Environmental Assessment Certificate Application

LNG Canada Export Terminal

Section 8 – Assessment of Potential Heritage Effects

October 2014

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Mitsubishi Corporation

8 ASSESSMENT OF POTENTIAL HERITAGE EFFECTS

8.1 Heritage Background

The Project is located within the traditional territory of Haisla Nation, and approximately 3.2 km northwest of Kitamaat Village, Haisla Nation's primary settlement. However, for thousands of years Haisla have occupied many village sites throughout their traditional territory and have fished, hunted and gathered across their traditional territory.

While there are numerous previously recorded archaeological and heritage sites in and around Kitimat Arm, none are located in the Project footprint. However, three previously recorded archaeological sites are located within 2 km of the Project footprint: sites GaTd-3, GaTe-3, and FlTd-5. Archaeological site GaTd-3, located approximately 500 m northeast of the Project footprint on the east bank of Kitimat River, consists of numerous types of archaeological materials, including ground stone artifacts, shell midden, and cultural depressions, such as roasting pits, cache pits, and longhouse foundations. Archaeological site GaTe-3, located approximately 1.5 km west of the Project on the west side of the RTA lands, consists of a single fallen culturally modified tree (CMT). Archaeological site FlTd-5, located on a vertical rock face approximately 2 km east of the Project, consists of a red ochre pictograph represented by a horizontal row of red dots along the rock face.

While there are few recorded sites near the Project footprint, archaeological fieldwork conducted near Kitimat Arm for other projects has identified numerous archaeological and heritage sites. Site types commonly recorded in this region include shell middens, lithic scatters, CMTs, petroforms and rock art; these are discussed in more detail in Section 8.2.3.

8.2 Archaeological and Heritage Resources

8.2.1 Introduction

Archaeological and heritage resources is selected as a VC based on its cultural importance to Aboriginal Groups and the historical significance of the area. Archaeological and heritage resources are important to Aboriginal Groups because they demonstrate the long-term use of their traditional territories and provide a physical link to their cultural history. Historical features such as cabins, trails, and historic (post-1846) artifact scatters or middens may be important to Aboriginal Groups or local communities.

Potential effects on archaeological and heritage resources will occur primarily during the construction stage of a project. Any adverse effects on archaeological and heritage resources will be mitigated through data or artifact recovery or other standard acceptable practices prior to construction.

8.2.2 Scope of Assessment

8.2.2.1 Regulatory and Policy Setting

On both private and provincial lands in BC, archaeological and heritage resources are protected in accordance with the legal requirements and conditions set forth in the *Heritage Conservation Act* (HCA). The HCA defines heritage value as "historical, cultural, aesthetic, scientific or educational worth or usefulness of a site or object." Further, a heritage site is defined in the HCA as "whether designated or not, land, including land covered by water, that has heritage value for BC, a community or an Aboriginal people." Heritage sites and objects that predate AD 1846 are automatically protected by the HCA, which is administered by the Archaeology Branch of the Ministry of Forests, Lands and Natural Resource Operations. Other sites protected under the HCA include burial places with historical or archaeological value (regardless of their age), Aboriginal rock paintings or carvings of historical or archaeological value (regardless of their age), heritage ship wrecks or airplane crash sites, or other sites as determined by the Lieutenant Governor-in-Council. Although not defined in the HCA, archaeological resources in BC are generally considered to be places containing physical evidence of past human activity in the form of material objects or features.

This assessment focuses on resources that are legally protected by the HCA. Traditional use sites and historical sites, while not covered by the HCA, are also considered in this assessment. Traditional use sites or ethnographic sites are locations reported as having been used or occupied by Aboriginal people in the past and may or may not contain any physical evidence of such an occupation or use. Historical sites date to the post-contact era, and this term typically applies to Euro-Canadian heritage sites, or sites related to other ethnic or local communities. Designated heritage sites have historical, palaeontological, or architectural significance as determined provincially through the HCA, or by other ethnic or local communities through the provisions of the *Local Government Act* (1996).

The Archaeology Branch has established standards, policies, and guidelines for the archaeological assessment process in BC. Under the HCA, these include the issuance of:

- Heritage Inspection Permits issued pursuant to Section 14 of the HCA to authorize archaeological impact assessments (AIAs)
- Heritage Investigation Permits issued pursuant to Section 14 of the HCA to conduct systematic data recovery (SDR), and
- Alteration Permits issued pursuant to Section 12 of the HCA to allow site disturbance following acceptable completion of mitigation requirements.

The OGC shares responsibility with the Archaeology Branch for the implementation and review of these standards for oil and gas developments and maintains its own set of policies and guidelines to manage the assessment process. These guidelines were followed during the assessment. For this Project,

Alteration Permits issued pursuant to Section 12 of the HCA will be administered by the OGC, while Section 14 permits are being administered by the Archaeology Branch.

There is no specific legislation to guide the management of heritage resources on federal lands. However, CEAA *2012,* details the kinds of considerations that are required for heritage resources, as well as for traditional lands and resources. The CEA Agency *Reference Guide on Physical and Cultural Heritage Resources* 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." This guideline is considered in the assessment.

8.2.2.2 Consultations' Influence on the Identification of Issues and the Assessment Process

The Haisla Nation Council reviewed the application for an HCA section 14 Heritage Inspection Permit for the AIA in the LSA. The HCA application is supported by Haisla Nation, as were all subsequent permit amendment applications. No issues were identified to the assessment team or the Archaeology Branch regarding the proposed study.

In addition, through LNG Canada's consultation program, potentially affected Aboriginal Groups have identified issues and concerns with respect to archaeology resources, which are assessed below as they relate to the LSA, as well as in Part C of this Application as they relate to potential adverse effects on Aboriginal Interests (section 14) or Other Matters of Concern to Aboriginals (section 16).

8.2.2.3 Traditional Knowledge and Traditional Use Incorporation

TK and TU information was gathered from Project studies submitted to LNG Canada and publicly available sources (see Sections 13, 14 and 16 for details). Any available TK/TU information relevant to the LSA was reviewed and considered before baseline data collection. This information was used to help plan AIA fieldwork and target specific areas within the LSA for intensive AIA survey, and was used at the time of writing to inform the assessment. Haisla Nation provided a Project-specific TK/TU Report to LNG Canada titled *The LNG Canada Proposed Terminal Site and Tanker Route within Haisla Traditional Territory* (the Haisla Report) (Powell 2013). Information from the Haisla Report is incorporated into this assessment. The LSA is entirely within asserted Haisla Nation traditional territory and does not overlap the asserted traditional territory of any other Aboriginal Group.

8.2.2.4 Selection of Effects

Archaeological and heritage sites are non-renewable resources. Effects on heritage sites, such as trails, cabins or post-1846 AD CMTs, or on protected archaeological sites and pre-1846 CMTs, are irreversible.

Archaeological sites and heritage sites might comprise artifacts, faunal and floral remains, and cultural features found on or beneath the ground surface and on land or under water in the LSA. These resources

might be damaged or destroyed by development activities involving ground disturbance or displacement or compaction of sediments. Clearing and grubbing, site grading, excavation, and activities associated with installation of services and facilities have the potential to disturb, mix, and redeposit culture-bearing sediments, artifacts, and cultural features.

The following potential effects on archaeological and heritage resources are assessed:

- damage to or removal of CMTs
- alteration or removal of terrestrial archaeological or heritage sites, and
- alteration or removal of intertidal archaeological or heritage sites.

8.2.2.5 Selection of Measurable Parameters

Measurable parameters facilitate quantitative or qualitative measurement of potential Project and cumulative effects, and provide a means to determine the level or amount of change to a VC. The measurable parameters for archaeological and heritage resources are outlined in Table 8.2-1.

Table 8.2-1: Potential Project Effects on Archaeological and Heritage Resources and Measurable Parameters

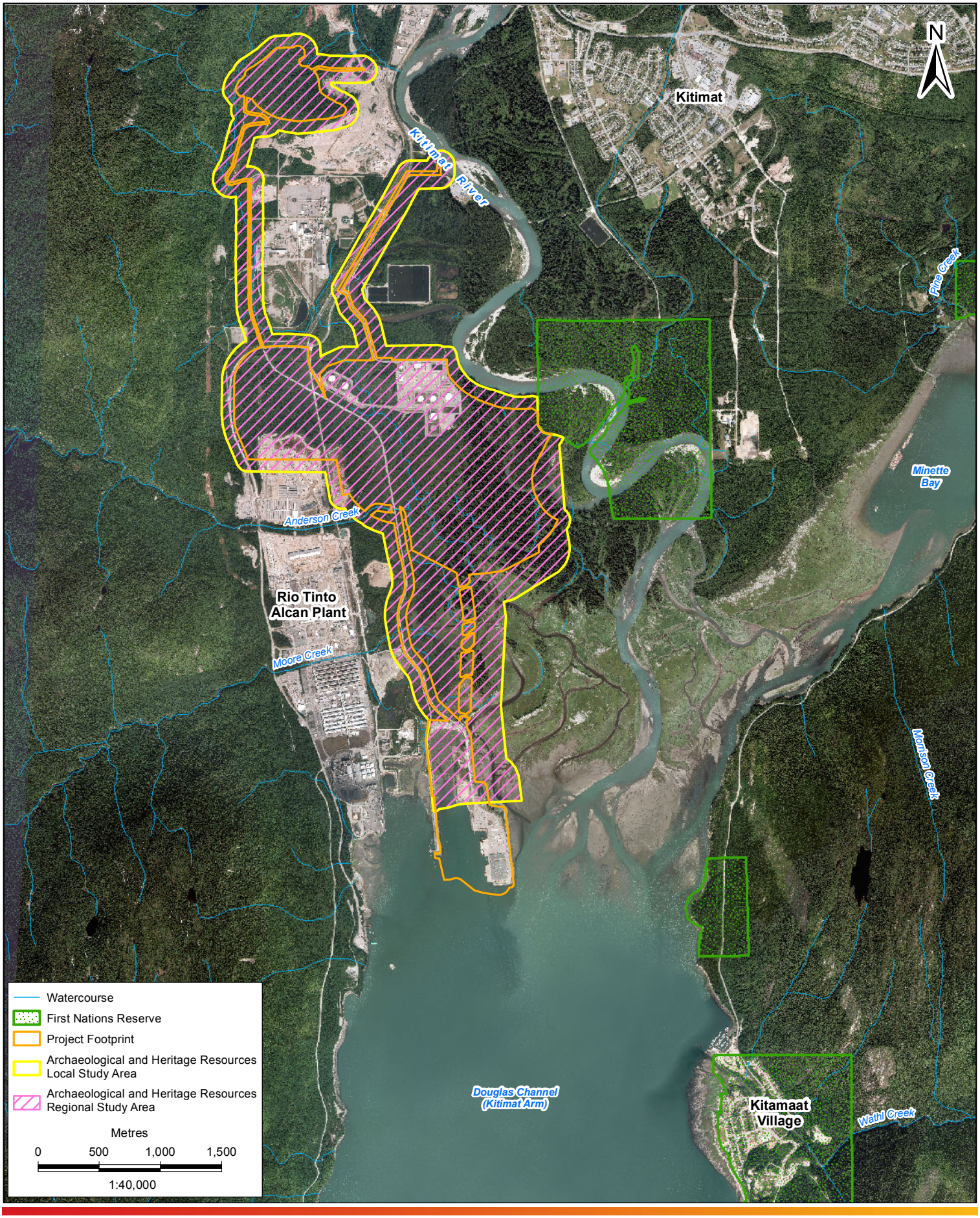
Potential Adverse Project Effects	Measurable Parameters
Damage to or removal of CMTs	Number, type, age, and heritage value of CMTs being altered or removed
Alteration or removal of terrestrial archaeological or heritage sites	Number and heritage value of terrestrial archaeological or heritage resources, or portions thereof, being altered or removed
Alteration or removal of intertidal archaeological or heritage sites	Number and heritage value of intertidal archaeological and heritage sites, or portions thereof, being altered or removed

8.2.2.6 Boundaries

8.2.2.6.1 Spatial Boundaries

The LSA for the archaeological and heritage resources assessment is the area of ground disturbance for the LNG Canada terminal and associated infrastructure, with an approximately 100 m buffer to the west and north and an approximately 250 m buffer to the east. The LSA includes pre-construction site clearing and the LNG Canada facility and marine terminal footprint. Where the safety zone extends beyond the west, north, and east buffers, the LSA includes the safety zone (Figure 8.2-1).

There is no RSA for archaeological and heritage resources because effects will not extend beyond the area of ground disturbance (i.e., the assessment area for cumulative effects is the LSA shown on Figure 8.2-1).



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ARCHAEOLOGY ENVIRONMENTAL EFFECTS ASSESSMENT

ARCHAEOLOGICAL AND HERITAGE RESOURCES LOCAL AND REGIONAL STUDY AREAS

LNG CANADA EXPORT TERMINAL
KITIMAT, BRITISH COLUMBIA

PROJECTION	DRAWN BY
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8.2.2.6.2 Temporal Boundaries

Based on the current Project schedule, the temporal boundaries are:

- construction, Phase 1 (trains 1 and 2) to be completed approximately five to six years following issuance of permits, the subsequent phase(s) (trains 3, 4) to be determined based on market demand
- operation, minimum of 25 years after commissioning, and
- decommissioning, approximately two years at the end of the Project life.

8.2.2.6.3 Administrative and Technical Boundaries

Protection of archaeological resources is administered by the Archaeology Branch, which has established standards, policies, and guidelines for the archaeological assessment process in BC. Mitigation measures for verified archaeological resources are determined by provincial regulations and are undertaken following completion of an AIA in the LSA. Following recommendations of the AIA, an SDR program may be implemented as mitigation for sites likely to be disturbed by development, under the requirements of an HCA section 14 Heritage Investigation Permit. A section 12 Alteration Permit is then issued, which may require archaeological monitoring during construction. The data recovery program pertains equally to intertidal and terrestrial archaeological sites, including CMTs. For the Project, section 12 permits will be issued by the OGC.

Technical boundaries associated with this assessment include potential data gaps in the relevant background literature and any gaps in field survey data. Even the most thorough study might fail to identify all archaeological materials that could be present. Furthermore, subsurface conditions observed during development might differ from those on which the assessment is based.

8.2.2.7 Residual Effects Description Criteria

Quantitative terms are generally not the primary means of evaluating the effects of a project on archaeological and heritage resources. Qualitative terms such as significance, heritage value or protection status of the resource are more often used. For example, disturbance of 5% of a previously undisturbed, highly significant archaeological site is very different from disturbance of 5% of a highly disturbed archaeological site of low significance.

The significance of archaeological and heritage resources is evaluated using standards described in the *BC Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998) and described in Section 8.2.2.7. The significance of TU sites should be evaluated in consultation with Haisla Nation. The significance of historic sites may be evaluated in consultation with specific relevant communities, including local historical societies.

Potential Project effects are evaluated using criteria from these guidelines and are very similar to criteria in Table 8.2-2 (from Archaeology Branch 1998).

Table 8.2-2: Characterization of Residual Effects for Archaeological and Heritage Resources

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Characterization of Residual Effects		
Magnitude	The amount of physical alteration or destruction that can be expected. The resultant loss of archaeological value is measured either in amount or degree of disturbance.	**Negligible:** No measurable change **Low**: A measurable change but is limited to small portions of archaeological or heritage sites of low significance[1] or to portions of archaeological or heritage sites already substantially disturbed by previous developments. **Moderate:** A measurable change to intact portions of archaeological or heritage sites of moderate or high significance[1], or substantial intact portions of archaeological or heritage sites of low significance. **High:** A measurable change to substantial intact portions of one or more sites of moderate or high significance.[1]
Geographic Extent	The spatial scale over which the residual effects of the Project are expected to occur. The geographic extent of effects can be local or regional. Local effects may have a lower effect than regional effects.	**Site-specific:** potential measurable changes to archaeological and heritage resources are restricted to that portion of the site situated within the LSA. **LSA:** potential measurable changes to archaeological and heritage resources are limited to the LSA.
Duration	The length of time an adverse impact persists. Impacts may have short-term or temporary effects, but, for archaeological sites, effects are always permanent.	**Short-term:** not applicable **Medium-term:** not applicable **Long-term:** not applicable **Permanent:** effect is permanent.
Frequency	The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once, as is the case with most archaeological sites.	**Single event:** occurs once **Multiple irregular event** (no set schedule): occurs sporadically at irregular intervals throughout construction, operation, or decommissioning phases **Multiple regular event:** occurs on a regular basis and at regular intervals throughout construction, operation, or decommissioning phases **Continuous**: occurs continuously throughout the life of the Project
Reversibility	The degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may have lower impact than irreversible or permanent effects.	**Reversible:** not applicable **Irreversible:** all effects on archaeological and heritage resources are irreversible.

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Context	Refers primarily to the sensitivity and resilience of the archaeological or heritage resources in question. Consideration of context draws heavily on the description of the existing conditions of the archaeological and heritage resources, which reflect cumulative effects of other projects, activities that have been carried out, and information about natural and human-caused impacts to these resources. Project effects may have a higher effect if they occur in areas or regions that: ▪ have already been adversely affected by human activities or natural disturbance factors (i.e., disturbed or undisturbed), or ▪ are fragile and have little resilience to imposed stresses.	**Undisturbed:** area relatively or not affected by human activity or natural disturbance factors. **Disturbed:** area has been previously disturbed by human development or natural disturbance factors. **Low resilience**: fragile archaeological or heritage site, such as CMTs or preserved organic materials, such as those commonly found in wet sites. **Moderate resilience:** archaeological and heritage resources that preserve moderately well in broader range of contexts, such as shell middens. **High resilience:** Resilient archaeological and heritage resources that may be preserved in a diversity of contexts, such as lithic scatter (stone tools and related detritus) sites.
Likelihood of Residual Effects		
Likelihood	Based on professional judgment, whether or not a residual effect is likely to occur	**L =** low likelihood that there will be a residual effect on archaeological and heritage sites. **M =** moderate likelihood that there will be a residual effect on archaeological and heritage sites. **H =** high likelihood that there will be a residual effect on archaeological and heritage sites.

NOTES:
[1] Significance in this context is defined per the *BC Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998)
SOURCE: Archaeology Branch (1998), Appendix F

8.2.2.8 Significance Thresholds for Residual Effects

Archaeological significance of all identified archaeological or heritage resources in the LSA are assessed using the criteria described in the *BC Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). These guidelines provide separate, but related criteria for evaluating the significance of pre- and post-contact (i.e., pre- and post-1846) archaeological and heritage sites, which are assessed when determining the degree to which a residual effect is significant.

For pre-contact archaeological and heritage sites, overall site significance is evaluated based on scientific significance, public significance, ethnic significance and economic significance.

The scientific significance of a site is based on whether or not it contains evidence that might:

- enhance understanding of cultural history, cultural process, and other aspects of local and regional prehistory

- be used for experimentation aimed at improving archaeological methods and techniques
- make important contributions to palaeoenvironmental studies, and
- contribute to other scientific disciplines.

Public significance is based on whether the site has potential for public use in an interpretive, educational, or recreational capacity, and whether the site is visited and used by tourists, local residents, or school groups.

Ethnic significance is based on whether the site has traditional, social, or religious importance to a particular group or community. For pre-contact archaeological and heritage sites, ethnic significance typically refers to significance to First Nations.

Economic significance is based on the value of user benefits.

An adverse Project residual effect on archaeological or heritage resources is assessed as significant if it results in any unmitigated disturbance or destruction of heritage resources (Table 8.2-3).

Table 8.2-3: Archaeological and Heritage Resource Significance Thresholds

Heritage Effect	Significance Threshold
Damage to or removal of CMTs	Damage or removal of CMTs that results in a loss of the ability to complete detailed CMT data collection as per the CMT handbook (Archaeology Branch 2001), including stem-round sampling, is archaeologically significant because of permanence and irreversibility. All CMT sites pre-dating AD 1846 are protected by provincial legislation and require some degree of mitigation when they cannot be avoided.
Alteration or removal of terrestrial archaeological or heritage sites	Alteration or removal of a terrestrial or intertidal archaeological or heritage site that results in a loss of the ability to complete an appropriate level of SDR is archaeologically significant because of permanence and irreversibility. All cultural and heritage resources pre-dating AD 1846 are protected by legislation and, regardless of the assessed cultural or scientific value of each, require some degree of mitigation when they cannot be avoided. SDR commonly consists of systematic excavation and recovery of some or all portions of resources to be affected and or archaeological monitoring.
Alteration or removal of intertidal archaeological or heritage sites	

8.2.3 Baseline Conditions

The overview of archaeological and heritage resource baseline conditions includes past data collected for the Project; previous archaeological, ethnographic and historical studies; and a discussion about landforms where sites might be present.

8.2.3.1 Baseline Data Sources

Records and documents of the archaeology, prehistory, history, palaeoenvironment, and ethnology of the region (published and unpublished), were reviewed to provide a cultural context for possible archaeological and heritage sites in the study area. Detailed site locations and descriptive information were obtained from the online Remote Access to Archaeological Data application maintained by the

Archaeology Branch. Information regarding Haisla Nation traditional use of the area was sought through consultation.

The AIA fieldwork was carried out from June to November 2013 and in April and May 2014 using pedestrian surveys of the LSA. This survey focused on visible archaeological features and materials, and landforms with high potential for buried archaeological and heritage sites, such as terraces, benches, knolls, and intertidal zones. Haisla Nation personnel participated in the AIA.

Twenty-three areas of high archaeological site potential were shovel tested. More than 500 shovel tests were excavated during 2013 and 2014 AIA fieldwork.

8.2.3.2 Baseline Overview

8.2.3.2.1 Ethnography

The Project is in asserted Haisla Nation traditional territory, which extends around Douglas Channel and Gardner Canal (Hamori-Torok 1990). At the time of European contact, Haisla were divided into two distinct groups. In the north, the Kitimaat occupied the Douglas Channel–Kitimat River region, whereas the Kitlope were established along the Gardner Canal–Kitlope River area. Haisla are linguistically separated from the neighbouring Tsimshian and constitute the most northerly of the Wakashan language group. Their closest linguistic relatives are the Haihais, the Heiltsuk, and the Oowekeeno (Hamori-Torok 1990).

Haisla subsistence was based largely on fishing, particularly salmon, using traps and weirs, harpoons, leisters, drop nets, river travel nets, and saltwater stone tidal ponds. Eulachon runs were very important and formed the basis for exclusive trading with interior groups. Land mammals were more important than sea mammals (Hamori-Torok 1990), and mountain goats, deer, grizzly bears, black bears, and marmots were all hunted or trapped. Berries were also included in the regular diet. The large coastal shell middens attest to the abundance of shellfish collected and their importance as food (Hamori-Torok 1990).

A number of traditional place names have been recorded, including several around the Village of Kitamaat. The spring village site of *Wya'giamya's* is of potential relevance. This site was reported to be situated at the mouth of Kitimat River and was traditionally occupied by Haisla during the eulachon run in April (Vlak 1980). Because Kitimat River has changed its course, evidence of this village might not be visible because of erosion or its location outside the assessment area.

The locations and importance of three *Wa'wais* (inherited territories) are documented in several sources (Barbetti and Powell 2005; Powell 2011, 2013). Two *Wa'wais*, *Simgas* and *Zagwis*, cover the lower courses, estuary, and mouth of Kitimat River as well as Minette Bay; *Yaksda* includes the west side of the lower Kitimat River, both terrestrial and river portions, as far south as Frog Falls. *Yaksda* encompasses

the drainages of Anderson and Moore creeks and was known for its subsistence resources and as a place for traditional cultural activities. It is also the current location of the RTA facility.

8.2.3.2.2 Prehistory

The prehistory of the Northwest Coast archaeological region is divided into two distinct periods: 5,000 years ago to European contact, and earlier than 5,000 years ago. The division point between the two was based upon information suggesting that the first appearance of shell middens on the north mainland coast occurred approximately 5,000 years ago (older middens were identified on coastal islands). Archaeological research and information about the mainland north coastal region are limited. Much of the work undertaken was concentrated in the Prince Rupert Harbour area and the Kitselas Canyon, 125 km up the Skeena River. Excavated sites are confined primarily to 11 sites in the Prince Rupert Harbour area and two sites in Kitselas Canyon. All the Prince Rupert Harbour sites date from 5,000 years ago to European contact. Relatively recent investigations at Masset Inlet and Coho Creek indicate that shell midden sites in Haida Gwaii (previously the Queen Charlotte Islands) appeared substantially earlier than 5,000 years ago (Ham 1990; Fedje et al. 2005). The earlier period is not yet represented in radiocarbon-dated mainland north coastal sites. A site in Bish Cove to the north is situated on a palaeoshoreline dated to approximately 9,300 years before present (BP) and contains materials suggestive of a mix of early assemblages to the south and to the north (Streeter 2006).

Several archaeological studies have been conducted in the Kitimat area. Forestry studies conducted about 50 km south of Kitimat identified three pre-1846 CMT sites (Brooke 2006). Two small developments in the Kitimat area did not contain archaeological sites or CMTs (Begg 2005a, 2005b). Three earlier archaeological overview assessments (AOAs) (Carlson 1981; Eldridge et al. 1995; Simonsen 1996a) have also been conducted in the Bish Cove area, just west of Kitimat. Simonsen (1995; 1996b) also conducted a land-use study and assessment for road construction and cut blocks in lands surrounding the Bish Cove facility. Three CMT sites were noted and recorded as FlTe-10, FlTe-11 and FlTe-12.

In 1997, three AIAs addressed proposed geotechnical testing at Bish Cove. An isolated pebble tool (FITe-9) was identified in the intertidal zone, approximately 5 m below the high tide line (Stafford and Eldridge 1997a). A second AIA focused on the Kitimat LNG facility site proposed for Bish Cove identified a cobble chopper approximately 300 m inland and 45 m above sea level (FITe-15), as well as CMT sites FITe-13 and FITe-14 (Stafford and Eldridge 1997b). A third 1997 study for a section of logging road proposed near Bish Cove IR 6 resulted in the discovery of small CMT site FITe-17 (Eldridge 1997).

Archaeological studies were also carried out 4 km south at Emsley Cove for an alternate proposed location for the Kitimat LNG facility, which recorded and updated several CMT sites and a shell midden (Wilson and Bowie 2005, 2006).

FITe-33 consists of over 800 CMTs, some exhibiting modification as early as AD 1575. The site was initially recorded in 2005, approximately 7 km south and southwest of the current study area, during an AIA for the Enbridge Northern Gateway Pipeline Project (Weathers et al. 2007; Kristensen and Weathers 2008).

In 2006, an AIA was conducted for the Kitimat LNG project proposed for Bish Cove IR 6, and the ROW of a proposed gas pipeline and transmission line. Three additional CMT sites—all believed to post-date 1846 AD—were identified. A subsurface lithic scatter site (FITe-35) was identified on a series of benches associated with a palaeoshoreline at approximately 35 m above sea level (Streeter 2006). Because of this association, FITe-35 is tentatively dated to 9,300 BP, the date of the still-stand in relative sea levels of 35 m above sea level.

Since 2006, additional AIA work has been conducted for previously unassessed portions of the Kitimat LNG project. One new CMT site (GaTe-3), located west of the RTA facility, and three traditional use CMT sites were recorded during the AIA (Burk 2013, 2014). FlTe-17, FlTe-31 and FlTe-33 were revisited and additional CMTs recorded (Burk 2014).

Tirrul-Jones (1985) completed an archaeological study close to the Project. This study involved an intensive investigation of a Haisla seasonal village site (GaTd-3) on the east bank of Kitimat River, 4 km north of the head of Douglas Channel (although Kitimat River has since shifted its course so significantly that it now meanders south to the west of GaTd-3). Tirrul-Jones (1985) suggests that the site served as a "major eulachon harvesting and processing site in the spring and a salmon fishing site in the fall. Both wild and domestic plants were tended and harvested at the site." This study included a thorough discussion of active erosion in the site area by the meandering course of the Kitimat River, which affected a portion of the LSA.

In 1975, the Haisla Youth Club, an organization of the Kitimaat Indian Band, surveyed the Kitimat River valley from Kitimat Arm to a rise of land about 30 m up the valley, focusing on logging roads. No sites were found (Mishra 1975).

8.2.3.2.3 History of European Contact

In 1788, Captain Duncan anchored at the mouth of the Skeena River. Four years later, Captain Jacinto Caamaño came into contact with Haisla people during his exploration of Douglas Channel (Walbran 1909; Howay 1929; Caamaño 1938).

The first full-time contact did not occur until after the establishment of Port Simpson by the Hudson's Bay Company in 1828 (Lovatt 1976). Richardson conducted a geological survey of the Kitimat Arm in 1874. In 1879, the Lakelse Valley to Kitimat was surveyed for the Canadian Pacific Railway (Dawson 1879). In 1848, Henry Frank was hired by the Dominion Government to widen the Indian trail from Kitimat to the

Skeena River so that it could take dog teams in the winter (Asante 1979). The trail extended from Kitimat to the mouth of the Copper River and was closely followed by the "Old Kitimaat" Road.

Beginning in 1889, Indian Reserves were set aside for Haisla (Hamori-Torok 1990). Four reserves were established for the Kitimaat in 1889, four more were allotted in 1910, and six more in 1916 (Hamori-Torok 1990).

The first missionary teacher arrived in the Kitimat Valley in 1883, and the Kitimaat Mission was established by the Reverend George Rakey of the Methodist church in 1893 (Hamori-Torok 1990). Among the first settlers were George and Cora Anderson, who came from Ontario to teach at the mission school in 1896 (Beck 1983). George Anderson became a homesteader and started to clear land in 1896 that would become the Anderson Ranch. It encompassed a large area within the Project footprint between Anderson Creek and Moore Creek. The ranch was active from 1898 to 1926, when Anderson stopped ranching (Beck 1983). Little remains of the ranch site today. First-hand accounts are provided by George Anderson's daughter in the book *Kitimat: My Valley* (Varley 1981).

Before the turn of the 20th century, the Commissioner of Mines reported that the Kitimat and Skeena valleys were rich in minerals and agricultural prospects (Varley 1981). Many new settlers came to this area because of the possibility of large-scale development and opportunity. Settlement of Kitimat increased following rumours that Kitimat would become the terminus for the Grand Trunk Railway (Beck 1983). Anticipation of the railway spurred the drawing up of an official townsite and a push to sell the surveyed lots to out-of-town purchasers. However, once Prince Rupert was chosen as the western terminus for the railway, hopes for continued growth and prosperity in Kitimat died out (Varley 1981).

The most active phase in the post-contact history of Kitimat Arm began after the turn of the 20th century. Dominion Telegraph began construction of a telegraph line from Port Essington to the Yukon in 1901. Surveying for CN Rail continued in the Kitimat area, where the rail link between Prince Rupert and Prince George was completed in 1914.

The next period of major population growth occurred in the early 1950s with construction of the facility at Kitimat by the Aluminum Company of Canada (Varley 1981).

8.2.3.2.4 Palaeogeographic Studies

The late Pleistocene and Holocene relative sea-level history of the Kitimat area is germane to identifying potential archaeological site locations in the region. While the global eustatic lowering of sea levels was significant during the late Pleistocene, local isostatic loading was so significant that it more than compensated for the eustatic lowering of the sea and resulted in relative sea levels that stood about 200 m above present levels around 10,500 to 11,000 BP. Relative sea levels in the Kitimat area subsequently fell rapidly, reaching about 120 m above present levels by approximately 10,100 BP, and about 35 m

above present levels at 9,300 BP (Clague et al. 1982; Clague 1983; Clague 1985; Josenhans et al. 1995).

Huntley (1997) analyzed the paleogeography and relative sea-level history at Bish Cove (located approximately 12 km south-southwest of the south end of the Project footprint) based on field observations and a comparison of the relative sea level curves for nearby areas. This research indicates that several periods of relative sea-level stability occurred in the study region:

- at approximately 200 m above modern sea level at about 11,000 BP
- from approximately 100 m to 130 m above modern sea level between approximately 10,000 BP and 10,500 BP, and
- at approximately 35 m above modern sea level at about 9,300 BP.

Recent archaeological work in the Kitimat area resulted in the identification of subsurface lithic site FlTe-35 on bench features related to a probable palaeoshoreline at 35 m above sea level, therefore inferring that this site dates to approximately 9,300 BP (Streeter 2006).

Relative sea levels continued to fall in the early Holocene. The sea reached its modern level in relation to land between 8,500 BP and 8,000 BP (Clague 1984). Relative sea levels may have fallen slightly below present levels in the Kitimat area before stabilizing at modern levels. This has not been confirmed because of a lack of data. Relative sea level curves for the Kitimat area indicate that if relative sea levels fell below present levels in the early Holocene, they would have been 10 m or less below present levels (Clague 1983; Huntley 1997; Fedje et al. 2005). Regardless of whether or not relative sea levels fell below modern ones, relative sea levels are confirmed as having stabilized at modern levels by approximately 5,000 BP (Clague 1984). The Project is only anticipated to affect the intertidal zone at the southern fringe of the Kitimat River estuary. It is highly likely that these areas comprise recent sediments, deposited in the context of modern (i.e., more recent than 5,000 BP) sea levels.

8.2.3.2.5 Potential Site Types

Site types commonly recorded in the study region include shell middens, lithic scatters, CMTs, petroforms, and rock art. Sites might comprise one or more of these components.

Shell middens are typified by the presence of shell remains from invertebrates, such as clams and mussels, which are discarded after processing or consumption. Shell midden deposits vary from small pockets to very large sites that are many hundreds of metres long. They are usually found along or near the shoreline but can also be found inland, although no inland middens are presently known for the region. Shell middens neutralize soil acidity so that archaeological materials that usually degrade quickly are preserved. Shell middens also commonly contain charcoal, ash and burnt sediments, fire-broken rock, stone, bone and antler artifacts, and human remains. Shell middens vary considerably in size,

context, and contents, and can represent villages, seasonal campsites, short-term resource procurement and processing sites, or other functions.

Lithic scatter sites consist of scatters of stone tools and/or manufacturing waste (the result of lithic raw material acquisition and tool production or maintenance). Isolated lithic artifact finds are included in this category. These sites lack structural remains, and often reflect little diversity in their artifact assemblages, because they are the result of less intensive and more specialized activities than reflected at village sites. They can represent seasonal or short-term campsites, lookouts, or various other activities.

Lithic scatter sites are frequently identified on the ground surface or in surface exposures, although such sites often include buried components. Alternatively, lithic scatters can be entirely subsurface in their distribution.

In the study region, scatters of lithic artifacts are commonly found in the intertidal zone. While some of these artifacts were likely lost or abandoned on the beach, many of the sites are associated with shell middens located above the intertidal zone. It is commonly assumed that these scatters have eroded from adjacent middens, and subsequently been dispersed through wave action. Lithic scatters could reflect earlier occupations as suggested by scatter FITe-35 at Bish Cove.

Petroforms are culturally produced rock or stone alignments, markers, or structures. Petroforms are frequently functional in nature, such as fish weirs and tidal ponds, dams, and canoe skids.

Canoe skids or canoe runs are narrow swaths of shoreline from which cobbles and boulders have been removed to facilitate landing canoes and dragging them up the beach.

Fish traps are alignments of stone, sometimes augmented with wooden elements, which are built on beaches or in rivers and streams to capture fish stranded during an ebbing tide or while attempting to ascend spawning streams.

Clam gardens, or clam terraces, are clam-rich sandy beaches formed through the removal of rocks from the intertidal zone to create them. The removed rocks are piled into a ring along the low tide line to prevent the sandy beach matrices from eroding (Williams 2006). These anthropogenic features have only recently been recognized by archaeologists. None have been recorded in the region, although two possible clam gardens have been tentatively identified near Prince Rupert (Eldridge and Parker 2007).

Rock art sites can include either pictographs or petroglyphs. Pictographs are painted images, typically in red ochre, and are often placed in highly visible locations. Petroglyphs are pecked or ground images in rock. Petroglyphs are the most common coastal rock art and can include images (often stylized) of human figures, trees, animals, mythological figures, and abstract designs. Petroglyphs can be difficult to identify depending on factors such as light, time of day, and direction of survey.

Culturally modified trees, in the most general sense, are any trees evidencing human modification. In a more specific and commonly used sense, CMTs have been modified by First Nations for traditional purposes such as removal of bark or wood for traditional building materials and removal of cambium for consumption. Provincial guidelines suggest that most CMTs be recorded as TU sites unless they pre-date AD 1846.

Most CMTs in the region are western redcedars, although more than a dozen species, including western hemlock, yellow cedar, spruce, and western yew, are known to have been used (Archaeology Branch 2001). There are two main CMT types: bark-stripped trees and Aboriginally logged trees.

- Bark-stripped trees in coastal areas are usually red and yellow cedars exhibiting tapered or rectangular bark strips. Cedars were stripped to obtain their inner bark which is used to manufacture numerous items, including ropes, baskets, mats, blankets, sacks, towels, and clothing such as cedar bark robes, aprons, and hats (Archaeology Branch 2001). Relatively young trees with few branches at the base were preferred for these purposes. A tapered bark strip was removed by making a horizontal cut in the tree bark then pulling the bark up and away from the tree in long, narrow strips. The bark strip would taper until the bark would break away from the tree. Large rectangular bark strips, usually 3 m to 7 m long and 40 cm to 70 cm wide, were produced by a horizontal cut at the top and bottom and were commonly used as roofing material. Smaller rectangular bark strips may have been stripped for specific inner bark lengths on younger trees for use as items such as skirts or mats. Multiple bark strips were sometimes removed side by side from the same horizontal cut. Multiple stripping results in multiple peaks at the top of the scars. Separate bark strips would often be taken from the same tree at different times, resulting in some trees exhibiting multiple scars. Once the strips were obtained, the inner bark would be separated from the outer bark and rolled up and bundled for transport.
- Aboriginally logged trees are “trees which have been tested, felled, cut or otherwise modified by native peoples as part of the traditional procurement of logs, posts, planks and other pieces of wood” (Archaeology Branch 2001:35). There are several such types of Aboriginally logged trees:
    - Stumps, often standing from 1 m to 3 m tall, show evidence of logging in the form of flat surfaces and or tool marks. Modifications are of First Nations origin provided they have no evidence of contemporary technologies such as chainsaws or spring-board notches. Stumps can be flat-topped, barber chaired, or stepped.
    - Planked trees are standing, wind-fallen or intentionally felled trees from which planks have been detached. Planked trees exhibit plank scars, which are flat, rectangular surfaces resulting from plank removal. Remnant notches may be present at both ends of the scar because planks were normally removed after first notching the tree or log at the two ends of the anticipated planks and then removing the plank with the aid of wood or antler wedges. The size of the scar reflects the size of plank removed. Long

scars are commonly 10 m or more in length and from 1 m to 2 m wide; short scars are generally under 4 m in length and less than 1 m wide (Archaeology Branch 2001).

- Canoe blanks are logs in the initial or intermediate stage of shaping into a canoe. A canoe blank has a shaped bow and or stem. Other attributes of a canoe blank vary with the size and style of the canoe being manufactured and the degree of completeness (Archaeology Branch 2001).
- Tested trees are standing trees with one or more rectangular holes chopped into their trunks (Archaeology Branch 2001). These holes were made to assess the quality of heartwood of the tree and confirm that it was not hollow. This would have been particularly important in selecting trees for canoes and planks.
- Kindling removal trees are trees from which pieces of wood or bark are removed for use as kindling or fuel. These trees exhibit one or more kindling removal scars. These scars are highly variable but usually take the form of chip marks and missing narrow pieces of wood. In coastal BC, these have been found most commonly on cedar (Archaeology Branch 2001).

- Trails can be historical or pre-contact. Historical trails are often documented, whereas pre-contact trails are usually identified on the basis of ethnographic or TK studies. They are often difficult to detect in the field and can be marked by blazed or modified trees.
- Historical sites can vary widely in type and are usually marked by standing or partly collapsed structures. Beams, depressions, and artifact scatters can also comprise a historical site. Because they typically post-date AD 1846, historical sites are usually not accorded legal protection by the HCA. While historical sites may be protected by a municipality or regional district as designated heritage sites under the authority of the *Local Government Act*, no historic sites in the Kitimat area have been accorded such legal protection to date.

8.2.3.2.6 Archaeological and Heritage Sites Identified in the Project Footprint

Two archaeological sites were identified in the course of AIA fieldwork for the Project. LNG Canada held a field visit to the archaeological sites with two Haisla Nation elders to discuss the significance of the sites. Haisla Nation will be providing input on the significance of the sites to LNG Canada. Additional information regarding these sites is available in the AIA report (Varsakis et al. 2014). Additionally, a smattering of debris related to historical ranching has been identified, both through AIA fieldwork and through consultation with the Kitimat Centennial Museum and the Kitimat Historical Society (Varsakis et al. 2014).

GaTe-4

Archaeological site GaTe-4 is located at Shovel Test Location (STL) 5, on the north bank of Moore Creek, approximately 50 m east of the current Eurocan haul road (Figure 8.2-2 and Figure 8.2-3). Twenty-eight subsurface tests were excavated in an area measuring approximately 25 m by 40 m; two of these tests yielded artifacts, three yielded charcoal and fire-modified rock (FMR), and one contained an unmodified bird bone. Four evaluative units were also excavated at STL 5. Two units were negative for archaeological artifacts or deposits, one unit contained FMR, and one unit contained a sawn deer scapula fragment. Archaeological materials found at this location were restricted to the top 30 cm of the tests. Site dimensions are approximately 30 m north-south by 20 m east-west.

Five short wooden objects with apparent cultural modifications were recovered from shovel tests at STL 5. The implements are blunt at one end and sharp at the other, resembling fish weir stakes in form and size. Such stakes would have been driven into the river bed to create a low fence behind which fish would be trapped. As the site is located on a salmon-bearing stream, the site context is consistent with this interpretation. These objects were recovered from well-drained sand deposits just below the organic layer of the forest floor. Although there is the possibility of some organic preservation in this context, the condition of the artifacts and their shallow burial depth indicate that they are likely not of great antiquity. There were no similar wooden objects found in any of the other shovel tests at the site.

Archaeological remains at this location are provisionally interpreted as representing a small fish processing site, based on the tentative identification of cooking fire remains as well as possible fish weir stakes. This interpretation is also consistent with the site's location on a salmon spawning stream.

The site significance evaluation of GaTe-4, based on the criteria established by the Archaeology Branch (1998) for archaeological and heritage site significance, is provided in Table 8.2-4. Ethnic significance is tentatively rated as high; Haisla Nation is to provide input regarding the significance of this site.

Table 8.2-4: Site Significance Evaluation of Archaeological Site GaTe-4

Scientific	Public	Economic	Ethnic	Overall
Low	Low	Low	High	Low

These rankings are largely attributable to the following traits at GaTe-4:

- presence of chronologically sensitive cultural items, including materials for absolute dating
- tool type quantity and variety, including tools indicative of fish harvesting activities
- presence of cultural features such as hearths
- site uniqueness and representativeness, and
- site integrity.

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ARCHAEOLOGY ENVIRONMENTAL EFFECTS ASSESSMENT

LOCATION MAP, ARCHAEOLOGICAL SITES GaTe-4 AND GaTe-5

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KITIMAT, BRITISH COLUMBIA

PROJECTION	DRAWN BY
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NAD 83	SW
DATE	FIGURE NO.
22-AUG-14	**8.2-2**

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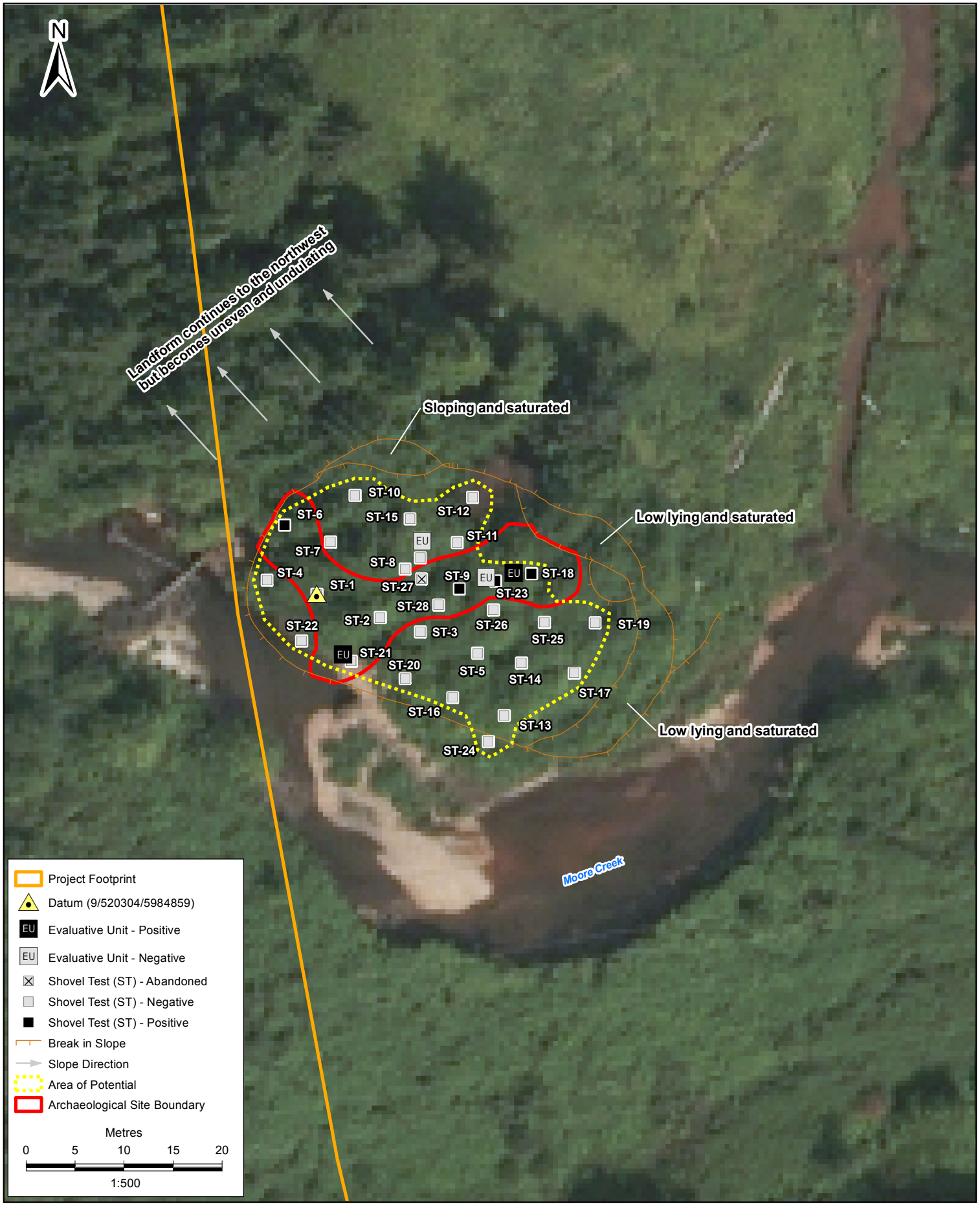

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ARCHAEOLOGY ENVIRONMENTAL EFFECTS ASSESSMENT

ARCHAEOLOGICAL SITE GaTe-4

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KITIMAT, BRITISH COLUMBIA

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NAD 83	SW
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The rankings are also attributable to the absence of the following characteristics at GaTe-4:

- internal stratification and depth
- association with ancient landforms
- distinct intra-site activity areas
- diagnostic faunal and floral remains, and
- exotic cultural items and materials.

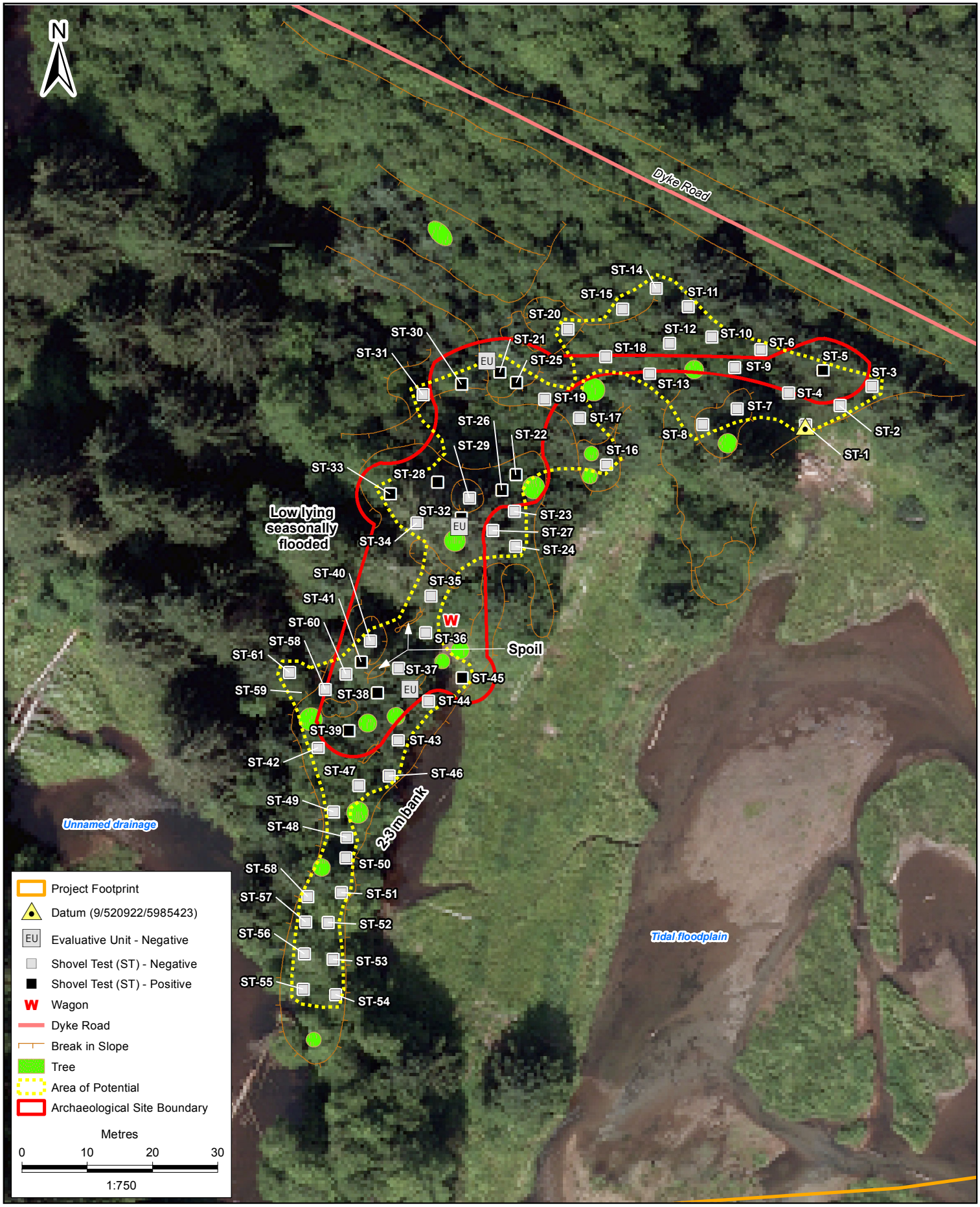
GaTe-5

Archaeological site GaTe-5 is located at STL 9 around extinct and extant stream channels of Moore and Anderson creeks just south of Dyke Road (Figure 8.2-2 and Figure 8.2-4) and above an active tidal floodplain. STL 9 is irregular in shape; its maximum dimensions are approximately 130 m by 100 m. The test location is an uneven, raised area that has been heavily disturbed by modern construction and historical activities. Access road construction has involved the excavation of fill from a number of borrow pits to the northwest. In addition, the active hydrology of the area has cut numerous channels through this test location.

Sixty-one subsurface tests were excavated at STL 9, and 14 of these were positive for cultural materials. Twelve lithic artifacts were recovered from eight of these; all were found between 15 cm and 40 cm below surface in silty sands and silty clay deposits. Additionally, four subsurface tests were positive for FMR, recovered between 0 cm and 59 cm below surface. Three evaluative units were also excavated in the assessment of GaTe-5; all were negative for archaeological materials.

Subsurface testing indicates that GaTe-5 is irregular in shape and approximately 68 m north-south by 66 m east-west in size. GaTe-5 is therefore an extensive, but low-density, subsurface lithic scatter site. Two flake tools, two pieces of lithic debitage (chipping detritus), four cores, three modified cobbles/pebbles, and one possible mortar stone comprise the assemblage. The two flake tools and the modified cobbles demonstrate evidence for scraping activities onsite. The presence of flake tools, bipolar reduction, and the low quality of lithic raw material indicate people were selecting the best material they could find onsite (which is not high quality) and manufacturing tools for expedient use. This assemblage reflects one or more short-term occupations of the site, where resources, such as fish, terrestrial game, or plant materials, were processed.

This location was used in historical times as well, as part of the Anderson Ranch. Remains of an old wagon are apparent at this location.



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ARCHAEOLOGY ENVIRONMENTAL EFFECTS ASSESSMENT

ARCHAEOLOGICAL SITE GaTe-5

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KITIMAT, BRITISH COLUMBIA

PROJECTION	DRAWN BY
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25-SEP-14	**8.2-4**

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The site significance evaluation for site GaTe-5 is provided in Table 8.2-5 based on Archaeology Branch criteria (1998). Ethnic significance is tentatively rated as high; Haisla Nation is to provide input regarding the significance of this site.

Table 8.2-5: Site Significance Evaluation of Archaeological Site GaTe-5

Scientific	Public	Economic	Ethnic	Overall
Moderate	Moderate	Low	High	Moderate

These rankings are largely attributable to the following traits at GaTe-5:

- presence of chronologically sensitive cultural items, including materials for absolute dating
- tool type quantity and variety, including tools indicative of resource processing activities
- presence of cultural features such as hearths
- site uniqueness and representativeness, and
- site integrity.

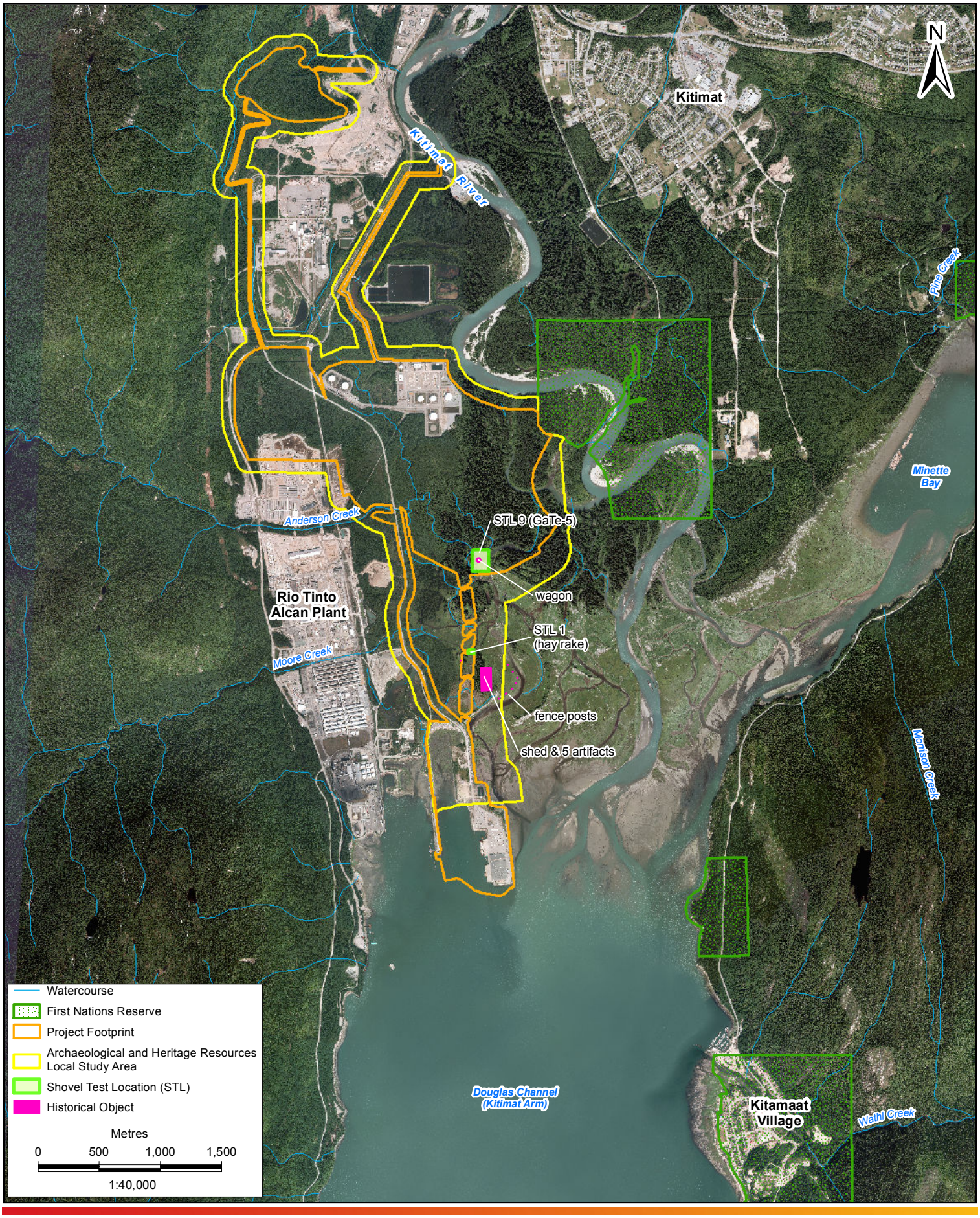
The rankings are also attributable to the absence of the following characteristics at GaTe-5:

- internal stratification and depth
- association with ancient landforms
- distinct intra-site activity areas
- diagnostic faunal and floral remains, and
- exotic cultural items and materials.

Historical Materials

Fieldwork for the AIA identified a probable wagon at STL 9, within archaeological site GaTe-5. Additionally, a hay rake was identified at STL 1 (Figure 8.2-5). These areas are believed to have been used as hay meadows during the occupation of the Anderson ranch. Both these areas are within the Project footprint and within the impact zone related to Project pre-construction and construction works. This location was revisited in 2014.

Additional historical materials were identified further south, east of the proposed LNG loading line, toward the front of the Kitimat River estuary, outside the Project impact zone (Figure 8.2-5). These include parts of a plough as well as other rusted metal fragments and old cut stumps. Representatives of the Kitimat Centennial Museum and the Kitimat Historical Society indicated that these items are part of a cluster of historical materials that they have already visited—five artifacts, including a metal wheel, a plough, a cultivator, some metal debris, and a mower rake, as well as a collapsed building with eight posts and some cedar fence posts.



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ARCHAEOLOGY ENVIRONMENTAL EFFECTS ASSESSMENT

HISTORICAL MATERIALS IDENTIFIED IN THE ARCHAEOLOGICAL AND HERITAGE RESOURCES LOCAL AND REGIONAL STUDY AREAS

LNG CANADA EXPORT TERMINAL
KITIMAT, BRITISH COLUMBIA

PROJECTION: UTM9	DRAWN BY: SHS
DATUM: NAD 83	CHECKED BY: SW
DATE: 22-AUG-14	FIGURE NO.: **8.2-5**

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8.2.4 Project Interactions

Table 4.4–1 (Section 4) identifies potential interactions of concern between Project activities and each of the selected VCs that are carried forward in the assessment. The potential effects identified in Section 8.2.2.4 that might result in an adverse effect as a result of interactions with Project activities are assessed. The extent to which the interactions are considered is ranked in Table 8.2-6.

A conservative approach is taken in assigning a Rank of 1, whereby interactions with a meaningful degree of uncertainty are assigned Rank 2 so that a detailed effects assessment is conducted.

Table 8.2-6: Potential Project Effects on Archaeological and Heritage Resources

Project Activities and Physical Works	Potential Effects		
	Damage to or removal of CMTs	Alteration or removal of terrestrial archaeological and heritage sites	Alteration or removal of intertidal archaeological or heritage sites
Facility Activities and Works			
Construction			
Site preparation (clearing, grubbing, grading, levelling, and set-up of temporary facilities)	2	2	0
Onshore construction (installation of LNG facility, utilities, ancillary support facilities, access roads, and includes hydrotesting)	0	2	0
Dredging (includes disposal)	0	0	1
Marine terminal construction (modifications to existing wharf, installation of sheet piling, material offloading and laydown areas, transfer piping and electrical installations)	0	0	1
Decommissioning			
Dismantling of land-based and marine infrastructure	0	1	1
Remediation and reclamation of the site	0	1	0

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 mitigation measures, or BMPs.

2 = Interaction may occur and the resulting effect may exceed negligible or acceptable levels without implementation of Project-specific mitigation. Further assessment is warranted.

NOTE: Only activities with an interaction of 1 or 2 for at least one effect are shown.

8.2.4.1 Justification of Interaction Rankings

Effects resulting from interactions that are ranked 1, while not assessed further in Sections 8.2.5.2 and 8.2.5.3, are considered in the cumulative effects assessment (Section 8.2.6) for the Project contribution to residual effects. Interactions that are ranked 2 (damage to or removal of CMTs and alteration or removal of terrestrial archaeological and heritage sites) are further assessed in Section 8.2.5.

Activities during construction that do not result in any new areas of ground disturbance or in a change in access have been ranked 0 because they will not interact with archaeological and heritage resources. These include waste management, vehicle and rail traffic, and start-up.

For the operation phase, potential interactions are ranked 0 because site disturbance would have already been mitigated at the construction stage; these interactions are not assessed further.

For the decommissioning stage, some interactions are ranked 1 because they might involve minor effects beyond those resulting from construction works but can be managed by adopting standard mitigation procedures outlined by the Archaeology Branch. In particular, the removal of building foundations and related buried infrastructure might require excavations that extend beyond those required for the construction and installation of these components.

Shipping-related wake effects on coastally located terrestrial sites and intertidal sites are ranked 0 because such effects are not anticipated. However, because Gitga'at First Nation, Gitxaala Nation, and Metlakatla First Nation have expressed concerns about the potential for such effects (see Section 13.2 and Section 16), they are discussed.

8.2.4.1.1 Alteration or Removal of Intertidal Archaeological or Heritage Sites

The AIA completed for the Project did not identify any intertidal archaeological or heritage sites, including the intertidal zone fronting the terminal footprint, which was systematically surveyed at low tide. However, in the unlikely event that construction activities, such as dredging or pile driving, uncover a site, there is the potential for these activities to disturb or destroy the site.

Archaeological and heritage sites located wholly or partially in the intertidal zone are typically visible on the surface (when the tide is out) and might include lithic scatters and petroforms such as canoe skids, fish traps, and clam gardens. These sites are non-renewable resources, are susceptible to alteration, and could be damaged or destroyed by many development-related activities. The value of these resources lies in the information that is derived from the inter-relationships between the individual artifacts and features, their spatial relationships, and their context. Removing or mixing sediments containing archaeological deposits, or displacing artifacts or features during construction or decommissioning of the Project could result in the permanent loss of information that is fundamental to understanding these resources.

Fieldwork and related background research for the AIA, including a review of historical air photos, indicates that the intertidal portion of the LSA has low potential to contain archaeological and heritage sites. Moreover, intertidal portions of the LSA have experienced substantial disturbance during previous industrial development and related fisheries habitat compensation efforts. Compensation habitat was constructed for the Eurocan pulp and paper mill expansion in 1989 and 1990. A dike consisting of quarry tailings was constructed along the southern boundary of the habitat compensation zone. Riprap was placed on top of the dike to create rocky habitat. The remainder of the habitat compensation zone was filled with sand and silt (Section 5.8).

It is possible, but highly unlikely, that unrecorded sites could be encountered. If new sites are identified in the intertidal component of the LSA during ground-altering activities, work affecting these sites will cease until Haisla Nation is consulted and the sites can be properly assessed by a professional archaeologist. If they are in conflict with Project works, the preferred mitigation measure will be to avoid these sites through Project redesign. Where site avoidance is not feasible or practical, effects on intertidal archaeological and heritage resources will be mitigated through SDR and or detailed documentation of exposed features, as appropriate, to standards defined by the Archaeology Branch.

An SDR program will be tailored to the Project and to the archaeological and heritage sites in question. For intertidal archaeological and heritage resources, SDR typically involves:

- adoption of wet-site procedures using high-pressure hoses and a wet-screening process, as appropriate
- mapping of the distribution of artifacts and features
- surface collection, cataloguing, and curation of artifacts
- other analyses, including radiocarbon dating, as required, and
- detailed recording of intertidal features.

SDR work must be conducted under the authority of a heritage investigation permit issued by the Archaeology Branch.

In the unlikely event that intertidal archaeological or heritage resources are identified in conflict with Project construction activities, residual effects will be low to high in magnitude (depending on the type of site), and site-specific in extent (Section 8.2.6). Although Project effects on intertidal archaeological or heritage sites will occur only once, effects will be permanent and irreversible. Because there have been substantial previous disturbances to the intertidal portions of the Project footprint these effects could occur in a disturbed or an undisturbed archaeological context, depending on location. The probability of significant adverse residual effects associated with unrecorded resources is extremely low. However, in the unlikely event that intertidal archaeological or heritage sites are identified during construction and

decommissioning, effects will be mitigated through avoidance, SDR, and detailed documentation. Therefore, residual effects of the Project on intertidal archaeological and heritage resources are assessed as not significant (Section 8.2.6).

8.2.4.1.2 Potential Wake Effects on Archaeological or Heritage Sites

Detailed summaries of data pertinent to potential wake effects are presented in Sections 5.8 and 7.4. Results from publicly available wake effects studies indicate that wake generated by Project shipping traffic will be less severe than wakes created naturally by weather.

Coastal archaeological and heritage sites have already been eroded by natural tidal action and storm surges; intertidal sites are constantly interacting with rising and lowering tides and related wave action. Project shipping traffic will not introduce any new wave effects on such sites. As a result, no interaction between Project activities, namely wake from carriers, and resources along the shoreline are anticipated and, therefore, this interaction is ranked as 0.

Additionally, LNG Canada is conducting a Project-specific wake study that incorporates feedback from potentially affected Aboriginal Groups where available. Based on a review of previous models, it is anticipated that this additional study will produce results that are consistent with those already reported for other projects.

8.2.5 Assessment of Residual Effects from the LNG Facility

Potential effects on archaeological and heritage resources resulting from construction and decommissioning of the Project are:

- damage to or removal of CMTs, and
- alteration or removal of terrestrial archaeological or heritage sites.

8.2.5.1 Analytical Methods

8.2.5.1.1 Analytical Assessment Techniques

Methods to assess effects on each archaeological or heritage site are largely the same. In general terms, specific activities and their exact spatial extents (horizontally and vertically), are compared with the extent of the particular archaeological or heritage resource. Mitigation measures are based on legislative requirements, and the effect on the resource, with reference to its heritage value.

8.2.5.1.2 Assumptions and the Conservative Approach

Two archaeological sites and a variety of historical materials have been identified by the AIA. The AIA field program is complete; however, even the most thorough study might fail to identify all archaeological materials that could be present, and subsurface conditions observed during development might differ from those on which the assessment is based. The full extent and nature of all heritage sites and their interactions with the Project are not presently known; these interactions will be assessed as part of the heritage review process. Potential effects on identified sites resulting from the Project will be mitigated according to an Archaeological and Heritage Resources Management Plan and applicable heritage legislation. Additonally, a Chance Find Protocol (CFP) will be provided to construction foremen so that they will know what to do and who to contact in the unlikely event that unrecorded archaeological or heritage sites are encountered during construction, in the absence of an onsite archaeologist (Mitigation 8.2-3)

Key assumptions in the effects assessment are:

- All sites identified in the LSA will be avoided or mitigated following HCA requirements and procedures.
- Even the most thorough study might fail to identify all archaeological and heritage sites that could be present.

8.2.5.2 Assessment of Damage to or Removal of CMTs

8.2.5.2.1 Description of Project Effect Mechanisms for Damage to or Removal of CMTs

During site preparation activities (e.g., clearing and grubbing, site grading), there is potential for damage to or removal of CMTs. Although no CMT sites have been identified in the LSA, they are fairly common in the Kitimat region.

The RTA facility site, which overlaps with the west-central part of the LSA, has been operating since the 1950s. The nearby former Methanex/Cenovus Terminal, located in the northern portion of the LSA, has been operating since the early 1980s. The presence of these two industrial facilities has likely restricted access to parts of the LSA; they represent impediments to the use of this area by First Nations peoples for their traditional harvesting of forest resources. Related vegetation clearing, and historical logging practices, also reduce the potential for CMTs to be present in the LSA. However, although AIA work is complete, it is possible that isolated CMTs might still be discovered.

8.2.5.2.2 Mitigation for Damage to or Removal of CMTs

Wherever possible, if found, Culturally Modified Trees (CMTs) will be avoided. In situations where CMTs cannot be avoided, mitigation measures will focus on recording them completely and systematically (Mitigation 8.2-1) as per the following:

- if CMT stem round samples are to be collected, monitoring of CMT removal by a crew comprised of a professional archaeologist and a Haisla Nation representative so that the stem-round samples are properly collected for CMT dating purposes (Mitigation 8.2-2), and
- a CFP will be provided to construction foremen so that they will know what to do and who to contact in the unlikely event that CMTs and/or other unrecorded archaeological or heritage sites are encountered during construction, in the absence of an onsite archaeologist (Mitigation 8.2-3).

CMTs that pre-date 1846 cannot be removed, except under the authority of an Alteration Permit issued pursuant to section 12 of the HCA by the OGC.

8.2.5.2.3 Characterization of Damage to or Removal of CMTs

In the unlikely event that a CMT conflicts with clearing and construction activities, residual effects will be negligible to low in magnitude and site-specific in extent (Table 8.2-7). Effects on CMTs will occur only once, but effects will be permanent and irreversible. Given that there has been substantial ground disturbance, and many of the forested portions of the LSA have been logged, it is likely that effects of the Project will occur in a disturbed context.

8.2.5.2.4 Determination of Significance for Damage to or Removal of CMTs

Because the potential for development to conflict with unidentified CMTs is low, the probability of significant adverse residual effects associated with CMTs is also low. With the implementation of proposed mitigation measures, information regarding traditional CMT harvesting and use will not be lost. Therefore, residual effects on CMTs are assessed as not significant (Table 8.2-7).

8.2.5.3 Alteration or Removal of Terrestrial Archaeological or Heritage Sites

8.2.5.3.1 Description of Project Effect Mechanisms for the Alteration or Removal of Terrestrial Archaeological or Heritage Sites

Terrestrial archaeological and heritage sites include resources located wholly or partially above the high tide line, excluding CMTs (which are discussed above). Sites might be evident on the ground surface or completely buried. Two terrestrial archaeological sites, GaTe-4 and GaTe-5, were recorded in the LSA (Figure 8.2-2, Figure 8.2-3, and Figure 8.2-4). Historic artifacts and structural remains related to the Anderson Ranch were also identified during the AIA and through discussions with the Kitimat Museum and the Kitimat Historical Society (Figure 8.2-5).

Project construction activities with the potential to affect terrestrial archaeological or heritage sites include clearing and grubbing, site grading, including deposition of imported fills, and onshore construction, including the installation of LNG facilities, utilities, support facilities and access roads (see Table 8.2-6 for a complete list). Additionally, the removal of site infrastructure during decommissioning may affect terrestrial archaeological or heritage sites because they involve disturbance or displacement of soils and sediments that may contain archaeological materials.

8.2.5.3.2 Mitigation for the Alteration or Removal of Terrestrial Archaeological or Heritage Sites

For identified terrestrial archaeological and heritage sites in conflict with Project activities and physical works, the preferred mitigation measure is avoidance of these sites through Project redesign. While Archaeological sites GaTe-4 and GaTe-5, which were recorded in the LSA, will be managed in consultation with the Archaeology Branch and Haisla Nation and in accordance with the Heritage Investigation Permit issued by the Archaeology Branch (Mitigation 8.2-4).

Where SDR is carried out, a detailed final report will be completed to ensure collected data and results of all analytical processes are available to other archaeologists and the Haisla Nation. A copy of the report will also be submitted to the Archaeology Branch. Archaeological monitoring will be reported in the same manner.

Historic artifacts related to the historical use of portions of the LSA for ranching are not protected by the HCA but may be of interest to local stakeholders. As a result, management of historic materials identified during AIA fieldwork will be done in consultation with the Kitimat Centennial Museum, the Kitimat Historical Society and other key stakeholders as required (Mitigation 8.2-5).In addition to the above, a Project-specific Archaeological and Heritage Resources Management Plan, including a Chance Find Protocol, will be developed and implemented prior to construction (Mitigation 8.2-6). The CFP will be provided to construction foremen in the unlikely event that CMTs and/or other unrecorded archaeological or heritage sites are encountered during construction, in the absence of an onsite archaeologist (Mitigation 8.2-3).

Any necessary archaeological monitoring of project activities will be carried out under the appropriate regulatory permit (Mitigation 8.2-7).

8.2.5.3.3 Characterization of Alteration or Removal of Terrestrial Archaeological or Heritage Sites

Project residual effects on terrestrial archaeological and heritage resources will be low to high in magnitude (depending on the type of site), and site-specific in extent (Table 8.2-7). While the Project effects on terrestrial archaeological and heritage resources will occur only once, the effects will be permanent and irreversible. As much of the LSA has been substantially disturbed, effects could occur in a disturbed or an undisturbed archaeological context.

8.2.5.3.4 Determination of Significance for Alteration or Removal of Terrestrial Archaeological or Heritage Sites

A Project-specific AIA identified two terrestrial archaeological sites and a number of historic artifacts. The potential for development to conflict with one of these sites, GaTe-5, is high. Project effects cannot be mitigated through avoidance, because the site is located in an area that will be covered in approximately 4 m of fill during construction. Project effects will be mitigated through SDR and/or archaeological monitoring of construction activities, to standards defined by the Archaeology Branch. Some of the identified historic artifacts are in conflict with the development; these will be revisited with members of the Kitimat Historical Society and the Kitimat Centennial museum and those artifacts deemed significant may be collected and curated at the museum. Therefore, residual effects on terrestrial archaeological and heritage resources are assessed as not significant (Table 8.2-7).

8.2.6 Summary of Project Residual Effects

Following implementation of mitigation measures, there are no anticipated residual effects from the Project on archaeological or heritage resources. Results of the Project-specific AIA presently indicate that there are two terrestrial archaeological or heritage sites in the LSA, but no CMTs or intertidal sites. The potential for development to conflict with unidentified CMTs and other archaeological or heritage sites in the LSA is low. The potential for residual effects, in the unlikely event that unrecorded sites are identified in the LSA during ground altering activities, is summarized in Table 8.2-7.

Mitigation techniques will be applied during the construction phase to manage residual effects on archaeological and heritage resources. With mitigation (i.e., completion of SDR studies and/or archaeological monitoring where unexpected residual effects cannot be avoided), none of the information regarding archaeological and heritage resources, including CMTs, in the LSA will be lost. Therefore, residual effects on archaeological and heritage resources are not significant.

Table 8.2-7: Summary of Project Residual Effects: Archaeological and Heritage Resources

Project Phase	Mitigation Measures	Residual Effects Rating Criteria						Likelihood of Residual Effects	Significance	Prediction Confidence	Follow-up and Monitoring
		Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Context				
Facility Works and Activities											
Effect #1: Damage to or removal of CMTs											
Construction	Mitigation 8.2-1 Mitigation 8.2-2 Mitigation 8.2-3	N/L	S	P	S	I	D	L	N	H	No follow-up programs are proposed for archaeological and heritage resources.
Operation		No effects anticipated									
Decommissioning		No effects anticipated									
Residual effects for all phases		N/L	S	P	S	I	D	L	N	H	
Effect #2: Alteration or removal of terrestrial archaeological or heritage sites											
Construction	Mitigation 8.2-4 Mitigation 8.2-5 Mitigation 8.2-6 Mitigation 8.2-3	M/H	S	P	S	I	U/D	H	N	M	No follow-up programs are proposed for archaeological and heritage resources.
Operation		No effects anticipated									
Decommissioning		L/M	S	P	S	I	D	L	N	M	
Residual effects for all phases		L/H	S	P	S	I	U/D	L/H	N	M	
Effect #3: Alteration or removal of intertidal archaeological or heritage sites											
Construction	Mitigation 8.2-1 Mitigation 8.2-3	L/H	S	P	S	I	D	L	N	H	No follow-up programs are proposed for archaeological and heritage resources.
Operation		No effects anticipated									
Decommissioning		L/H	S	P	S	I	D	L	N	H	
Residual effects for all phases		L/H	S	P	S	I	D	L	N	H	

KEY

MAGNITUDE:

N = Negligible—no measurable change

L = Low—a measurable change but is limited to small portions of archaeological or heritage sites of low significance or to portions of archaeological or heritage sites already substantially disturbed by previous developments

M = Moderate—a measurable change to 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—a measurable change to substantial, intact portions of one or more sites of moderate or high significance[1]

GEOGRAPHIC EXTENT:

S = Site-specific—potential measurable changes to archaeological and heritage resources are restricted to that portion of the site situated within the LSA

LSA—potential measurable changes to archaeological and heritage resources are limited to the LSA

DURATION:

ST = Short-term—not applicable

MT = Medium-term—not applicable

LT = Long-term—not applicable

P = Permanent—effect is permanent

FREQUENCY:

S = Single event—occurs once

MI = Multiple irregular event (no set schedule)—occurs sporadically at irregular intervals throughout construction, operation or decommissioning phases

MR = Multiple regular event—occurs on a regular basis and at regular intervals throughout construction, operation, or decommissioning phases

C = Continuous—occurs continuously throughout the life of the Project

REVERSIBILITY:

R = Reversible—not applicable

I = Irreversible—all effects on archaeological and heritage resources are irreversible

CONTEXT:

U = Undisturbed—area relatively or not affected by human activity or natural disturbance factors

D = Disturbed—area has been previously disturbed by human development or natural disturbance factors

L = Low resilience—fragile archaeological or heritage site, such as CMTs or preserved organic materials such as those commonly found in wet sites

M = Moderate resilience—archaeological and heritage resources that preserve moderately well in broader range of contexts, such as shell middens

H = High resilience—resilient archaeological and heritage resources that may be preserved in a diversity of contexts, such as lithic scatter (stone tools and related detritus) sites

LIKELIHOOD OF RESIDUAL EFFECT OCCURRING:

Based on professional judgment

L = Low likelihood that there will be a residual effect on archaeological and heritage sites

M = Moderate likelihood that there will be a residual effect on archaeological and heritage sites

H = High likelihood that there will be a residual effect on archaeological and heritage sites

SIGNIFICANCE:

S = Significant

N = Not Significant

PREDICTION CONFIDENCE:

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

8.2.7 Assessment of Cumulative Effects

Cumulative effects are considered for each Project residual effect. Three stages are involved: (1) establishing context by providing an overview of the cumulative effects of other projects and activities on the VC; (2) determining the potential for Project residual effects to interact with the effects of other projects and activities; and if the Project does interact cumulatively with other actions, and (3) if the Project does interact cumulatively with other projects and activities, assessing the significance of the resulting overall cumulative effect, and characterizing the Project's contribution to the change in cumulative effects.

8.2.7.1 Summary of Cumulative Effects

Other projects in the LSA may have already altered or removed CMTs, terrestrial archaeological and heritage sites, or intertidal archaeological and heritage sites. These projects include the RTA facility and the related modernization project, the former Methanex/Cenovus Terminal, and the Kitimat LNG project, for which site preparation works have commenced.

The effects of the Project on archaeological and heritage resources will be mitigated by collecting archaeological and historical data to provincial standards as overseen by the Archaeology Branch. Consequently, there will be no significant loss of archaeological or heritage resources and therefore no residual effects. Although other projects may have affected these resources in the past, the lack of Project residual effects means there is no potential for the Project to contribute to cumulative effects.

8.2.8 Prediction Confidence and Risk

Prediction confidence related to Project effects on archaeological and heritage resources is generally high.

Fieldwork for the AIA failed to identify any CMTs in the LSA. This work confirmed that much of the footprint area has been logged, or otherwise cleared of vegetation for the construction of the RTA facility and the former Methanex/Cenovus Terminal. Moreover, the presence of these industrial facilities, and the impediments to access to the LSA that they present, likely preclude the recent (i.e., the past 30 to 40 years) use of this area by Aboriginal Groups for their traditional harvesting of forest resources. However, it is possible that isolated CMTs could still be discovered. Therefore, the prediction confidence related to the absence of CMTs in the LSA is moderate to high.

Fieldwork for the AIA also did not identify new intertidal archaeological and heritage sites, but did confirm that the intertidal portions of the LSA have experienced substantial disturbance by previous industrial development and related fisheries habitat compensation efforts. Therefore, confidence in the prediction related to the absence of intertidal archaeological and heritage sites in the LSA is high.

Two terrestrial archaeological and heritage sites have been discovered in the LSA. Confidence related to the status of areas subject to subsurface testing is high; all were tested to Archaeology Branch standards. Therefore, confidence in the prediction related to terrestrial archaeological and heritage sites in the LSA is high.

Even the most thorough AIA can fail to identify all archaeological and heritage resources in a LSA. If unanticipated archaeological or heritage resources are identified after the completion of AIA fieldwork, all work nearby will cease so that the discovery can be assessed and the results of this assessment shared with the Project team, Haisla Nation, and the Archaeology Branch.

Confidence in site-specific mitigation measures proposed for identified archaeological and heritage sites that cannot be avoided by Project redesign is high. Mitigation by SDR will be conducted to standards defined by the Archaeology Branch and will be tailored to each site through discussions with the Archaeology Branch and Haisla Nation.

Prediction confidence for the cumulative effects assessment is high. Although additional terrestrial archaeological and heritage sites might yet be identified, effects on these sites can be effectively mitigated through additional archaeological studies conducted to provincial standards. Therefore, residual effects of the Project on archaeological and heritage resources will be not significant. The lack of residual effects associated with the Project means there is no potential for the Project to contribute to cumulative effects.

8.2.9 Follow-up Program and Compliance Monitoring

No follow-up programs are proposed for archaeological and heritage resources.

Archaeological site GaTe-4 is located approximately 50 m east of the current Eurocan Haul Road (Figure 8.2-2 and Figure 8.2-3). Although Project works include widening this road to within 3 m of the site, impacts to this site should be avoidable as long as care is taken to avoid the site during construction. It is recommended that flagging be placed around GaTe-4 prior to development to indicate the site boundaries. In the event the road is widened further into the site area, a permitted SDR study is recommended.

GaTe-5 is located within the Project terminal footprint and will be significantly impacted by the placement of approximately 4 m of fill (Figure 8.2-2 and Figure 8.2-4). The placement of fill will result in compaction of archaeological deposits present there and will render the site inaccessible to archaeologists and members of Haisla Nation. It is anticipated that these effects cannot be avoided through Project redesign. If this is confirmed, then it is recommended that effects be mitigated through an SDR study. A Heritage Investigation Permit issued by the Archaeology Branch pursuant to Section 14 of the HCA will be required for an SDR study; no such permit has yet been issued for the Project.

Subsequent Project construction at GaTe-5 and other terrestrial archaeological and heritage sites, if present, will proceed under the authority of Alteration Permits obtained from the OGC. Archaeological surveillance and monitoring of Project construction works are common requirements of these permits, depending on the results of the site assessments and related SDR studies, and the nature of effects on the sites in question. Archaeological surveillance and monitoring may be conducted so that:

- land-altering development activities are not conducted in areas for which avoidance is the chosen management strategy
- appropriate archaeological samples can be retrieved as construction occurs
- work can be paused if significant, unanticipated archaeological materials or features are unearthed, and
- all other aspects of the mitigation plan as specified by the Archaeology Branch are instituted (e.g., use of specific types or grades of fill).

Because no CMTs or intertidal archaeological or heritage resources have been discovered in the LSA, no follow-up program is warranted. Nonetheless, a CFP will be adopted to increase the chances that, however unlikely, any new CMTs, intertidal sites, or terrestrial sites found during operations will be properly recorded and mitigated.

8.2.10 Summary of Mitigation Measures

The following commitments are made regarding archaeological and heritage resources:

- Wherever possible, if found, Culturally Modified Trees (CMTs) will be avoided. In situations where CMTs cannot be avoided, mitigation measures will focus on recording them completely and systematically (Mitigation 8.2-1) as per the following:
  - if CMT stem round samples are to be collected, monitoring of CMT removal by a crew comprised of a professional archaeologist and a Haisla Nation representative so that the stem-round samples are properly collected for CMT dating purposes (Mitigation 8.2-2), and
  - a Chance Find Protocol (CFP) will be provided to construction foremen in the unlikely event that CMTs and/or other unrecorded archaeological or heritage sites are encountered during construction, in the absence of an onsite archaeologist (Mitigation 8.2-3).
- Archaeological sites GaTe-4 and GaTe-5, which were recorded in the LSA, will be managed in consultation with the Archaeology Branch and Haisla Nation and in accordance with a Heritage Investigation Permit that will be applied for to the Archaeology Branch (Mitigation 8.2-4)

- Management of historic materials identified during AIA fieldwork will be done in consultation with the Kitimat Centennial Museum, the Kitimat Historical Society and other key stakeholders as required (Mitigation 8.2-5).
- A Project-specific Archaeological and Heritage Resources Management Plan, including a Chance Find Protocol, will be developed and implemented prior to construction (Mitigation 8.2-6).

Any necessary archaeological monitoring of project activities will be carried out under the appropriate regulatory permit.

8.2.11 Conclusion

The Project has the potential to impact terrestrial and intertidal archaeological and heritage resources and CMTs. An AIA has been completed for the Project. No CMTs or intertidal archaeological and heritage sites were identified; however, two terrestrial sites were identified.

All unavoidable effects of the Project on archaeological and heritage resources will be mitigated to provincial standards as defined and overseen by the Archaeology Branch. For terrestrial archaeological sites, effects will be mitigated before construction through an SDR program, as appropriate, so that archaeological data regarding these sites are secured. Any necessary archaeological monitoring of construction works at these sites will confirm that the mitigation plan is carried out as appropriate; make it possible to retrieve any archaeological samples during construction; and confirm that construction work ceases if significant, unanticipated archaeological materials or features are unearthed so that the mitigation plan can be amended. Residual effects on archaeological and heritage resources are assessed to be not significant.

No CMTs have been identified in the LSA, and the potential for the Project to conflict with CMTs is low. The probability of significant adverse residual effects associated with unrecorded resources is extremely low. In the unlikely event that CMTs are identified in the LSA, mitigation implemented at these sites will preserve as much information as possible regarding traditional Aboriginal forest use. Therefore, residual effects on CMTs are determined to be not significant.

No intertidal archaeological or heritage sites have been identified in the LSA, and the potential for the Project to conflict with unidentified intertidal archaeological sites is low. The probability of significant adverse residual effects associated with unrecorded resources is low. However, in the unlikely event that such intertidal sites are identified during construction and decommissioning, effects will be mitigated through avoidance or SDR. Residual effects on intertidal archaeological and heritage resources are assessed as not significant.

The Project AIA identified two terrestrial archaeological sites, GaTe-4 and GaTe-5, as well as a small number of historical artifacts. GaTe-4 is located outside any impact zone related to the Project and can be avoided. If the nearby Eurocan Haul Road is widened to extend within the site boundaries, mitigation through SDR is recommended. The potential for development to conflict with site GaTe-5 is high, and site avoidance is not practicable. Mitigation of Project effects will be achieved through SDR and or subsequent archaeological monitoring of construction activities to standards defined by the Archaeology Branch. Identified historical artifacts will be revisited, and a selection might be collected subsequently for curation at the Kitimat Centennial Museum. Residual effects on terrestrial archaeological and heritage resources are assessed as not significant.

The Project's potential to contribute to cumulative effects is limited to cumulative interactions with other projects located in the archaeological and heritage resources LSA, including the existing RTA Facility and Modernization Project, the former Methanex/Cenovus Terminal, and the proposed Coastal GasLink Pipeline, Douglas Channel LNG, and Kitimat LNG projects. There are no data available to indicate what archaeological and heritage resources were present in the RTA and Methanex/Cenovus Terminal areas before construction of these facilities. The small portion of the Coastal GasLink Pipeline ROW that overlaps with the LSA was assessed as part of the LNG Canada AIA with negative results (Varsakis et al. 2014). Archaeology impact assessments conducted for the small portions of the Douglas Channel LNG and the Kitimat LNG projects that overlap the LSA also did not identify archaeological or heritage sites (Burk 2013, 2014; Wharram 2013). Because the Project will not result in residual effects, there is no potential for it to interact with these other projects; therefore, the Project's contribution to cumulative effects is not significant.

8.3 Summary of Assessment for Potential Heritage Effects

8.3.1 Summary of Project Residual Heritage Effects

Following implementation of the mitigation measures, there are no anticipated residual effects from the Project on archaeological or heritage resources. Results of the Project-specific AIA indicate that there are two terrestrial archaeological or heritage sites in the LSA, but no CMTs or intertidal sites. The potential for development to conflict with unidentified CMTs and other archaeological or heritage sites in the LSA is low. Table 8.3-1 summarizes Project residual effects on archaeological and heritage resources.

Table 8.3-1: Summary of Project Residual Effects on Archaeological and Heritage Resources

Valued Component [1]	Potential Effects	Key Mitigation Measures[2]	Significance Analysis of Residual Effects
Facility Activities and Works			
Archaeological and Heritage Resources (C)	Damage to or removal of culturally modified trees (CMTs)	▪ Wherever possible, if found, Culturally Modified Trees (CMTs) will be avoided. In situations where CMTs cannot be avoided, mitigation measures will focus on recording them completely and systematically (Mitigation 8.2-1). ▪ If CMT stem round samples are to be collected, monitoring of CMT removal by a crew comprised of a professional archaeologist and a Haisla Nation representative so that the stem-round samples are properly collected for CMT dating purposes (Mitigation 8.2-2). ▪ A Chance Find Protocol (CFP) will be provided to construction foremen in the unlikely event that CMTs and/or other unrecorded archaeological or heritage sites are encountered during construction, in the absence of an onsite archaeologist (Mitigation 8.2-3).	Not significant. No CMTs have been recorded in the LSA. Because the potential for Project development to conflict with unidentified CMTs is low, the probability of significant adverse residual effects on CMTs is also low. With implementation of the mitigation measures, information regarding traditional CMT harvesting and use will not be lost. Therefore, residual effects on CMTs are assessed as not significant.
Archaeological and Heritage Resources (C)	Alteration or removal of terrestrial archaeological or heritage sites	▪ Archaeological sites GaTe-4 and GaTe-5, which were recorded in the LSA, will be managed in consultation with the Archaeology Branch and Haisla Nation and in accordance with the Heritage Investigation Permit issued by the Archaeology Branch (Mitigation 8.2-4) ▪ Management of historic materials identified during AIA fieldwork will be done in consultation with the Kitimat Centennial Museum, the Kitimat Historical Society and other key stakeholders as required (Mitigation 8.2-5). ▪ A Project-specific Archaeological and Heritage Resources Management Plan, including a Chance Find Protocol, will be developed and implemented prior to construction (Mitigation 8.2-6).	Not significant. An AIA for the Project identified two terrestrial archaeological sites. The potential for development to conflict with one of these sites, GaTe-5, is high. Project effects cannot be mitigated through avoidance. Additionally, a number of historical artifacts were identified; some of these may be collected and curated. Project effects on site GaTe-5 will be mitigated through SDR and or archaeological monitoring of construction activities, to standards defined by the Archaeology Branch. Historical artifacts that cannot be avoided may be collected and curated at the Kitimat Centennial Museum. Therefore, residual effects on terrestrial archaeological and heritage resources are assessed as not significant.

NOTES:

[1] Construction Phase = C; Decommissioning = D

[2] See Section 20 (Summary of Mitigation Measures) for a full list of mitigation measures.

8.3.2 Summary of Cumulative Heritage Effects

Other projects in the LSA may have already altered or removed CMTs, terrestrial archaeological and heritage sites, or intertidal archaeological and heritage sites. These projects include the RTA facility and the related modernization project, the former Methanex/Cenovus Terminal, and the Kitimat LNG project, for which site preparation works have commenced.

The effects of the Project on archaeological and heritage resources will be mitigated by collecting archaeological and historical data to provincial standards as overseen by the Archaeology Branch. Consequently, there will be no significant loss of archaeological or heritage resources and therefore no residual effects. Although other projects may have affected these resources in the past, the lack of Project residual effects means there is no potential for the Project to contribute to cumulative effects.