of combinations of artifacts and features found on or below the ground’s surface, within the LAA may be damaged or destroyed, however unlikely, by project-related surface or ground disturbance or displacement or compaction of sediments.
20.5.3.2 Mitigation
Site-specific mitigation recommendations are based on the results of the AIA (Appendix R) and inventory studies (Appendix S) studies, following professional standards of the BCAPA and federal guidelines for archaeological resources provided by Parks Canada. The following measures will be applied:

- Work affecting archaeological or heritage sites will cease until the site can be properly assessed by a professional archaeologist
- SDR studies will be conducted on affected heritage sites, consisting of:
  - Scientific excavation and/or surface collection studies
  - Collection and analysis of artifacts, faunal remains, botanical remains, and other archaeological remains
  - Collection and processing of carbon samples for dating
  - Completion of other appropriate specialized analytical processes (e.g., geochemical analysis of stone tools, blood residue analysis)
  - Analysis and interpretation of all recovered data
  - Cataloguing of all collected artifacts and their subsequent curation in an approved facility
  - Production of a comprehensive report
- Archaeological or heritage resources of low significance may also be mitigated through a program of archaeological monitoring carried out during construction
- A chance find protocol document will be used during project construction and implemented in the event that unrecorded archaeological or heritage sites are encountered.

20.5.3.3 Characterization of Residual Effects
With the completion of mitigation measures, the Project will not result in residual effects to archaeological or heritage resources. In the event that additional or previously unrecorded or unidentified archaeological or heritage resources are found in conflict with clearing and construction activities, mitigation measures will be implemented.

Any unmitigated disturbance or destruction of other archaeological or heritage sites would result in adverse residual effects within an undisturbed archaeological context, could be of low or high magnitude, and are site-specific in extent. While these effects would occur only once, they would be permanent and irreversible.

20.5.3.4 Likelihood
The potential for development to affect unidentified archaeological sites is not likely considering previous field surveys in the LAA. As a result, the likelihood of adverse residual effects to unrecorded resources is low.
20.5.3.5 Determination of Significance of Residual Effects

CMTs have been recorded throughout the LAA. No other archaeological or heritage sites have been recorded within the LAA. However, in the event that such sites are identified, effects will be mitigated through avoidance where possible, systematic data recovery (where appropriate) and/or archaeological monitoring of development. Residual effects on archaeological and heritage resources are, therefore, not significant.

20.5.3.6 Confidence and Risk

A high degree of confidence is placed on the results of the Archaeological Inventory of Lelu Island and completed AIA of the Geotechnical Drilling Program through in-depth pre-field research within the LAA. The field assessment examined all areas assessed to have high archaeological potential. In addition, a large sample of low archaeological potential areas were examined to ground truth their predicted potential. However, even the most thorough study may fail to identify all archaeological materials that could be present, and subsurface conditions observed during development may differ from those on which the assessment is based.

Coast Tsimshian communities can provide comment on the importance of the individual sites as well as appropriate mitigation steps where avoidance of cultural resources is not possible. It would be beneficial for the Coast Tsimshian to provide additional historic and/or traditional knowledge from which appropriate mitigation strategies can be developed. Mention of prehistoric use of the island was noted during the AIA.

Since the confidence in these results is not low, no additional risk analysis has been conducted.

20.5.4 Summary of Residual Effects

With the fulfillment of mitigation measures and mitigation standards required by the regulatory authority and established in adherence to agreements developed through First Nations consultation, there are no anticipated residual or cumulative effects from the Project on archaeological and/or heritage resources. Results of the project-specific and previously completed archaeological studies on Lelu Island have not resulted in identification of terrestrial archaeological or heritage sites within the LAA; however; over 430 CMTs have been identified in possible conflict with the project development. The potential for development to conflict with unidentified CMTs and/or other archaeological or heritage sites is low. In the unlikely event that unrecorded sites are identified within the PDA during ground altering activities, potential residual effects are summarized in Table 20-4.

Mitigation techniques will be applied during the construction phase to minimize residual effects on archaeological and heritage resources. With the use of the mitigation measures (i.e., completion of SDR studies and/or archaeological monitoring where unexpected residual effects cannot be avoided), none of the information regarding traditional aboriginal, terrestrial and intertidal use within the PDA/LAA will be lost. Residual effects on CMTs and/or other archaeological and heritage resources therefore, are not significant.
### Table 20-4: Summary of Residual Effects on Archaeological and Heritage Resources

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Mitigation/Compensation Measures</th>
<th>Residual Effects Characteristics</th>
<th>Follow-up and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Destruction or Disturbance of CMTs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Construction           |  Systematic Data Recovery (SDR) studies for CMT sites will be conducted by systematically recording a representative sample of CMT features.  
                       |  Use of a Chance Find Protocol during project construction.                                      | U L/M PDA P I S              | L N H None              |
| Operation              |                                                                                                 |                                  |                         |
| Decommissioning        |                                                                                                 | No effects anticipated           |                         |
| Residual effects for all phases |                                                                                                   |                                  |                         |
|                        |                                                                                                 | U L/M PDA P I S              |                         |
| **Disturbance or Destruction of other Archaeological or Heritage Sites**                                                                             |                                   |                         |
| Construction           |  Work affecting archaeological or heritage sites will cease until the site can be properly assessed by a professional archaeologist.  
                       |  Systematic Data Recovery (SDR) studies on affected heritage sites (if found).  
                       |  Archaeological or heritage resources of low significance may also be mitigated.  
                       |  Use of a Chance Find Protocol during project construction.                                      | U L/H PDA P I S              | L N H None              |
| Operation              |                                                                                                 | No effects anticipated           |                         |
| Decommissioning        |                                                                                                 |                                  |                         |
| Residual effects for all phases |                                                                                                   |                                  |                         |
|                        |                                                                                                 | U L/H PDA P I S              |                         |
**KEY**

**CONTEXT:**
- **U** = Undisturbed: There are no existing disturbances within the PDA
- **D** = Disturbed: There are existing disturbances within the PDA

**MAGNITUDE:**
- **L** = Low: Effect is detectable but is limited to small portions of CMTs and/or other archaeological or heritage sites of low significance or to portions of archaeological or heritage sites already substantially disturbed by previous developments
- **M** = Moderate: Affects small but intact portions of archaeological or heritage sites of moderate or high significance, or substantial, intact portions of archaeological or heritage sites of low significance
- **H** = High: Affects substantial, intact portions of one or more sites of moderate or high significance

**EXTENT:**
- **PDA** = Limited to the PDA
- **LAA** = Limited to Lelu Island and private property on the mainland
- **RAA** = Extending beyond Lelu Island and the private property on the mainland

**DURATION:**
- **ST** = Short term: Measureable for less than one month
- **MT** = Medium term: Measureable for more than a month but less than two years
- **LT** = Long term: Measureable for the life of the Project
- **P** = Permanent: Measureable parameter unlikely to recover to baseline

**REVERSIBILITY:**
- **R** = Reversible: Effects will cease during or after the Project is complete
- **I** = Irreversible: Effects will persist after the life of the Project

**FREQUENCY:**
- **S** = Single event: Effect occurs once
- **MI** = Multiple irregular event (not set schedule): Effect occurs sporadically at irregular intervals
- **MR** = Multiple regular event: Effect occurs daily
- **C** = Continuous: Effect occurs continuously

**LIKELIHOOD:**
Based on professional judgment
- **L** = Low probability of occurrence
- **M** = Medium probability of occurrence
- **H** = High probability of occurrence

**CONFDIENCe:**
Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation, and assumptions made.
- **L** = Low level of confidence
- **M** = Moderate level of confidence
- **H** = High level of confidence
20.6 Cumulative Effects

20.6.1 Context for Cumulative Effects
Results from the project-specific archaeological study indicate that there are CMTs recorded within the PDA. No other archaeological or heritage sites have been identified within the LAA. The potential for development to conflict with unidentified archaeological or heritage sites is low given the mitigation procedures to be undertaken where necessary, including the adoption of a chance find protocol. As a result, the likelihood of potential cumulative effects of past, present and future projects and activities associated with unrecorded resources is low.

20.6.2 Cumulative Effects Assessment
The cumulative effects assessment is a two-step process to determine the potential for cumulative effects on Archaeology and Heritage Resources. In conducting the cumulative effects assessment, the residual effects arising from interactions that scored either a 1 or a 2 in Table 20-3 are considered. The first step consists of two questions:

- Is there a project residual effect?
- Does the project residual effect overlap spatially and temporally with those of other past, present or reasonably foreseeable future projects?

Where the answers to both of these two questions are affirmative, there is potential for the Project to contribute to cumulative effects on Archaeology and Heritage Resources. Potential contribution of these project effects to cumulative effects is assessed below. The second step consists of one question:

- Is there a reasonable expectation that the contribution (i.e., addition) of the Project’s residual effects would cause a change in cumulative effects that could affect the viability or sustainability of the VC?

Where the answer to this question is affirmative, additional assessment of the potential cumulative effects is described below.

20.6.2.1 Summary of Cumulative Effects
Mitigation of destruction or disturbance of CMTs is a requirement for all projects; therefore, it is assumed that the mitigation implemented for the Project will be similarly implemented for other projects that could potentially have cumulative effects. Combined with the fact that no residual effects on other archaeological sites and heritage resources within the LAA are anticipated, no cumulative effects are anticipated.

20.7 Follow-up and Monitoring
Due to the low probability that a previously unidentified CMT and/or other archaeological or historical site will be found within the LAA after the initial construction stage, it is concluded that there is no need for follow-up. However, in the unlikely event that a site is identified during any project stage,
archaeological monitoring and/or SDR studies will be completed. These studies may be implemented for a variety of construction-related activities, as listed in Table 20-4.

A chance-find protocol will also be adopted to increase the chances that, however unlikely, any archaeological and heritage resources not identified during the inventory or AIA will be properly recorded and mitigated.

20.8 Conclusion

CMTs and other archaeological and heritage sites within the PDA are described in the AIA report (Appendix R) and final Inventory (Appendix S). The AIA and Inventories identified over 430 CMTs with 558 modification features on Lelu Island. Given the increase in site size and the close proximity of CMTs located on Lelu Island, it is recommended that all CMTs on Lelu Island be combined into one larger site, GbTn-24, using the first CMT site number recorded on Lelu Island.

With mitigation, the residual effects on archaeological and heritage resources are expected to be not significant. CMT site GbTn-24 will be mitigated as described in Section 20.5.2.2, where in conflict with project development, resulting in negligible magnitude residual effects. No cumulative effects are anticipated on archaeological and heritage resources.

Based on the results of the assessment and the recommended mitigation measures, the conclusion of this assessment will not be affected by the final bridge location within the LAA.

20.9 References


20.10 Figures

Please see the following pages.
Archaeological and Heritage Resources
Local Assessment Area and Regional Assessment Area


Although there is no reason to believe there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

DATE: 21-FEB-14
FIGURE ID: 123110537-454
PROJECTION: UTM - ZONE 9
DATUM: NAD 83
CHECKED BY: A. GALLACHER
PREPARED BY: K. POLL
PREPARED FOR: Pacific NorthWest LNG

Local Assessment Area and Regional Assessment Area
Project Component
Turning Basin
Railway
Road
Watercourse